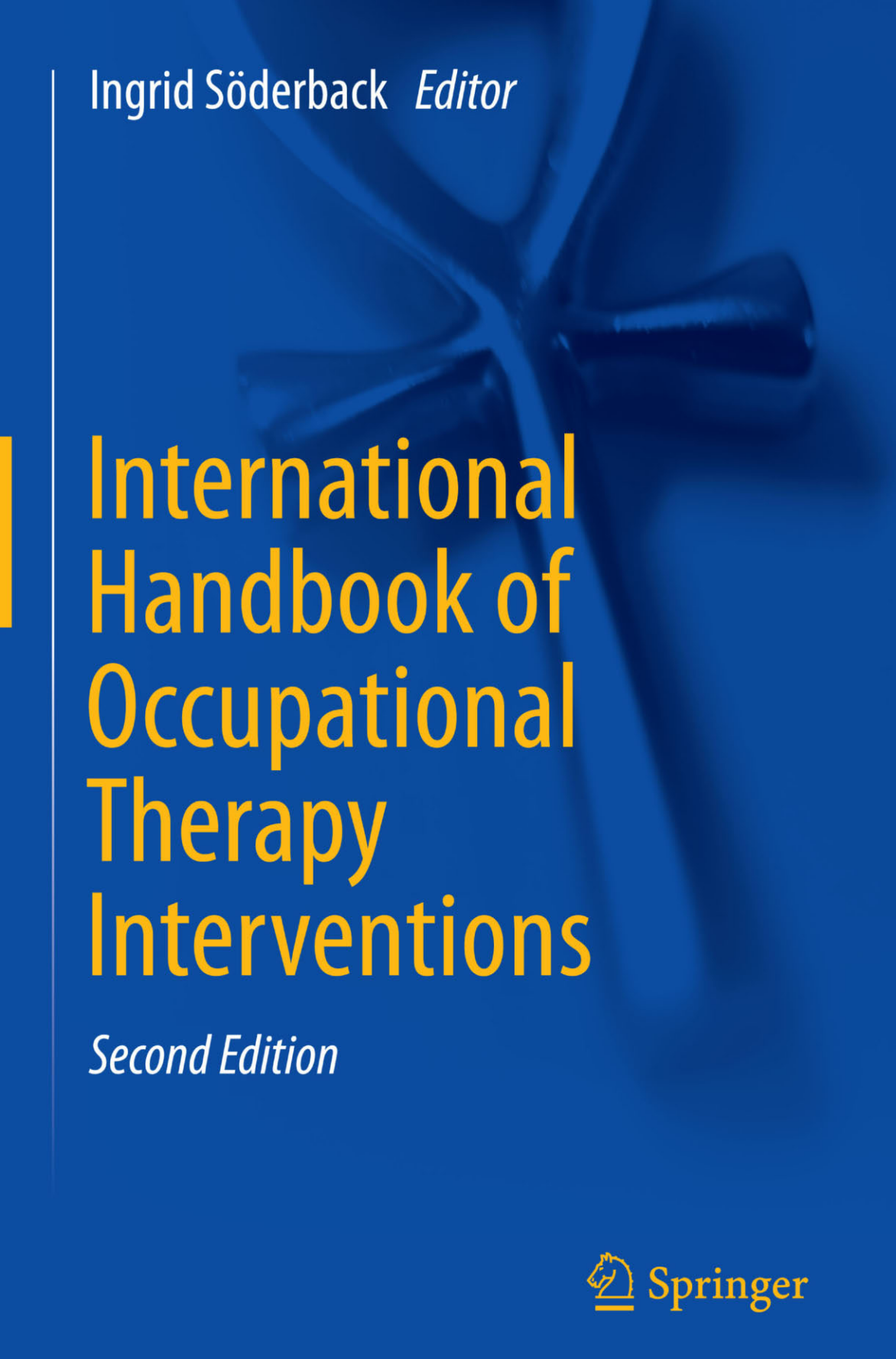
Ingrid Söderback Editor
International Handbook of Occupational Therapy Interventions
Second Edition
Springer

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Foreword

It is my pleasure to contribute to the second edition of the *International Handbook of Occupational Therapy Interventions*. This book is unique in that it emphasizes the clinical aspects of occupational therapy from the perspectives of practitioners and students.

Now it is a momentous time to be an occupational therapist. Occupational therapy is one of the fastest growing health professions in the world. Areas of the world such as Africa, Eastern Europe and the Middle East where occupational therapy did not exist 30 years ago are developing occupational therapy practices. In the industrialized world occupational therapy is expanding its scope of practice to neonatal units, Alzheimer's treatment facilities, school systems integrating children with autism and other developmental disabilities into mainstream curriculums, primary prevention programs such as preventing falls in the aging and high technology rehabilitation programs for individuals with severe disabilities. What are the pressing issues in healthcare that are changing the scope of occupational therapy? These include:

- Cost containment, i.e., utilizing the health resources of a country to its maximum
- Population demography changes, i.e., treating increasing older individuals with chronic disabilities
- Increased home health services, i.e., providing services as people age in their own homes
- Specialized vs. generalist roles, i.e., utilizing specialist functions to treat patients holistically such as in hand therapy
- High technology, i.e., using computer technology for communication, prosthetics, low vision programs and cognitive training
- Incorporating meaningful and purposeful occupation in health promotion
- Social class gap, i.e., providing occupational therapy to the most impoverished
- Complementary/alternative medicine, e.g., incorporating tai chi, stress management, and yoga into occupational therapy practice
- Evidence-based practice, i.e., incorporating research into clinical practice

All of these issues are impacting healthcare and are relevant to the practice of occupational therapy as described in these chapters. This book reflects the advances that occupational therapy is undergoing with the incorporation of evidence-based prac-

tice (EBP). For example, research studies in many parts of the world are utilizing EBP in justifying occupational therapy interventions. How are the latest findings of clinical research incorporated into practice as reflected in this book? We recognize that randomized controlled trials (RCTs) are considered the gold standard in research. The components of an RCT are the operational definition of the intervention or treatment, outcome measures that are standardized, identification of a randomly selected target population, and a research design that has a control group that can be replicated. All of these components increase the validity of the results and the generalizability to a clinical population. The most important aspect of a clinical research study is that the results generate further research and improve practice. The transferability of the results to clinical practice depends upon the quality of the research design and the operational definition of the patient population. Best practice in occupational therapy reflects the ongoing improvement of clinical practice as exemplified in this text.

In addition to incorporating EBP in the text, the authors have used Socratic Case Studies to describe how patient assessment and intervention are dynamically related. It is a method that enables the reader to interact with the authors in arriving at creative solutions through clinical reasoning and problem solving. New chapters have been added regarding the application of, for examples telemedicine to occupational therapy and palliative hospice care.

Franklin Stein PhD, OTR, FAOTA,
Professor Emeritus,
Founding Editor,
Occupational Therapy International

Preface

To be occupied is a fundamental right of every person, regardless of having a disability or living in an obstructive environment. Occupational therapists encourage and contribute to individuals' potential to perform activities and carry out occupations at home, at school, at work, and in the community. The main expected outcomes of applying occupational therapy interventions (OTIs) are clients' optimal adaptations, learning/re-learning, recovery, health, and wellness.

International Handbook of Occupational Therapy Interventions, Second Edition comprehensively discusses:

- The research methodology and extensive literature reviews that constitute the basis of the first and second editions
- The scientific evidence with the aim of validating the suggested taxonomy of OTIs; the "Occupational Therapy Intervention Framework" (OTIF)
- Theoretical core knowledge that is necessary for understanding clinical praxis
- Specific evidence-based OTIs presented in 52 chapters
- Interactive clinical case studies reflecting particular OTIs

The purpose of the handbook is to outline occupational therapists' professional skills and activities, i.e., to provide a description of evidence-based OTIs used in clinical praxis worldwide. The main professional roles of occupational therapists are to:

- Manage and facilitate clients' adaptations
- Guide/teach clients' learning or re-learning
- Enable and maximize clients' recovery
- Prevent clients' occupational ill health and promote health and wellness

The handbook is an encyclopedic practical reference for:

- Students of occupational therapy who are developing their knowledge and skills
- Practicing occupational therapists who want to update and fine-tune their knowledge and skills
- Members of rehabilitation and health care teams, stakeholders, and others who want information about the praxis of occupational therapy and the role of occupational therapists.

International Handbook of Occupational Therapy Interventions, Second Edition is one of many generative discourses aimed at providing education in occupational therapy and information about OTIs. Thus, it is a source for the further research and development of the occupational therapy field and practice.

Ingrid Söderback
Nacka, Sweden

Acknowledgments

I want to express my sincere gratitude to the 116 authors who contributed to *International Handbook of Occupational Therapy Interventions*, Second Edition. Without your extensive efforts, this book would not have become a reality. Your expert knowledge has enriched our professional knowledge by demonstrating how occupational therapy interventions are international applied.

Special thanks to my colleague Kathryn Magill for your contribution, advice, and language criticism.

I am grateful to the clients whose cases are discussed in the interactive case studies.

My deepest gratitude is due to my family and friends who encouraged me to embrace this edition and for your tireless support during this process.

I also want to express my appreciation to Springer Science+Business Media Editor Janice Stern, for giving me the confidence to carry out the work.

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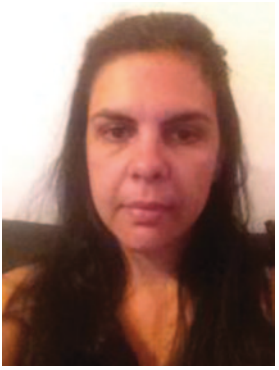

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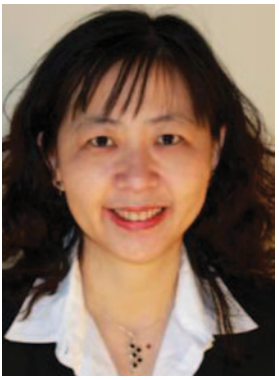

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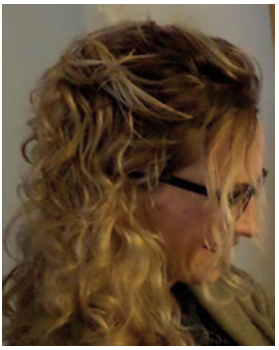

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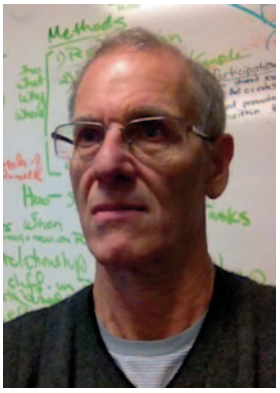

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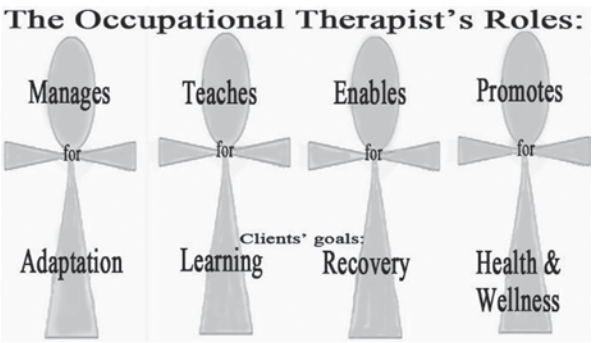
Part I
Occupational Therapy: Basic Information



Chapter 1
International Perspective on Occupational Therapy: The Past—The Present—The Future

Ingrid Söderback

> *Most of the estimated one billion people with disabilities around the world* ***lack*** *access to appropriate medical care and rehabilitation services, especially those living in low- and middle-income countries. As a consequence, people with disabilities experience greater challenges in attaining and maintaining maximum independence and health. Lack of services creates a barrier to full inclusion and participation in all aspects of life.*
> World Health Organization, Medical Care and Rehabilitation (2014).

Abstract This chapter contains a very broad overview of occupational therapy, the past professional development, the present status of occupational therapy presented in an international perspective, and some reflections for the future.

Keywords Development · Historical perspective · Occupational therapy worldwide

Introduction

The content of the citation above raised the question: "To which extent do (OTs) contribute these disabled people's decedent life including abilities to perform wanted and expected daily activates"?

Occupational Therapy

Peoples' ability to *perform occupations* and activities of daily living (ADL) at home, school, work, can be impacted by injury, illness, impairment or disability, or by environmental or cultural barriers. In these cases, *occupational therapists'* (*OTs*)

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role is to conduct interventions that (a) facilitate and/or improve the way people carry out activities and occupations, (b) prevent peoples' occupational ill-health, and (c) promote peoples' ambition towards optimal occupational health and wellness. Performances of occupations and activities are thus both the main therapeutic goal and the therapeutic media applied to all occupational therapy interventions (OTI).

The Past of the Occupational Therapy Profession

The term *occupational therapy* originated in the USA in 1914. Occupational therapy is often stated to have originated in the philosophical ideas of the *moral treatment movement*. This movement valued work as having a positive influence on (mentally ill) patients' health. However, other influences were from social movements such as the *settlement movement*, which aimed to ameliorate daily life especially among women. The *arts-and-crafts movement* originated in England and was adopted in the USA by the founding physicians of occupational therapy, Adolph Meyer, Herbert Hall, and William Dunton around 1920. Their philosophical belief was that "creative and manual work could help reconstruct one's sense of self and therefore help to counteract the negative effects of industrialization" (Clark et al. 1998, pp. 14–15). In 1925, in Aberdeen, Scotland, the first American-educated OT was employed. Thus, the philosophical beliefs that influenced the origin of occupational therapy were an enriching exchange between the USA and the UK in the early 1920s (Baum and Christiansen 1997; Clark et al. 1998; Hagedorn 1995).

The first federation for promoting occupational therapy was founded in 1917 in the USA (American Occupational Therapy Association (AOTA) (2002, 2013). Occupational therapy as a modern *health profession* was established there during the early 1920s and was at first practiced mainly in psychiatric hospitals.[1] A more detailed account of the origin of occupational therapy in the USA and Great Britain, respectively, is depicted by Baum and Christiansen (1997) and Hagedorn (1995).

Where one places the roots of occupational therapy depends on the country. For example, in *Sweden*, the first official training of OTs was conducted in Stockholm in 1947.[2]

The World Federation of Occupational Therapists (WFOT) was established in 1952 in Stockholm, and it runs International Congresses every fourth year.

[1] The following references are recommended for full information about occupational therapy's origins in the USA: "The Occupational Therapy Context" (Baum and Christiansen 1997) and in the USA and Great Britain "Occupational Therapy: A Retrospective" (Hagedorn 1995).

[2] Personal communication to Inga-Britt Lindström, former chair-woman of the Swedish Federation of Occupational Therapists; Gunilla Myrin, former head of the occupational therapy department, the Rehabilitation Clinic, Danderyd hospital, Stockholm Sweden and Kerstin Wikell, former colleague ibid. clinic

My interpretation of Swedish occupational therapy development during the past 45 years

The profession has undergone several theoretical and clinical shifts about how the professional collective images itself in the past 45 years according to my personal view and interpretation of the context of textbooks (see, Chap. 2, Table 2.1). *During the 1960s,* the OTIs were closely linked to medical diagnoses, such as the management of neurologic conditions (Macdonald 1964). This brought about a reductionist perspective on the human being, with the consequence that the core content of occupational therapy was diminished.

Let me give an authentic example:

> In the late 1960s, the occupational therapy profession was relatively sparsely represented at acute hospitals in my country—Sweden. I was in my first professional job on neurologic and orthopedic wards. I was responsible for a referral from a respected physician. The referral stated: "Sixty-eight-year-old woman with right femur fracture, at present having her leg in traction for at least 2 weeks". (Meaning she was lying in bed). The prescription was: "A teddy bear—thank you". Observe that nothing was told about the ladies occupational deficits. So, what did this mean? After interviewing the client it became clear that she wanted something to do while laying waiting for her femur fracture to heal. Thus the lady wanted to make a teddy bear, which was to be a gift to her new-born grand-child. Thus, the occupational therapist (OT) was able to offer the patient the opportunity to do something that was meaningful and useful for her. This type of 'Enabling' intervention is the primary origin of occupational therapy.
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> Nowadays there are many other cost-effective measures that would have been appropriate for this patient. The physicians' prescription would have included a postoperative occupational intervention program. During the hospital stay, the interventions would have comprised an individualized learning process to improve the patient's ability to ambulate indoors, to perform light housework, and get into and out of an automobile. The OT would have prescribed assistive devices, such as a reacher, a raised toilet seat, a raised bed, and stocking pullers. These devices would make the patient independent in self-care, such as personal hygiene, bathing, and toileting. There is now considerable evidence to support such interventions for people suffering from hip fractures (Hagsten et al. 2006; Hagsten and Söderback 1994).
>
> To assess health promotion and risk for new injury incidents, a home visit aimed at preventing further accidental falls (see Chap. 63) would have taken place after the patient's discharge from the hospital (Söderback 2008).

During mid-1980s, emphasis shifted to descriptions of the development of occupational therapy programs, centering on how the OTs contribute to teamwork in, for example, psychosocial rehabilitation (Cottrell 1993). This view of occupational therapy frequently caused it to be confused with the contributions of other healthcare professions, especially physiotherapy.

The early 1980s was a period in many countries, Sweden among them, where political trends required the training of health care professionals, including OTs, to be expanded from a clinical–practical-based profession to an academic university discipline. Theory was advocated before clinical practice. This opened the way for OTs to earn PhDs and to perform research that revolutionized the scientific bases of occupational therapy.

Demarcation of the subject occupational therapy and development of the concepts concerning the core content, especially occupation, was the most accurate

self-image. One consequence of the raised educational level was that the academic discipline required theoretical approaches. These theories were expected to contribute to (1) the application of educational curricula, (2) the production of basic knowledge concerning how the human being is occupied, and (3) research that proved OTI with evidence of its effects.

Between 1980 and 1997, many theories (i.e., abstract descriptions of phenomena) and models (i.e., descriptions of conceptual systems) were developed (see Chap. 8). Clinical applications of the abovementioned theories and models constitute *frames of reference* (Dutton et al. 1993; Mosey 1986), which are today more often mentioned as programs.

At the time of publication of *International Handbook of Occupational Therapy Interventions* (IHOTI, first edition) there was obviously a gap between these theories/models/frames of references and how occupational therapy was clinically applied (Kielhofner 2005). However, in 2014, the gap between theory and clinical practice is less wide. Most of the presented *occupational therapy interventions* (OTIs) (Parts II–V) in this second edition have very clearly stated their theoretical base. These OTIs have multiple scientific bases, adopted from occupational science, together with many other theoretical models from the psychological–pedagogical–medical–technical sciences and also behavioral, biomechanical, cognitive, developmental approaches, all which help OTs to understand the *human as an occupied being.* Their purpose is to provide the OTs with a knowledge base for clinical reasoning concerning the practical use of assessments and interventions (Christiansen 1991).

The twentieth century provided a *holistic perspective* on the occupied human being. The focus now is on (1) occupation as the core content of OTI, (2) applied research concerning *client-centered practical models* describing the client–therapist interactions (Mortenson and Dyck 2006)—this research was expected to attain the *goals* of developing, maintaining, or improving clients' health and well-being and avoiding ill-health—and (3) *evidence-based clinical use of OTIs* research, which provides the community with information about the outcomes, cost-effectiveness, and value of OT interventions (Pierce 2001). These perspectives on OTI approximate the contents of IHOTI, second edition (see Parts II–V).

The Present Status of an International Perspective on Occupational Therapy

Statistics and Figures

A broad international Witchger Hansen et al. 2013 perspective on occupational therapy (2014) is as follows:

- In our world, we are about 7,148,800 people living on six continents in about 250 countries (WHO 2014) (see Appendix 1.1).
- The authors of IHOTI, second edition, are living in 17 different countries, representing all six of the world continents (see contributors' list). However, there are

more authors living in the USA and North Europe. The reason might partly be language difficulties (see Chap. 3) and partly that science and research are better represented in these countries.

- Education to OT is available in about 68 (~33%) of the 206 countries (see Appendix 1.1). However, there might be available education to OT in more countries, because, only educational institutes approved by the WFOT (2014) are accounted here.

  Examples:

  - In Myanmar/Burma, there were 25 OTs with at least 1 year training working in mental health care (0.045 per 100,000 general population; WHO aims report on mental health system in Myanmar 2014).
  - In Oman there were OTs—i.e., 0.19 per 100,000 general population—working in mental health services (WHO aims report on mental health system in Oman 2014).

- It is a very shifting representation if education to OT is available around the globe. About 95% of the population in Oceania continent has "theoretical" access to receive occupational therapy services, but only 30% of the population living in the African continent has that access as described below:

  The African continent:
  Countries: Ten out of 48 countries, i.e., ~21 %, offer education in occupational therapy.
  People: Thus, ~30 % are these people who have access to OT (n ~ 320,539,699 people; total population: 1,058,127,641.
  The Asian continent:
  Countries: Sixteen out of 55 countries, i.e., ~30 %, offer education in occupational therapy.
  People: Thus, ~49 % are these people who have access to OT (n ~ 2,109,137,415 people; total population: 4,268,059,207).
  The Oceania continent:
  Countries: Two (with the highest number of inhabitants) out of 12 countries, i.e., ~30 %, offer education in occupational therapy.
  People: Thus, ~95 % are these people who have access to OT (n ~ 27,922,633 people; total population: 29,185,982).
  The European continent:
  Countries: Thirty out of 47 countries, i.e., ~64 % offer education in occupational therapy.
  People: Thus, ~90 % are these who people who have access to OT (n ~ 686,555,786 people; total population: 761,216,048.
  The North American continent:
  Countries: Three out of 15 countries, i.e., ~20 %, offer education in occupational therapy (American Occupational Therapy Association (AOTA), 2002, 2013).
  People: Thus, ~64 % are these people who have access to OT (n ~ 70,183,102 people; total population: 110,130,659).

The South American continent:
Countries: Seven out of 19 countries, i.e., ~37 % offer education in occupational therapy.
People: Thus, ~87 % are these people who have access to OT (n ~ 484,345,038 people; total population: 559,768,527.

- However, it is very difficult to show a realistic view of people's access to occupational therapy services. Therefore, it is recommended to study detailed and updated information available on the Internet through, e.g., the home pages to World Federation of Occupational Therapists (WFOT 2008b), Occupational Therapy Africa Regional Group (OTARG), European Network of Occupational Therapy in Higher Education (ENOTE 2008), and the occupational therapy association of the respective countries.
  Another way of describing people's access to occupational therapy services would be to estimate the figures of the number of OTs per 100,000 inhabitants. For example, in the USA, there are ~ 105,000 OTs (studentsscholarship.org 2014), meaning that there are ~ 300/100,000 OTs. It might be noticed, that in Europe, Germany, and UK have the biggest number of practicing OTs and Denmark has the highest number of OTs, i.e., 75/100,000 inhabitants (ENOTHE 2014). ENOTHE represents 35 countries of the European continent in which education to become an OT is available and occupational therapy services exist.
- It is also obvious that education to become an OT does not exist in many "developmental" countries (see Appendix 1.1). For example, a WHO note in a report on mental health system in Myanmar (Bhutan): "At present, there are less than one OT per 100 000 inhabitants in Bhutan" (WHO aims report on mental health system in Bhutan 2014, p. 16).

The Future: Factors Influencing the Existence, Need for, and Evolution of Occupational Therapy Services

The content of applied occupational therapy clinical praxis is strongly influenced by several factors:

- *Age structure of the world population*. Because of an increasing number of old people who are expected to live longer and with increasing occupational deficits the need for OTIs may increase (see Chap. 7).
- *The medical health panorama* has strongly influenced occupational therapy. Here are some examples:
  - As a consequence of the polio epidemic of the 1950s, people survived with serious disabilities. To assist these people, rehabilitation clinics were started, for example at Danderyd Hospital in Stockholm, Sweden, in 1962. In the countries to which people returned from the battlefields of the Second World War with physical disabilities, the need for medical rehabilitation and occupational therapy grew both in the USA and the UK.

  - During the tuberculosis epidemic of the 1920s, sanatoria were established in Sweden, where occupational therapy was included in the recovery treatment. However, because medical treatment has drastically reduced the number of patients with tubercular diagnoses, rehabilitation/occupational therapy is no longer needed. Thus, when medicine makes revolutionary progress, the panorama of candidates participating in occupational therapy changes.
  - Nowadays, the stress-related occupational ill-health has severely increased, which affects the development of new approaches to evidence-based OTIs, e.g., see Chaps. 9 and 38

- *Political and Economic Factors* The medical care organization and policy of individual countries determines the extent of health and medical care and social welfare, including whether occupational therapy is a part of the system. The portion of gross national product that a country chooses to allocate to health care is significant. The social insurance system affects how much occupational therapy a client is entitled to. An example is whether disabled people have free access to assistive devices or how much they have to pay by themselves (see Chap. 23)
- *Legal Factors* Legislation affects the status of occupational therapy and the respect in which the profession is held. Thus, for example, certification in Sweden (National Board on Health and Welfare) has positively affected the respect for occupational therapy.
- *Cultural Factors* affect the content of OTIs For example, the extent to which arts and crafts are used in OTIs varies extensively around the world. Furthermore, traditional ideas of how health care should be conducted in various countries influence the therapy, which is reflected in this handbook (see Chap. 4).
- *Marketing* is a decisive factor in the existence and development of occupational therapy. Information on the discipline must be conveyed in terms of the OTs *doing, i.e., the contents of OTIs,* professional competence, current research results, and the proven effects of client's participation. It is the moral duty of every OT to contribute to this marketing so that it may contribute to the health and well-being of present and future clients and to the advancement of health care and social well-fare care.

Summary

Present. The professional knowledge in occupational therapy has increased in a very positive way during the 5 years that have passed since IHOTI, first edition, was released.

Examples are:

- Theoretical approaches distinctly underpin the OTIs presented in IHOTI, second edition.
- Expression of OTIs is much clearer, i.e., the concept *occupational performance* is our core content.

- Many more countries in the world offer education to OTs and new and innovative occupational therapy services are under implementation, e.g., in Thiruvananthapuram, India (personal communication).
- There are many laudable cooperation's between occupational therapy institutes around the world as presented in the Special Issue of Occupational Therapy Intervention (2013).
- There is a burgeoning development to inspire OTs working from an ecological perspective to promote occupational health and wellness (see Chap. 62).
  There is great hope that occupational therapy will continue to develop for the presumptive clients' benefit.

For the nearest future, I recommend:

- Continued research with the aim of creating a worldwide accepted taxonomy of OTIs (see the Chaps. 3 and 4).
- Consensus conferences aimed at articulating outcomes of OTIs corresponding to our core content.
- Continued research of what OTIs are used in clinical praxis that will foster to increased quality of OTIs and professional communication.
- Continued assessments of populations' health and wellness concerning occupational performances of activities in daily life, i.e., studies of needs assessments (see Chap. 7).
- It is recommended to exact define which OTI(s) was used in a scientific study. This is especially important for studies where the OTI is a prat among other interventions used in a team work. Moreover, the used OTIs might be stated in the title and abstract of the scientific article, which would increase the accuracy in data-based searches (see Chap. 3).
- Continuing well-designed multicenter RTC studies that prove evidence of used OTIs.

Conclusion

- In addition to earlier textbooks where the focus of *human as an occupied being* has been outlined, the content of IHOTI, second edition, contributes with *the focus of what OT professionals are doing,* that is OTs' four main professional roles applied to 53 presented OTIs and the four main OTI goals expected to be obtained (see Chaps. 3 and 4).
- IHOTI, second edition, consists of *clinical case studies* aimed at facilitating occupational therapy students' learning and the education in occupational therapy.Thus, IHOTI, second edition, may be considered to be one of the many generative discourses for education and a source for the further development of occupational therapy.

Appendix 1.1: Relationship between inhabitants of countries in the six continents and their access to occupational therapy estimated on the availability of education for training OTs

Africa			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Cape Verde	491,875		
Algeria	38,700,000		
Angola	20,609,294		
Benin	10,323,000		
Burkina Faso	17,322,796		
Burundi	10,163,000		
Cameroon	20,386,799		
Central African Republic	4,616,000		
Chad	12,825,000		
Comoros	743,798		
Democratic Republic of the Congo	67,514,000		
Djibouti	873,000		
Egypt	86,082,100	X	
Equatorial Guinea	1,622,000		
Ethiopia	86,613,986		
Gambia	1,849,000		
Ghana	24,658,823		
Guinea	10,824,200		
Guinea-Bissau	1,704,000		
Ivory Coast	23,202,000		
Liberia	4,294,000		
Madagascar	21,263,403		
Mali	15,302,000		
Mauritania	3,461,041		
Morocco	33,194,500		
Mozambique	23,700,715		
Oman	3,957,000		
Republic of the Congo	4,448,000		
Senegal	13,567,338		
Sierra Leone	6,190,280		
Somalia	10,496,000		
South Sudan	11,296,000		
Sudan	37,964,000		
Swaziland	1,250,000		
Togo	6,191,155		
Tunisia	10,886,500		
Western Sahara	567,000		
Zambia	14,580,290		

Africa			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Botswana[a]	2,024,904	X	
Kenya[b]	44,354,000	X	
Malawi[a]	16,363,000	X	
Mauritius	1,257,900	X	
Nigeria[b]	173,615,000	X	
Tanzania[a,b]	44,928,923	X	
Uganda[b]	35,357,000	X	
Zimbabwe[b]	12,973,808	X	
Rwanda[a,b]	10,537,222	X	
South Africa[b]	52,981,991	X	*

[a] Not approved education by WFOT
[b] Members of the occupational therapy Africa regional group
[*] Countries where authors of IHOTI, 2nd edition, live

Asia			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Afghanistan	25,500,100		
Bahrain	1,234,571		
Bhutan	744,910		
Brunei	393,162		
Burma	53,259,000		
Cambodia	15,135,000		
Eritrea	6,333,000		
Gabon	1,672,000		
Indonesia	249,866,000		
Iraq	34,035,000		
Kazakhstan	17,186,000		
Laos	6,580,800		
Lebanon	4,822,000		
Lesotho	2,074,000		
Maldives	317,280		
Mauritius Vanuatu	264,652		
Mongolia	2,931,300		
Nepal	26,494,504		
Niger	17,129,076		
Papua New Guinea	7,398,500		
Qatar	2,045,239		
Saint Kitts and Nevis	54,000		
Saudi Arabia	29,994,272		
Seychelles[a]	90,945		
South Korea	50,219,669		
Syria	21,898,000		
Tajikistan	8,160,000		
Timor-Leste	1,066,409		

Asia			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Turkmenistan	5,240,000		
United Arab Emirates	8,264,070		
Uzbekistan	30,183,400		
Vietnam	89,708,900		
Yemen	25,235,000		
Armenia	3,017,000	X	
Azerbaijan	9,477,100	X	
Bangladesh	152,518,015	X	
India	1,241,270,000	X	
Jordan	6,555,800	X	
Kuwait	3,065,850	X	
Macau China	598,200	X	
Namibia[b]	2,113,077	X	
Pakistan	185,841,000	X	
China	1,360,720,000	Xa	
Georgia	4,483,800	Xa	
Kyrgyzstan	5,663,133	Xa	
Malaysia	30,030,000	Xa	
Philippines	99,235,900	X	
Russian Federation	143,700,000	X	
Singapore	5,399,200	X	
Sri Lanka	20,277,597	X	
Taiwan	23,377,515	X	
Thailand	65,926,261	X	
Hong Kong China	7,184,000	X	*
Japan	127,180,000	X	*
South Korea	24,895,000	X	*

[a] Not a member of the World Health Organization. Education available but not approved by WFOT. Not accounted

[b] Member of the occupational therapy Asia regional group

[*] Countries where authors of IHOTI, 2nd edition, live

Oceania			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Christmas Island, Australia	2072		
Cocos Keeling Islands, Australia	596		
Cook Islands, NZ	14,974		
Fiji	858,038		
Kiribati	106,461		
Niue, NZ	1613		
Norfolk Island, Australia	2302		

Oceania			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Samoa	187,820		
Tokelau, NZ	1411		
Tonga	103,036		
Australia	23,405,803	X	*
New Zealand	4,516,830	X	*

* Countries where authors of IHOTI, 2nd edition, live

Europe			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Albania	2,821,977		
Belarus	9,468,100	XX[a]	
Bosnia and Herzegovina	3,791,622		
Kosovo	1,815,606		
Libya	6,202,000		
Macedonia	2,062,294		
Monaco	36,136		
Montenegro	620,029		
Slovakia	5,415,459		
Ukraine	45,426,200		
Vatican City	839		
Austria[b]	8,504,850	X	
Belgium[b]	11,132,269	X	
Bulgaria[b]	7,282,041	X	
Croatia[b]	4,290,612	X	
Cyprus[b]	865,878	X	
Czech Republic[b]	10,513,800	X	
Estonia[b]	1,311,870	X	
Finland[b]	571,323	X	
Germany[b]	80,619,000	X	
Greece[b]	10,815,197	X	
Hungary[b]	9,906,000	X	
Iran	77,269,000	X	
Ireland[b]	4,593,100	X	
Israel[b]	8,146,300	X	
Latvia[b]	2,005,200	X	
Lithuania[b]	2,941,953	X	
Luxembourg[b]	537,000	X	
Malta[b]	416,055	X	
Moldova	3,559,500	X	
Palestine[b]	4,420,549	X	
Poland[b]	38,502,396	X	
Portugal[b]	10,487,289	X	
Romania[b]	20,121,641	X	

Europe			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Serbia[b]	7,181,505	X	
Slovenia[b]	2,061,875	X	
Spain[b]	46,609,700	X	
Switzerland[b]	8,112,200	X	
Turkey[b]	76,667,864	X	
Norway[b]	520,200	X	*
Denmark[b]	5,731,962	X	*
Iceland[b]	325,671	X	*
Sweden[b]	9,651,531	X	*
The Netherlands[b]	17,153,872	X	*
Italy[b]	59,943,933	X	*
France	68,283,000	X	*
UK[b]	68,751,812	X	*

[a] Education available but not approved by WFOT. Not accounted
[b] Members of the European network of occupational therapy in higher education
[*] Countries where authors of IHOTI, 2nd edition, live

North America			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Antigua and Barbuda	86,295		
Bahamas	351,461		
Barbados	285,000		
Belize	349,728		
Costa Rica	4,667,096		
Cuba	11,167,325		
Dominican Republic	9,445,281		
North Grenada	103,328		
Haiti	10,413,211		
Jamaica	2,711,476		
Saint Lucia	180,000		
São Tomé and Príncipe	187,356		
Panama	3,405,813	X	
Canada	35,295,770	X	*
USA	31,481,519	X	*

[*] Countries where authors of IHOTI, 2nd edition, live

South America			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Bolivia	10,027,254		
Ecuador	15,693,600		
El Salvador	6,340,000		

South America			
Country	Inhabitants	Education to OT available	Chapter in IHOTI, 2nd edition
Guatemala	15,438,384		
Guyana	784,894		
Honduras	8,555,072		
Nicaragua	6,071,045		
Paraguay	6,783,374		
Solomon Islands	581,344		
Suriname	534,189		
Trinidad and Tobago	1,328,019		
Uruguay	3,286,314		
Argentina	41,660,096	X	
Brazil	201,032,714	X	*
Chile	16,341,929	X	
Colombia	47,494,000	X	
Mexico	118,395,054	X	
Peru	30,475,144	X	
Venezuela	28,946,101	X	

Countries not members of the World Health Organization (population 516,073) and do not either offer education to become an OT were Federated States of Micronesia, Saint Vincent and the Grenadines, Andorra, Dominica, Marshall Islands, Liechtenstein, San Marino, Palau, Tuvalu, and Nauru

* Countries where authors of IHOTI, 2nd edition, live

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Chapter 2
The Genesis of International Handbook of Occupational Therapy Interventions

Ingrid Söderback

Abstract The *International Handbook of Occupational Therapy Interventions* (IHOTI) was designed through the results of extensive literature searches in 2007 (IHOTI, 1st edition) and 2013 (IHOTI, 2nd edition). The database searches were focused on occupational therapy with emphasis on evidence-based occupational therapy interventions. These searches also helped selecting the colleagues who are clinical experts and authors of chapters in Parts II–V. Occupational Therapy Intervention Framework (OTIF) emerged from the literature studies. A rough copy of OTIF was presented in IHOTI, 1st edition. In IHOTI, 2nd edition, OTIF has been reinforced with definitions and a validation study. It is suggested that OTIF should become a professional taxonomy of the occupational therapists' doing.

Keywords Genesis · Occupational therapy intervention framework (OTIF) · Origin · Scientific method

Introduction

The International Handbook of Occupational Therapy Interventions (IHOTI, 2nd edition) elucidates clinical praxis in occupational therapy. The text originates from the occupational therapists' (OTs) perspective and explains occupational therapy interventions (OTIs) which were evidence-based and had been presented in scientific literature. My purpose in compiling IHOTI, 1st edition, was to increase our understanding of how the OTIs contribute to clients' function, occupational performance, recovery, health, and wellness. The aims of the IHOTI, 2nd edition, were to intensify the description of subjects connected to occupational therapy such as ethical considerations (see Chap. 6) and needs assessment (see Chap. 7) and those that influence performance of OTIs. It was also important to upgrade the information presented in IHOTI, 1st edition, and add OTIs that had been proved since 2008. Moreover, the development that stresses the connection between theory and clinical praxis was added (see Chap. 9). Finally, IHOTI, 2nd edition, contributes with description of the

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educating method "Integrative Patient Cases" (see Chap. 10) aimed at occupational therapy students in their learning of how to clinically apply OTIs.

Method and Material

Method

An extensive review of the literature (Stein and Cutler 2000) was used to determine which OTIs should be included and which scientists and clinicians should be invited to contribute to chapters of IHOTI, 1st edition.

Material

Scientific Publications

Data searches of scientific publications for IHOTI, 1st edition, covered the years 1990–2007 and for IHOTI, 2nd edition, the years 2008–2013. The searches used the PubMed database (http://www.mrc-lmb.cam.ac.uk/genomes/madanm/pres/pubmed1.htm) as the primary source. The OT seeker (http://www.otseeker.com/) and the Cochrane Collaboration database (http://www.cochrane.org/cochrane-reviews) were additional sources for IHOTI, 2nd edition. Moreover, I followed the publications in *Scandinavian Journal of Occupational Therapy,* http://informahealthcare.com/journal/occ; *Occupational Therapy International,* http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291557–0703 and *Work, A Journal of Prevention, Assessment, and Rehabilitation* http://www.iospress.nl/journal/work/.

Exclusion Criteria

- Publications concerning psychometric investigations and validation of occupational therapy assessment instrument and of occupational therapy theories and models.
- Publications concerning OTIs known from textbooks, e.g., Bobath and Bobath 1950, are not represented in IHOTI, 2nd edition, since no study thereof was found connected with occupational therapy or no author was available or the method had no proved evidence of its efficacy for patients.
- The exclusion criteria used for IHOTI, 2nd edition, were as shown in Chap. 3

Inclusion criteria of IHOTI, 1st edition, were:

- Keyword: occupational therapy.
- Articles containing in the title or suggesting in the text an identifiable OTI.
- Articles published in referee-examined scientific journals.

- Publications describing types of: case reports, clinical trials, consensus, developmental conference reports, comparative studies, evaluation studies, literature reviews, meta-analyses, randomized control trials (RCTs), research reports, and research supports according to the PubMed database classification (US National Library of Medicine and National Institutes of Health 2006).
- Publications based on studies of clients or literature.
- The selected OTI is described in more than one published study.
- The publications contain a complete abstract in English.
- The author names and email addresses or postal addresses are identifiable through Internet searches.
- Recent articles were chosen over older ones.
- An international distribution of the publications was desirable.

The inclusion criteria of IHOTI, 2nd edition, are as shown in Chap. 3. Included scientific studies are as described above, but restricted to include only evidence-based review publications.

Textbooks

For IHOTI, 1st edition, I reviewed the 27 textbooks (Table 2.1) that I have used during my career to obtain an overview of the OTIs presented in textbooks.

Results

The Occupational Therapy Intervention Framework (OTIF)

Occupational Therapy Intervention Framework (OTIF) originated from the literature studies. OTIF four-factor framework of OTIs elucidates the occupational therapists' professional doing (See Chap. 3, Fig 3.1). The IHOTI, 1st edition, presented a rough copy of OTIF. In IHOTI, 2nd edition, OTIF has been reinforced with definitions and a validation study. The content of OTIF is accounted in Chap. 3. OTIF is suggested to become a professional occupational therapy taxonomy.

Selected Occupational Therapy Interventions

IHOTI, 1st edition: By July 2008, IHOTI, 1st edition contained 61 chapters, of which 50 chapters concerned OTIs. These OTIs were selected to be included in the handbook as follows:

1. The primary PubMed search with the keywords "occupational therapy" and the inclusion criteria generated 4456 items (about 50% of the available items) published from 1960 to July 2006, and 225 items published from August 2006 to December 2007. The abstracts of these publications were saved on the EndNote database (EndNote 1998–2000). Publications before 2002 were saved

Table 2.1 Textbooks used for identification and an overview of OTIs

1	Allen C (1985) Occupational therapy for psychiatric diseases: measurement and management of cognitive disabilities. Little, Brown, Boston
2	Christiansen C (1994) Ways of living: self-care strategies for special needs. AOTA Director of Nonperiodical Publications, Bethesda
3	Christiansen C, Baum C (1991) Occupational therapy: overcoming human performance deficits. Slack, Thorofare
4	Christiansen C, Baum C (1997) Occupational therapy: enabling function and well-being. Slack, Thorofare
5	Cynkin S, Robinson AM (1990) Occupational therapy and activities health: toward health through activities. Little, Brown, Boston
6	Ellergård K, Nordell K (1997) Att bryta vanmakt mot egenmakt (To break powerlessness against arbitrariness) (In Swedish). Johnsson & Skyttes Förlag, Borås
7	Fleming Cottrell RP (1993) Psychosocial occupational therapy. AOTA, Bethesda
8	Hagedorn R (1995) Occupational therapy: perspectives and process. Churchill Livingstone, Edinburgh
9	Hopkins HL, Smith HD (1993) Willard and Spackman's occupational therapy, 8th edn. J.B. Lippincott, Philadelphia
10	Jacobs Gold K (1993) The nature and quality of optimal flow experience. A form of job satisfaction in a selected occupation: the case of occupational therapy practitioner. Doctoral Dissertation, University of Massachusetts, Lowell
11	Johnson JA, Yerxa EJ (1989) Occupational science: the foundation for a new model of practice. Haworth, London
12	Katz N (1992) Cognitive rehabilitation: models for OTI in occupational therapy, 1st edn. Andover Medical Publishers, Boston
13	Kielhofner G (1985) A model of human occupation: theory and application. Williams & Wilkins, London
14	Kielhofner G (1992) Conceptual foundations of occupational therapy. F.A. Davis, Philadelphia
15	Kielhofner G (1995) A model of human occupation: theory and application, 2nd edn. Williams & Wilkins, Baltimore
16	Lamport NK, Coffey MS, Hersch GI (1989) Activity analysis handbook. Slack, Thorofare
17	Macdonald EM (1964) Occupational therapy in rehabilitation: a handbook for OTs, students and others interested in this aspect of reablement. Ballière, Tindall and Cox, London
18	Mann WC, Lane JP (1991) Assistive technology for persons with disabilities: the role of occupational therapy. AOTA, Bethesda
19	Miller RJ, Sieg KW, Ludwig FM, Denegan Shortridge S, van Deusen J (1988) Six perspectives on theories for the practice of occupational therapy. Aspen, Rockville
20	Miller RJ, Walker KF (1993) Perspectives on theory for practice of occupational therapy, vol 1. Aspen, Gaithersburg
21	Mosey AC (1973) Activities therapy. Raven, New York
22	Mosey AC (1986) Psychosocial components of occupational therapy. Raven, New York
23	Neistadt ME, Crepeau EB (1998) Willard & Spackman's occupational therapy, 9th edn. Lippincott Raven, Philadelphia

Table 2.1 (continued)

24	Pedretti LW, Early MB (2001) Occupational therapy: practice skill for physical dysfunction, 5th edn. Mosby, London
25	Read C, Sanderson SR (1980) Concepts of occupational therapy. Williams & Wilkins, Baltimore
26	Stein F, Roose B (2000) Pocket guide to treatment in occupational therapy. Singular Publishing Group, San Diego
27	Stein F, Söderback I, Cutler SK, Larson B (2006) Occupational therapy and ergonomics: applying ergonomic principles to everyday occupation in the home and at work, 1st edn. Wiley, Philadelphia

for possible future documentation of the history of the OTIs, if they were to be included. Publications from 2002 to 2007 ($n=959$) were chosen for primary categorization.

2. The abstracts of the articles were carefully reviewed. The articles that did not fulfill the inclusion criteria were discarded, leaving 352 items in the original file. These articles were critically evaluated and classified by (1) the OTIF categories; (2) the clients participating in the OTIs (children, adolescents, adults, and frail elderly); (3) their diagnoses; and (4) the titles and database references (authors' names, addresses, and publication facts). Four copies of the original file, one for each of the OTIF category, were used for further identification of the OTIs.
3. Many of the OTIs identified had no title. However, the authors had explained the participating clients in terms of body function, body structure, activity and participation, environmental factors, or diagnoses. Therefore, I was able to use the concepts of the International Classification of Functioning, Disability, and Health (ICD; World Health Organization 2007) for further classification. With the ICD definitions in mind, the articles in each of the four files were again carefully reviewed and categorized.
4. The definitions of the OTIs were validated by a comparison according to the *Thesaurus of Occupational Therapy* subject headings (American Occupational Therapy Foundation 2004) and the PubMed MeSH database (US National Library of Medicine and National Institutes of Health 2006). The content of each OTI was reviewed based on the definitions, and the OTI was labeled according to the authors' suggestions plus my clinical experiences.
5. For OTIs represented by more than one published study, a scale was constructed, giving priority to randomized studies, to the newest publications, to OT as authors, and to the geographic distribution. Identification continued until a saturation point was reached; that is, the same articles or authors turned up irrespective of the search method. The Contents pages of IHOTI, 1st edition, showed the bibliography of selected OTIs.

IHOTI, 2nd edition: By March 2014, the Handbook contained 66 chapters, of which 52 chapters concerned OTIs.A similar process, as the one described above, was conducted and was accounted in Chap. 3. This database search generated 276 scientific publications, of which 27% concerned OTIs. Among these publications, five new OTIs were extracted and hence included in IHOTI, 2nd edition (see Chaps. 14, 23, 29, 57 and 64).

Authors

For each identified OTI suggested to be included into IHOTI, 1st edition, the presumptive authors were contacted by email, letter, or telephone call. Fourteen of those contacted declined, and addresses for another 14 were not found.

In IHOTI, 2nd edition, 118 authors from around the world (see the Contributors list) contributed to the IHOTI, 2nd edition. The same procedure as for IHOTI, 1st edition, was performed. Moreover, all authors who had contributed to IHOTI, 1st edition, were contacted with a letter of agreement to cooperate for upgrading their respective chapters. One author could not be contacted and three authors could not work on an upgraded version of their chapters.

Discussion

The chapters of IHOTI, 2nd edition, may be viewed as a sample of the available OTIs.

The OTIs presented is the result of my attempt to apply scientific methodology in the selection process. However, this process of identification of OTIs and available authors was restricted by language barriers, as I only selected scientific publications in English. In addition, there are, doubtless, more OTIs in clinical use that are not presented in published (evidence-based) studies and therefore are not represented in this handbook.

Moreover, there is a very rapid addition of publications concerning new and innovative OTIs. Therefore, the reader is strongly recommended to follow occupational therapy scientific publications.

Anyway, IHOTI, 2nd edition, includes more than 50 OTIs, which should be considered only as a sampled selection, and which are representative of publications of evidence-based OTIs. However, nobody knows if the selected OTIs are generally applied in clinical praxis. This is a question for further research.

My intention was to find authors from a wide range of countries. However, the OTIs included here are largely from Australia, Europe, and the USA. There is none from Africa (apart from South Africa) and presumptive authors living in the Eastern part of the world are underrepresented. Occupational therapy/rehabilitation in these countries, if available as a public clinical practice, is very sparsely represented both in reality and in the literature, possibly because of language problems, political decisions, and national economic scarcity that limit the funding of public rehabilitation and occupational therapy.

Finally, the chapters in this handbook will hopefully provide students, colleagues, and stakeholders with descriptions of evidence-based OTIs that can be clinically applied.

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World Health Organization (2007) ICF introduction. http://www.who.int/classifications/icf/site/intros/ICF-Eng-Intro.pdf. Updated version 2014. http://www.who.int/classifications/2014icfupdates.pdf?ua=1. Assessed 11 Sept 2014

Chapter 3
Towards a Taxonomy of Occupational Therapy Interventions: A Comparative Literature Analysis of Scientific Review Publications Published 2008–2013

Ingrid Söderback and Kathryn L. Magill

For me, words are a form of action, capable of influencing change.
Ingrid Bengis (2014) Cited in Developing Teachers.com

For the things we have to learn before we can do them, we learn by doing them.
Aristoteles: The Nicomachean Ethics.

The words studies, publications, and articles are used synonymously throughout this study.

Abstract This chapter's outline provides a taxonomy—Occupational Therapy Intervention Framework (OTIF)—and a validation study of its categories and concepts. A comparative literature analysis was performed between OTIF's concepts and the occupational therapy interventions (OTIs) presented in the abstracts of 74 selected review publications of 2008–2013. The publications were found ($n = 276$) through the use of three databases. The results showed reasonable compliance, meaning that OTIF has the potential to be developed as a professional taxonomy for use among occupational therapists. The participants of the analyzed studies were clients who traditionally participate in OTIs, e.g., stroke victims.

Keywords Classification · Database search · Occupational therapy interventions (OTIs) · Occupational therapy goals · Occupational therapist's roles · Scientific literature · Taxonomy

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Objective

1. An overview of clients' diagnoses/disabilities represented in the included scientific publications.
2. An initial validation of the Occupational Therapy Intervention Framework (OTIF; as first presented in Söderback 2009, pp. 16–17, Fig. 2.2) to be supported by 74 selected scientific review publications of 2008–2013.
3. Discussion of the present status of the databases' documentation concerning occupational therapy interventions (OTIs).

Background

A *taxonomy* is a way to group concepts together in categories, classes, and subclasses. One of the purposes of developing and using a taxonomy is to facilitate a common expression among relevant people, which concerns the subject.

Taxonomies used *in health care* are a reality. Examples are a taxonomy for nursing practice in the administrative domain (Kelly et al. 2005) and a taxonomy of nursing care organization models in hospitals (Dubois et al. 2012). The American Medical Association uses a "health-care provider taxonomy," version 13.0. It concerns many health professions, e.g., behavioral health and social service providers; chiropractic providers; nursing; speech, language, and hearing services (Johnson et al. 2009). However, it does not include occupational therapy services.

More specific are taxonomies concerning interventions applied in health care, e.g., the Wilson et al. (2009) taxonomy used by psychologists in rehabilitation teams and the *rehabilitation treatment taxonomy (RTT*), which focuses on the "active ingredients of treatments and their link to patient/client deficits/problems that are targeted in therapy" (Dijkers 2014; Dijkers et al. 2014). Although these taxonomies include occupational therapy as an intervention, they fall short in the ability to distinguish OTIs into categories or classes.

There are *occupational therapy taxonomies* which originated from various theories and models describing the human being occupied, e.g., the Person–Environment–Occupation Model (Christiansen and Baum 1997); Model of Human Occupation (Kielhofner 2008); and Occupational Form, Performance, and Synthesis (Nelson 1997).

Among occupational therapists (OTs), a commonly used taxonomy is the International Classification of Functioning, Disability and Health (ICF; WHO 2014), describing a biopsychosocial model of a person's present status and activity and participation depending on the disability. However, the ICF does not state specific interventions aimed at improving a person's health and/or quality of life.

Another way to classify occupational therapy activities was investigated for patients with a stroke diagnosis at six rehabilitation clinics. The results showed that commonly used goals improved upper extremity control and dressing performances (Latham et al. 2006). However, these goal-directed descriptions did not explain the "how," i.e., the choice of which OTIs was used to reach the goal. An original occupational therapy classification framework was outlined in Canada. According to this framework, the OTIs were classified as (a) "training, education, task adaptation, and environmental modification," which we have interpreted as OTIs: (b) "occupational development and skill development," which we have interpreted as occupational therapy goals, and (c) "support provision and support enhancement," which we have been interpreted in this chapter as the roles of the OTs. This classification arose through a review of 21 years of international occupational therapy literature from 1990 to 2010. The eight mentioned "interventions" were classified belonging to improvement of clients' self-care, productivity, and leisure activities (McColl and Law 2013).

However, through a search with the word "taxonomy" (the American Occupational Therapy Association Inc., AOTA 2014), no taxonomy was identified that covers *the profession of occupational therapy focusing on OTs' roles and the major goals of OTI*, which is the characteristics of the *OTIF* (see also Söderback 2009, p. 16, Fig. 2.2).

Validation is the process to support the truth; OTIF's categories are expected to be supported by scientific review studies published from 2008 to 2013.

An OTI is a client-centered, goal-directed approach that incorporates purposeful and meaningful occupations/activities. The various interventions provide a delivery model for clients to adapt to their environment, condition, learn or relearn a specific task, recovery for a specific condition, and maintain health.

OTs' roles are a set of behaviors with accepted codes that the therapist acts in contact and communication with the clients/patients, relatives, members of the multidisciplinary team, and other relevant people (Christensen and Baum 197, p. 603). OTs' roles are explained in job areas such as working with children and youth, aging people, in health care, mental health, rehabilitation, work, and industry (AOTA 2014). OTs' expert roles are to act as communicator, collaborator, case manager, change agent, scholar, practitioner, and professional (Canadian Association of Occupational Therapists 2014).

These descriptions of OT roles could be extended by the perspective of the "how-to-do" roles", i.e., the OTs manage, teach, enable, and promote the clients' goal-directed and meaningful occupations within activities of daily life (ADLs); production (work); play; leisure/relational activities conducted at home, work, school, and natural environments.

Occupational therapy goals are directed towards a solution of an occupational performance problem. The goals are aimed to develop, recover, or maintain clients' ADLs and quality of life, often stated according to the ICF or other underpinning occupational therapy theories/models.

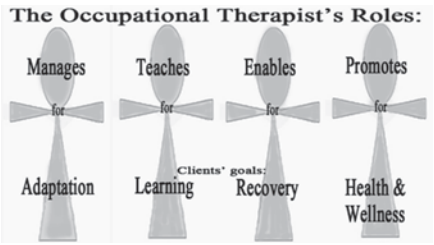

Fig. 3.1 Basic categories of the Occupational Therapy Intervention Framework (*OTIF*). The occupational therapists' (*OT*s) roles are as follows: to *manage* internal, temporal, occupational, and environmental *adaptations* that affect clients' occupational behavior and performance and that influence his/her patterns of daily occupations; to *teach* activities of daily living so that that clients *learn*/*relearn* to accomplish desired and expected tasks at home, at work, at school, in leisure time, and in the community; to *enable* the client to perform meaningful and purposeful occupations, which thus influence his/her *recovery* and well-being; and to *promote health and wellness*, i.e., through preventions of accidents and illness (Soderback 2009). The figures are stylized Ankh signs (means key of life) (see Fig. 4.1 p. 55)

OTIF

OTIF. Development *OTIF*, as a suggested clinical taxonomy of OTIs, was discovered during the design of the International Handbook of Occupational Therapy Interventions (IHOTI), first edition (Söderback 2009, pp. 5–8, 16–17). The principles of the grounded theory methodology (Glaser and Strauss 1967, 2012) were used for analyzing the data from an extensive literature search covering 2002–2007. Additionally, the use of textbooks in occupational therapy and the first author's clinical experiences added to the development.

OTIF. Content and Definitions OTIF consists of four basic categories, i.e., four OTs' "doing" roles interconnected with four OTI goals as outlined in Fig. 3.1. To each of the basic categories belongs four to nine OTIs.

OTIF's present content is defined in Tables 3.1, 3.2, 3.3, and 3.4.

Method

Design of the study was a *comparative literature analysis*. An interpretive comparison was performed between the OTIF definitions (i.e., the "lens"; Tables 3.1–3.4) through which the data sources (i.e., the content of the scientific review publications' abstracts) were viewed (Harvard College Writing Center 2014). Publications where the data were contrasted, i.e., interpreted not to suit the OTIF, were excluded. Included publications ($n = 74$) were those publications where the data were interpreted to be compatible with OTIF definitions.

Table 3.1 A clinical framework on occupational therapists' (OTs) roles and occupational therapy intervention (OTIs) goals

OTs manage and facilitate clients' adaptations	
Manage is to make modifications, decisions, or adjustments to a client, directly or indirectly, that results in the change. *Adaptation* is any adjustment of a client's environment, design of devices, tools, or mechanisms, to be suitable to person's most functional, rational, practical, effective, and ergonomic use. Adaptation is also a person's ability to adjust habits or behaviors to meet a new, or challenging, situation.	
Interventions	*Definition*
Environmental adaptations	Changes that modify the physical environment, home or outdoor space, making them accessible to all people regardless of disability
Housing adaptations	Accommodations that alter a client's dwelling, indoors and outdoors
Accessibility	Is the application of ergonomically appropriate body positions; ability to reach and enter physical environments
Accommodations	Providing wheelchairs or accessibility options, indoors and outdoors
Electric prostheses, orthotics, and splints	Artificial devices used to support or supplement damaged muscles, joints, or skin (arms/hands)
Assistive device	Equipment that provides increased opportunities for independence and supports function
Universal design	The design of products and environments to be accessible to all people
Occupational adaptations[a]	Make use of tools, material, gravity, and universal design to adjust a task to be performed in the most functional, rational, practical, effective, and ergonomically appropriate way
Temporal adaptations	The relationship between a person's activity patterns, time allocation, and experience of health or illness
Intrinsic adaptations (comparable with coping)	Is a person's internal motivation and skill set that supports strategies to reduce occupational stress, thereby forming habits or behavior

[a] Not included in the study's investigation. Refer to International Handbook of Occupational Therapy Interventions, first edition

Data sources were scientific review publications, i.e., studies that investigated the effects of OTIs. These include randomized controlled trials (RCTs), controlled clinical trials (CCTs), and comparative studies (CIMTs).

Data selection: The keyword search criteria were (a) the words "occupational therapy interventions," either as a single word or in combinations, or (b) originated from an occupational therapy department, or (c) written by OTs (c), and (d) abstracts available in English. The database searches were performed from 2008 to July 2013, because this was the time period after IHOTI first edition (Söderback 2009) was published. Only *review studies* were selected for the analyses, aimed to assure that more than one study underpinning the interpretation for each OTI category.

Table 3.2 A clinical framework on occupational therapists' (OTs) roles and occupational therapy intervention (OTIs) goals

OTs teach and clients learn or relearn	
Definition	
Teach (synonym: educate) (inform, demonstrate, instruct, arrange) applies learning methods to impart new or changed information that influences a person's ways of doing occupations *Learning* is the process of acquiring knowledge and skills. A person's ability to participate in teaching situations, which fosters their ability to gain knowledge through doing (occupational process), thereby altering their habits, behavior, and nature	
Definition	*Interventions*
Problem solving	Is the pedagogic approach of a goal-directed process aimed to help clients and caregivers with strategies that fix problems in daily activities and performances
Cognitive teaching approach	Integrates clients with cognitive impairments to use strategies for monitoring how they are thinking and processing information. The aim is to develop self-awareness and facilitate realistic goal setting. The teaching process uses various techniques, i.e., questioning, visualizing, feed-forward, and feedback that is mediated by meaningful occupations in the context of daily living activities
Active learning—energy conservation	Is the ability of the client to engage in understanding new material, skills, or tasks through problem solving, collaboration, and trial and error The abilities to use resources in the most efficient manner in order to maintain occupational performances for longer time durations and with less fatigue or pain
Psychoeducation	Aims to integrate a client, with mental illness, to use strategies to reinforce strength and coping skills that he/she deals with lasting symptoms. The teaching process is mediated by the activities that are performed in a social context of daily life
Neuromusculoskeletal and movement-related learning	Are the techniques aimed to improve a client's range of motion, muscle strength/endurance, gross/fine motor coordination, maintain functional postural control, muscle tone, or joint protection without pain or risk for injury
Occupational rehabilitation programs	Concerns the client's ability to work. Most often, the OT works as a member of the rehabilitation team

Table 3.3 A clinical framework on occupational therapists' (OTs) roles and occupational therapy interventions (OTIs) goals

OTs enable clients to be meaningfully occupied for reasonable recovery	
Enable is providing a client with opportunities that make it possible for him/her to participate in meaningful occupations *Recovery* is a person's actions to regain control of a balanced state of mind and body that supports an optimal quality of life	
Interventions	*Definition*
Creating opportunities for participation mediated by occupations	Is to provide opportunities, guidance, support, and facilitation which allows for clients to interact with occupations shaped by their interests, desires, or values in all daily activities. The experiences and feelings of the ongoing task implementation can be an individual or a shared experience with others. These interventions are mediated by multifaceted activities, which are often supported by adaptations of materials, tools, or processes that suit the clients' abilities
Recreational activities	Are the clients interacting with therapeutic occupations/activities, which offer them enjoyment, satisfaction, pleasure, self-esteem, and can facilitate relaxation which may result in good health and social interactions (i.e., handicraft, hobbies, reading newspapers or books, playing games, watching movies or TV, sports, discussions, and travel)
Music	Is any kind of organized sound, where clients are either a performer or listener
Gardening comparable term: horticulture therapy	Is an organized event where clients interact as active participants or observers with plants, flowers, or nature, thereby making positive impressions and feelings

Table 3.4 A clinical framework on occupational therapists' (OTs) roles and occupational therapy interventions (OTIs) goals

OTs prevent ill-health and promote a clients' ability to sustain healthy and with wellness helping to foster a clients' overall wellbeing	
Promotion is any activity that supports or encourages a client to take actions that increases their overall health and wellness *Health* is a state of complete physical, mental, and social well-being and not merely the absence of disease or sickness *Wellness* is the state or condition where a person maintains a healthy balance of the mind, body, and spirit that results in an overall feeling of well-being	
Interventions	*Definition*
Preventing fall accidents	Are all measures that reduce a person's risk for ending up on ground and thereby preventing injury
Preventing traffic accidents	Are all attempts, physically, environmentally, and behaviorally, to reduce injuries and disabilities caused by traffic accidents
Preventing accidents at work	Are all measures taken at redesigning work (the work processes, structures, equipment, tools, and materials) used for increasing on-the-job safety that reduces work accidents and sick leave
Preventing illnesses	Are the strategies taken in education, engineering, and enforcement aimed to modify their behavior or lifestyle for improved safety, health, and quality of life

Results of data collection

The results of the collected data comprised 276 scientific publications/studies, where 30 were duplicates. About 3% of the publications were written by the authors of the first edition of IHOTI and therefore excluded (see Appendix 1).

The following databases were used:

- The *Cochrane Collaboration database*, Cochrane reviews, includes reviews of RCTs (http://www.cochrane.org/search/reviews/occupational%20therapy); using the search words "occupational therapy" contributed with 52 results, where 13 publications (known participants: $n = 7390$) were included for further analyses. Thirty-nine results were excluded (Appendix 1) because the studies were (a) not complete, withdrawn from the database, or abstracts were not available; or (b) it was expressed in the abstract that the content of the study concerned another interventions than is commonly known as occupational therapy (e.g., drug or pharmacy therapy, psychological intervention approaches, health economics, hearing rehabilitation, language therapy, occupational health, physical therapy, physiotherapy, radiotherapy, surgery); or (c) the interventions were mixed, e.g., performed by a rehabilitation team that the OTIs included were impossible to separate.
- The *OTseeker database* includes RCTs (http://www.otseeker.com); using the search words "occupational therapy intervention" contributed with 25 results. Of these 12 studies (known participants: $n = 1680$) were included for further analyses. Thirteen results were excluded (Appendix 1) due to the (a) OTIs were mixed with other interventions; or (b) concerned: physiotherapy, health economic, visits to physician; or (c) was not complete. All results from the OTseeker database were also possible to identify in the PubMed.
- US National Library of Medicine National Institutes of Health: *National Library of Medicine* (*NCBI*; *PubMed*; (http://www.mrc-lmb.cam.ac.uk/genomes/madanm/pres/pubmed1.htm) contributed with 159 results; using the search words "occupational therapy interventions" restricted with the categories: "abstract available," "humans," "review." Forty-seven results (unknown participants) were included for further analyses. Excluded were 110 results (Appendix 1), due to the (a) OTI were mixed with other interventions; or (b) concerned: chiropractor therapy, cognitive psychotherapy, education of health professions, ergonomics, health economics, speech therapy, occupational health medicine, medical rehabilitation, physiotherapy; or (c) no interventions, or no results, were specified, or the studies were not complete or withdrawn.

The references of excluded publications are presented in Appendix 1.

Process. The data search results were converted to Excel files with columns for the publications: (a) title, (b) references, (c) OTIF main category, (d) participants' diagnoses, and (e) evidence of the intervention [(e) is not used in this study]. The Excel's sorting function was used to extract the data.

Interpretation. Two interpreter: the first author (OT with >40 years' experience) and the second author (OT with >5 years' experience) independently classified the studies to be included or excluded in this study. The authors had an agreement of ~90 %. The comparative interpretation analyses were performed by the second author (aimed to avoid bias).

Results

The client's diagnoses/diseases/dishabilles represented in the included scientific publications concerned a variation of diagnoses/diseases/disabilities, where clients surviving a stroke or a cerebral brain injury ($n=20$) were most often represented. Clients living with Alzheimer's disease and dementia disease and their spouses ($n=12$) were also common subjects among the studies. Single studies with clients who had a variation of physical disabilities ($n=15$), for example, a shoulder condition, carpal tunnel syndrome, rheumatoid arthritis, chronic pain, and musculoskeletal disorders, were well represented. Studies of mental illness and psychotic conditions ($n=4$) were few, and there was only *one* study *each* of the patients living with a cancer diagnosis or in the end of life. The studies of older people (e.g., lower limb amputation, hip fracture, prevention of falls; $n=7$) and of children (congenital hemiplegia, cerebral palsy developmental conditions, motor impairment; $n=8$) were relatively well represented. *Two* studies concerned people's work condition. In four studies, the diagnoses/diseases were not mentioned.

Validation of the OTIF

This initial validation of the OTIF (as presented in Fig. 3.1 and Tables 3.1–3.4) was interpreted to be essentially supported by the included scientific review publications 2008–2013 ($n=74$), as shown in Tables 3.5–3.8.

The 74 publications supported that 20 out of 23 were scientifically documented after 2008, apart from the "enabling interventions" (gardening and music) and the "promoting interventions" (prevention for traffic accidents).

- Moreover, the results showed OTs overwhelmingly act in the role of *teacher for the clients' learning/relearning*. This OTIF category encompasses six interventions: problem solving, cognitive teaching approach, active learning, i.e., energy conservation, psychoeducation, neuromuscular and movement-related learning, and occupational rehabilitation programs, which were interpreted to be supported by 35 of the included publications (Table 3.5). Among these, interventions concerning neuromuscular and movement-related learning were dominant and interpreted to be the content of 13 of the abstracts.

Table 3.5 References to publications interpreted to concern the OTIF category manages for adaptation

Validation of the OTIF category manages for adaptation	
Interventions	References to included articles
Environmental adaptations	
Housing adaptations	Pighills et al (2011) J Am Geriatr Soc 59(1):26–33
Accessibility	Arbesman and Logsdon (2011) Am J Occup Ther 65(3):238–246 Cook et al (2009) Clin Rehabil 23(1):40–52 Winkle et al (2012) Occup Ther Int 19(1):54–66
Accommodations	Bohr (2013) Am J Occup Ther 65(1):24–28 Laver et al (2011) Cochrane Database of Syst Rev Issue 9. Art. No.: CD008349 Leland et al (2012) Am J Occup Ther 66(2):149–160 Letts L, Minezes J, Edwards M, Berenyi J, Moros K, O'Neill et al (2011) Am J Occup Ther 65(5):505–513. Retrieved 3 July 2013 from PubMed database Padilla (2011) Am J Occup Ther 65(5):514–522. Retrieved 1 July 2013 from PubMed database Padilla (2011) Am J Occup Ther 65(5):523–531, 2011. Retrieved 3 July 2013 from PubMed database Shaw et al. Health Technol Smits-Engelsman et al (2013) Dev Med Child Neurol 55(3):229–237. Retrieved 3 July 2013 from PubMed database. doi: 10.1111/dmcn.12008. Epub 2012 Oct 29 Van Niekerk et al (2010) BMC Musculoskelet Disord 13:145, 2012 Assess (2010) May;14(26):1–113, iii–iv. doi: 10.3310/hta1426 Winkle et al (2012) Occup Ther Int 19(1):54–66
Electric prostheses, orthotics, and splints	Beasley (2012) J Hand Ther 25(2):163–171 Demetrios et al (2013) Cochrane Database Syst Rev (Issue 6. Art. No.: CD009689) Drummond et al (2012) Clin Rehabil 27(5):387–97 Mehrholz et al (2012) Cochrane Database Syst Rev (Issue 6. Art. No.: CD006876) Novak et al (2009) Pediatrics 124(4):e606–e614 Page et al (2013) Cochrane Database Syst Rev (Issue 3. Art. No.: CD009601) Spiliotopoulou and Atwal (2012) Prosthet Orthot Int 36(1):7–14 Wallen and Gillies (2006) Cochrane Database Syst Rev (Issue 1. Art. No.: CD002824)
Assistive devices	Intiso et al (2012) J Nephrol 25(Suppl 19):S90–S95
Universal design	Jensen and Padilla (2011) Am J Occup Ther 65(5):532–540
Temporal adaptations	None

Table 3.5 (continued)

Validation of the OTIF category manages for adaptation	
Intrinsic adaptations (comparable with coping)	Carnes et al (2012) Clin J Pain 28(4):344–354 Kim et al (2012) Neuro Rehabil 31(2):107–115 Lam et al (2010) Int J Geriatr Psychiatry 25(2):133–141 Lambeek et al (2010) JRBMJ 340:c1035, 2010 McEwen et al (2009) Brain Inj 23(4):263–277 Robinson et al (2011) Aust Occup Ther J 58(2):74–81 Polatajko and Cantin. American Journal of Occupational Therapy, May/June 2010, Vol. 64, 415-429. doi:10.5014/ajot.2010.09072 information Sakzewski et al (2009) Pediatrics 123(6):e1111–e1122 Thinnes and Padilla (2011) Am J Occup Ther 65(5):541–549 Zwicker and Harris (2009) Can J Occup Ther 76(1):29–37

- OTs' role as *manager and facilitator for clients' adaptations*. This category was interpreted to be supported by the publications to a similar extent ($n=34$; Table 3.6). The majority of analyzed abstracts interpreted fell under the OTI: environmental adaptation, i.e., electronic prosthesis, orthotics splints ($n=9$) and under the OTI: internal adaptation (coping; $n=10$). There was no review concerning temporal adaptation and intrinsic adaptation.
- OTs' role as *enabler for clients' health and well-being* was interpreted to be supported by seven publications (Table 3.7). The majority of these abstracts fell under the OTI; recreational activities.
- OTs' role as *promoter for clients' health and wellness*, i.e., to prevent illness and disability, was interpreted to have the least support among the publications. *Three* publications concerned prevention of fall incidents and *two* of prevention of illness.

There was an overlap of in about 10 % (eight publications) for the content of included publications, i.e., it was interpreted that the abstract of one publication concerned more than one of OTIF category and/or class.

Table 3.6 References to articles interpreted to concern the OTIF category teaches for learning or relearning

Validation of the OTIF category teaches for learning or relearning	
Interventions	References to included articles
Problem solving	Poulin et al (2012) Top Stroke Rehabil 19(2):158–171
Cognitive teaching approach	Bowen et al (2013) Cochrane Database Syst Rev (Issue 7. Art. No.: CD003586) Chung et al (2013) Cochrane Database Syst Rev (Issue 4. Art. No.: CD008391) Clare et al (2010) Am J Geriatr Psychiatry 18(10):928–939 Das et al (2007) Cochrane Database Syst Rev (Issue 3. Art. No.: CD002293) Dodson (2010) Work 36(4):449–457 Hoffmann et al (2010) Top Stroke Rehabil 17(2):99–107 Hoffmann et al (2010) Cochrane Database Syst Rev (Issue 9. Art. No.: CD006430) Loetscher and Lincoln (2013) Cochrane Database Syst Rev (Issue 5. Art. No.: CD002842) Yuill and Hollis (2011) Occup Ther Int 18(4):163–186
Active learning—energy conservation	De Boer et al (2011) Cochrane Database Syst Rev 16(2):CD007569 Hubbard et al (2009) Occup Ther Int 16(3–4):175–189
Psychoeducation	Audhoe et al (2010) J Occup Rehabil 20(1):1–13 Crowther et al (2001) Cochrane Database Syst Rev (Issue 2. Art. No.: CD003080)
Neuromusculoskeletal and movement-related learning	Bowen et al (2011) Cochrane Database Syst Rev (Issue 4. Art. No.: CD007039) Chudyk et al (2009) Arch Phys Med Rehabil 90(2):246–262 Crotty et al (2010) Cochrane Database Syst Rev (Issue 1. Art. No.: CD007624) Fletcher-Smith et al (2013) Cochrane Database Syst Rev (Issue 6. Art. No.: CD010116) Galuppi (2011) Dev Med Child Neurol 53(7):621–629 Levac et al (2009) Pediatr Phys Ther 21(4):345–355 Law et al (2009) Best Pract Res Clin Rheumatol 23(1):103–116 Liepert et al (2010) Curr Opin Neurol 23(6):678–682 Mehrholz et al (2012) Cochrane Database Syst Rev (Issue 6. Art. No.: CD006876) Poulin et al (2012) Top Stroke Rehabil 19(2):158–171 Rabadi et al (2008) Clin Rehabil 22(12):1071–1082 Wallen et al (2006) Cochrane Database Syst Rev (Issue 1. Art. No.: CD002824) Verbeek et al (2011) J Cochrane Database Syst Rev 15(6):CD005958 Zwicker and Harris (2009) Can J Occup Ther 76(1):29–37
Rehabilitation programs	Désiron et al (2011) BMC Public Health 11:615 Hand et al (2011) Am J Occup Ther 65(4):428–436 Hoy et al (2011) Can J Occup Ther 78(1):13–25 Krug et al (2009) Mo Med 106(2):145–149 Macedo et al (2009) Arthritis Rheum 61(11):1522–1530 Morgan and White (2012) Curr Opin Support Palliat Care 6(2):138–143 Paquette and Thiel (2012) J Neurosurg Sci 56(4):299–306 Sakzewski et al (2011) Arch Phys Med Rehabil 92(4):531–539 Von der Heyde (2011) Am J Occup Ther 65(1):16–23 Polatajko and Cantin (2010) Am J Occup Ther 64(3):415–429

Table 3.7 References to articles interpreted to concern the OTIF category enables for recovery

Validation of the OTIF category enables for recovery	
Interventions	References to included articles
Recreational activities	Bowen et al (2011) Cochrane Database Syst Rev (Issue 4. Art. No.: CD007039) Chudyk et al (2009) Arch Phys Med Rehabil 90(2):246–262 Crotty et al (2010) Cochrane Database Syst Rev (Issue 1. Art. No.: CD007624) Fletcher-Smith et al (2013) Cochrane Database Syst Rev (Issue 6. Art. No.: CD010116) Galuppi (2011) Dev Med Child Neurol 53(7):621–629 Levac et al (2009) Pediatr Phys Ther 21(4):345–355 Law et al (2009) Best Pract Res Clin Rheumatol 23(1):103–116 Liepert (2010) Curr Opin Neurol 23(6):678–682 Mehrholz et al (2012) Cochrane Database Syst Rev (Issue 6. Art. No.: CD006876) Poulin et al (2012) Top Stroke Rehabil 19(2):158–171 Rabadi et al (2008) Clin Rehabil 22(12):1071–1082 Wallen and Gillies (2006) Cochrane Database Syst Rev (Issue 1. Art. No.: CD002824) Zwicker and Harris (2009) Can J Occup Ther 76(1):29–37
Gardening	None
Music	None

Table 3.8 References to included articles interpreted to concern the OTIF category promoting for health and wellness

Validation of the OTIF category promoting for health and wellness	
Intervention	References to included article
Preventing fall accidents	Intiso et al (2012) J Nephrol 25(Suppl 19):S90–S95 Jensen and Padilla (2011) Am J Occup Ther 65(5):532–540 Leland et al (2012) Am J Occup Ther 66(2):149–160
Preventing traffic accidents	None
Preventing accidents at work/return to work	De Boer et al (2011) Cochrane Database Syst Rev 16(2):CD007569
Preventing illnesses	Padilla (2011) Am J Occup Ther 65(5):523-531 Cook et al (2009) Clin Rehabil 23(1):40–52 Thinnes and Padilla (2011) Am J Occup Ther 65(5):541–549

Present Status of the Databases' Documentation Concerning OTIs

Among the 276 found publications from three databases, roughly 27% ($n=74$) were possible to use for this study's aim in order to perform a comparative literature analyses.

Discussion

Clients Participating in OTI

Clients traditionally seen in occupational therapy services were well represented as participants in this study's included publications. The majority of the scientific articles analyzed dealt with the diagnosis of stroke or dementia. This literature analyses encompassed all age groups. However, for example, information regarding occupational performance throughout the life span was lacking. It may concern adults with, e.g., autism or obesity who obviously have occupational performance deficits in the daily life activities. This fact raises question if people needing occupational therapy (see Chap. 7) are the prioritized clients (see Chap. 6).

OTIF

We as OTs encounter of the never-ending question: "What does an OT do?" Countless times, we have defined what our profession does by explaining the "doing" through examples of other health-care professions. An initial finding, that this study provided, suggests an outline of a *taxonomy—OTIF*—may help to better explain what it is that OTs actually do. The OTIF contains (Fig. 3.1 and Tables 3.1–3.4) OTs' professional "doing," i.e., OTs' roles and examples of applied OTIs. The OTIF intended goal is to provide colleagues, allied health professionals, and the medical community with a *universal occupational therapy language*, *clearly stating the* "doing" *of the OT profession*.

Results of the validation of OTIF

The results of this comparative literature analysis show that the content of the abstracts of the included publications ($n = 74$) and the content of OTIF had a reasonable (~87%) compliance. This result was despite that only the content of the abstracts was used for the comparisons. This result might have a higher degree of compliance if the complete publications had been studied.

The information gathered overwhelmingly shows that the main OT role is as a *teacher*. This role—*as a teacher*—might be used to reinforce the statement "the traditional OT role is working with a client, helping them achieve a meaningful state in life" (AOTA Inc. 1994).

Present Shortcomings of OTIF

The OTIF seems to provide us with a way to classify OTs' professional "doing" and highlights the OTIs commonly seen within scientific literature. The OTIF does

not cover all OTIs that are presented in available scientific literature. For example, the Tree Theme Method (Gunnarsson and Björklund 2013) was not caught in the databases, probably because there is a lack of a review to date. The OTIF is also limited in its scope because it fails to take into account upcoming OTIs such as bionic limbs. These shortcomings illustrate the fact that the OTIF or future occupational therapy taxonomies have to be a classification tool which is under *continuous development*.

Methodological Shortcomings Validation studies based on comparative interpretation analysis, as used in this study, are weak in their design. Thus, the results of this study have a tendency to draw more positive conclusions. For example, the validity of this study would have been improved if more than one person (KM) had performed the analysis between OTIF's and the 74 publications. However, it should be noted that this study used a similar design as McColl and Law's study aimed to classify OTIs (2013) and therefore is possible to be accepted.

An additional scientific shortcoming is that the OTIF has no foundation in clinical practice. Therefore, more research is required in order to better understand the role that the OTIF has within clinical practice. If more research was available, it would be possible to use some cluster analysis method and thus determine if OT roles are categorized as *managing*, *teaching*, *enabling*, *and promoting*. Additionally, more research could also help to promote the OT role into new and emerging practice areas. Correlative statistics could reveal how various OTIs were interconnected and the relationship between clients' deficits and occupational performance areas.

Discussion of the Present Status of the Databases' Documentation Concerning OTIs

Among the found publications, with the search words "occupational therapy interventions," only 27% were useful for this study. The reasons were because (a) the OTI was not clearly stated, (b) the OTI was a part of a team-related intervention program. For the future, we strongly recommend colleagues to clearly name the title of the used OTI(s) in the abstracts of the scientific publications. Moreover, this fact advocates further development of a general occupational taxonomy such as OTIF, and (c) finally, it is interesting, how publications which do not concern OT and OTIs (see Appendix 1) could be found through this study's database search. It is important for the OT profession to become aware of the difficulties in trying to locate evidence-based information surrounding OT and OTs within an online database searches.

Recommendations

However, even if the information obtained from this comparative literature analysis provides an initial introduction into what is needed in order for the OTIF to become a pillar within the OT community, much more research is necessary. *The*

OTIF needs to be clinically tested and thus, based upon the results, redesigned and possibly extended to cover a broader scope. After clinical testing and redesign, additional studies facilitating systematic exploration of the efficacy and effectiveness of the OTIs through cross-study analysis, and (d) informing decisions about OTIF's feasibility of implementation in broader community settings could make it a valuable tool for the OT profession.

Conclusion

The current demand within the health-care community is to provide evidence-based practice (e.g., Evidence-based Behavioral Practice 2014) as a way to promote greater efficacy and health by integrating the best available evidence with practitioner expertise. It is essential for the OT community to incorporate evidence-based practice as well as move towards a universal language in which we define the "doing" of our profession as a foundation built on a core understanding of what exactly OTs *do* and which specific OTIs are applied. The OTIF could be a start towards such a *taxonomy*, because it allows OTs to explain what we are "doing," and also applies OTIs aimed at a clients' goals.

The future, *goal of the OTIF*, is to provide a universal classification system that allows OTs to *globally speak the same language* regardless of clients' diagnoses/disabilities, or practice area, expertise, or training, thus promoting greater evidence-based practice, client satisfaction, and well-being.

Appendix 1

Excluded Publications

Due to Not Concerning Occupational Therapy or the Author Is an Author of the First Edition of International Handbook of Occupational Therapy Intervention

References

C = Cochrane
P = PubMed
O = OTseeker

Aas RW, Tuntland H, Holte KA, Røe C, Lund T, Marklund S, Moller A (2011 April 13) Workplace interventions for neck pain in workers. Cochrane Database Syst Rev (4):CD008160. doi:10.1002/14651858.CD008160.pub2 (P)

Abizanda P, León M, Domínguez-Martín L, Lozano-Berrio V, Romero L, Luengo C, Sánchez-Jurado PM, Martín-Sebastiá E (2011 July) Effects of a short-term occupational therapy intervention in an acute geriatric unit. Randomized Clin Trial Maturitas 69(3):273–278. doi:10.1016/j.maturitas.2011.04.001. Epub 2011 May 20 (O)

Agerwala SM, McCance-Katz EF (2012 Sep-Oct)Integrating screening, brief intervention, and referral to treatment (SBIRT) into clinical practice settings: a brief review. J Psychoactive Drugs 44(4):307-317 (P)

Ale MT, McKeough ZJ, Troosters T, Bye P, Alison JA (2011) Exercise training to improve exercise capacity and quality of life in people with non-malignant dust-related respiratory diseases. Cochrane Database of Systematic Reviews (Issue 10. Art. No.: CD009385). doi:10.1002/14651858.CD009385 (C)

Altenmüller E (2010 Mar) Jabusch HC.Focal dystonia in musicians: phenomenology, pathophysiology, triggering factors, and treatment. Med Probl Perform Art 25(1):3–9 (P)

Andersen MF, Nielsen KM, Brinkmann S (2012 March) Meta-synthesis of qualitative research on return to work among employees with common mental disorders. Scand J Work Environ Health 38(2):93–104. doi:10.5271/sjweh.3257. Epub 2011 Oct 24 (P)

Arends I, Bruinvels DJ, Rebergen DS, Nieuwenhuijsen K, Madan I, Neumeyer-Gromen A, Bültmann U, Verbeek JH (2012 Dec 12) Interventions to facilitate return to work in adults with adjustment disorders. Cochrane Database Syst Rev 12:CD006389. doi:10.1002/14651858.CD006389.pub2 (P)

Azad N, Molnar F, Byszewski A (2008 May). Lessons learned from a multidisciplinary heart failure clinic for older women: a randomised controlled trial. Age Ageing37(3):282–287. doi:10.1093/ageing/afn013. Epub 2008 Feb 18 (O)

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Baldo P, Doree C, Molin P, McFerran D, Cecco S (2012) Antidepressants for patients with tinnitus. Cochrane Database Syst Rev (Issue 9. Art. No.: CD003853). doi:10.1002/14651858.CD003853.pub3 (C)

Balhara YP, Verma R (2012 Sept) Schizophrenia and suicide. East Asian Arch Psychiatry 22(3):126–133 (P)

Balhara YP, Verma R (2012 Sept) Intensive voice treatment in Parkinson's disease: Lee Silverman voice treatment. East Asian Arch Psychiatry 22(3):126–33 (P)

Baur X, Aasen TB, Burge PS, Heederik D, Henneberger PK, Maestrelli P, Schlünssen V, Vandenplas O (2008 Aug) Wilken D; The management of work-related asthma guidelines: a broader perspective. Best Pract Res Clin Rheumatol 22(4):677–691. doi:10.1016/j.berh.2008.04.001 (P)

Bendixen RM, Kreider CM (2011 May-June) Review of occupational therapy research in the practice area of children and youth. Am J Occup Ther 65(3):351–359 (P)

Bestha DP, Jeevarakshagan S, Madaan V (2010 Aug) Management of tics and Tourette's disorder: an update. Expert Opin Pharmacother. 11(11):1813–1822. doi:10.1517/14656566.2010.486402 (P)

Bhui KS, Dinos S, Stansfeld SA, White PD (2012) A synthesis of the evidence for managing stress at work: a review of the reviews reporting on anxiety, depression, and absenteeism. J Environ Public Health 2012:515874. doi:10.1155/2012/515874. Epub 2012 Feb 14 (P)

Boncoraglio GB, Bersano A, Candelise L, Reynolds BA, Parati EA (2010) Stem cell transplantation for ischemic stroke. Cochrane Database Syst Rev (Issue 9. Art. No.: CD007231). doi:10.1002/14651858.CD007231.pub2 (C)

Bonnet MP, Basso O (2012 April) Prohemostatic interventions in obstetric hemorrhage. Semin Thromb Hemost 38(3):259–264. doi:10.1055/s-0032-1302441. Epub 2012 Feb 1 (P)

Brown CA, Kother DJ, Wielandt TM (2011 Dec) A critical review of interventions addressing ageist attitudes in healthcare professional education. Can J Occup Ther 78(5):282–293 (P)

Burton AK, Kendall NA, Pearce BG, Birrell LN, Bainbridge LC (2009 Jan) Management of work-relevant upper limb disorders: a review. Occup Med (Lond) 59(1):44–52. doi:10.1093/occmed/kqn151. Epub 2008 Dec 10 (P)

Caliandro P, La Torre G, Padua R, Giannini F, Padua L (2012) Treatment for ulnar neuropathy at the elbow. Cochrane Database Syst Rev (Issue 7. Art. No.: CD006839). doi:10.1002/14651858.CD006839.pub3 (C)

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de Vries U, Reif K, Petermann F (2011 May) Cancer-related fatigue. Psychosocial support. Curr Opin Rheumatol. 23(3):259–264. doi:10.1097/BOR.0b013e32834540fb (P)

Dirmaier J, Krattenmacher T, Watzke B, Koch U, Schulz H, Barghaan D (2010 March-April) Evidence-based treatments in the rehabilitation of patients with depression-a literature review. Psychother Psychosom Med Psychol 60(3–4):83–97. doi:10.1055/s-0029-1220887. Epub 2009 Dec 10. Article in German (P)

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Endre L. [Occupational rhinitis] (2010 June 6) Orv Hetil 151(23):941–945. doi:10.1556/OH.2010.28872. Article in Hungarian (P)

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Chapter 4
Occupational Therapy: Emphasis on Clinical Practice

Ingrid Söderback

Abstract This chapter discusses core contents, theoretical basis, fundamental statements, and ethical considerations of occupational therapy. Classification systems for identifying clients for occupational therapy are presented. Occupational Therapy Intervention Framework (OTIF), i.e., the occupational therapists' roles, the occupational therapy intervention and therapeutic media, and occupational therapy goals are introduced.

Keywords Clients · Clinical reasoning · Disability · Goals · Health · ICF · International classification of functioning · Interventions · Need for occupational therapy · Occupational therapy · Occupational therapy intervention framework · Purpose · Statements · Theoretical base · Therapeutic media

Core Contents of Occupational Therapy

Statements and Definitions of Occupational Therapy

Occupation is the core content and the most basic concept of occupational therapy.

> Occupations is everything people do to occupy themselves, including looking after themselves…enjoying life…and contributing to the social and economic fabric of their communities…. (Law et al. 1997)

Occupations deal with the equality of the occupational therapy interventions (OTIs) in occupational therapy.

> Occupation or goal-directed activity is a method to improve human performance in self-care, work, and play/leisure pursuits. These methods are originated in theory and research that links the physical, psychological, cognitive, and emotional factors (capabilities) of human performances to the individual's attitudes, motivation, values, interests, habits, living environment, and present culture. (Levine and Brayley 1991)

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Thus,

> Occupational therapy is any activity, mental, or physical, medically prescribed and professionally guided to aid a patient (client) in recovery from disease or injury (McNary 1947).

In occupational therapy, occupation—occupational performance—is thus both the mediator and the goal of the intervening process (Royeen 2002).

In other words, purposeful and meaningful activities are used in occupational therapy (Stein and Roose 2000) to *restore* people's functioning and to *prevent* injury, disease, or disability. Environmental barriers frequently need to be removed to *facilitate* people's *participation* in social life (World Health Organization 2014).

Core elements of the occupational therapists' (OTs) work are (1) the production of tasks and activities and the time it takes to do them; (2) the "doing" process itself; and (3) clients' motivation for "doing," their experience of meaning and satisfaction while doing, and the results (Nelson 1988, 1996).

How a therapeutic occupation is performed depends strongly on the individuals' functional capability, will, interests, habits, roles, and what is socially common and acceptable in the individual's culture (Kielhofner 2007, 2008). These factors deeply influence how the OT conducts OTIs. These facts are illustrated: Many years ago, an OT from South Africa met a Swedish colleague during a conference. In his presentation, my colleague explained how to adapt the knobs on an electric stove if the patient has weak hand grips, and how to arrange for a person in a wheelchair to be able to reach the knob when cooking. The South African's comment after the lecture: "This is not relevant, possible, or appropriate in my country: you know, most women, even if they are disabled, sit on the ground and do their cooking over an open fire."

Professional Titles in Occupational Therapy

Some European countries use the terms *ergotherapy* and *ergotherapist* instead of occupational therapy and *occupational therapist* (WFOT 2008).

The ancient Egyptian *ankh symbol* is the professional sign adopted by OTs working in the USA and Sweden. The symbol (Fig. 4.1) represents "everlasting life, contributing to good health and protecting from negative active influence" (Ellison 2008; Wikipedia 2014).

Throughout this handbook, a stylized ankh is used to symbolize the OTs' therapeutic roles (Fig. 4.1) in health care and social welfare.

The Occupational Therapy Discipline

The academic discipline of occupational therapy may be divided into basic and applied research:

- The *basic research area* is termed *occupational science*. This area concerns studies of humans as *occupational beings*. Occupation refers to the goal-directed

Fig. 4.1 The Ankh sign. A wall at the Temple of Karnak, Luxor, Egypt. (Photo: Ingrid Söderback)

activities that characterize humans' daily life and lifetime and how occupations affect human health and vice versa (Clark et al. 1991; Zemke and Clark 1996). Hokings, Jones, and Kirk in Chap. 9 state the base of occupational science and its connection to clinical applications (Whiteford and Hocking 2012).

- The *applied research area* includes studies of (1) needs assessment (Müllersdorf and Soderback 2000; Soriano 1995, see Chap. 7), (2) clinical reasoning process (Schell and Schell 2007, see Chap. 5), (3) marketing (Soderback and Frost 1995), (4) controlled studies of evidence for the intervention's effectiveness (see Chap. 8), and (5) cost effectiveness (Graff et al. 2008).

The applied research focuses on OTIs—the area with which the handbook is mainly concerned (Parts II–V).

The Theoretical Base of Occupational Therapy

Clinical practice is guided by the occupational therapy's theoretical and applied knowledge consisting of the following:

- *Axioms* and *theories* that describe the human as an occupied being.
- *Values and beliefs* about people's capacity to alter their performance of daily occupations toward health.
- *Ethical considerations.*
- *Clinical reasoning* about how to manage specific OTIs with clients.
- *Experience of conducting OTIs.*

Axiom

An axiom is a fundamental statement that "commends itself to general acceptance" (Oxford English Dictionary 2014). Axioms include a presumption that truth is not susceptible of proof with currently available scientific methodology.

The axioms used in occupational therapy all concern hypotheses about the relationship between the occupied human being and his or her health. Meyer (1922), a psychiatrist and neurobiologist who worked with people with mental illness, is widely considered the "father of occupational therapy." He stated this axiom:

> Man learns to organize time and he does it in terms of doing things. (Meyer 1922; quoted in Christiansen and Baum 1997, p. 33)

This may be understood to mean that occupation provides the human being with "a sense of reality, achievements, and temporal organization" (Christiansen and Baum 1997, p. 33).

Another often quoted and well-known axiom was stated by Reilly (1962):

> Man, through the use of his hands as they are energized by mind and will, can influence the state of his own health (p. 2).

Through creativity and doing tasks, a person can "deploy his thinking, feelings, and purposes to make himself at home" (van Deusen 1993, p. 159).

Axioms that include statements such as the above are criticized for lacking connection with the OT's everyday role and clinical practice. Elizabeth Yerxa (1967) recognized this gap between occupational science and clinical practice. She emphasizes the role of the OT in "assisting the individual to cope with problems of everyday living and to adapt to limitations that interfere with competent role performance" (Baum and Christiansen 1997, p. 34).

A typical axiom for this handbook is that *OTIs influence clients' states of activity health*, which include the experience of (1) being in a state of occupied equilibrium, (2) conveniently, and with feelings of (3) meaningfulness, (4) well-being, (5) satisfaction, and (6) optimal quality of life.

Activity health means that experience and feelings when performing occupations of daily life meet a person's expected goals and appropriate sociocultural norms (Cynkin and Robinson 1990; Soderback 1999). This experience is a possible outcome factor of occupational therapy.

Theories and Models

Occupational theories and models describe *people as occupied beings living in their social and cultural environments*. Among many promising approaches, the predominate models, in my view, are as follows:

- The *Model of Human Occupation* (Kielhofner 1985, 1995, 2002, 2005, 2007, 2008).
- The *Occupational Science* (Johnson and Yerxa 1989; Zemke and Clark 1996).
- The *Person–Environment Occupational Performance: A Conceptual Model for Practice* (Christiansen and Baum 1997).

- *Occupation: form and performance* (Nelson 1988).[1]

These models have made invaluable contributions to the development of the discipline and to OTs' clinical reasoning (see Chap. 5).

Values and Beliefs

The following prominent values permeate OTs' thinking in their work with clients:

- People have the capacity to find *alternative ways* of performing occupations to gain competence and master their desired and expected roles in life. This may entail changes toward a state of *occupied equilibrium,* meaningfulness, and well-being. This positively influences quality of life and health.
- *Participation* in occupational therapy, where clients are occupied in various purposeful or meaningful ways, *influences* their *occupational capability*.
- OTs seek to apply *client-centered interventions* (Sumsion 2006). Here the client is *valued* as his or her own expert. Therefore, it is the client's knowledge of how to arrange his or her daily habits, and choice of meaningful and purposeful activities, that influences the OTs' intervention plans.
- The client is the actor, the occupied partner during all therapy sessions. The OT acts as a guide, *helping the client to self-help*.
- The habilitation/rehabilitation aspect is highly valued, focusing on the client's future ability to move from *dependence to interdependence to independence*.

Ethical Considerations and Priorities

Ethical considerations and priorities operate in all clinical situations in which OTs need to decide on what is right or wrong. Lindberg and Broqvist (Chap. 6) present a model for analysis of ethical dilemmas that can be used in OTs' daily work and discuss the concept of prioritization.

The Clients

Classifying Those Who May Need Occupational Therapy

Classification systems in healthcare are used to define and describe people's strengths and deficits. Clients[2] who participate in occupational therapy are:

[1] For extensive accounts of the contents and the pros and cons of these models, refer to the original literature.

[2] Client is the chosen term throughout the Handbook. However, it is interchangeable with the term patient.

- People diagnosed with medical conditions having functional limitations and restrictions in activities of daily living (ADL), such as self-care, and in home, work, and leisure activities. Based on scientific studies, the clients who at present are representative to participate in occupational therapy are presented from two different perspectives in Chaps. 3 and 7.
- People in general who are living in a society and are at risk for occupational deficits (see Chap. 62).

Clients participate in occupational therapy at (1) a hospital; (2) a care institution, such as a nursing home, senior citizens' home, or health center; (3) a wide range of workplaces; and (4) in their homes. Students may participate in occupational therapy at their schools (WFOT 2008a). Clients represented in the chapters of this handbook are classified according to the International Classification of Diseases (ICD), and presented in Table 4.1.

In occupational therapy, various classification systems are in use:

- *Conducting an OTI* or an occupational therapy program: Here OTs describe clients' occupational performance deficits according to *the* occupational therapy model that underpins the actual OTI which is in use. E.g.,
  - Domain and Process (American Occupational Therapy Association (AOTA 2002, 2013) describes occupational therapy in general. It shows how clients have strengths and deficits in occupational spheres, performance skills/patterns in relation to context, what an activity demands, body functions and body structures, and other factors affecting the occupation. According to this framework, candidates for occupational therapy have performance limitations when conducting needed or desired occupations (e.g., Chap. 44).
  - OTI may depend on the client's age. (For children, e.g., see Chaps. 21, 44, 45, and 52; for older adults, and frail elderly, see, e.g., Chaps. 12, 29, and 63.)
- Clients who may *need occupational therapy* are described according to the following classification systems which are used alone or in combinations:
  - *International Classification of Functioning, Disability, and Health (ICF)* is "used to understand and measure health conditions." This is a system for classifying health and health-related domains that describes body functions and structures, activities, and participation. The ICF also includes a list of environmental factors. The term *functioning* is the catchall term for "body functions, activities, and participation," and *disability* is the catchall term for "impairments, activity limitations, or participation restrictions" (World Health Organization 2007a).
  - According to the ICF, people may be helped by OTIs if they meet the following criteria:
  - Have impairments due to changed body functions or structures concerning (1) mental functions, (2) sensory functions, (3) neuromusculoskeletal and movement-related functions, or (4) functions of the skin and related structures. They *seldom have impairments due to* (1) voice and speech functions or (2)

Table 4.1 Examples of diseases/disorders represented in this handbook, thus describing the candidates who may participate in occupational therapy

ICD-RHP			Exemplified in the handbook	
Blocks	Title	Disease	Disease/disorder specified	Chapter no.
F20–F29	Mental and behavioral disorders	Schizophrenia, schizotypical, and delusional disorders	Schizophrenia	25
F20–F29		Schizophrenia, schizotypical, and delusional disorders	Schizophrenia	34
F20–F29		Schizophrenia, schizotypical, and delusional disorders	Schizophrenia	35
F20–F29		Schizophrenia, schizotypical, and delusional disorders	Schizophrenia	36
F20–F29			Depressive disorders	51
F30–F39	Mental and behavioral disorders	Mood: state of depression	Dementia	28, 29, and 38
F70–F79	Mental and behavioral disorders	Disorders of adult personality and behavior	Mental retardation	44
G80	Mental and behavioral disorders	Disorders of personality and behavior	Rett syndrome	23
G80	Diseases of the nervous system	Cerebral palsy and other paralytic syndromes	Cerebral palsy	45
G82	Injury, poisoning, and certain other consequences of external causes	Paresis/paralysis in the lower limb	Paraplegia, tetraplegia, and muscle weakness	20
G83	Injury, poisoning, and certain other consequences of external causes	Injury, poisoning, and certain other consequences of external causes	Several various diseases, e.g., cerebral paresis	39
G00–G09	Diseases of the nervous system	Inflammatory diseases of the central nervous system	Musculoskeletal pain and fatigue	49
G82	Injury, poisoning, and certain other consequences of external causes	Paralysis of upper limb	Cumulative trauma disorders	15
G82		Paresis/paralysis in the lower limb	Paraplegia and tetraplegia	16
G83	Injury, poisoning, and certain other consequences of external causes	Paresis/paralysis in the lower limb	Stroke, hemiparesis	41
G83	Injury, poisoning, and certain other consequences of external causes	Paresis/paralysis in the lower limb	Mental retardation	14

Table 4.1 (continued)

ICD-RHP			Exemplified in the handbook	
Blocks	Title	Disease	Disease/disorder specified	Chapter no.
H00–H59	Visual disturbances and blindness	Low vision on both eyes	Various eye diseases	22 and 32
LF30–LF39	Mental and behavioral disorders	Schizophrenia, schizotypical, and delusional disorders	Alzheimer's disease	56
M00–M99	Diseases of the musculoskeletal system and connective tissue	Neck and back pain	Musculoskeletal pain	47
M00–M99		Neck and back pain	Chronic low back pain disorder	48
M00–M99			Neck and back pain	49
M05–M14	Inflammatory polyarthropathies		Rheumatoid arthritis	42
M15–M19	Inflammatory polyarthropathies		Arthrosis	42
S00–T98	Injuries, poisoning, and certain other consequences of external causes	Injuries to the wrist and hand, fractures, burns	Hand trauma, hand arthritis	18
S00–T98		Injuries to the wrist and hand, fractures, burns	Burn injury	19
S10–S19	Injuries to the neck; spinal cord injury	Injuries to the neck; spinal cord injury	Musculoskeletal pain	47
S6	Intracranial injury (brain injury; brain damage)	Acquired brain injury	Stroke	30
S6			Acquired brain injury, stroke	31
S6			Acquired brain injury, stroke: apraxia	22
S6			Multiple sclerosis	33
S6			Stroke	40
S6			Parkinson's disease	43

The classification is according to the International Classification of Diseases and Related Health Problems (ICD-RHP), 10th Version, for the World Health Organization (2007).

functions of the cardiovascular, hematologic, immunologic, and respiratory systems. They *very seldom have impairments due to* functions of the digestive, metabolic, and endocrine system, and they *almost never have impairments due to* genitourinary and reproductive functions.
- Have a combination of impairments and disabilities or solely disabilities concerning performances of (1) learning and applying knowledge, (2) general tasks and demands, (3) communication, (4) mobility, (5) self-care, and (6) domestic life.
- Have restricted participation in (1) personal interaction and relationships or (2) community, social, and civic life.

While the ICD might not be considered, the most sensitive system for describing strengths and deficits among occupational therapy clients, it has the overwhelming advantage of being well known among health professions and stakeholders internationally, for which reason it is used here.

- The *Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR* (American Psychiatric Association 2008).
- The *Statistical Classification of Diseases and Related Health Problems* 10th Revision, Version for 2007 (ICD 10th) classifying diseases and disorders (World Health Organization 2007b) resulting from illness or injury.
- Other country-specific systems for classifying care, including OTIs is, for example, for use in Sweden, *Classification of Care Interventions* (National Board of Health and Welfare (Socialstyrelsen) 2009).

As long as there is no consensus among OTs worldwide regarding what classification system has to be used when conducting OTIs or for identifying people needing therapy, it is of less significance what system is used; similar shortcomings in "agreement between the definitions of the Framework and the clinical application" have been demonstrated by Butts and Nelson (2007). Consequently, epidemiologic knowledge of which people need and participate in occupational therapy should be further developed by conducting research on needs assessment (Soriano 1995) as advocated by Müllersdorf and Soderback (2000; see Chap. 7). This lack of knowledge also influences the public's and stakeholders' understanding of the discipline of occupational therapy.

OT's Clinical Reasoning

Clinical reasoning is thoroughly reported in Chap. 5. Clinical reasoning is a chain of theories of the occupied human being, scientific knowledge, and evidence-based practice. The chain may be viewed as the art of managing OTI (Hagedorn 1995) and the emphatic and ethical ways of meeting the client.

Clinical reasoning entails the following:

- The OT's ideas of optimal clinical practice are compatible with the needs of the client. Clinical practice embraces all that happens during an interactive OTI process.
- The OT has the knowledge and experience to conduct OTIs. OTs must respect clients' narratives about their experience of disability and life in order to understand and make decisions about OTIs that may also be applied with future clients. OTs use this information to explain OTI choices, motivate the client to participate, and make the final decisions about the therapy.
- The OT makes use of available information about the client when planning, directing, and reflecting on a client's proposed participation. The following questions may be helpful: Who is the client? What is his or her occupied status? What does the client want in relation to what occupational therapy can offer and the community can afford? What are the goals and expected outcomes? What would be the most effective and appropriate OTI? Is the stipulated OTI evidence-based and cost-effective? (Early 2001).

The OTs' Roles

An OT is a healthcare practitioner who analyzes the impact of occupation on health and quality of life in order to restore a functional interaction between the person and the environment. (School of Physical and Occupational Therapy, McGill University 2014)

- The OT's main roles are:
  - The *team member role:* acting together with other health professionals in habilitation, medical rehabilitation, geriatric, or social welfare teams to attain the client's expected health goals (see Chap. 46).
  - The *consulting role:* cooperating with the client's family, friends, coworkers, and others (landlords, architects) who can play a significant role in helping people attain their occupational goals (e.g., see Chaps. 24 and 28).These roles entail interpersonal relationships, requiring the OT's cooperation and management (Yerxa 2001), meaning that OTs guide, advise, recommend, and coach to solve problems (Glantz and Richman 1997).
  - The *therapeutic roles:* In the clinical cooperation between the client and the OT, the OT is the partner who possesses his/her occupational, ergonomic, pedagogic, psychological, and medical knowledge and professional skill to conduct OTIs. For example, OTs facilitate, guide, coach, teach, and encourage the clients participating in OTIs. This is followed out with emphatic understanding of client's personality and unique circumstances. OTs have responsibility for collaborating with clients so that they reach the goals of engagement in meaningful and purposeful ADL (see Parts II–V).

The OTIF comprises OTs' four main roles as presented in chapter 3 and as outlined in Fig. 4.2:

- OT manages and facilitates (internal, temporal, occupational, and environmental) adaptations that affect client's occupational behavior and performance and that influence patterns of daily occupations (see Part II).
- OT teaches functions and ADL so that that client's learn/relearn to accomplish desired and expected tasks at home, at work, at school, in leisure time, and in the community (see Part III).
- OT enables for clients to perform meaningful and purposeful occupations, which then facilitate his or her recovery and well-being (see Part IV).
- OT promotes clients' health and wellness that is expected to prevent injuries, diseases, and disabilities (see Part V).

OTs play these main and important roles during conducting OTI. It is an interaction between the clients, the OT, and the occupation/activity that is in focus. OTs act with focus on strategies that (1) create a relationship built on confidence with their client, (2) support goal setting that makes use of the client's experience, and (3) motivate the client's interdependent living (Guidetti and Tham 2002), and (4) is responsible for conducting the OTI process.

Conducting OTIs

Intervention refers to what occurs during an occupational therapy session. Outlined in OTIF, it is the OT's application of methods used to adapting, teaching, enabling occupational performances and promoting activity health (Fig. 4.2).

- OTIs concerning how the OT *manages* and facilitates the client's *adaptations* are presented in Part II of the handbook and comprises environmental adaptations (Chap. 12–14), accessibility (Chap. 15), accommodation (Chaps. 16 and 17), orthotics and splints (Chaps. 18 and 19), assistive devices (Chaps. 20–23), universal design (Chap 24), and temporal adaptation (Chaps. 25 and 26).
- OTIs concerning how the OT *teaches* for the client's *learning* or relearning are presented in Part III of the handbook and comprises teaching strategies in context with neurological diseases (Chaps. 27–29), the dialog technique approach (Chap. 30–32), programs for active learning (Chaps. 33–38), neuromusculoskel-

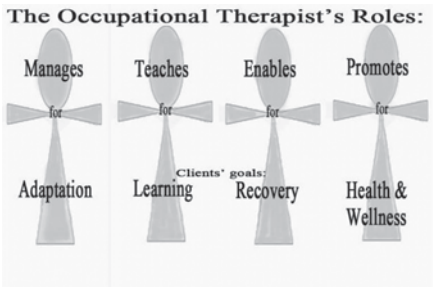

Fig. 4.2 The Occupational Therapy Intervention Framework (OTIF). The figures are stylized Ankh signs (see Fig. 4.1)

etal and movement-related learning (Chaps. 39–45), learning approaches for participation in working life (Chaps. 46–52).
- OTIs concerning how the OT *enables* for the client's *recovery* are presented in Part IV of the handbook (Chaps. 53–60) and comprises activities such as movement exercises, reactional activites, horticultural/gardening activites, and music.
- OTIs concerning how the OT *promotes* for the client's *health and wellness* are presented in Part V of the handbook and comprises (Chap. 62) how the OT prevents, e.g., the client getting injured or disabled by sickness.

The OTIs that in this way are classified to belong to either category of OTIF is a theoretical construct toward a professional taxonomy (Chap. 3) and which need more research to be truly stated. In clinical reality, OT uses a mix of OTIs to the single client. For the future, it may be a favor if OTs had access to practical guidelines[3] for the various OTIs. However, the chapters of this handbook may be helpful for a starting point in this extensive work.

OTIs are conducted based on the OT's professional management skills, which constitute a *case management process*. The process involves evaluation, intervention, and outcome (AOTA 2007; Fischer 2009, 2014). The seven aims of the process are (1) to evaluate the client's occupational performance status, (2) to set realistic and appropriate goals in accordance with the client's wishes and expectations, (3) to judge whether available OTIs may contribute to the client's activity health, (4) to select and implement appropriate intervention(s), (5) to use appropriate therapeutic media, (6) to give the client information that may boost motivation and participation (see Chap. 62), and (7) to discharge the patient and assess the outcome (see Chap. 8).

This process is described as linear (Reed and Sanderson 1980). However, in clinical practice, the steps are *interactive* and may be used as an integrative case management process, as described by Hagedorn (1995). This interactive process where the various steps were used simultaneously has been demonstrated in a clinical study of six outpatients (Soderback et al. 1994).

Therapeutic Media Used in OTIs

OTIs include combinations of therapeutic media, also termed *professionally legitimized tools* (Mosey 1986). The most commonly used therapeutic media are discussed in the following subsections.

- Deliberate Therapeutic Conscious Use of Self
  The use of self in the professional way that OTs meet and communicate with clients, team members, and other health professionals and people involved in the clients' care and habilitation/rehabilitation. It is the OT's "planned use of personality, insights, perceptions, and judgments [that contribute to] the therapeutic process" (Rogers 2007). Engagement and knowledge should mark the OT's co-

[3] See US Department of Health & Human Services, Guidelines http://www.guideline.gov/content.aspx?id=38529

operation with and management of the client. This cooperation should comprise an understanding of the client's personal circumstances. The OT should show empathy and respect for the client's life situation, and maintain ethical behavior (see p. 11; Hagedorn 1995; Schwartzberg 1993).

- Activity Analysis and Activity Synthesis
  These analyses focus on the tasks that constitute the performances of an occupation or activity. Activity synthesis is the integration of some or all of these performance components with an appropriate theory that is consistent with the client's goals and present status (Crepeau 1998). Activity analysis and synthesis are prerequisites for using purposeful and meaningful occupations as legitimate tools (Mosey 1986).
- Activity analysis is the OT's detailed examination, giving information about the inherent qualities and requirements of an occupation, an activity, or a task. This examination is required if the occupation is to be usable as a therapeutic medium. Through it, the OT may understand (1) the performance components and sequential steps that complete a task; (2) the tools, equipment, material, and other sources needed for the "doing"; (3) how the task's difficulty level can be adapted to various degree of difficulties; (4) the time necessary for completion; (5) ergonomic and environmental prerequisites of effective and optimal performance; and (6) elements of risk or danger in the doing process. Results of an activity analysis also give OTs information about the clients' feelings about what they are doing (e.g., not everyone enjoys washing dishes; Lamport et al. 1989; Stein and Roose 2000).
- Activity analysis also underlies job analysis, showing what a job requires of a worker in terms of functions, characteristics, components, temperament, and environmental conditions (US Department of Labor 1996; US Department of Labor, Employment and Training Administration, and Service 1991). Such analysis is used in connection with simulated work tasks in occupational rehabilitation (VALPAR 1993), to modify work tasks so that they match the worker's ability and to prevent occupational injuries (Soderback 2006; Soderback et al. 2000; Stein et al. 2006).
- Activity synthesis consists of the integrative processes among the client, the actual occupation, and the appropriate theory (e.g., frames of reference; Mosey 1986). Activity synthesis leads to the development of strategies with which the client learns desirable new ways of performing occupations. This learned-performance approach is expected to be able to generalize to new occupations or new situations. Thus, activity syntheses may be used for selecting which performance components should be stressed during an OTI, and how the occupation should be graded and adapted (Crepeau 1998; Hagedorn 1995).
- Activity synthesis requires the OT-specific knowledge of the biomechanical, ergonomic, neurodevelopmental, cognitive–perceptual, and psychosocial theories that may be the focus of the OTI. Activity syntheses are a part of the OT's professional knowledge base, though they seldom are distinctly explicit.
- Activity synthesis is the base for the following:

Intervention approaches (see Part III) used for teaching functional training for remediating (see Chaps. 30–32). An example is cognitive teaching of the dialogue technique approach.

- Constructing occupational therapy assessments. For example, the Intellectual Housework Assessment (IHA) consists of integration between the analysis of housework tasks, where work sequences are selected and integrated with Luria's neuropsychological functional reorganization theory (Soderback 1988).
- Purposeful Activities Used Therapeutically
  This therapeutic medium comprises the clients' performance of (1) ADL, such as self-maintenance and housework; (2) real or simulated work tasks; (3) tasks used for training functional performances, such as movement of a paralytic arm/hand; and (4) doing arts and crafts (Levine and Brayley 1991).
- Quite simply, the OT selects an activity that is effective for reaching the client's goal. The OT (1) determines degree of difficulty of performance, (2) chooses what tools and materials should be used, and (3) expresses other requirements for performance. These professional decisions are made in relation to the clients' present functional ability, will, and motivation for participation (Mosey 1973; Schwartzberg 1993).
- Therapeutic Uses of Meaningful Activities
  These activities comprise the clients' performance of things that he or she wants to do. OTs in various ways enable clients to perform occupations otherwise barred to them by their current status. Doing meaningful activities is a way of meeting the client's need for acceptance, achievement, creativity, autonomy, and social relations. The meaningfulness of the activity should help the clients to feel that they are productive, contributing, and needed members of the community (see case of Marie-Louise, Chap. 53).
- Therapeutic Uses of Problem Solving
  These uses include (1) how OTs may suggest unusual ways of performing occupations; problem-solving in this context is closely related to adaptive interventions (see Chap. 11) and (2) a training strategy for managing common social situations (Liberman et al. 1998).
- Therapeutic Uses of Group Dynamics
  Mosey (1986) stated: "A group is an aggregate of people who share a common purpose and are interdependent in the achievement of that purpose." Group dynamics as a legitimate tool is often used (1) to create spirit of community, (2) to express feelings among clients who have a similar experience of disability, (3) to foster a healthy lifestyle, and (4) to develop social skills (Mosey 1986).
- A great range of purposeful and meaningful activities, such as arts and crafts, housework, and leisure activities, are used to mediate group dynamics. The OT's responsibility for creating a therapeutic group is (1) to plan, analyze, synthesize, and adapt the occupation to be performed; (2) to recommend the constellation and number of group members; (3) to set the goal for the group; (4) to outline norms for the group; and (5) to establish how the environment should be arranged to encourage interaction among the group members. Here, the OT's professional leadership skills come into play, in particular, managing commu-

nication with and among group members, since this is often directed at modeling clients' behavior or facilitating the expression of clients' feelings (Hagedorn 1995; Schwartzberg 1998).

- Therapeutic Use of Ergonomics and Environmental Factors
  Ergonomics is how the environment meets the person's needs for overcoming disability and restricted social participation (see Parts II and V). Environmental factors include the person's immediate surroundings and social interaction with others.
- Environmental factors are used deliberately in most OTI aimed at adapting the environment and preventing trauma and ill-health in the home and at the workplace.
- Ergonomics include applications of (1) ergonomic physical principles, such as actions with joints in neutral positions to avoid constant muscle strain and pain; (2) ergonomic psychological principles, such as organizational factors at work that affect workers' stress levels, possibly leading to stress-related ill-health, exhaustion, or depression (see Chap. 65); and (3) the use of universal design (Stein et al. 2006) to achieve the best fit between the individual and the tools used.

OTIF Main Goals

In occupational therapy, a goal is a concise statement of what is expected to occur over the short term or a long term (Hagedorn 1995).

The *OTIF four main OTI goals* are sketched in Fig. 4.2. These main goals, which may be the main outcomes of OTIs, are those the clients *adapt* to and *learn/relearn* that wanted and required performances of activates are feasible and that he/she *recovers* and maintains *health and wellness*. These goals are defined in Chap. 3. They are interactive and used to the same client.

Goal setting is based on assessments[4] (see Chap. 8).

The OT states appropriate main goals and subgoals for the actual OTI. *Subgoals* may be to acquire new ways of doing daily occupations, change behavior toward a healthier lifestyle, overcome internal or external obstacles to occupation, obtain or keep paid employment, and maintain daily occupations (Reed and Sanderson 1980).

Goals are stated among other factors depending on the client's occupational and medical statuses. The direction of the medical prognosis may be as follows:

- *Improvement.* Recovery is possible, such as after a hip replacement. The goal is to *develop* or *restore* the clients' functioning and occupational performance.
- *Status quo.* The client's condition is a permanent state, such as paraplegia. The OTI goals are to *maintain* present functional status of (regained) abilities, allowing the performance of needed and desired daily occupations.

[4] For an extensive overview of available assessments, see the Index of "Assessments, Approaches and Instruments" (Christiansen and Baum 1997) and use a database search, e.g., Entrez PubMed (National Library of Medicine 2008).

- *Deterioration* is connected with degenerative diseases. A decrease in client's functional status is expected, such as with Alzheimer's disease. The OTI goals are to *compensate* for lost disability by adapting occupations and environments and to *prevent* risks of ill-health that restricted occupational performance incurs (AOTA 2002, 2013).

Summarizing, the general main goals of OTIs are to optimize function, activity, and participation; to enable/improve the performance of ADL tasks; and to express feelings of being occupied.

The Occupational Therapy Students' Learning

During past years, education in healthcare and medicine (e.g., Karolinska Institute) has emphasised the use of pedagogical method: *The Interactive Client Case Studies*. Nordqvist and Sundberg present the method in Chap. 10. Case descriptions, written in the spirit of the Integrative Client Case Studies, are presented at the end to most of the chapters presented in Parts II–V.

This pedagogical method was inspired by the "case method" used at Harvard Business School. It is also entitled "Case Based Method and Socratic Case Study Method" (Stein et al. 2006, Chap. 3).

Using Integrative Client Case Studies offers an opportunity for occupational therapy students to reflect on their professional doing and how they articulate professional knowledge and expertise in the use of OTIF, the OTIs, and the values for the clients.

The case descriptions presented were recommended to be written (1) with authentication, i.e., preferably from a real episode; (2) including *one* client's perspective; (3) having a clear perspective that facilitates the image of the leaner's professionally role; (4) in a narrative style, i.e., as a story which both mirrors the client's and the OT's roles; (5) preferably include details and describe conflicts that often appear in clinical practice; (6) the text should allow several interpretations and solutions; (7) finish with open-ended questions; and (8) to help the student's learning and the teacher to prepare for a seminar discussion of probable solutions.

The presented case studies may be tested in educational situations and presumably adapted and upgraded.

Few studies have evaluated the evidence for the effectiveness of applying the case teaching–learning method. Thistlehwaite et al. (2012) in a review study explored students perceptions of participating in "case-based learning," which was overwhelmingly positive and engaging.

Conclusion

This chapter provided an introduction to the occupational therapy clinical practice. The content presented here is what is judged necessary to understand the content of Parts II–V of the handbook. However, it is strongly recommended that the reader

studies the references, newly published textbooks in occupational therapy, and continuously follows the scientific information available from publications regarding occupational therapy and occupational science.

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Chapter 5
Clinical Reasoning Process: Cornerstone of Effective Occupational Therapy Practice

Annie Carrier, Mélanie Levasseur, Denis Bédard and Johanne Desrosiers

Abstract This chapter provides a description of occupational therapists' clinical reasoning. First, we present the clinical reasoning process integrative framework, including its internal and external factors of influence. Then, because of its core importance for effective practice, we discuss ways to learn about and improve clinical reasoning. Specifically, we propose a procedure inspired by Kolb's experiential learning model and Vermersch's explicitation technique to explicate and reflect upon one's clinical reasoning process. This reflection reinforces one's knowledge base, fosters expertise development, and optimizes clinical reasoning.

Keywords Client-centered practice · Clinical reasoning framework · Factors influencing clinical reasoning · Metacognitive skills and clinical reasoning · Reflective practice and clinical reasoning · Vermersch's explicitation technique and clinical reasoning

Introduction

Referred to as the *essence of professional identity* (Higgs and Jones 2008), the *basis of practice* (Schell and Schell 2008), and the *underpinning of all actions* (Norman 2005), clinical reasoning (CR) is considered a core competence for effective clinical practice (Higgs and Jones 2008). Consequently, it is important to know more about practitioners' CR. From a professional perspective, this knowledge expands occupational therapy's (OT) formal theories (Carrier et al. 2010). Moreover, from an individual perspective, CR and reflection upon it, i.e., metacognition

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(Carr and Shotwell 2008), helps shed light on elements, sometimes implicit, that affect professional practice, offering opportunities for improvement (Carrier and Prodinger in press). Metacognition also supports reflective practice (Kinsella 2001), which in turn reinforces one's knowledge base (Craik and Rappolt 2003), fosters expertise development (Jensen et al. 2008), and optimizes CR (Rivett and Higgs 1995). However, to be able to reflect on CR, OT practitioners and students need a clear conceptualization of CR. Based on a recent grounded theory study on occupational therapists' CR (Carrier et al. 2012), the aim of this chapter is to advance the conceptualization of CR.

We begin with a description of CR and its integrative framework and process, including its internal and external factors of influence. Then, because of its core importance for effective practice, we discuss ways to learn about and improve CR.

What Is CR?

First described as a cognitive process to solve problems and make decisions (Rogers 1983), CR is now defined more comprehensively as *the process that practitioners use to plan, direct, perform, and reflect on client care* (Schell 2009, p. 314). As a complex, context-dependent process (Schell and Schell 2008), CR needs to be considered within authentic relationships (Loftus 2012), such as with clients and colleagues. Consequently, CR can be investigated fruitfully in real-life situations (Arocha and Patel 2008; Unsworth 2008) and should be considered within the clinical setting.

Integrative CR Process Framework

The integrative CR process framework (Fig. 5.1) is a conceptualized representation of occupational therapists evolving CR that occurs during a clinical encounter as well as the external and internal factors influencing it. *External factors* relate to the client, the environment, the task, and how these factors interact, while *internal factors* relate to the occupational therapists themselves (Table 5.1). These external and internal factors influence the evolving CR process in each of its eight stages (Table 5.2).

During the clinical encounter, the CR process evolves from a generic to a personalized mode. The *arrows* represent the CR process. As they relate to the occupational therapist and modulate the influence of external factors, internal factors are the integral part of the CR process. External factors are represented by the *pink area* and *circular lines,* which, respectively, illustrate the static and dynamic influence exerted on the CR process. The narrowing gap between the lines indicates the increasing dynamic influence of external factors. The practice context, depicted by a square, has an implicit and diffused influence throughout the whole process. (From the *Australian Occupational Therapy Journal,* Carrier et al. 2012)

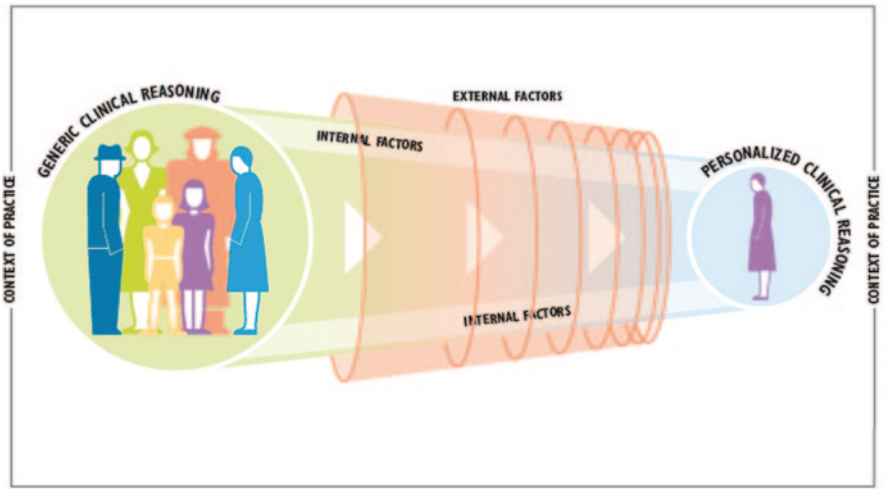

Fig. 5.1 Integrative clinical reasoning (CR) process framework. (From the *Australian Occupational Therapy Journal*; Carrier et al. 2012)

Table 5.1 External and internal factors influencing the evolving clinical reasoning process. (Adapted from Carrier et al. 2012)

External factors	Description
Client	
Availability (emotional, cognitive, physical)	Includes personality, openness to intervention, personal (e.g., level of education, learning style and speed), and functional characteristics (e.g., functional profile, type of disabilities, prognosis) Functional characteristics interact closely with the task (e.g., determine the objective)
Previous knowledge	Task knowledge and habits
Environment	
Client's physical and social environment	Physical and social obstacles and facilitators
Availability of tools	Tool(s) available or not when intervening
Occupational therapist's practice context	Includes physical location of the intervention, organizational factors (e.g., underlying values, implicit and explicit rules), work organization, and social environment (colleagues) Influence of the practice context is modulated by the OT's personality
Task	
Content	Type, complexity, and quantity of tasks (e.g., number of pieces of equipment involved)
Objective	Determined by the client's particular characteristics and environment (e.g., familiarize versus teach how to do it)
Interaction of Factors	

Table 5.1 (continued)

External factors	Description
Client–environment interaction	Degree of correspondence between the client and his/her social and physical environment
Task–environment interaction	Degree of correspondence between the task, equipment used, and place where it is done
Degree of difficulty/safety	Difficulty experienced by the client and risk to the client's safety when performing the task during assessment and intervention
Result of the strategy	Success or failure of the intervention strategy The result may be *anticipated* (prior to using the strategy) or *evaluated* from the client's reactions (after using the strategy)
Internal factors	*Description*
Knowledge and experiences (professional and personal)	Includes: Knowledge about (1) assessments, interventions, and equipment; (2) client's availability with respect to intervention Experiences regarding clients' reactions and characteristics, assessments, interventions, and equipment Acquisition of new knowledge and experiences sustains the development of the intervention plans that are available to the OT
Personal habits	Usual way of intervening in this type of clinical situation (corresponds to the profile–plan match)
Preparation	Degree of preparation for intervening; the need to prepare depends on the OT's knowledge and experiences
Availability (emotional, cognitive, physical)	Includes personality, degree of cognitive and physical fatigue, and openness to reactions from the client and his/her social environment. These reactions indicate the results of the strategy used
View of occupational therapy	A two-way, interactive and dynamic process modulated in terms of intensity

OT occupational therapist

Although described in Table 5.2 in a linear fashion, the CR process is circular, extremely fast, and constant throughout the clinical encounter.

Although described in Table 5.2, the eight CR stages can be aggregated in three phases (Table 5.2), each of which constitutes an evolution of the CR process from a generic (phase 1) to a personalized mode (phase 3).

Specifically, at first, the intervention plan is developed using internal factors (such as past experiences and personal habits) and information about external factors (such as characteristics of the client and his/her environment). In the generic mode, external factors are exclusively CR content (what the occupational therapists are reasoning about). Then external factors increasingly influence the process itself and CR is gradually personalized to better fit the clinical situation and the client's

Table 5.2 The eight stages of the clinical reasoning process. (Adapted from Carrier et al. 2012)

Stages		Description of occupational therapists' cognitive actions
Phase 1—Development of the intervention plan		
1.	Gathering information	Collect information about **external factors related to the client, the environment, the task, and their mutual interaction**
		Determined by the **knowledge** occupational therapists have of their client and his/her situation; less knowledge = more detailed information gathering May be limited by organizational elements of the **practice context**, such as the lack of information in medical records and referrals
2.	Picturing the clinical situation	Develop a picture of the clinical situation
		May be more or less complete, depending on the comprehensiveness of the information obtained in stage 1, with potential later effects on the choice of interventions
3.	Matching to the generic profile (a) and the intervention plan (b)	(a) Link the picture of the clinical situation to the generic profile that fits best from the occupational therapist's own bank of profiles Bank content depends on the occupational therapist's **experience** May be possible to estimate the level of complexity of the clinical situation, which is related to **external factors** collected during stage 1
		(b) Match the generic profile to a particular sequence of therapeutic actions (or intervention plan) Influenced by emotional **availability** and specifically **personality** Matching is the usual way to intervene in a particular situation (**personal habits**) Intervention plans available depend on **experience** and **knowledge** If **knowledge of client** is insufficient and **client's availability** is unknown, a "general" intervention plan, which includes varied strategies involving a wider range of methods, is used
Phase 2—Finalization of the choice of intervention plan		
4.	Assessing the plan	Go back to the picture of the clinical situation and assess the plan in regard to: Occupational therapist's own **availability and readiness** to intervene **Availability of the tool** being considered (e.g., equipment) Anticipated efficacy of the plan (**results obtained**) State of their **therapeutic relationship** with the client (i.e., emotional link between therapist and client and, if applicable, the client's social environment)
5.	Choosing to use (or not use) the plan	Choose to use the plan, or to postpone or end the intervention Clients are consulted about the plan to get their agreement. The action of consulting is influenced by the **way therapy is viewed** and the **physical location of the intervention**, e.g., the client's home (element of the practice context)

Table 5.2 (continued)

Stages		Description of occupational therapists' cognitive actions
Phase 3—Adaptation in action of the plan		
6.	Setting the plan in motion	Engage in intervention plan—Start the sequence using a particular strategy
7.	Checking information	Briefly assess the effectiveness of one's actions. Specifically, when open-minded (element of **availability**), occupational therapists consider: Their client's reactions, which inform them regarding their emotional, cognitive, and physical **availability** Reactions of their client's social **environment** **Results obtained** using the chosen strategy and level of intensity
8.	Pursuing (a) or modifying (b) the plan	(a) Continue with the initial plan If intervention goes as foreseen (strategy and level of intensity deemed effective, positive reaction from client and social environment)
		(b) Modify the plan If intervention does not go as foreseen (strategy and level of intensity deemed ineffective, negative reaction from client and social environment) Process of trial and error for less-experienced therapists Use of **previous experience** in similar situations for experienced therapists

Bold text external and internal factors of influence

particular needs and circumstances. Internal factors (such as availability) support this evolution of the influence of external factors. Separately from other external factors, the practice context has an implicit and diffused influence that seems to act on most of the stages of CR.

Results

How to Learn About and Improve CR

Inspired by Kolb's experiential learning model (1984) and Vermersch's explicitation technique (2006),[1] the aim of the following section is to help OT practitioners and students learn about and improve their CR. Academics and fieldwork educators can also use the suggested procedure.

[1] The explicitation technique is a form of guided retrospective introspection that can be used, through the detailed description of one's actions, to access the cognitive processes informing those actions. Learning the explicitation technique involves taking a 35-h workshop and follow-ups. For more information about this technique and examples of its use, see Maurel (2009). Information about the workshops is available from the Research Group on the Explicitation (GREX) website at http://www.grex2.com/ (in French).

Table 5.3 Probes and questions to assist with reflection on experience

Relecting on experience: Probes to help explicate	
At first…	How?
Then…	What happens next?
And when…	What?
While…	
At that moment…	
Relecting on experience: Questions to guide analysis	
Have I prepared myself? If so, how did I prepare? If not, what led me not to prepare?	
How do I get started? What factors do I focus my attention on to begin with?	
What factors are taken into account in my referral or assessment forms? What factors are missing?	
How do I feel: In that moment? About the client? About our relationship? About his/her environment? About the task?	
How comprehensive is my picture of the clinical situation? What helps provide a comprehensive picture of the situation? What hinders it?	
How do I assess my plan? What factors are taken into account? What factors are missing?	
While carrying out my plan, what factors do I focus my attention on?	
Was I able to carry out the plan I had initially chosen? If not, what prevented me from carrying it out?	
What knowledge do I activate throughout my CR process?	
What experiences do I activate throughout my CR process?	
What factors are central to or recurrent in my CR process? Are any factors missing? If so, what leads to the absence of these factors?	
What factors are taken for granted in my CR process?	
Is my CR process progressing and becoming more personalized to the client or situation? What helps this progression? What hinders it?	
How is my view of occupational therapy involved in my CR process? My professional and personal values?	

Start with a Concrete Experience

Choose and briefly describe a situation you wish to explore. If you are a practitioner or fieldwork student, the situation could be a clinical encounter that did not go as planned, was a success, even if challenging, or occurs regularly in your setting. If you are a student, the situation could be a clinical simulation, a team assignment, or an exam.

Reflect on that Experience

The next step is to explicate in writing and analyze your CR process, including the factors involved.

To *explicate your CR process*, you need to describe your CR as if it was occurring in your head during the chosen situation (word-for-word account in the present tense). To get started and help you stay descriptive, you can use the statement"While I am (in chosen situation), I am…" as well as probes outlined in Table 5.3.

Then, reading your account, *identify relevant components of the integrative framework* (CR process and factors). *If applicable* to your chosen situation, you can use the questions in Table 5.3.

Learn from Your Experience and Analysis

Based on this analysis, identify one or two useful *elements you have learned* about your CR process or your practice. Then specify what you wish *to reinvest* in another similar situation in the future and how you will do it.

Test What You have Learned

In a new situation, *reinvest* what you have learned.

Repeat the Cycle

Academics and fieldwork educators can also assist their students verbally in the explicitation of their CR process. Explicitation can point to specific areas in the CR process that may need to be improved. In Box 5.1, we list key elements that support successful explicitation of the CR process used during the clinical encounter, whether real or simulated.

Box 5.1 Key Elements to Verbally Support the Explicitation of Students' Clinical Reasoning Process (Inspired by Bourget et al. (2013) and based on Vermersch (2006))

- Establish a *communication contract* about a specific clinical encounter: "If you agree, I suggest we take the time to explore together what you do when you…. Is that OK with you?"
- Get the student to start with a description of the encounter: "Tell me what you did with…or in that situation…" but *do not stay at a general level.*
- Use *probes* (From Table 5.3 can also be used) to explicate a detailed CR process, relating to:

  The chronological evolution of the situation: "And then, what do you do?"; "After doing…, what happens next?"

  The reasoning underlying the actions: "When you do…, what do you do?"; "When you do…, what do you think?"; "At that moment, what is going on in your head?"

  The factors considered in the situation: "When you…, what are you focusing your attention on?"; "What led you to propose…?"

- *Summarize* what the student says: "If I understand correctly, first, you…, and then, you…, and finally, you…."
- Use the *present tense* as if the process were actually happening.
- *Reuse* the words, expressions, gestures, etc. used by the student.
- Do *not presume* anything.
- *Avoid* the questions "Why?" or "Do you remember?" as they tend to lead to over-rationalization.
- *Never insist* if the student does not remember or is stuck; always start or continue with probes or a summary of what the student said up to that point.

Conclusion

In this chapter, we aimed to raise in OT practitioners and students awareness of their CR process and its factors of influence in order to optimize their metacognitive skills, an important requirement for improving clinical practice. According to the integrative framework presented, external and internal factors influence the CR process, which evolves from a generic to a personalized mode. Personalization enables occupational therapists to better adapt their interventions to their clients' specific needs and situations, potentially improving the meaningfulness as well as the effectiveness of OT for clients. To improve CR and facilitate its evolution from a generic to a personalized mode, it is essential to explicate and reflect upon one's CR process. To do so, a procedure inspired by Kolb's experiential learning model and Vermersch's explicitation technique could be a valuable addition to the OT practitioners' and students' toolkit.

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Chapter 6
Ethical Considerations and Priority in Occupational Therapy

Mari Broqvist and Margareta Lindberg

Abstract Working as an occupational therapist (OT) places great demands on professional knowledge, including the OT's ethical awareness and the ability to weigh different norms and values against one another. National guidelines for priority setting are one set of norms; ethical professional codes compose another. In Sweden, OTs have not only a National Model for Transparent Prioritisation, valid for all areas of health care, but also a specific Code of Ethics to support their professional decision making through reflection and analysis.

Keywords Ethical professional codes · Ethical analysis · Ethical principles · Model for priority setting

Definitions

Prioritisation is a decision to give preference to something or someone over other options that must stand aside in some way (e.g. must wait their turn); it is a choice based on a ranking.

Rationing involves limiting the possibilities for optimally satisfying care needs (National Center for Priority Setting in Health Care 2007).

The concepts of *ethics and morality* are often used interchangeably to refer to the values and norms that should guide actions and comprise categories of appropriate conduct for OT in any professional circumstance. From a theoretical point of view, ethics can be described as theoretical reflection on morality.

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Purpose

The objective of this chapter is to present two different models that support the ethical decisions and prioritisation OTs engage in. First, we present a model for ethical analysis that can be used in all kinds of ethical dilemmas in OTs' daily work, and we illustrate it with a case. Then, we zoom in, addressing ethical guidelines that specifically concern prioritisation, exemplified by other types of ethical dilemmas.

A Professional Code of Ethics

The OT works to promote opportunities for activity and participation for clients so that they can live the best life possible. Interventions should, as far as feasible, be based on the person's own goals with regard to the environment. Furthermore, the intervention should be grounded in evidence or other scientific results and proven experience. This places great demands on the OT's ability to weigh different kinds of knowledge, as well as norms and values, against one another. A specific professional code of ethics can provide important support in a range of ethical dilemmas that arise in the daily work. One object of the Swedish Code of Ethics for Occupational Therapists (Swedish Association of Occupational Therapists 2012) is to enhance ethical awareness among OTs and support their professional decision making through reflection and analysis. The code was adopted by the General Assembly of the Swedish Association of Occupational Therapists in 1992 and has been revised three times (1988, 2004, and 2012). The code includes a number of duties for the OT and a common base of professional ethical values. Many OT organizations worldwide have also developed their own ethical guidelines according to the local needs. The World Federation of Occupational Therapy (WFOT) has adopted a comprehensive code of ethics that is available to all member organizations. These codes can be found on their respective organizations' websites.

A Model for Ethical Analysis

The model presented here is included in the Swedish code of ethics and provides a clear structure for an ethical analysis. Various aspects are important during this process (Fig. 6.1).

An Ethical Dilemma

Examining the case presented below provides opportunities for understanding this model of ethical analysis.

A 45-year-old man is being treated at a mental clinic after a serious suicide attempt. He is deeply depressed after having lost his job, where he had been employed

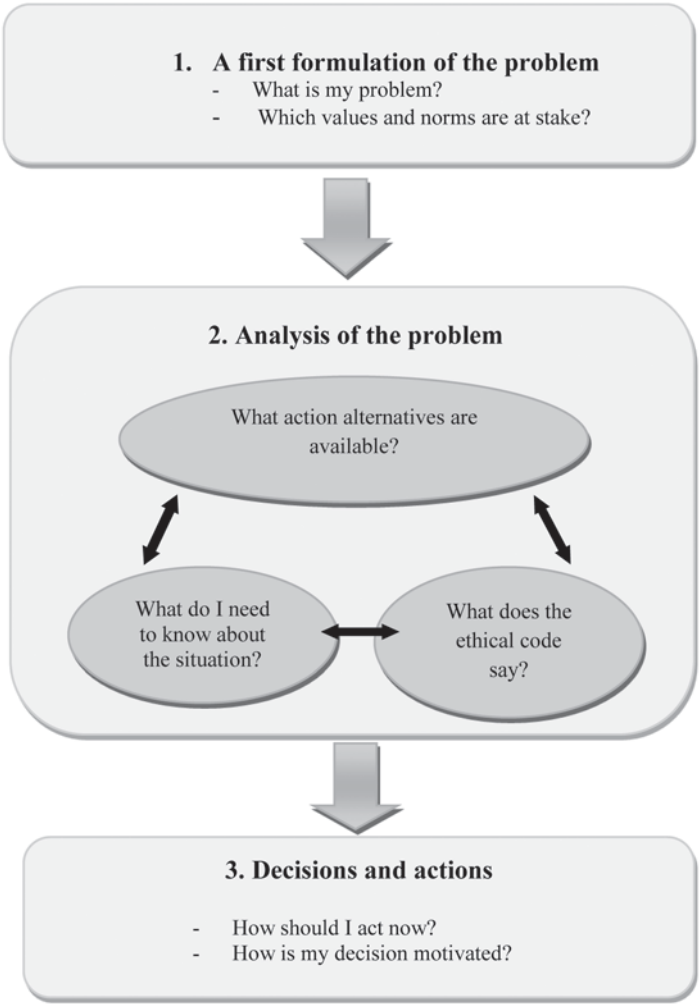

Fig. 6.1 A model for ethical analysis from the Swedish code of ethics for occupational therapists

for the past 20 years. Occupational therapy is prescribed. Initially, he is entirely apathetic, but after some time, he recovers his zest for life and can cope well with everyday activities. He starts a program of preparatory occupational training, during which he comes into contact with people who are undergoing treatment as outpatients. The man expresses a wish to live at home and to come to his therapy sessions during the day. The OT encourages this initiative, since she is convinced that he can now cope, but agrees only on condition that he can first try several weekend furloughs. However, the patient's wife questions the professional competence of the OT. She states that weekend furloughs for her husband are out of the question; she does not consider him well enough to come home at all, even for a weekend.

Formulation of the Problem

In the *first step,* it is important for the OT to formulate and clarify the ethical problem by using the information available and applying the OT's own interpretation of the situation. The problem often focuses on how to behave in a correct, ethical manner—that is, in a professional way. In this case, there exists a conflict between the OT's professional opinion about the rights of her patient, on one hand, and the rights of the patient's wife, on the other.

Analysis of the Problem

In the *second step,* the OT must ask the following questions: *What alternative actions are possible in this situation? Whose rights should take priority—those of the patient or those of the relative? Are there strong reasons for considering the rights of the wife? If so, what are they? Is there any way of satisfying the rights of both people?*

Based on OT's professional competence, the OT reflects on various options: *Is more than one person affected by my actions? How will they be affected? What other information is important for my decision? Is it possible to try a short stay at home supported by professionals? Is it possible to propose that the wife receive support from a psychologist during the upcoming time of her husband's transition? What are the consequences of the various options?*

In order to take a decision, the OT must relate the choices to his or her own fundamental values, which comprise personal morality, and to the code of ethics for OT. The Swedish code underlines that the OT should conduct treatment based on the patient's own will as far as it is consistent with the profession's goal. This suggests that the husband's wants should prevail over the wife's.

Decisions and Actions

In the *third step,* the OT decides how to act and also determines what motivates that decision. Following this model for analysis, the choice is a result of reasoning—it is rational and understandable both in content and structure. It is based on correct information, as well as on values and norms that the OT believes to be correct and can argue for, and in most cases, share with others. By referring to information, to possible courses of action, and to fundamental values insofar as possible, the OT can justify his or her choice and actions.

In the example case, the OT decided that, to begin with, she needed more information about what support the wife might need in order to accept that her husband could go home. *How would you yourself act in a similar situation?*

Ethical Guidelines for Priority Setting

Leaving the ethical dilemma concerning conflicts of interest, we turn attention to the conflict of having to set priorities. The conditions for health care have changed over the years in most countries. The increasing gap between possibilities, demands, and diminishing resources is real, creating difficult choices and ethical dilemmas for OTs. *Am I, as an OT, concentrating on the right problems? Could I consider my choices fair?* Choices, of course, do not arise only in times of restriction: *What should be expanded when expansion is possible? Whose need for health care should take priority over others'?*

States with publicly funded health-care systems are trying to find ways of accepting prioritisation and rationing within health care. One approach has been to establish national ethical guidelines for priorities, guidelines that could gain broad public acceptance. Sweden is one of several countries that have such guidelines; Norway, Denmark, Finland, the Netherlands, and New Zealand are others. Being an OT in these countries requires that one be aware of and act in accordance with these guidelines.

Since 1997, an ethics platform has been part of the laws that regulate health care in Sweden at all levels, from national political decisions to everyday work. The platform consists of three ethical principles: the human dignity principle, the needs-solidarity principle, and the cost-effectiveness principle. These principles seem, more or less, to be part of official or unofficial ethical norms even in countries that have not established national ethical guidelines (National Center for Priority Setting in Health Care 2007).

The Human Dignity Principle

The human dignity principle states that every individual has equal value and equal rights, regardless of personal characteristics and function in society. It is inconsistent with this principle to allow needs to be pushed aside because of, say, chronological age, gender, lifestyle, or socioeconomic circumstances. This principle is easy to embrace but nevertheless raises questions in OT practice. *Should an OT prioritise, for example, a person aged 55 (working age) over a 70-year-old retiree?* In many countries, there are no seldom age-related borders for cross-professional rehabilitation in specialized teams. *Or could one claim that children should automatically have high-priority access to OT?* The principle also forbids positive discrimination, which is to give high priorities only because of age.

Another dilemma lies in choosing between people who have or those who do not have a functioning social network. The social circumstances of an OT's patients are often highly relevant and must be considered because an individual's functioning and disability occur in contexts that could be facilitators or barriers. In the World Health Organization's framework for measuring health and disability, the International Classification of Functioning, Disability, and Health (ICF), environmental factors are essential (WHO 2001).

The human dignity principle addresses only factors that should *not* determine the priorities, and therefore it must be supplemented with additional guidance.

The Needs-Solidarity Principle

Needs are a central priority principle almost worldwide. In Sweden, the needs-solidarity principle means that when it is necessary to prioritise among effective interventions, more health-care resources should be given to those in greatest need, those with the most severe conditions, and those with the lowest quality of life. This applies even if not everyone can have their needs met in part or at all. The concept of need here entails a gap between one's current and one's desired state of health and that care (e.g. occupational therapy) is necessary to achieve the desired state of health. It means that both the severity of the disability and the patient's potential to benefit from an intervention must be integrated into the assessment for prioritisation.

Thus, if the 55-year-old person mentioned before has a more severe disability than the older person, or if that 55-year-old could benefit more in health from an occupational therapy intervention, it seems fair to give the younger person higher priority. Considering the need also leads to the conclusion that OT must differentiate the priority given to children according to the severity of various activity limitations and participation restrictions, as well as according to the efficacy of the various occupational therapy interventions addressing these problems. Moreover, a totally different intervention could be undertaken in order to reach the same goal, depending on the state of the patient's social network. Some assistive technologies, for example, require a supportive social network in order to be successfully used; if no such social support is in place, other interventions may be more efficient for the patient.

Solidarity means striving for health that is as equitable as possible among patients, but the idea also implies a special responsibility to appraise the needs of people with impaired autonomy, which, in this context, means they are unable to exercise their rights (for example, children). After being assessed, further activities should be guided by the needs of the OT's intervention, not by the impaired autonomy per se.

The Cost-Effectiveness Principle

In choosing among the different services and interventions, the cost-effectiveness principle requires that the OTs strive for a reasonable relationship between costs and effects. Unlike some countries, Sweden rejects the benefit principle, saying that interventions yielding the greatest collective benefit should be chosen. Effects should be measured as improvement in health and in an improved quality of life for each individual. This principle is also subordinated in the ethical platform. This means that patients with severe diseases and substantial disabilities should take precedence over milder cases if there exist effective interventions, even if those interventions

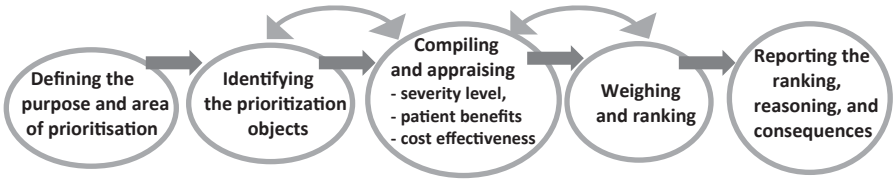

Fig. 6.2 Steps in the national model for transparent prioritisation in Swedish health care

are more costly. In the case discussed above concerning the 55- and 70-year-old patients, the OT might have concluded that their health conditions are extremely severe and that although some available interventions yield high benefits for the patients, these should nevertheless not take high priority because of unreasonable costs, compared to other interventions. Or, the opposite might occur: Despite a high cost (e.g. a major home adaptation), the severity of the condition and the patient benefits might justify the intervention. The border for reasonable cost-effectiveness is not explicit in Sweden (and probably not in any country), but it needs to be addressed in any discussion of a prioritisation process.

A Model for Ethical Priority Setting

Even though ethical principles for prioritisation are widely accepted, they tend to be insufficient to direct practical work. The Swedish Code of Ethics for Occupational Therapists (Swedish Association of Occupational Therapists 2012) refers to ethical guidelines for priority setting, but there is still a need for using complementary tools to support practice. Since 2007, a National Model for Transparent Prioritisation in Swedish Health Care has been in place; this is a systematic and concrete method for discussing the ethical guidelines for prioritizing on a policy or a group level. The model is well supported in Swedish health care (and by small-scale tests conducted in Germany) among authorities and different professionals, including OTs. It has, for example, been used to support for decisions and assuring quality in daily clinical care or for creating a basis for improving efficiency by phasing out ineffective interventions (Broqvist et al. 2011).

There are many examples of OTs' having used the priority model in Sweden. At the University Hospital in Gothenburg, OTs have worked out ranking lists for dealing with stroke, spinal-cord injuries, hand surgery and burns, among many others conditions; the lists guide their daily work. OTs from many county councils and hospitals (e.g. Uppsala University Hospital) have come together and established priority rankings for patients with rheumatoid arthritis in order to ensure equivalent interventions regardless of which OT the patient is meeting. In Child and Youth Habilitation in the Skåne region, the priority model is used in a cross-professional context in which OTs played an essential part in establishing the priorities (Edin et al. 2011).

The priority model involves the steps outlined in Fig. 6.2.

Prioritisation Object

Prioritisation always involves ranking something, a choice between two or more alternatives. In the Swedish priority model, the prioritisation object always consists of a *condition–intervention pair*. Since interventions have different effects on different conditions (e.g. different activity limitations), the same intervention can be given different priority depending on the condition that it targets. The WHO's ICF has frequently (but far from always) been used to describe conditions in priority work involving OTs. More precisely, articulating the conditions and interventions that OTs perform daily has been perceived as important. Doing so could improve communication about the use of OT interventions—with other health professions, with politicians, and with patients.

Compiling and Appraising Severity Levels, Patient Benefits, and Cost-Effectiveness

The next step in the model, guided by the ethical platform, is to assess the severity of the conditions, the patient benefits with intervention, and the listed interventions' cost-effectiveness. Figure 6.3 gives guidance about what to include in the assessments.

Rating is recommended on a scale of very high, high, moderate, and low. The practical meaning of the grades is not defined in the model but must be discussed and identified by those working with prioritisation.

The model also includes evaluating the quality of the scientific evidence and experience-based knowledge used to appraise severity level, patient benefits, and cost-effectiveness. Hence, the best possible evidence, supported if possible by systematic reviews, should be used in setting priorities. If the quality of scientific evidence allows, established checklists and evidence-grading systems should be presented. The requirement for systematic searches for evidence must, however, be adapted to the purpose of each priority process and to the resources (e.g. time) available for discussion. For example, at child and youth habilitation in the region of Skåne, local best practices were noted for uncontroversial interventions where views about efficacy did not diverge. If there were diverging perspectives, more systematic research was done (Edin et al. 2011). Broadly discussing experienced-based knowledge could reveal needs for further research and create awareness about existing evidence.

Weighing and Ranking

The appraisals, finally, are weighed together qualitatively and ranked on a 10-level scale, where 1 indicates the highest priority and 10 the lowest. It is important to maintain a logical association between the priority level assigned and the appraisals.

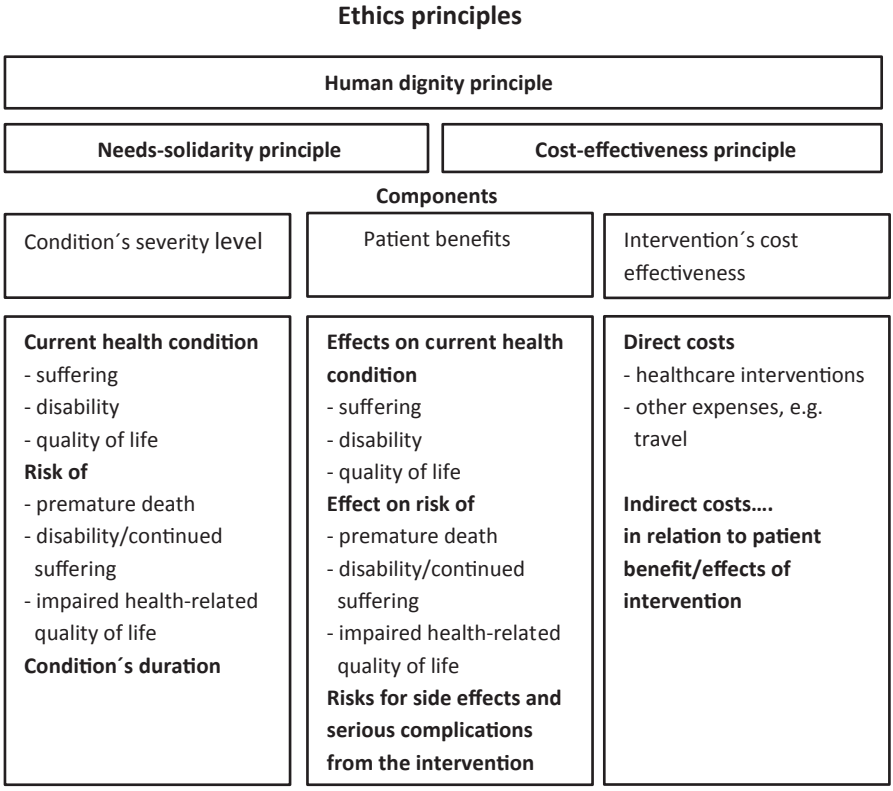

Fig. 6.3 Components for appraising the severity level of the conditions, the patient benefits, and the cost-effectiveness of the intervention

Low overall values on severity levels, patient benefits, and cost-effectiveness can never yield a high priority. It is also an important step in the priority process to create consensus among colleagues regarding how to act upon the priorities. Table 6.1 presents an extract of the ranking list from child participating in Youth Habilitation in Region Skåne. The ranking list indicates that the OTs ought to focus primarily on the package of intervention, which has the highest ranking. In situations of staff shortage, for instance, one should concentrate on assistive technology and on counselling before initiating parent education, which has the lowest priority (Edin et al. 2011).

Conclusion

In order to establish reasonable and just priorities, government and researchers in many countries have discussed the importance not only of generally accepted ethical principles but also of transparent prioritisation. Transparency entails informing

Table 6.1 Example of a ranking list

Condition	Intervention	Condition's severity level	Patient benefit	Quality of knowledge base	Cost/ effects[a]	Ranking
Child 0–5 year CP, GMFCS IV-V[b], Moderate/ severe mental retardation						
Body functions						
Mental functions						
Sleep dysfunctions	Position-ing assistive technologies	Very high	High	Local best practice		4
	Counselling about sleep habits to social network	Very high	High	Local best practice		4
	Parental support	Very high	Moderate	Local best practice		5
	Parent education	Very high	Low	National best practice		7
	Positioning	Very high	High	Local best practice		3
	Pharmaco-therapy	Very high	High	International best practice		3
	Package of interventions above	Very high	Very high	Local best practice		2

[a] The assessment of cost-effectiveness had not yet been completed when this ranking list was published (Edin et al. 2011). This means that ranking could be adjusted in relation to costs

[b] GMFCS stands for *Gross Motor Function Classification System*, a 5-level classification system that describes the gross motor function of children and youth with cerebral palsy (CP). Level I indicates the best function

those affected by the priorities about the reasons for and the consequences of the priorities chosen. This puts demands on OTs' ethical explanations not only when it comes to priority setting but also in all forms of decision making and clinical action. Becoming aware of and leaning on models and ethical codes, along with keeping the ethical discussion alive, can help to make OTs more secure in this openness.

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Chapter 7
Participants in Occupational Therapy Interventions: Needs Assessments—A Necessary Phase in Rehabilitation

Maria Müllersdorf

Abstract Occupational therapy interventions should always be preceded by a needs assessment on which a basis for an intervention and a follow-up evaluation can be formed. The assessment should also be performed systematically using instruments designed for the specific purpose. In occupational therapy, all assessments shall aim for occupation and occupational performance.

Keywords Needs assessment content process · Needs assessment instruments · Occupational therapy needs assessment · Referral to occupational therapy

Background

With demands for higher efficiency, a heavier burden on health care and reduced community resources, needs assessments are not only a health-care priority issue for politicians, care providers, managers and employees, they are also a way of refining and developing measures for use in a specific profession (Polit and Beck 2004; Witkin and Altschuld 1995), in this case, occupational therapy. Unmet needs are strongly related to lower standards of health and identifying such needs should therefore be a priority (Wiersma 2006) in order to provide services in accordance with patients' needs (Karlsson et al. 2010).

To Whom Do Occupational Therapists Address Their Interventions?

No statistics are available as to whom occupational therapists (OTs) address their interventions. To gain a rough estimate, a review of multiple databases was done. An overview of peer-reviewed articles published in occupational therapy journals resulted in a variety of target populations, areas of interest, and diagnoses as the

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focus for occupational therapy. These included aspects such as occupational therapy interventions, instrument development, descriptions of specific diagnoses, etc. A categorization of occupational therapy focus in the articles could be as follows:

1. *Age*—e.g., children, young people, adolescents, adults, working age, seniors, and the elderly
2. *Areas for rehabilitation*—e.g., mental health, palliative/hospice care, pediatrics, geriatrics, medical rehabilitation, public health, and acute care
3. *Diagnoses*—e.g., cancer, dementia, stroke, rheumatoid arthritis, Asperger's syndrome, and multiple sclerosis

From the results, it seems that occupational therapy has developed from its roots in mental health institutions to embrace a great variety of areas. Mental health, geriatrics, and pediatrics seem to have a special interest for occupational therapists since specific journals with these topics are regularly published (e.g., Physical & Occupational Therapy in Pediatrics, Physical & Occupational Therapy in Geriatrics) though not included in the abovementioned review.

Of course, studies within the area of occupational therapy are published in journals other than those specific to occupational therapy. Searching for occupational therapy interventions using the PubMed database, the keywords occupational therapy, treatment, and intervention in different combinations displayed 101 articles published in 2013. Again, only reviewing the abstracts, some categories were more obvious than others. Those categories were stroke/brain damage, pediatrics, neurological problems, pain, mental disorders, and geriatrics. Work-related issues, impaired vision, and cancer were other areas of concern in the articles.

Finally, the Cochrane Library offers a variety of reviews focused on evidence-based practice. Using occupational therapy as the keywords in titles and abstracts, 42 reviews were found in the area of occupational therapy published between 2000 and 2013. Once again, stroke/brain injury, mental health, and pain issues were the most represented among the reviews.

As the results from the above overviews show, a variety of patients are the focus of occupational therapy. Still, we do not know who participates in occupational therapy interventions or who would benefit from it. One could also discuss which patients would benefit from occupational therapy interventions and if these patients today get such interventions. Another critical question is whether diagnosis, areas, or age spans are the most appropriate ways of identifying the "right" patients for occupational therapy. An alternative way would be to focus on occupational performance using a needs assessment instrument thereby being able to "get out of the box" thinking in diagnoses.

The Basics of Needs Assessments

Every step and measure offered in rehabilitation/occupational therapy should be based on some form of needs assessment. This is a basic assumption which appears logical and necessary. However, how the needs assessment is performed and how

well it is grounded varies (Müllersdorf and Söderback 1998). To assess somebody's needs requires a clear awareness of what is to be assessed. If the assessment results in unmet needs, appropriate occupational therapy interventions should be offered to the patient/client. This is quite logical reasoning but, unfortunately, it is not that straightforward in the area of occupational therapy. In the literature and from clinical experience, it is evident that the common knowledge about occupational therapy is not fully clear to patients who might benefit from occupational therapy services (e.g., Cranitch 2003) or health-care professionals (Keesing and Rosenwax 2011) who therefore do not refer patients to occupational therapy to the extent they probably should (e.g., Cup et al. 2007). Undoubtedly, occupational therapy services are requested by various kinds of populations such as: *the elderly* (Kent et al. 2000), *patients in palliative care* (Jeyasingam et al. 2008; Keesing and Rosenwax 2011), *disabled people in rural communities* (Kent et al. 2000), and *children with grief issues* (Milliken et al. 2007). Finally, occupational therapists may not always be clear about the content of occupational therapy and the measures they could offer (e.g., Halkett et al. 2010; Shaw et al. 2006). One reason can possibly be detected in a statement by Wilcock (2000, p. 84) that there is no "simple generic occupational therapy philosophical statement that everyone in the profession learns and uses." Theory is a powerful tool for supporting measures to take (or not to take), to evaluate, and to understand and should therefore not be underestimated as a supportive aid in occupational therapy and the occupational therapy profession (Finlayson 2007).

Definitions and Procedures

The concept of needs assessment may be understood in different ways (Müllersdorf and Söderback 1998) and is described both as technical and sophisticated (Soriano 1995) which calls for reflection. To understand its complexity, the main definitions of need and assessment followed by ways of conducting a needs assessment are presented.

The Concept of Need Firstly, there is no clear consensus on the definition of need (Kersten et al. 2000). Secondly, it is important to understand that the perception of need is considerably influenced by beliefs, culture, politics and values which give cause for reflection concerning the context in which the needs assessment is executed (Finlayson 2007a; Wilcock 1993). Thirdly, in rehabilitation, people with the same impairment and the same profession prioritize different needs and solutions depending on their experience and individual choices (Kersten et al. 2000; Warren 1989; Barclay et al. 1999). However, some basic definitions help to understand the concepts of need, assessments, and assessment procedure which, in turn, may clarify the assessment of need for occupational therapy interventions.

Need as a *noun* describes the difference between the actual situation and what is desired, pointing to the final outcome. The *verb* need points to the solution, what actually is needed to be done to reach the final outcome (Witkin and Altschuld 1995). The importance of the *outcome* may define needs. Benn and Peters (1964)

suggested a hierarchal order of needs with the following content: (a) biological needs—for survival; (b) basic needs—to reach a decent standard of living; (c) functional needs—what is needed to do a particular job. Blazer et al. (2007) expand the definition of basic needs to include needs such as safety, financial needs and adequate housing. To what degree a need is recognized may be defined as *expressed* or *unexpressed* need according to Bunston (1994). Expressed needs are those recognized and may be fulfilled or not. Unexpressed needs are not recognized by the subject herself but may be detected by others, for instance by relatives or professionals. Needs can be *met* or be *unmet*. Residual unmet needs may depend on three different reasons: (a) out of topic and cannot be directly addressed (e.g., wanting a partner); (b) cannot be fully assessed (e.g., the patient is not able or refuses to discuss the need); or (c) there is no appropriate measure available (Slade et al. 2005). Unmet needs, as a strong predictor of quality of life, can also be used as an outcome criterion (Wiersma 2006).

The Concept of Assessment Assessment as a concept is not as well described in the literature. However, Stewart (1979) included three elements, i.e., (a) an assessment is a description of the size and nature of the problem related to the existing services to meet this need; (b) it includes the attitudes towards the problem and existing services; and (c) solutions to meet the need are necessary. As a consequence of this description, it is crucial for occupational therapists to bear in mind that focus on engagement in occupation is the cornerstone in occupational therapy (Robinson et al. 2011). In the literature, a difference between assessment and evaluation has been pointed out (Polit and Beck 2004; Soriano 1995). In relation to needs, an *assessment* is associated with what needs are to be approached while *evaluation* is associated with what needs have been approached.

The Needs Assessment Process

In summary, three words could be helpful before a needs assessment to clarify the procedure: when (time-design), who (subject), and how (data collection).

When? When assessing the needs of patients with some form of problem in order to plan measures in occupational therapy, it is fruitful to structure the process. Start by deciding if the needs assessment will be performed once or repeatedly (Polit and Beck 2004); this forms the design for the procedure. Here, one should consider the character of the problems the patient might have. Is the patient's status relatively constant (e.g., paraplegia) or does it vary over time (e.g., chronic pain)? In the case of a paraplegic patient, a single needs assessment might be enough as a starting point, as the patient's status will probably not alter in the near future. In the example of a patient with chronic pain and changing levels of pain over time, several assessments should be performed over a period of time to detect needs occurring at different times during the period. It is important to capture a stabile baseline from which the intervention can proceed.

Who? The next issue is to define who is to be assessed—the subject of the needs assessment. This is essential (Witkin and Altschuld 1995). Is it the individual patient, his or her relatives, the professionals, or stakeholders who are the focus of the needs assessment? It is well known that different populations give different results on the same issue depending on different angles of the problem.

How? Finally, decide how data collection will be performed. There are several options—questionnaires, interviews, observations, self-reports, etc. Once again, the choice depends on the purpose of the assessment and the various options have their pros and cons. For instance, questionnaires are recommended when specific information is sought and they may provide reliable data as self-reports (Bruhn and Trevino 1979). The advantage of interviews is their generally high validity (Soriano 1995). Critical incident technique is one way of detecting special events/critical incidents of relevance to the patient (Flanagan 1954; Witkin and Altschuld 1995).

Purpose

The purpose of a needs assessment is to form a starting point for any measure/intervention in occupational therapy. The assessment should be performed systematically and with instruments designed for the specific purpose. Following up the needs assessment and the interventions offered to the patient with an evaluation is also a way of refining and developing measures in the occupational therapy profession.

Methods

The literature (textbooks and reviewed articles published in international journals accessed from the databases Cinahl and PubMed) has been a resource for this chapter. When understanding the complexity of the contexts of need and assessment, there are several obvious ways needs assessments could performed. Some initial questions must be asked prior to the assessment:

1. What criteria exist for occupational therapy interventions for the target group?
2. Whose perspective will the assessment take? Is it the patient's, the professional's, the relative's, or the stakeholder's perspective?
3. What aspect of needs will be assessed? Is it recognized–unrecognized needs, expressed–unexpressed needs, or met–unmet needs?
4. How will data be collected? Will it be, e.g., by questionnaires, interviews, observations, self-reports, focus groups, or Delphi surveys?
5. How has the instrument for data collection been designed? Is it an instrument aimed at measuring, e.g., the patient's needs, problems caused by a disease, disease symptoms, or quality of life or health?

6. Which professional, rehabilitation, or care aspect is the instrument for data collection designed for? Is it for, e.g., occupational therapy, rehabilitation, health, care, nursing, or physiotherapy?
7. Which target group is the instrument aimed at? Is it specific or general? Is it specific to, e.g., diagnosis, symptoms, impairments, disability, or quality of health?

Results

The results will help the reader to focus on what is to be assessed and the assessment process required to expose adequate needs. Examples are given from the area of chronic pain.

Content of Needs Assessment

It is often problematic to ask patients about their needs as unrecognized needs will not be detected. It is therefore more fruitful to ask about the problems patients perceive. At this stage, it is crucial for the occupational therapist to focus on the essence of occupational therapy (Keesing and Rosenwax 2011; Palmadottir 2003)—that is occupation. Even though a patient suffers, for example, from chronic pain, it is not the pain the occupational therapist should focus on. Patients with chronic pain have most often been thoroughly examined and treated for the pain from a medical perspective. Using a pain-assessment instrument to measure the status of pain is of no interest if the emphasis is on the patient's needs in the area of occupational therapy. The occupational therapist should focus on occupation in different forms and how the patient's daily occupations are affected by pain. Therefore, the process of the assessment should always start with two questions: (a) what problems does the patient have in performing daily occupations as an effect of, e.g., chronic pain and (b) what needs arising from these problems must be met to improve the patient's possibilities to perform daily activities? These questions are fundamental for developing criteria for occupational therapy interventions. Criteria for selecting clients/patients for occupational therapy interventions, clarified in a systematic way for different populations with different disabilities, should be of help to both occupational therapists and professionals referring to occupational therapy. However, few studies have been explicitly performed to state specific criteria for occupational therapy. An example of needs/problems forming *criteria for referral to occupational therapy interventions has been identified for chronic pain,* based on statistical factor structure of the Occupational Therapy Needs Assessment (OTNA)—Pain and the Occupational Therapy Needs Assessment-Pain-Patient instruments (Müllersdorf and Söderback 2002; Müllersdorf 2001, 2002). These criteria are described in Table 7.1.

Table 7.1 Criteria for the referral of patients with chronic pain to occupational therapy interventions

Category	Subcategories
Needs due to limitations in activity performance caused by pain intensity	Interrupted occupational performance
	Given up occupational performance
	Performs occupations with more effort
	Increased pain in occupational performance
	Having difficulties with perceived expectations
	Is dependent on others for occupational performance
	Stopped performing occupations
	Lacks self-confidence
Needs for knowledge	Information about pain
	Information about new ways of handling occupations
Needs for education to manage	Is tense/stressed due to pain
	Has difficulties adjusting to changes
	Is in the workplace during sick leave
Needs due to discouragement/adjustment difficulties caused by pain intensity	Is supported to regain occupations
	Stopped performing occupations
	Lacks self-confidence
	Has temporal rest/work/leisure imbalance
	Needs changes in the home or workplace
Needs due to dependency	Is dependent on others
Needs due to work-related factors	Needs changes in the home or workplace
	Would like to be in the workplace during sick leave

Perspectives It is well described in the literature that different perspectives give different results regarding needs assessment. Occupational therapists, patients, and caregivers often assess needs differently (e.g., Kersten et al. 2000; Müllersdorf 2002; Müllersdorf and Söderback 2002; Preston et al. 2012) which can be manifested in various ways. For instance, needs assessed by caregivers and palliative care inpatients resulted in the caregivers identifying quantitatively more unmet needs than the patients did (Jeyasingam et al. 2008). Another study showed disagreement on a qualitative base, but with results opposite to that of the former reference. Home residents self-perceived their potential to rehabilitation higher than their carers did (Chang et al. 2011).

It is quite obvious that professionals and patients assess differently. Patients ought to be experts on their own needs (Burnett and Yerxa 1980; Bunston et al. 1994) and should be expert on their needs. As Wiersma (2006, p. 118) puts it: "The perspective of the beholder is important because discrepancies between the patient and the professional are substantial with respect to number as well as type of needs." On the other hand, professionals have accumulated experience from treating many patients with the same problem, and could therefore have valuable insight to add to the patient's perspective. Patients often desire to participate in planning their rehabilitation but it is crucial to remember that all patients are individuals and

may react differently to the same issue although having the same diagnosis (Peoples et al. 2011). Shared decision making about treatment may be preferred by some patients while others prefer to transfer the decision to health-care professionals (Proot et al. 2000). A client-centered perspective combined with a recommended (Polit and Beck 2004) and straightforward elucidation would be to use several perspectives representing expertise from different angles on the same topic—a form of triangulation. That is, the patient, the professional and the relatives share their experience using assessment instruments and come to an agreed realistic solution through discussions/interviews.

It is not only between the patient and the professionals that incongruence occurs, differences also arise between professionals. Perceptions of rehabilitation needs have been found to be poorer among general practitioners (Kersten et al. 2000) and physicians in cancer care (Ganz 1990) compared to other professionals. This fact necessitates that all members of the rehabilitation team play an active role in identifying the patient's needs in their specific area of expertise.

Aspects of Needs The guidance on how needs should be defined for clients/patients to be candidates for occupational therapy and for being included as a part of occupational therapists' professional knowledge should be sought in relation to the meaning of occupational therapy. Occupation as a core concept in occupational therapy gives an indication of interpretation and choice. First of all, unmet needs must be a priority in all health care and rehabilitation. What needs should occupational therapists focus on? Basic needs—as in having a decent life—and functional needs—defined as being able to do one's job—(Benn and Peters 1964) are probably the obvious choices for occupational therapists. Unresolved and/or unexpressed needs (Bunston et al. 1994) are also appropriate for occupational therapists as daily life tasks often seem to remain unresolved or unexpressed by clients or health-care professionals in general.

Data Collection The most common and recommended ways of collecting data for a needs assessment are: questionnaires, interviews, observations, and/or self-reports from key informants using, e.g., Critical Incident Techniques (Boberg et al. 2003; Bruhn and Trevino 1979; Soriano 1995). The choice of method depends highly on what instrument the assessor will have access to. Studies have shown that a combination of an assessment instrument with a discussion/interview has a more valid outcome than if an assessment instrument alone is used (Liu et al. 2005). It is also worth remembering that the highest predictor of a successful rehabilitation is the patient's own belief in effective treatments and the ability to learn to cope with the situation (Jensen et al. 2000; Man et al. 2004).

Requirements for Needs Assessment and Target Groups

All assessments should be done systematically and with the appropriate focus, using instruments that are valid and reliable. However, practice does not always live up to theory, which gives us some issues to deal with.

OTNA Instruments The OTNA was first developed for the selection of patients with cancer at cancer clinics for participation in occupational therapy and rehabilitation (Söderback and Hammersly 1997; Söderback et al. 2000). OTNA was further developed for patients with chronic pain who were seeking primary health care. Two different versions—one for occupational therapists (OTNA-P(ain)) and one for the patients (OTNA-P(ain-Patients); Müllersdorf and Söderback 2000; Müllersdorf 2002) were developed based on the knowledge that professionals and patients often assess the same needs differently and which was also proved for chronic pain. In addition, the OTNA-P includes suggested interventions based on a literature review of proposed occupational therapy interventions for patients with chronic pain (Müllersdorf 2002).

Another approach to needs assessment is to use general but still patient-specific instruments developed for use in OT. These instruments are not developed to assess needs based on a specific population. Instead, they are based on general aspects of occupation for various populations such as mental health, pain or stroke, or on problems as an effect of symptoms typical for different populations. A well-known, used worldwide, psychometrically tested, valid, and reliable instrument is the Canadian Occupational Performance Measure (Carswell et al. 2004). It uses a dialog technique between the patient and the occupational therapist to set the goals for desired occupations. With this instrument, it is possible to unite different perspectives, i.e., the patient's and the professional's, and to set goals to meet the patient's needs.

Assessment instruments based on a framework, a model, or a theory are also available. An example is the foundation of the variety of assessment instruments that belong to the *Model of Human Occupation* (MOHO; Kielhofner 1992). Among these, 14 are now available on the Internet (http://www.uic.edu/depts/moho/). The instruments have been translated to different languages and are therefore accessible for many occupational therapists. Examples of instruments based on MOHO are the *Assessment of Communication and Interaction Skill* (ACIS) covering three domains (physicality, information exchange, and relations) to describe communication and interaction skills; Child Occupational Self-Assessment (COSA) is aimed at assessing children's perceptions and perceived importance of everyday activities; and the Occupational Circumstances Assessment Interview and Rating Scale (OCAIRS) which structures information about occupational participation among adolescents or adult populations.

The abovementioned instruments are just a selection from the set of needs assessment instruments available and described in the literature. However, a vast variety of assessment tools for different populations and purposes exist. In the UK, for example, 117 different assessment tools are recognized for use by occupational therapists (http://www.connectingforhealth.nhs.uk/systemsandservices/data/snomed). The choice should, as mentioned before, be considered thoroughly beforehand regarding how the results from the data collection will be used.

Rehabilitation Medicine Needs Assessment Instruments A rehabilitation needs assessment for patients with disabilities, developed by Kersten et al. (2000), is a general tool assessing met needs and satisfaction with the services provided with

the aim of detecting and prioritizing unmet needs in rehabilitation. The Perceived Limitations in Activities and Needs Questionnaire (PLAN-Q) was developed based on the theoretical framework of Kirshner and Guyart (1985). It is aimed at assessing rehabilitation needs among patients with neuromuscular disorders (Pieterse et al. 2008).

Care/Caring Needs Assessment Instruments Needs assessment instruments for care, including the area of daily occupations, are also available. Examples of such instruments are the Needs Assessment Tool (NAT) for use in palliative care (Waller et al. 2010), and the Camberwell Assessment of Needs (CAN; Phelan et al. 1995) for use in mental health. The Care Needs Assessment Pack for Dementia (CarenapD) was constructed to detect needs among individuals with dementia and to specify the care required to meet the detected needs (Chung 2006). An instrument for determining older people's need for nursing care is the Nursing Needs Assessment Tool (Slater and McCormack 2005). An assessment tool for planning the discharge of patients from the hospital to the home or nursing home is the Discharged Patients' Enquiry Questionnaire. Here, outcome is assessed in accordance with the interplay of factors in the discharge process, the patients' perceptions of the quality of the care, and his/her needs for compensatory help with the performance of daily activities (Söderback 2008).

As stated before, the abovementioned instruments are a very small selection from the set of assessment instruments described in the literature that, in some way, assess patients' needs for care or compensatory help instruments.

Discussion

Questions arise concerning occupational therapists developing nonoccupation-based practice (Robinson et al. 2011). The norm for interventions in occupational therapy is occupation in relation to occupational performance. Bearing this in mind, together with an ambition to always use valid and reliable assessment tools, occupational therapy should have no problem in being distinct and forming evidence-based interventions valuable for both patients and profession.

Meeting the patient is the starting point in the procedure of needs assessment–intervention–evaluation. If the steps are not done properly, ethical dilemmas may be raised. Firstly, the needs assessment should be accurately done, using valid and reliable assessment instruments designed for the specific purpose. Assessing and collecting data about the patient is an ethical issue—it must always be an area of concern for the profession and only done when such information is necessary to plan for further occupational therapy intervention. The needs assessment must therefore focus on occupation and occupational performance. To ask the patient to discuss their problems and needs beyond the professional area could be unethical and, at worst, be intrusive. The intervention should be evidence based and followed by an evaluation which, in turn, contributes to the knowledge of occupational therapy interventions.

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Chapter 8
Evidence-Based Occupational Therapy and Basic Elements for Conducting Assessments

Ingrid Söderback

Abstract This chapter reports about evidence-based interventions and the underpinning methodology for evaluating the effectiveness of occupational therapy interventions (OTIs). The content and the steps that compose evidence-based OTIs are described as well as the various methods for conducting quality assurance. Assessment instruments represent the prerequisites for conducting evaluations of intervention effectiveness. Therefore, their possible aims, psychometric functions, the process of collecting data, and interpreting the results are reported in broad terms. An overview of the various available methods, e.g., the Goal Attainment Scale for evaluating a single client's progress when participating in therapeutic sessions, is presented. Statements for evaluation of OTIs and recommendations for future advances are suggested.

Keywords Assessment instruments · Effectiveness · Evaluation · Evidence-based interventions · Goal attainment scale · Outcome statements · Psychometric theory · Quality assurance · Single case research design

Introduction

The clients, members of the profession, and society (Söderback 1995) expect that the interventions applied in occupational therapy are approved to gain the clients' purposes, be harmless, goal-effective, and cost-effective. *In other words, occupational therapy interventions (OTI) should be evidence-based* (Thomas et al. 2011). *Applying this to clinical practice means that the occupational therapist (OT) use his/her* clinical expertise together with the best known available external evidence from systematic research in connection to the clients' values, preferences, expectations, and goals (Sackett et al. 2000), that he/she makes informed decisions about the actual OTI(s) (Law and Bennett 2014). *This chapter concerns the requirements to establish OTIs to be proved evidence-based*.

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Definitions and Background

Evidence is a declaration which supports the proof of the truth. This support ranges from weak to strong. Evidence is used to formulate judgments, e.g., usefulness or statements for conclusions. Scientific evidence means support or refute that a theory is proved to be true, or an intervention is truly effective through the results of scientific studies.

Evidence-Based Medicine The term *evidence-based medicine* originated at McMaster Medical School in Canada in the 1980s to label this clinical learning strategy. The term was introduced to the database Medline in 1997, and was first identified in connection with occupational therapy through Ottenbacher's and Maas's (1999) post hoc power statistical analysis of 30 research interventions, demonstrating that the OTIs "produced a potentially useful treatment effect, but the effect was not detected as significant." Evidence-based medicine means that interventions include "the process of systematically finding, appraising, and using contemporaneous *research findings* as the basis for clinical decisions."

Results

Evidence-Based Interventions and OT Clinical Practice

Evidence-based practice in occupational therapy originates from these clinical decisions that OTs need to made in order to perform OTIs with high quality. These decisions may respond to questions referring to consideration about a client's need for being occupied, in comparison between two or more OTIs and then a choice of the most appropriate OTI(s), and archive performances and measurements that support expected outcomes (Bennett and Bennett 2000).

The Framework for Evidence-based Occupational Therapy Practice (Bennett and Bennett 2000) refers to the basic of (a) the client-centered approach, i.e., the uniqueness of a single client and his/her actual culture and environment and (b) the OTs knowledge, experiences, and clinical reasoning (see Chap. 5), about how to perform OTIs, e.g., according to Fisher's (2013), Occupational Therapy Intervention Process Model.

An evidence-based process includes $A^4 + E$:

- ASSESS: Acknowledge about the need of information and reflection, i.e., OTs' awareness of need for complementary knowledge and willingness to implement clinical changes
- ASK, i.e., creating answerable clinical questions
- AQUIRE, i.e., searching information and knowledge from scientific and clinical practical literature
- APPRAISAL, i.e., clinically appraise the relevance and validity of the information obtained from the literature studies

- APPLY, i.e., using of research evidence
- EVALUATION, i.e., appraisal of appropriateness and transfer of knowledge (Aas and Alexanderson 2012, p. 34; Bennett and Bennett 2000, p. 172)[1]

Applied to occupational therapy, these steps of the evidence-based process are exemplified below.

ASSESS This is the individual OT's responsibility which develops the profession and thus the quality of the OTIs (Söderback et al. 1993).

ASK: Clear Formulated Clinical Questions

A study aimed at providing evidence of an intervention should include clear formulated clinical questions based on the clients' occupational problem. These questions originate from the clients', the professional, and the stakeholders perspectives. It might be preferable to conduct these studies from the *clients' viewpoint.* For example, Cowls and Hale (2005; see Chap. 34) evaluated: "Which are the eight clients' opinions about participating in psycho-educational groups?" Their view was that voluntary attendance and the supportive milieu of the groups were the most appreciated. Evaluation of the quality of the hospital discharge process, as outlined in a system-oriented approach, investigated: "Which is frail elderly's perception of their satisfaction with and trust in the quality of care after discharge from the hospital to home" (Söderback 2008). However, there are relatively few studies with this client-originated viewpoint. It is much more common that research questions are originated from the occupational therapy *professional perspective* as treatment outcome studies, implying evaluation assessments of the results or the consequences of conducting a specific intervention. The results are expected to show efficacy of interventions, safety of interventions, program evaluations, or efficacy assessments. For example, a common research question is: "Is the new routine for the use of this specific intervention more effective than the routine ordinarily used?" Studies originated from the stakeholder perspective, include cost-benefit analysis. These studies are conducted with the research question: "Is the cost of an intervention program defensible compared to its expected benefits or cost-effectiveness." In other words, alternative ways to achieve effective results are investigated. For example, OTIs conducted in ten sessions were more cost-effective with patients diagnosed with dementia and their caregivers, compared to those who did not participate in occupational therapy (Graff et al. 2008; see Chap. 28).

[1] Further information and evaluating tools about evidence-based medicine is available from the University of Oxford, UK. http://www.cebm.net/index.aspx?o=1001.

AQUIRE: Search Information in Literature for Relevant Clinical Studies in Connection to Asked Questions

Occupational therapists working as clinicians may find information about evidence-based OTIs through the following specific databases:

- *OT seeker* (McKenna et al. 2008) is a valuable discipline-specific, online database and an excellent way of making research accessible for OTs' decision making. The OT seeker is proved to be of clinical value, as demonstrated in a study in which 62% of OTs ($n=309$), who used the source during a 30-day period had improved their ability to locate evidence-based interventions (Bennett et al. 2007).
- *The database Cochrane reviews* (Collaboration Cochrane Library 2014) provides practitioners with up-to-date information as a base for relevant evidence in their field of interest. For example, the Cochrane Library was used to identify the strategies for dealing with clinical heterogeneity of interventions of occupational and physiotherapy. The results showed limitations in the number and type of outcome measures and the lack of quantitative data synthesis (van den Ende et al. 2006).
- *Entrez-PubMed* is the general database for medicine with representation of most of the profession-specific occupational therapy journals presented in the English language (National Library of Medicine 2008a).

APPRAISE the Quality, Usefulness and Appropriateness of OTIs in Connection to Individual Clients

It is consensus in occupational therapy that all clinical decisions made, should be based on results conducted by scientific high-qualitative studies. These studies are based on scientific methods which includes (a) systematic reviews of interventions (i.e., assess the benefits and harms of interventions), (b) diagnostic tests, (e.g., needs for an OTI, see Chap. 7), (c) methodological reviews (i.e., measure the quality of the research methods), (d) meta-analysis (i.e., statistical estimation of the average results from several clinical trials), and (e) reliable and valid assessment instruments based on sound psychometric theory. More information about how to prove evidence of interventions and which OTI are evident effective are available in the Cochrane Library (Collaboration Cochrane Library 2014).

The scientific methods used for studies expected to prove or reject the evidence of the effectiveness of OTIs include the following:

- Results of well-reported *randomized controlled trials* (RCTs). The quality of these studies may be analyzed according to the Nelson-Moberg Expanded Consort assessment instrument. However, the primary psychometric data that result from this instrument showed that there is a need for greater sophistication if it is to be a valid tool for evaluation of RCTs (Moberg Mogren and Nelson 2006).

- *Systematic reviews* performed according to the Cochrane Review Guidelines or the best evidence synthesis reviews (van der Velde et al. 2007).
- Other ways for determining evidence of the effectiveness of OTIs include, e.g., *qualitative case methodology*, results from *consensus conferences, focus groups, the Delphi method, reports from peer review groups,* and *a best evidence synthesis review*. These scientific studies and clinical consensus should constitute the outline of clinical practice guidelines and for determining the evidence of the effectiveness of OTIs (Gopalakrishnan and Ganeshkumar 2013).

APPLY: Evidence for Validity and Usefulness of OTIs

In clinical practice, an OTI is evidence-based only if there is compliance between the application of the OTI to an individual client (personal preferences, health condition, occupational pattern, and environment) and how the research study is processed regarding (a) the purposes and the population, (b) the intervention content, e.g., doze, materials, environment, and (c) outcome data as documented according to the single client and during all the time of the intervention (Evidence-based Intervention Network 2014).

EVALUATION Implement Useful Findings in Clinical Practice

Implementation of evidence-based OTIs in clinical practice and evaluation of occupational therapy programs requires specialist knowledge and comprehensive work. However, there are very helpful guidelines, checklists, and references to scientific articles available, e.g., the web portal Evidence-Based Occupational Therapy Webportal (2014), a program evaluation workbook for occupational therapists (Canadian Association of Occupational Therapists 2014) and program evaluation workbook and critical reviews forms for qualitative and quantitative research (Law et al. 2014).

If research is to be optimally used to provide clinicians with evidence for the interventions applied, the following recommendations should be observed: (1) Contextualize the research and clinical practice by outlining the research results that it is easy to access and understand; (2) establish a researcher–stakeholder partnership; (3) provide professional–peer support (Koch et al. 2006); and (4) provide clinicians with knowledge through targeted workshops, and provide follow-up support aimed at implementing new routines of evidence-based practice (McCluskey and Lovarini 2005).

Quality Assurance in Occupational Therapy

In health care, quality assurance is a continuing process using measures aimed at improving the quality of the OTIs that the clients are offered. These measures as-

sess quality and effectiveness, and identify the shortcomings, which should result in recommendations for improvement and follow-up monitoring (National Library of Medicine 2008b). The quality of OTIs is expected to be acceptable, accessible, accredited, comprehensive, cost-effective, equitable, effective, efficient, relevant, and reliable (Wright and Whittington 1992).

Several methods are available for ensuring the quality of OTIs:

1. The *Donabedian method* (1980/1982) is aimed at identifying the quality and problems in health care through investigation of structure (resources and administration), process (culture and professional cooperation), and outcome (competence development and goal achievement) (Kunkel et al. 2007). This method is sparsely used in occupational therapy.
2. "*A chart-stimulated recall* (CSR)[2,3] *peer-review process* and the interview tool were revised, implemented, and evaluated…to assess the clinical competence of the occupational therapy staff" (Salvatori et al. 2008), and the same method was used to outline clinical guidelines for OTIs in patients with burn injuries (Simons et al. 2003).
3. *Evaluation of intervention programs* is a commonly used approach in studies evaluating effectiveness. For example, Goodman et al. (2005; see Chap. 15) demonstrated that 74 % of all ergonomic recommendations regarding improvement of computer stations had been implemented by an engineer company.
4. The *DySSy-model* (Kitson 1989) uses an eight-step process for ongoing assessments; for example, an evaluation of occupational therapy case-record documentation showed that only 21 of 100 of the records were complete (Backman et al. 2008).

Assessment Instruments

All health services in Sweden are expected to be based on scientific evidence, meaning that *effectiveness* (that is if the intended goals are reached) and *efficiency* (that is the amount of resources required to reach the goal; Söderback 1995) of an OTI are demonstrated. In other words, the intervention should be effective for improving the clients' functioning (World Health Organization 2007, p. 11). Therefore, assessment instruments with guaranteed reliability and validity constitute an absolute prerequisite for (1) making well-founded evidence-based clinical decisions, (2) evaluating, planning, goal setting in OTIs, (3) conducting RCT scientific studies, and (4) investigating the effectiveness, efficiency, and cost-benefit analysis of clinical interventions' outcomes. Assessment is a process of collecting objective and relevant data. These data are measured, scored, and interpreted according to standardized criteria, which includes psychometric reliability and validity and an

[2] For information on research design (see, Stein, Rice, Cutler, Clinical Research in Occupational Therapy, 2012, Taschenbuch, 978-1-111-64331-7).

[3] For an explanation of these methods, see a textbook containing scientific methodology (Polit and Hungler 1999).

adequate performance procedure (Stein and Cutler 2000). The assessment process requires analysis of the critical factors of the client's continuum of functioning and impairment, related to the significance and meaning of task performance, the tools used, and the environment where the task or occupation will occur. An assessment instrument provides quantity measures expressed in scores, frequencies, time, percent, or physical measures such as length or temperature. Assessments are used with emphasis on different functional dimensions depending on the client's disease and disability. For example, the assessment for clients with chronic fatigue syndrome emphasizes the amount of energy needed to perform the actual tasks related to the functional capacity of the client (Barrows 1995).

Selection of an Instrument for Assessment

The rationale for selecting an adequate assessment instrument for a client and situation, as well as the procedure for gathering data, is based on a problem-solving process that is both continuous and dynamic. The following sections discuss the OTs' decision making in selecting appropriate assessment instruments through a systematic review of their psychometric properties, feasibility, and viability. This review may be useful in determining the appropriateness of assessment instruments for a client's unique situation. For this purpose, the appendix 1 provides a blank form for evaluation of assessment instruments.

Available Types of Assessment Instruments

The OT should make a choice of which type of assessment instrument would be appropriate for use in relation to the individual client's status, diagnosis and functioning, expected occupational therapy goal, and present environment. The choice might be between:

- *Global assessment instruments* are used to compare the client's results with those of a normative group.
- *Diagnosis-specific instruments* are used for clients who suffer from the same medical diagnosis or disabilities.
- *Domain-specific instruments* are used for assessing impairments, activity limitations (e.g., related to work capacity), or age or participation restrictions. The results of this assessment determine the characteristic patterns of clients' who belong to a specific domain.

The Aims of Assessment Instruments

There are assessment instruments aimed at (1) describing, (2) predicting, or (3) evaluating outcome (Law and Letts 1989). A descriptive assessment instrument

is used to establish clients' occupational characteristics, symptoms, or patterns of occupational performances aimed at determining the choice of occupational therapy interventions. A predictive assessment instrument is used to determine the future need for support for performing activities of daily living (ADL) and generalization effects (see Chap. 22). The evaluating outcome assessment instruments are used in RCT studies and to determine clients' goal attainment and other expected results after the clients have participated in an intervention.

Content of the Assessment Manual

Every assessment instrument should include a manual for conducting the assessment, a computer program for interpreting the results, and a form for recording the results. The required contents of a manual are (1) administration instructions; (2) the assessment instrument's aim (describe, predict, evaluate) and focus; (3) the theoretical base of the assessment; and (4) the psychometric functions (see below). The administration instructions are the guiding principles for conducting the specific assessment. The focus may be intended for a diagnosis, or a domain, or related to age, or combinations of these. The psychometric functions are data regarding the validity, that is, the measure determines what it really is intended to measure, and the reliability, that is, how exact the measure is.

Psychometric Functions: Types of Measurement Scales

The items represent measures that are constructed with scales of *nominal* (category), *ordinal,interval,* or *quota*. The sensitivity of an assessment instrument is determined by the types of the assessment scale, that is, for which clinical situations the assessment instrument is appropriate, such as to describe function, predict future functioning, or evaluate outcome.

Nominal and ordinal measurement scales are used to differentiate between categories. Assessment instruments constructed with nominal scales are appropriate to use for *describing clients' occupational characteristics* and give an indication of the range of the disability and occupational dysfunction, but are not useful for evaluation of effectiveness.

Measurements based on an *ordinal measurement scale* (e.g., the Likert scale, Guttman cumulative scale[4], and Goal Attainment Scale (GAS)) define the order of ranks that make comparisons between people with the same prerequisites and over time. The results give a summarized assessment of the client's present status and predict the outcome of participation in an intervention (how *effective* the intervention will be for this client).

Assessments based on an *interval measurement scale* show a continuum, such as a range of motion, size difference in centimeters or minutes, and include the exact

[4] For complete information about these scale types (see Polit and Hunger 1999).

distance between the measurement points, but without an absolute zero point. The standardized scale type, based on the interval scale, shows the client's divergence from the mean value, and is used for measuring intelligence, for example.

A *quote measurement scale* has the same prerequisites as an interval scale measurement, but includes an absolute zero point. The interval and the quote measurement scales are preferable when determining the intervention *effectiveness*.

Psychometric Functions: The Items

The *items* are composed of questions and observations of a performance or specific task. Several items constitute *variables*, also called factors, and these, in turn, constitute categories. The items that constitute variables have their relative positioning order on a measurement scale. This order is determined by statistical methods, such as Cronbachhs coefficient alpha (α). Such coefficients determine how exact the measure of an assessment instrument is; that is, it represents the *reliability*. The reliability statistics are used to understand for which clinical situations the assessment instrument is appropriate. The *internal consistency* of an assessment instrument is expected to be between $\alpha = 0.71$ and $\alpha = 0.80$ in order to have acceptable measurement properties useful for receiving *descriptive* information. The alpha (α) coefficient should be higher than 0.81 for measurement properties necessary for the *evaluation* of intervention effectiveness. However, assessment instruments to be used with a *predicative* aim should have an internal consistency of more than $\alpha = 0.95$ (Law and Letts 1989).

Psychometric Functions: Validity of an Assessment Instrument

Logical reasoning and the construction of an assessment instrument are a matter of vital importance for its validity.

The *content validity,* representative validity, or face validity concerns the degree to which items represent the subject of measure, for example, that measures of daily activities really are the client's daily activities. The *construct validity,* theory validity, or internal validity corresponds to the theoretical origin of the assessment instrument (convergent validity), or is distinct from it (divergent validity).

The *criterion validity* or empirical validity concerns the degree to which an assessment measures concurrent changes between two group members or predicts the client's changes over time among the members of a group of clients.

Collecting Data Using an Assessment Instrument

The variations in collecting data are shown in Fig. 8.1.

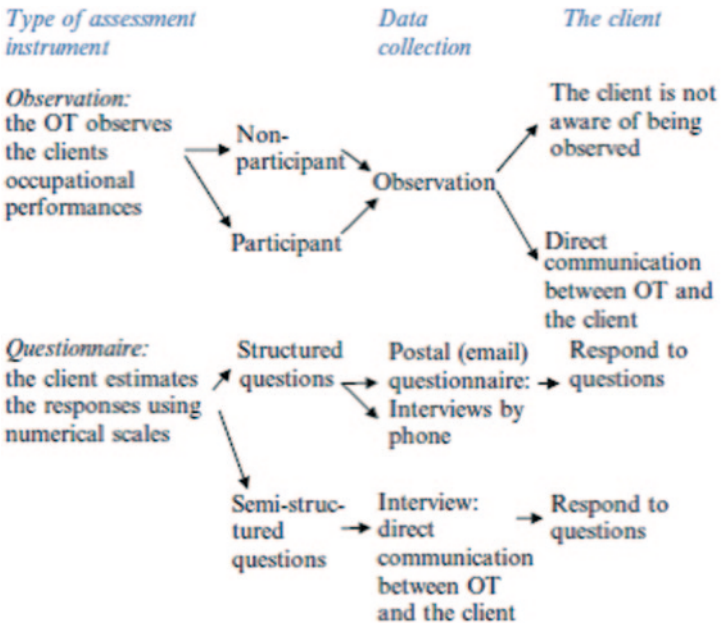

Fig. 8.1 Different ways of collecting data using assessment instruments

Reporting Results of Assessments

Results of an assessment are determined in terms of the following:

- *Raw scores,* which seldom give useful information for goal setting or evaluation. Normally, raw scores should at least be converted to percentage.
- *Response patterns* or behavior outcome, which is used to compare and describe differences in function among people belonging to similar groups (e.g., clients with the same diagnoses, impairments, activity limitations, participation restrictions, or socioeconomic circumstances).
- *Derived scores* (e.g., standard scores, measures of central tendency, standard deviations, or percentiles), which give OTs the opportunity to compare clients' function over time and between groups; that is, evaluation of intervention effectiveness is possible.
- *Index*, which is a ratio that compares two related measures. For example, the body mass index describes the relationship between a client's height and weight.
- *The degree of difficulty* in performing a task, which can be analyzed by using the Rasch method for analyzing data (Fisher 1993; Kirkley and Fisher 1999; Linacre and Wright 1991–1996). This statistical measure indicates the client's estimated ability to perform tasks in relation to the degree of difficulty in performing the tasks. Thus, scoring occurs in two ways: (1) the difficulty level of the tasks, and (2) the way in which the results of a client are comparable to others

having a similar disability. Use of the Rasch analysis method enables the OT to plan interventions. For example, the *Evaluation of Daily Activity Questionnaire* (EDAQ; Nordenskiöld et al. 1996) was used to describe how well women with rheumatoid arthritis ($n=47$) could perform activities of daily living. Among 102 activities, the women indicated that grocery shopping was the hardest task to perform and walking indoors was the easiest task to perform. The Rasch analysis is used with the *Assessment of Motor Process Skills* (AMPS; Fisher 1993).

- *Method-time measurement* (MTM) scores (Farrell 1993), which are criterion-referenced procedures that measure the time it takes for a client to complete a predetermined number of basic movements within a predetermined time standard (Jacobs 1991). These results are used in determining job readiness by comparing the worker's performance to established job standards.
- *Modular Arrangement of Predetermined Time Standards* (Farrell and Muik 1993), which is a version of MTM where the standard length of time is related to the area of work in which the specific movement is performed.

Outcome Assessments Aimed at Evaluating the Results of One Client's Participation in an Intervention

Evaluation of *one* client's participation in an OTI is not enough to determine evidence for the effectiveness of the intervention. However, evaluation of a client's development during a series of occupational therapy sessions should be a natural part of OTIs, because it (1) gives the OT valuable information about the necessity of changes in the intervention, (2) might be a motivation factor for the client, and (3) could be a useful base for conducting studies that might contribute to a decision based on evidence effectiveness.

The clinical evaluation of the client's progress is related to (1) the projected goals of the intervention, (2) the direction of the impairment or disability (improvement, maintenance, or deterioration; Söderback 1995), and (3) the focus of the evaluation (e.g., self-care, physical improvement).

Quantitative evaluations[5] are most often based on assessment instruments of the client's participation in an intervention. These evaluations are conducted as (1) *a summative assessment* including a testing before and after the intervention, or (2) *a formative assessment* or a series of assessments during the time an intervention is carried out. Pretesting identifies the client's need for OTIs, while post-testing gives information about the client's change(s).

The results of these summative or formative assessments are possible to determine by using the *reliability change index* (RCI; Guidetti and Söderback 2001; Ottenbacher et al. 1988).

[5] *Qualitative* methods for evaluating the effectiveness of client's perception of OTIs are greatly advocated but for the present outside this frame of effectiveness evaluation.

Goal Attainment Scaling (GAS: Chang and Hasselkus 1998; Kiresuck et al. 1994) is a valuable method for determining a client's change during participation in interventions. For example, in a vocational training program, the results showed that three out of four patients had attained their predetermined goals ($T \geq 50$; Gruwsved et al. 1996). GAS has become an adequate and often used method for evaluating effectiveness of OTIs for the single client (a search in PubMed captured 13 scientific articles, years 2010–2013)

Finally, *Single Case Research Experimental Design* (Kazdin 1982; Stein and Cutler 2012) is a scientific alternative for OTs to receive information about the effectiveness of an intervention that is newly applied to or modified for a small group of clients. See, for example, Campbell et al.'s (2007) multiple-baseline study that investigated the effectiveness of errorless learning applied to a client with severe traumatic brain injury. The results showed significance ($p < 0.001$) of memory lapses during a 3-month follow-up.

Outcomes

Outcomes are efforts aimed at "assessing the quality and effectiveness of healthcare as measured by the attainment of a specified end result (goal) or outcome," but the efficacy, safety, and practicability may also be investigated due to treatment evaluations (National Library of Medicine 2008b). Outcome is an important dimension of health attribute of interventions, including ability to function, health perceptions, and satisfaction with care (American Occupational Therapy Association 2002).

Reporting Outcome Evaluation of Interventions

The *lack of changes or changes*, i.e., stated outcomes that occur during and after a client has finished participation in OTIs is *suggested* to be evaluated using e.g., statements that concern the *level of*:

1. Occupational performances ability
2. Satisfaction with occupational performances
3. Satisfaction with environmental and occupational adaptations
4. Function, i.e., independence in personal and instrumental daily activities, plus cognitive, motor and emotional functions
5. Quality of life
6. Recovery
7. Wellness—well-being
8. Temporal balance
9. Satisfaction with current (occupational/work) health status
10. Adaptation to present impairment/disability
11. Compliance with OTI's
12. Satisfaction with OTIs appropriateness, usefulness, and cost-effectiveness (Stein et al. 2006)

Such statements, used for evidence of the OTIs' effectiveness, are of great importance for the credibility of outcome and for defining the profession. It might be suggested that the more the profession uses joint statements about outcome, the better respected the intervention will be. Of course, the opposite is also true: Disparate statements of outcome will cause less evidence for its effectiveness.

Therefore, the question is: *What are the most appropriate statements to be used to determine OTIs?* In other words, *what outcome terms should be recommended for use?* However, the answers to these questions are beyond the scope of this handbook.

Discussion At present, in the literature of occupational therapy, a very wide range of outcome statements exists[6]. Some of them seem to have less connection to the core content of occupational therapy, e.g., survival time. Other outcome statements concern occupations, such as the number of occupational performances errors, extensive ability to perform activities of daily living, or ability to perform work tasks or sustaining work. Outcome statements were also originated from the International Classification of Functioning, Disability, and Health (ICF) terminology, for example, measures of impairments such as balance and anxiety.

The *conclusion* is: If outcome statements were used in professional compliance among OTs, the occupational therapy profession would be more respected.

Recommendations for the Future

I would recommend:

- Further development and documentation of occupational therapy outcome statements, fixed by consensus among colleagues.
- Teamwork for conducting more extensive RCT studies, which will result in greater numbers of clinical decisions being based on evidence.
- Continuously assessed quality assurance as a natural part of clinical work.
- Arrangement of consensus conferences aimed at discussing outcome statements that are congruent. Such statements would facilitate communication among OTs worldwide, as they are working to meet their clients' occupational needs.

[6] This statement is based on the studies of the scientific occupational therapy literature that was used in Chap. 3 and the Table 58.1 as presented in IHOTI, first edition.

Appendix 1

A checklist of clinical decisions to make in choosing an assessment instrument	
1	The assessment instrument entitled:
	Version?
2	The source of the assessment instrument:
	Author(s)?
	Reference(s)?
3	References with:
	(a) Clinical applications?
	(b) Evidence of the psychometric functions of the assessment instrument?
4	Theory or model that constitutes the base of the assessment instrument?
5	Is a manual, a computer program, recording forms, and other equipment for administration of the assessment instrument available?
6	How is the assessment instrument administered? How are the data collected? How are results given to the client?
7	What is the focus of the assessment instrument? (global, diagnosis-specific, etc.)
8	For what is the assessment instrument intended? (diseases, diagnoses, disability, impairment, age, language)
9	What is the aim of the assessment instrument? (describe, predict, evaluate)
10	Describe the construction of the assessment instrument? (e.g., number and titles of items and factors).
11	What measurement scale is used? (nominal, ordinal, interval, quote)
12	What type of scale is used for the assessment?
13	What is known about the reliability of the assessment instrument? (internal consistency, observer-/test–retest reliability)
14	How sensitive is the assessment instrument (suitable for application to describe, evaluate, predict)?
15	How appropriate (sensitive) is the assessment instrument for performing repeated measures?
16	What reliability coefficients are known that correspond to a group of people with the same prerequisites as the client who would take the assessment?
17	What standard deviation is known according to the group of people with the same prerequisites as the client who would take the assessment?
18	What is known about the validity of the assessment instrument? (content, concurrent, criterion)
19	With what method are the results calculated?
20	Is there enough psychometric information for calculating the results and is the specific formula for calculating the results stated?
21	Are guidelines for interpretation of the clients' performance available?
22	Are cut-off scores, criteria, or other limits for the clients' performance stated that make the result interpretable for making clinical decisions or evaluating intervention results?
23	What is known about the cost-benefit of the assessment instrument?
24	Does the administrator (therapist) need specific knowledge?
25	What are the positive and negative experiences of using the assessment instrument (preferably based on scientific publications) for similar situations as for the actual client?

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Chapter 9
Occupational Science Informing Occupational Therapy Interventions

Clare Hocking, Margaret Jones and Kirk Reed

Abstract Occupational therapists' need for greater knowledge of occupation is described from two perspectives: as it was understood at the time the profession was established and as it is defined in the present day. Occupational science responds to that need. This new field of investigation is defined, and understandings about occupation that are shared by occupational therapists and scientists are reviewed. Three ways in which occupational science informs practice are identified. First, it supports a return to occupation-focused practice, where occupation is both the means of intervening and the goal of intervention, and understanding clients' occupational history is essential. Second, occupational scientists are generating new intervention strategies, two of which are briefly outlined. Third, occupational science is opening up new practice areas with vulnerable populations, such as immigrants and refugees, using interventions that promote population health rather than providing rehabilitation. The need for ongoing research, particularly to support population-based interventions, is recognised.

Keywords Environment · Health and well-being · Occupation · Participation

Introduction

John Ruskin once observed that 'the highest reward for a person's toil is not what they get for it, but what they become by it' (BrainyQuotes 2013). In pointing out that the things we do transform us, Ruskin was voicing a key tenet of the arts and crafts movement: making things by hand is ennobling, enriching mind and spirit. Drawing from that philosophy and their own experiences, occupational therapy's founders firmly believed that occupation has curative properties. Not only would it benefit people with mental illness, nervous disorders, tuberculosis and orthopaedic conditions (Christiansen and Haertl 2014) but it was also the very basis of health (Christiansen 2007).

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In the century that followed, occupational therapists developed a wealth of knowledge about the ways health conditions interrupt occupation, the environmental barriers encountered by people with disabilities and how to intervene. However, these advances in practice were not informed by deepening understandings of occupation because, apart from practical craft skills, occupation was virtually absent from occupational therapy curricula (Fish 1947; World Federation of Occupational Therapists 1998). The need for in-depth knowledge of occupation itself was not substantially addressed until the late 1980s when occupational science emerged (Clark et al. 1997). This new field of study was initially described as dealing with 'universal issues about occupation' that occupational therapists would take up and apply in practice (Yerxa et al. 1989, p. 4). A more recent definition described it as 'concerned with the nature, performance, and outcomes of the ordinary and extraordinary things people do in their everyday lives' (Hocking 2012, p. 1365). To understand the complexities of occupation, occupational science incorporates ideas from ecology, economics, engineering, philosophy, political sciences and population studies (Dickie 2010). This fresh approach to understanding occupation reaches beyond occupational therapy to fields and contexts outside health care.

Like occupational therapists, occupational scientists initially viewed occupation as something individuals do, perhaps for or accompanied by others, which meets survival, identity and belonging needs. Engaging in occupation was understood to be self-initiated, purposeful or goal-directed, to use time and energy, and require some level of attention (Gray 1997), even when the task was familiar and mundane. Occupations developed capacity, knowledge and competence—enabling people to become what they have the capacity to be (Yerxa et al. 1989). Because of the interconnection between occupational science and occupational therapy, it is not surprising to find that these views of occupation align closely with the profession's practices and processes. Occupational therapists are also concerned with the purpose of valued occupations; the time, energy and other demands of performance; and how skills, knowledge and competence can be developed so that clients can participate.

In describing how occupational science would serve occupational therapy, its American founders specified that it would encompass the substrates, form, function and meaning of occupation (Clark et al. 1991). Alternatively, viewed from a health perspective, occupational science is about doing, being, belonging and becoming (Wilcock and Hocking 2015). Other prominent assertions are that occupations are named and hold meanings within their cultural context (Zemke and Clark 1996). There is also an emerging awareness, in both the profession and the science, of occupation as a transaction with the environment. That is, rather than considering people and the environment as separate entities, the focus shifts to understanding how people and environments are interconnected and interact. This perspective draws inspiration from Dewey's notion of transaction, which considers people and environment as a whole, with each affecting and being affected by the other. In a practice context, a transactional perspective is perhaps best illustrated by dynamic performance analysis (Polatajko et al. 2000). Using that approach, therapists engage clients in the occupation they wish to perform, identify where the performance breaks down and intervene by testing out solutions. In this way, the interaction of person, environment and occupation become the focus, rather than any single component.

Table 9.1 Examples of occupations explored by occupational scientists

Occupation	Participants	Authors
Activist occupations	Older men and women	Fox and Quinn (2012)
Cooking festive meals	Older women	Wright-St. Clair et al. (2013)
Quilt making	Adult and older women	Dickie (2003)
Reading picture books	Young children	Lee et al. (2003)
Singing in a choir	Adults	Tonneijck et al. (2008)
Tagging (graffiti)	Youths	Russell (2008)

Established Practice Areas Informed by Occupational Science

A quick glance through the contents of the *International Handbook of Occupational Therapy Interventions* confirms that the profession primarily works with people with disabilities. In this well-established biomedical domain, occupational science is contributing to the renaissance of occupation-focused practice (Whiteford et al. 2000). That shift is occurring alongside the increasing emphasis given to evidence-based practice, where therapists use research results to supplement the information provided by clients, their knowledge of the practice environment and insights gained from experience (Baker and Tickle-Degnen 2014). Evidence from research spans ways to diagnose the cause of the problem, the likely prognosis and how effective different interventions might be. In addition, occupational therapists need evidence about the concerns clients have and their experience of engaging in occupation (Hoffman et al. 2013).

It is this last area, understanding people's occupational concerns and experiences, which is prominent in the occupational science literature. One focus has been to learn more about the characteristics and meaning of the diverse occupations of adults and older adults and, to a lesser extent, children and youths (see Table 9.1). As well, the ways people organise activities within a family (Evans and Rodger 2008), negotiate responsibility for domestic work (Primeau 2000), interact with the local environment (Manuel 2003), manage the demands of shift work (Walker 2001) and many other aspects and functions of occupation have been described. Building up this body of evidence is imperative for occupational therapy, which identifies occupation as both the means it uses to enhance health and the goal of intervention (Chisholm and Boyt Schell 2014). The profession's commitment to client-centredness is also served by research shedding light on the ways people's identity, sense of satisfaction, relationship with others, learning, development and achievements are bound up in their everyday activities. Appreciating occupation from such rich perspectives gives life to occupational therapists' concern with the things people want, need and are expected to do. It helps us interpret clients' life histories and respect their aspirations and occupational goals.

Beyond their knowledge of occupation and its place in people's lives, occupational therapists who work with people with disabilities need to appreciate how health conditions impact engagement in occupation. Here also, the evidence accu-

mulated by occupational scientists is salient. It is also, at times, generated expressly to inform occupational therapy practice. For example, studies have revealed how occupational routines can support family well-being when an adolescent has a mental illness (Koome et al. 2012), that while children with dyspraxia cannot be 'cured' they can enjoy and succeed in gymnastics (Hessell et al. 2010), that occupation is meaningful to people with chronic mental illness (Eklund et al. 2012) and the complex knowledge academics with multiple sclerosis build up as they navigate the university campus and workload demands (Dale Stone 2009). Other researchers have entirely reframed recovery from mental illness from an occupational perspective (Sutton et al. 2012) and uncovered the participation skills that community members need to be able to support children to engage in everyday occupations after a brain injury (Jones 2014).

Occupational Science Generating New Interventions

Several new interventions developed by occupational scientists also support the move back to occupation-centred practice. These are based on studies that have investigated people's occupational concerns, and how patterns of occupation affect people's health. For example, the ReDesigning Daily Occupations (ReDO) programme developed in Sweden by Erlandsson (2013) is a 16-week facilitated programme based on research about patterns of everyday occupations among women with complex family situations (Erlandsson and Eklund 2003, 2006). The Value and Meaning in Occupations model developed by Persson and colleagues (Persson et al. 2001) formed the theoretical framework that underpinned the ReDO programme. Important elements of the ReDO programme are based on occupational science and occupational therapy principles, such as reflecting on one's occupational history, identifying interests, stressors and rewards, mapping how time is used and becoming aware of the value and meaning that may be found in everyday occupations. The aim of the ReDO programme is for participants to have begun a long-lasting change to their patterns of daily occupations, providing knowledge and understanding of each participant's unique patterns of daily occupations and what shapes them, through a process of occupational analysis. Research has shown that the ReDO programme has a greater return to work success rate than 'care as usual' (Erlandsson and Eklund 2011) and that the 'ReDO interventions showed greater gains for the higher educated and older women in this middle aged sample' (Eklund et al. 2013, p. 91). These results point to the ReDO programme being a promising occupational therapy intervention.

Another example of a new intervention is based on the work of occupational scientists from the University of Southern California. The team led by Florence Clark and her colleagues identified that the occurrence of pressure ulcers could have an occupational underpinning and as such could be a barrier to participating in everyday occupations. The initial study, the Pressure Ulcer Prevention Study I (Clark et al. 2007) began as a holistic ethnographic study to explore the life con-

texts that contributed to the occurrence of pressure ulcers. From the data gathered in this study, the occupational science researchers were able to develop a model for occupational therapy intervention. This required testing of the efficacy of the intervention and manualising the therapeutic methods. The manual provisionally included such topics as occupational story making, habits and routines, participation and activity and spirituality (Blanche et al. 2011). A randomised control trial, the Pressure Ulcer Prevention Study II, has been developed to evaluate the cost effectiveness of the new intervention compared with standard care. Its goal is to provide occupational therapists with a theoretically guided, evidence-based intervention programme to reduce the risk of pressure ulcers.

Occupational Science Opening up New Practice Opportunities

In addition to supporting current practice, occupational science challenges and equips occupational therapists to establish new roles in population health and social justice. The first call to make that shift, by reorienting practice from rehabilitation and prevention to health promotion, was in the World Health Organization's Declaration of Alma-Ata (1978). Recognising gross inequalities in people's health status, that document declares health to be a fundamental human right and a worldwide social goal. Knowing that occupation is the foundation of good health, it is easy for occupational therapists to see that the profession has much to offer. Concepts developed by occupational scientists bring clarity to the profession's role in population health, explaining the relationship between poor health and burdensome or restricted participation in occupation. Two concepts are pivotal: occupational deprivation and transactionalism.

The consequences of being deprived of a sufficient range of occupations include actual and important reductions in well-being, with long-term implications for health (Wilcock and Hocking 2015). That outcome has been validated in a number of studies. For example, marginalization within the workplace, inflexible workloads and schedules, and provision of necessary health services within normal work hours can make it impossible for people with disabilities to sustain employment (Dale Stone 2003; Jakobsen 2004), pushing them into poverty and alienating them from the rest of society. Equally, refugees and asylum seekers, whose access to work and other culturally significant occupations is severely curtailed, describe challenges with constructing meaningful routines, maintaining parental roles, preserving their culture and preparing for the future (McElroy et al. 2012; Steindl et al. 2008). A population health approach addresses such issues as a matter of justice, using interventions designed to change attitudes and practices across work, transport, housing, immigration, health and social sectors. Horghagen and Josephsson's (2010) account of promoting the visibility of asylum seekers housed in a Norwegian reception centre by engaging them in a theatre production is one example. Taking a transactional approach, which views people as both shaped by and shaping their

context, is imperative. Only in that way can we fully appreciate the ways people mediate environmental demands and restrictions, to best fit their beliefs, capacities and circumstances (Connor Schisler and Polatajko 2002).

Conclusion

Occupational science is a relatively new field of study. There is much work to do before we can claim that it provides a comprehensive understanding of the nature, performance and outcomes of the things people do in their everyday lives. Even so, it is changing the ways occupational therapists intervene with people who have difficulty doing the things they want, need and have to do. In every practice area, occupational science informs practice by revealing the rich and complex meanings occupation holds, which occupational therapists need to understand if we are to appreciate the significance of people's occupational goals and to engage them in the interventions we offer. In some practice areas, the science is generating new, evidence-based interventions that address costly threats to health, such as the ReDO programme for workers experiencing unsustainable levels of stress and the pressure ulcer prevention programme for people with spinal cord injuries. In population health, occupational science offers a fresh perspective to understanding the nature of the health threats affecting diverse populations. Thus equipped, occupational therapists can stand alongside others working in that field to promote health and well-being by challenging restrictions on people's access to occupation and helping them to change patterns of occupations that undermine health.

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Chapter 10
Interactive Patient Cases in Occupational Therapy: How to Succeed

Jonas Nordquist and Kristina Sundberg

> *Hence, the characteristics of interactive patient cases encourages holistic learning and offers the learners the opportunity to get to know more about less than less about more* (Gerring 2006).

Abstract This chapter introduces an opportunity to learn more about the benefits of using interactive patient cases in occupational therapy education. Why, how and when should you introduce interactive patient cases and how do you write a case and facilitate a case seminar? This chapter brings insight to these questions, as well as presents a historical background to the usage and an overview of what type of learning interactive cases can stimulate.

Keywords Case · Interactive · Learning · Learning activity · Patient case

Introduction

Lecturing is currently a widely used learning activity in health professions education, but is it the most appropriate one for encouraging high-quality learning? Even though lecture is one useful learning tool in the educational toolbox, research shows that only a small percentage of the information delivered in a lecture is retained (Dunkin 1983). There is also no evidence that passive transfer of information should have any impact on participants' daily practice (Miller 1990).

Departing from these findings, we address in this chapter one specific learning activity that can be used to increase the activity as well as the interactivity in occupational therapy education: *interactive patient cases*. Hence, in using this specific learning activity, you will strive towards creating high-quality learning.

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The term "case" sometimes has a slight negative connotation in the world of health professions: the specificity of a case is in some contexts considered an indicator of a low level of generalizability and therefore seen as problematic (Flyvbjerg 2011). We would instead argue that interactive patient cases are valuable learning tools for high-quality learning and that interactive patient cases can contribute with this in learning modules. The added value of this chapter is that it provides you with knowledge on why, how and when to use interactive patient cases. You will, in this way, obtain both the evidence and the practical implications of the benefits of using interactive patient cases (Biggs and Tang 2007; Knowles 1998; Marton and Säljö 2008).

The overall aim of this chapter is to provide you with research evidence as well as practical performance suggestions to highlight the usefulness of a specific learning activity within the occupational therapy context: interactive patient cases.

The objectives are to develop your ability to identify the main features of an interactive patient case and to also explain the difference between "traditional cases" and "interactive cases". You shall also be able to prepare yourself for running and interactive patient case seminar. To summarize, these questions are addressed:

- Can patient cases be used to improve learning in occupational therapy?
- Are there different kind of patient cases and does this imply any difference from a learning quality perspective?
- How does one best prepare to teach with cases?

"Traditional Cases" Versus "Interactive Patient Cases": What, Why, How and Where?

Traditional Cases

What Is a Traditional Case?

Some people might wonder if there is a different types of cases. Has occupational therapy throughout history not consisted entirely of *patient cases*? Such cases can be either very typical and quite common, or very unusual but still of interest. Many health profession journals have special sections for *patient cases* and there are not many *case reports* at different scientific conferences. We try to point out below the difference between what we label as "traditional cases" and the *interactive patient cases* we are highlighting in this chapter.

There are of course huge variations of "traditional cases" and it is always vulnerable to try to give a fair and valid characterization without becoming too general, or even stereotypical. However, we would argue that a "traditional case" always has a few "classical" components. First, it is a story of "someone" who presents with a medical history and symptoms. There might then be a summary of different test results, therapy given and the immediate outcome. Second, "traditional cases" often end with "what do you do"? Hence, the focus in on a more or less complex

or typical clinical encounter and clinical decision making, but it can also be used to discuss ethical issues.

The typical ingredient features of this kind of cases are that they normally only focus on the occupational therapist, or other health-care practitioners, and the broader context of the clinical encounter and professional situation is left out. Also, many cases are already preclinically analysed by the case author. Some of the diagnostic process, and hence the framing of the clinical problem, has already been taken care of. The pure focus is to "solve" or "manage" the clinical situation. The authenticity of these cases varies to some degree: some are true case reports, others are written to fit a "typical" or "unusual" situation and "corrected" so that atypical information or "unclear, dubious or inconclusive findings" are left out in order to give accuracy to the case and the point/points the faculty member likes to make (Nordquist et al. 2011).

Why Use Traditional Cases?

In many instances, the educational aim and objectives are not communicated with the participants (Hattie 2009). It is taken—more or less—for granted that the idea is to solve the problem, and that this does not require a clarification in terms of communicating the explicit learning objectives with the case. "Traditional cases" can be used for various purposes:

- Training clinical decision making
- Illustrating a lecture with a practical case
- Trying to integrate theoretical knowledge into a practical context

Interactive Patient Cases

Interactive Patient Cases: What Is the Difference and What Is New?

Interactive patient cases have been inspired by the use of cases at Harvard Business School, famous for its "case method". Harvard University, USA has been using cases for more than 100 years and it is almost in the fabric of its teaching in many professional schools (Garvin 2003). They are currently used in education, law, political science, and business (Lundeberg et al. 1999). We have tried to take the methodology behind the way Harvard over the years has developed cases and apply this to the world of health professions in order to improve the learning quality of the use of cases (Nordquist et al. 2011). We first outline below how the health profession cases can be developed by using the Harvard "case method" and then, in a separate section, address the issue of why this enhances learning quality compared to "traditional cases".

First, what are the unique features of a case from Harvard Business School? Before presenting the individual components of a case, one has to be reminded of

the overall purpose of using cases in the first place. When many of the professional schools opened in the first decades into the twentieth century, the purpose was to train professionals: lawyers, business managers, public health professionals, etc., and the training programmes had hence to be relevant to practice. Previously, prior to the establishment of professional schools, higher education mainly focused on liberal arts: philosophy, music, literature, the fine arts and history, among other disciplines. The whole purpose was to "cultivate the mind of men and women" and train critical thinking. By "cultivating the mind of men and women", persons with a degree from a university would be ready for professional practice since they had been trained in analytical and critical thinking. However, the technological development required slightly more of technical knowledge and "liberal arts" degrees were insufficient for professional practice, thus the birth of professional schools (Sullivan 2005; Nordquist et al. 2011).

In order for the professional schools to use material relevant for professional practice, they simply created "cases" based on authentic situations in real life—in the professional setting. This solved two problems for the professional schools: First, the content and the framing of the content originated in practice and were hence both relevant and accurate for future professionals to use for training purpose. Second, since the material was authentic, the graduated did in fact collect a significant degree of experience, even though they yet had not been practicing. However, already at graduation, by being exposed to a variety of cases, they were both ready for practice and not novices entering practice. At least they were advanced beginners (Dreyfus and Dreyfus 1980) on their way to become proficient. The case method was with these purposes the perfect method to match the overall vision and mission of the professional schools to properly, and in a relevant manner, prepare students for practice (Barnes et al. 1987; Christensen et al. 1991; Lundeberg et al. 1999; Silverman et al. 1995).

Interactive Patient Case Characteristics: How to Write a Case

Teaching with cases offers an opportunity for learners to achieve structured reflection around the professional role as an occupational therapist: What *should* we do as members of the profession and what are we *actually* doing? Are our actions aligned with our professional standards? Structured reflection through the usage of cases hence contributes to articulation of the professional collective knowledge and expertise, which sometimes can be tacit. Language and dialogue are central when it comes to learning with cases—through social interaction and joint reflection together with peers, collective learning is possible (Nordquist et al. 2011).

How then should one go about writing a case that contributes to reflection and learning? To prepare professionals for practice, *a case has to have a specific design and has to be used in a specific way in the classroom*.[1]

[1] A manual for writing case studies is available for professions working with information systems (Farhoomand 2004).

Let us first begin with the design and the writing of a case as such. An important point of departure is that the cases have to be *authentic*. Armchair cases (fictional stories) cannot be allowed since it jeopardizes the criteria of proving the students with experience, and the criteria of "relevance for practice" could be questioned if the true, authentic, context and situation are not presented properly (Mauffette-Leenders et al. 1981; Silverman et al. 1995). With this important point of departure—*authenticity*—(however, details were disguised in order to protect the integrity of the protagonist, others involved, the companies, organization, etc.) there are three features that a written case in the Harvard Business School tradition has to fulfil in order to be classified as a case:

1. *The professional perspective*: All cases produced must be written from the professional's perspective: the occupational therapists and in Harvard tradition, the lawyers, accountant, manager, etc. The whole idea is to train students to become professionals. It becomes critical that the students from day 1 get to see the world from the perspective of a professional. Hence, all cases have *one single protagonist: the professional*. The students will frame the problem and act upon this framing from this particular professional perspective (Nordquist et al. 2011; Schön 1991).
2. *The narrative*: A situation does not just occur. Rather the opposite, *a situation is always embedded in a larger and often quite complex context* which is an important part of the learning process (Bruner 1998; Lave and Wenger 1991; Moll 1990; Säljö 2000). The protagonist is normally not acting independently and alone. He or she is part of an organizational context and its organizational cultures, professional codes, implicit expectations of a professional, power relations, hierarchies, reward systems, etc. By reducing all those "wider contextual factors" decision making or the way to approach a problem becomes stripped of its "practical relevance". A professional always has—in the professional role outside the classroom—to take the external context into account. This does in turn impact decisions, the analysis of the problem, possible solutions and its anticipated consequences. Cases in the Harvard Business School tradition emphasize this strongly in order to create an as authentic and relevant experience for the students as possible (Nordquist et al. 2011; Schön 1991).
3. *Open ended*. A case in the Harvard Business School tradition cannot have one simple solution. Most cases do not have a "solution"—as for a technical problem—but have rather different approaches to handle or manage a specific situation. There are two sides to this: first, the framing of a problem. A very important part for all problem solving or decision making in any area is the way we define and frame a problem. It is therefore important that cases allow for *framing* the problem, situation or dilemma *before* going into problem solving. (Heifetz 1994). Going into problem solving, the alternatives or possible solutions you hold depend on how you have defined and framed the problem. In some instances, there might very well be "one solution" but this is given how you have understood the problem or the situation. So even if there is "one way forward only", still this is based on assumptions about the nature of the situation to deal

with. Successful cases elicit debate and controversy among the participants in a case discussion and really successful cases still provoke debate or consideration long after the formal class has come to an end. However, one has to be very clear about the explicit learning objectives (Nordquist et al. 2011).

These three specific case features are also in alignment with the recommendations of Stein et al.'s on of how to write a case study in the realm of occupational therapy education, where the authors emphasise, for example *authenticity, a professional perspective, a narrative style and the opportunity for several solutions* (Stein et al. 2006).

How to Learn from and Teach with Interactive Patient Cases

Teaching: Make the Learning Visible

The very first rule for all teaching and learning is to clarify the learning objectives which are to make expected learning visible to the learner (Hattie 2009; Biggs and Tang 2007). This is one of the most important factors for learners' achievement (National Research Council 2000).

When using interactive patient cases for learning purposes, one cannot be too precise when formulating learning objectives. Rather, one should consider the cognitive ability the learner is expected to train and then the content, i.e.:

> After attending this cases seminar, you should be able to make an *assessment* of the need for adaptation of the patient's home environment

Here, *assessment* is the active verb communicating the cognitive ability the learner is expected to improve by using an interactive patient case. This active verb can certainly be *changed* depending on what the overall aim is with a seminar.

Teaching: Individual Preparations

Each participant has of course to read and prepare the individual patient case (Mauffette-Leenders et al. 1981, 1997). Sometimes you might also like to give out related articles or other materials to the participants to study in connection with the case, to put some meat on the bones and hence lay the foundation for a substantial discussion in later stages.

The educational idea with this first step is that the learner should try to read the case and find out how it connects to his or her previous knowledge. What is new and what is old? Are there contradictions and discords between the case and the learner's perspective? Is there something that the learner has to learn more about in order to understand the case properly? Once all of these initial steps have been cleared, the learner has to focus on the diagnosis of the situation and possible solutions. What are the problems of the case and for whom? When the problems have been expressed, the learner is expected to come up with his or her solution to the

problems defined: What should the protagonist do in this situation, why and what risks or consequences could be anticipated?

Teaching: Group Preparation

The next step is for a small group of learners to meet and discuss their own reading of the case: How does it connect to previous knowledge and experience, what are the problems of the case and what would possible solutions be for the protagonist of the case?

The underlying idea with this second stage—group preparations—is that the learners will teach and learn from each other at this stage. Assuming that everyone is properly prepared, a peer-learning process will automatically be elicited at this stage. This also gives the participants a good point of departure for the large class seminar. At the group preparation stage, the participants get the chance to check on their own understanding of the case, their own solutions, etc. and try their positions in a small and probably safer environment compared to the seminar with a larger number of participants (Boud et al. 2001).

The group preparation stage could be conducted either prior to the seminar, and hence outside the formal seminar time, or during the first 10–15 min of the scheduled seminar.

Teaching: The Seminar

1. Setting-up the room
   In the last and final step, the participants meet in the large class seminar. The size can vary between 20 and 60 or even 80 participants, with one facilitator. There are a few factors preconditioned in order for the seminar to work, of which the first one is: the set-up of the room. A traditional classroom setting with seats in proper order after each other, with everyone facing the front of the room where the facilitator stands, is totally undoable in a case seminar.

The golden rule is that the room must be set-up in a way so that participants can see each other. It must be possible to establish eye contact within the room between participants as well as between individual participants and the facilitator (Nordquist et al. 2011). Below is an example of how a room can be designed in order to meet these requirements (Fig. 10.1).

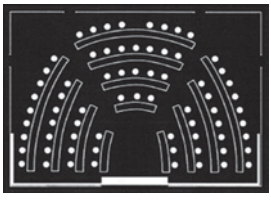

Fig. 10.1 Room designed for a case seminar

Table 10.1 The facilitation plan

A *facilitation plan* might look something like this:	
Opening question—5–10 min: What are the problems in this case?	Diagnosis of what is in the group, the groups understanding and reading of the group. Open question to get the seminar going
Next: What situation is the occupational therapist facing in this case?	Here, the seminar is starting to focus—more specific question: What is the occupational therapists' problem? Here, the participants are forced to see the case from his or her perspective and define the problem through this lens
Next: What are the alternatives the occupational therapist has in this situation?	This question focuses on problem solving: Given the definition of his/her problem above, what are now the possible ways to handle the situation?—Problem solving
Next: What consequences could one predict acting upon the different alternatives just proposed?	Here, the idea is to force the participants to enter the "balconies" and evaluate different alternatives or proposals to solve the situation
Closing question: The learning objectives today were XXX—what can this case teach us about XXX? Have we, and if so how, reached the above learning objective?	This section brings the case back towards the learning objectives: What can the case teach us and have we, if so how, reached the learning objectives? The group is involved in concluding and summarizing of the seminar

2. Preparing the facilitator
   To be the teacher (facilitator) in a case seminar is quite different from engaging in the role as a traditional teacher or lecturer. The whole idea is to lead the discussion and get the participants to contribute their understanding to elicit as much experience, contradictions and different positions on a case as possible (sometimes also conflicting views).

The facilitator has to have a sufficient level of knowledge in the content area in order to be able to ask relevant questions, follow-up questions and to paraphrase different positions. If you do not know the area, this is very difficult.

A case facilitator can best prepare the case seminar by thinking through the questions he or she would like to address and, of course, how these relate to the overall *learning objectives* with the seminar. A seminar might have different sequences and the facilitator will have thought these through prior to the seminar in order to steer the seminar in a way that the learning objectives will be achieved (Table 10.1).

In the seminar, the facilitator has to remember what "part" of the seminar to stay within and can then ask as many follow-up or clarifying questions as possible. The idea is to get as many points of views as possible to be expressed and then also to relate to those in different ways and "connect" participants in the seminar. The facilitator has to keep in mind approximately how much time to spend on each section in order to conclude the seminar on time. (For different facilitation styles, please see: Barnes et al. 1987; Mauffette-Leenders et al. 1997; Table 10.2).

Table 10.2 Teaching with cases: a summary

In conclusion, to achieve the best results, you need to keep the following topics in mind when teaching with cases:	
The learning outcomes	Formulate learning outcomes and make them visible to all participants
The participants	Participants need to make individual as well as group preparations before the case seminar to achieve the desired levels of learning
The facilitator	The facilitator needs to make preparations for the case seminar by formulation of his/her facilitation plan
The room	The room should be set so that eye contact within the room can be established between participants as well as between individual participants and the facilitator

High-Quality Learning With Interactive Patient Cases

Education is quite different from biomedical sciences when it comes to evaluating effects and finding evidence for benefits of one specific learning method over another. The gold standard for collecting evidence in biomedicine is of course the double-blinded Randomized Control Trial (RCT) which aims at pinpointing clear cut, statistically proven effects which in turn can be generalized to other settings. However, this specific kind of trial and evidence is very difficult to achieve in the world of teaching and learning. A vast amount of confounding variables is making it more or less impossible to isolate and assess a specific learning activity in a way that traditional effect measurements have any value (Ringsted et al. 2011).

Thus, instead of measuring effects of this particular method in relation to, i.e. lectures or simulations, we will provide you with research-based educational arguments and show you how case-based learning is meeting these criteria. This does not perhaps leave you with the optimal generalizable evidence that case-based learning is the golden method for specific learning objectives, but you will be reassured that case-based learning has a strong evidence base in the current educational literature on the topic of high-quality learning. In addition, there is also specific research in the area of the results of case-based learning (Lundeberg et al. 1999) as well as on related problem-based learning (Albanese 2010; Schmidt et al. 2011; Tiwari et al. 2006).

From a constructivist perspective of learning, we know that new learning is integrated and incorporated into your previous knowledge and experience (Biggs and Tang 2007; Marton and Säljö 2008). Learning is *not* just adding new bits of information and then measuring retention after some period of time. Learning is how new pieces of information change your understanding of something, and this requires a different strategy in order to learn (Nordquist et al. 2011). Transfer of knowledge is clearly insufficient and you have to find other strategies as well. Having said that, new pieces of information are of course important, but what we are trying to express

Table 10.3 Learning with cases: a summary (part I: II)

Builds on previous knowledge	Creates new knowledge as well as activates previous knowledge
Active learning	Forces participant to be active as a learner
Peer learning and collaborative learning	Fosters peer learning and collaborative learning
Triggers situational interest	Triggers situational interest and in turn learning

here is that in order to foster and cultivate high-quality learning, you need both new information *and a* process for integrating it with previous knowledge. This will in turn either influence your understanding of a new phenomenon or give a new perspective on an old phenomenon with which you already are familiar. Interactive patient cases are as a result an excellent instrument to use when wanting to achieve this (Nordquist et al. 2011).

Further, we also know that in order to achieve high-quality learning, the learner needs to be active in the learning process and see the relevance of the new learning (Knowles 1998; Hattie 2009; Granberg 2004) as well as be engaged in peer learning (Hattie 2009; Boud et al. 2001; Schmidt et al. 2011). It has also been shown that being confronted with problems in a learning situation raises interest and triggers learning (Hattie 2009; Schmidt et al. 2011). Hence, what case-based learning supports are a few things that are perfectly aligned with what we currently know about adult learning and high-quality learning (Nordquist et al. 2011; Table 10.3).

In addition, the context of the interactive patient case is always authentic and facilitates a more contextually relevant learning, rather than a scaled-down and stripped experience from any contextual factors of importance (Nordquist et al. 2011). Hence, the characteristics of interactive patient cases encourage holistic learning and offer the learners the opportunity to get to know more about less than less about more (Gerring 2006). And the fact that the specific knowledge from a specific interactive patient case cannot be formally generalized does not imply that it does not contribute to knowledge accumulation; the results may very well be transferrable (Flyvbjerg 2011). Interactive patient cases further facilitate reflection-on-action and it assists in both elaborating on the framing of a problem and, in the next step, finding proper problem-solving strategies (Schön 1991). Finally, it surfaces tacit knowledge and underlying assumptions that in many cases never are explicitly addressed, but that in many cases have a strong influence on how we think and act (Heifetz 1994; Table 10.4).

Table 10.4 Learning with cases: a summary (part II:II)

Holistic learning	Stimulates holistic and contextual learning
Surfaces tacit knowledge	Surfaces tacit knowledge as well as underlying assumptions, which often has a profound influence on how we think
Assists problem framing and problem solving	Assists in both framing a problem and finding proper problem-solving strategies for it

Where Does the Interactive Patient Case Fit in? Fitting Cases into the Educational Puzzle

As previously stressed, learning objectives are the key to achieve learning. Also for any educational event, the aim and the objectives are the scaffold for the entire event. In order for you to get some help in trying to fit in interactive patient cases into your educational puzzle, you might use this model as a starting point:

- Why would you like to use cases?
- What educational purposes do you have?
- What kind of knowledge would you like to support through your case: pure theory or theory and "attitudes"? (Skills are perhaps not optimal to train in a case discussion since this requires much more hands-on methods.)

By answering these questions, you will get a suggestion of what kind of interactive patient case to use and where to fit it in a course or a programme.

Conclusions

Can patient cases be used to improve learning in occupational therapy?

Are there different kind of patient cases and does such a difference make any sense from a learning quality perspective?

How does one best prepare to teach with cases?

We have tried to show you that there is a difference between "traditional patient cases" and "interactive patient cases". Traditional cases are decontextualized, leaving the protagonist unidentified and focused on factual problem solving. It disregards the stage of the problem setting, the perspective of the protagonist and, indeed, the context.

On the opposite end of the scale are the interactive patient cases. Such cases are always authentic (however, disguised), written from one person's perspective in a narrative form and are open ended. Interactive patient cases help the participant or the learner to connect with his or her previous knowledge and experience, it activates the learner in the seminar and fosters peer and collaborative learning.

The different steps in working with interactive patient cases are well aligned with the available evidence on high-quality learning in the literature. Still, it is of great importance to keep in mind that interactive cases cannot be incorporated by default in any course; they have to be closely considered in the overall educational design and the facilitation process as well as the set-up of the room has to be carefully considered. We would argue that traditional patient cases are currently being used (and misused) in courses and programmes, since they are not developed to reach its optimal educational value. Sometimes they work well, sometimes less well. Even if there are good examples of where they work well, there is indeed a huge difference between good and great.

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Part II
Interventions: The Occupational Therapist Manages the Client's Adaptations

Fig. 1 The men proved their excellent internal adaptability thus the environmental accessibility was not optimal. (The photos are unrelated to occupational therapy). Photo: Ingrid Söderback. To the left: Yangon, Burma; to the right: Saigon, Vietnam

Chapter 11
Interventions: The Occupational Therapist Manages for Adaptations

Adapting Interventions: Overview

Ingrid Söderback

Abstract This part of the handbook surveys the occupational therapy interventions (OTIs) in which the occupational therapist (OT) manages adaptations. These interventions aims are that the client modify (i.e., internal adaptations; coping ability) him/herself to present circumstances, and thus is able to perform activities of daily life (ADL) in the most independent way. The adaptive interventions include *environmental adaptations* (housing adaptations, accessibility, accommodations, electric prosthesis, orthotics, splints, assistive devices), *universal design, occupational adaptations, temporal adaptations, and intrinsic adaptations*. Each of these adaptive interventions (apart from occupational adaptations) are represented by one to four chapters in this part of the handbook. The case of John, a man suffering from paraplegia, illustrates some of these adaptive interventions.

Keywords Accessibility · Accommodation · Adaptive interventions · Assistive devices · Electric devices · Environmental adaptations · Housing adaptations · Intrinsic adaptations · Occupational adaptations · Paraplegia · Temporal adaptations · Therapeutic media · Universal design

Introduction

Adaptive Interventions focuses on therapeutic adjustments of a client's environment or design of devices, tools or mechanisms, as to be suitable for his or her most functional, rational, practical, effective, and ergonomically utilization. Adaptation is also a client's alternation or adjustment in structure, habits, or behavior to meet challenging situations, in new or modified surroundings (Fig. 11.1).

An occupational therapist's (*OT's*) *role as a manager* varies widely. OTs (a) use "therapeutic use of self" for mending/fixing/carrying out and solve occupatioanl problems; (b) acts as facilitator, teacher, moderator, and manager. The role(s) is dependent on which of the adaptive interventions is used at present.

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Fig. 11.1 The occupational therapist's (OT) role in the OTIs aimed at manage adaptations. OT has responsibility for that clients receive, accept, and use prescribed environmental interventions that influence client's internal adaptation and ability to independently perform occupations. The figure is a stylized Ankh-sign

Outcomes of the adaptive interventions may be stated in, e.g., level of satisfaction and meaningfulness, increased self-efficacy, and independence in activities of daily life (ADL) and work.

Case Study

An accident at work left John paraplegic and wheelchair-bound. He had been a manager of a large farm. He lived in a first-floor apartment in an old building on the farm that came with the job, but the bathroom was on the ground floor.

John had very firm opinions on everything in his life. Thus, for example he refused, most unreasonably, to wear shoes since he could not walk. John had come to the rehabilitation department many months previously and should have left weeks ago. He was bored and refused to participate in almost all activities, particularly occupational therapy. The primary opinion of the rehabilitation team was that John could not move back to his apartment at the farm. The owner judged it impossible to render the apartment wheelchair-friendly. John had been offered an apartment for people with disabilities in an apartment building, but he refused to move to any other place. The rehabilitation team was very concerned: What would happen to John?

My job was being John's contact person. I managed to persuade him to wear boots when he went out for some fresh air in the winter, so that his feet would not freeze. If the boots were put between the wheelchair's foot supports, they stood firm enough for him to lift his paralyzed leg into the leg of the boot; gravity did the rest. This way of putting on his boots allowed John to be less afraid of losing his balance and falling out of the wheelchair, thus giving him a feeling of independence.

When our patients were outdoors, I sat next to John. I talked to him, sometimes without getting an answer. I put a deck of cards in my pocket and one day I asked John if he could play cards. John was happy to be able to show me something he was good at: playing poker. We had established contact at last.

I asked John if he had visited his home since the accident (I knew that he had not). Spring came and a week or so later John asked me if I could take him to visit his home. He wanted to see the apple blossoms on the farm. I got permission from his physician, and a taxi was ordered for the next day. It was the first time John had been outside the hospital grounds. When we reached the farm, John wanted me to go in and fetch a few things for him. There were stairs up to the front door and just inside there were 14 steep steps up to the apartment. To the right was the bathroom with a door that was too narrow to admit a wheelchair.

I could not find the things John wanted. Then he decided to "walk" up to the apartment himself. At the bottom stair, he raised himself from the wheelchair and sat on the second stair. He then lifted himself, facing backward, up to the apartment. I carried the folded wheelchair and John raised himself first onto a stool and then into his wheelchair. He went into his kitchen and bedroom without a problem.

Following a telephone call to the hospital, John decided to stay home until the next day. I brought him a special raised toilet seat combined with a latrine bucket. When I visited him the next day, John had spent 24 h at home without any problems.

The rehabilitation team planned to discharge John to his apartment at the farm—a very cost-effective measure. I organized the necessary contacts for home adaptation and a discussion with the farm's owner to explain what changes in the apartment were absolutely necessary. A stair-lift was installed, plus handrails at suitable points. John received daily help from a home help service.

In professional terms, what occupational therapy interventions were effective in enabling John to live independently at home?

The main intervention was *adaptation,* which is the changing process aimed at fitting different human conditions into various environments. In John's case, this meant his interaction with his home environment. Because this interaction went well, there were improvements in John's behavior (Barris et al. 1985), in his ability to perform tasks independently, rationally, and effectively, and in his will to live at home. This interactive human balance may be changed by using *intrinsic, occupational, temporal, and environmental,* adaptations.

Intrinsic Adaptations

Intrinsic adaptations are the person's internal forces for incentives, motivation, and skills that support his/her strategies to reduce occupational stress and to chance habits or behavior. Intrinsic adaptations address cognitive factors: (1) *ability* to acquire general or special types of knowledge (National Library of Medicine and Health 2006/2008/2014); (2) *skills,* indicating at what level of competence tasks are performed; and (3) *capacity,* the current potential to perform. Ability, skills, and

capacity are affected by the individual's functional status: (1) *self-efficacy*, meaning one's perception of and belief in one's ability to perform tasks successfully and (2) *motivation*, the innate drive to master challenges. These personality factors generate the emotional reactions that affect the individual's occupational performances (Matheson 1997) and hence constitute the individual's intrinsic adaptation.

OTs use environmental stimuli to bring about changes in intrinsic adaptation. Another term for intrinsic adaptation is *occupational adaptation*, which Bontje et al. (2004) defined as people's attempt at overcoming disabling influences on occupational functioning. Another term that is similar to intrinsic adaptations is coping (Carver 2013).

John's paraplegia impaired his ability to perform daily activities. He had lost his capacity to walk, let alone work. In this situation, John was very vulnerable to the environmental demands, as his social role had changed completely (Hansen et al. 2005; Matheson 1997), stifling all initiative, energy, motivation, and drive. The consequences of this were loss of self-efficacy and motivation to be independent and occupied. John's innate and intrinsic needs to master occupational challenges were severely disturbed. In Levine and Brayley's (1991) words, the optimal fit between intrinsic adaptation and social and environmental demands was in imbalance. The occupational therapy goal was to effect a positive change in motivation and self-efficacy.

The OT's Role In situations like John's, the OT's role is to establish communication based on the client's psychosocial status, will, wishes, and interests (Bränholm 1992; Kielhofner 1985). The OT may use his or her knowledge, experiences, understanding, engagement, empathy, and respect to motivate the client to perform self-initiated, self-chosen, purposeful, and meaningful activities. The *therapeutic use of self* is the medium for bringing about the change in the client's intrinsic adaptation (Schwartzberg 1993).

John's intrinsic adaptation was initially influenced through the way the OT presented poker playing. John became engaged in an occupation within his sphere of interest. As against his present role as an impaired person, he could feel himself as being a more competent and skilled person, doing something he was good at and that was meaningful to him. Presenting tasks in ways that engage clients may prompt them to act as their own agent of change (Dunn 1997).

The terms *internal adaptation* and *coping* are closely related. Schultz (1997) stated that coping is the individual's specific emotional reaction to a particular condition, while adaptation is the individual's reaction to how far environmental demands are within his or her capacities.

Outcome Database search (2007) found numerous studies addressing the relationship between coping and stress, and descriptions of the *progress* of intrinsic adaptation among several diagnostic groups, e.g., the elderly (Bontje et al. 2004) patients with craniocerebral trauma (Dumont et al. 2007) and patients with poliomyelitis sequelae (Jönsson et al. 1999). Clients' intrinsic adaptation as an OTI outcome is exemplified in Chaps. 37 and 38 .

Occupational Adaptation

Occupational adaptation of tasks and activities makes use of tools and materials (Schwartzberg 1993). It addresses how to help clients adjust to perform a task in the most functional, rational, practical, effective, and ergonomically appropriate way (Stein et al. 2006). Examples include (1) determining the most practical direction for peeling potatoes—toward you or away from you, (2) determining the most ergonomically and labor-saving way of opening a jar—with one hand or by fixing the jar in place, (3) using a tool that requires less force, (4) determining which hammer and what type of nails are most effective for a particular task, and (5) determining the most practical way of cutting slices of a tomato to show a "fleur-de-lis" pattern and to prevent the seeds from spilling out.

Adapting clients' task performance may follow a natural development (Bontje et al. 2004), potentially observed among people born with impaired nervous systems (e.g., cerebral paresis), or those who slowly develop such impairments (e.g., degenerative muscular dystrophy diseases; Nätterlund 2001).

Motivation prompts the client to adapt to the performance of a task. This internal prompt is affected by the client's perception of how meaningful the task is and how satisfied he or she will feel upon its completion. The various ways of performing a task depend on (1) *personal factors*, such as habits, skills, and experience (2) what *task* is expected to be performed, and the form and function of the result; and (3) the *context for the performances*, e.g., the process, available time, and cultural norms (Knox 1993).

John was motivated to be outdoors every day. This habit originated from his farm work. During this work, he normally wore boots, not shoes. Because of his impaired neuro-musculoskeletal and movement-related function, he had two options: either to remain dependent on another person to help him put on his boots every time he wanted to go outdoors, or learn to put on his boots in a different way than he did before he was injured.

In a therapeutic perspective, clients adapting the performance of a task always choose a method or procedure that differs from their regular habits or from the general manner in which most people perform the task. These alternative methods and procedures permit people to accomplish a part of or the complete task.

People who are suddenly disabled, like John, may have difficulty adapting to the performances of tasks and therefore need professional help.

The OT's role is to *support and teach* (see Chap. 26). The OT promotes the client's attempt to carry out the task in a way that suits his or her personality and the environmental context. The OT draws on his or her experience and imagination to create the optimal adaptation for the occupation (task) to be performed. The occupational adaptations include the following principles (Nätterlund 2001; Nätterlund and Ahlström 1999; Stein et al. 2006):

- *Problem solving,* which includes steps to identify, develop, plan for, and implement an appropriate and meaningful solution for the client. For John, the solution to the problem of toileting was the special raised seat combined with a latrine bucket.

- *Using an unusual body part* for performing an activity, such as using the toes for gripping and handling a paintbrush (Mouth-and-Feet Artists 2007). This is exemplified by how John used his back to *walk* upstairs.
- *Using gravity as a force*. Hence, John used the weight of his leg to help in putting on his boot.
- *Holding an object* or keeping an object still by using unusual body parts, such as holding a bowl between the knees. Alternatively, holding an object still by external arrangements, such as putting the bowl on an antislip mat, fixing the work object in place with clamps, or holding a boot between the footrests of a wheelchair, as John did.
- The muscle strength required for opening, lifting, bending, pushing, filling, or pouring can be decreased by *using both hands* or by using tools with leverage.
- *Optimal body positioning*. People with a hemiparetic arm can learn to put on a shirt, blouse, or cardigan by turning the neckline in position away from the body, holding the wrong side of the garment up, and taking the paretic arm to cross the middle line of the body. When drawing the sleeve over the hand, the hand and arm will turn into the garment. Then it is easy to draw it over the shoulder (Eggers 1991).

The above mentioned principles for adaptation of tasks need to be addressed in clinical studies, as there is little scientific documentation.

Temporal Adaptation

Temporal adaptation is the process of assessing and adjusting one's use of time during performances, and how this time use arouses feelings (Szalai and Converse 1973; Soderback 1996; van Deusen 1993). Temporal adaptation varies depending on the task and activity, such as daily self-care, sleep, work, recreation, and rest (Kielhofner 1977; Kielhofner et al. 1980; Nurit and Michal 2003). The *temporal balance* should mirror the client's realistic adaptation to scheduled and organized time, in which the client gives priority to occupations that are desired or expected. Adolph Meyer (1922), the "father of occupational therapy," stated, "A suitable balance among individuals' daily activities, self-maintenance, work, leisure time activities, rest and sleep is important for remaining in good mental health" (see also Weeder 1986).

The way people manage their *temporal balance* is expressed in unique *temporal activity patterns* or idiosyncratic configurations. Examples are: (a) The study by Chilvers, Corr and Singlehurst (2010) of how English healthy older people's activity pattern is configured in terms of necessary, enjoyable, and personal occupations. (b) A temporal activity pattern consists of time-cycles of occupational performance. These patterns include *when* (timing), *how long* (duration), sequential *order*, and *frequency* of performance. Temporal activity patterns appear in daily routines that are rational and suitably managed and common in the culture in which the individual lives (Kielhofner, 1977). The patterns are configured by the individual's self-perception of his/her efficacy level, values, interests, and goals.

McKenna et al. (2007) demonstrated a habitual average temporal activity pattern among 195 Australian people, 75 years of age or older. The participants spent "most of their time on sleep (8.4 h/day), solitary leisure (4.5 h/day), instrumental activities of daily living (3.1 h/day), social leisure (2.7 h/day), and basic activities of daily living (2.6 h/day)."

Temporal activity patterns are influenced by the individual's intrinsic adaptation, seeking to structure and organize activity to overcome stress. Therefore, when an individual experiences balance within the temporal activity pattern, comfortable feelings may be aroused. Such outcomes of the temporal activity patterns are expected to determine people's *activity health*, wellbeing, and satisfaction (Cynkin and Robinson 1990; Nieistadt 1993). Activity health is promoted when the individual has control over available time within a time frame and is able to properly organize time into a balance of occupations.

Activity ill-health may be seen as imbalances or disorganizations of the temporal activities patterns (Kielhofner 1977; Rosenthal and Howe 1984; Soderback 1996). Activity ill-health has been demonstrated, e.g., among people suffering from paraplegia (Yerxa and Locker 1990) and stroke (Soderback and Lilja 1995), and among the elderly (Nystrom 1974). Activity ill-health interferes with an individual's ability to manage time to accomplish occupations in sequential order or as a daily routine. When disruption of regular cycles occurs, it often leads to a feeling of disorientation and confusion, a feeling of being unsettled of being in a somewhat chaotic state, and being unable to set goals that give meaning to the performance of activities. This condition appears commonly when social roles are changed (Kielhofner 1977). Individuals may feel (1) that they have too much time, because they are no longer employed; or (2) that they have too little time, because physical, cognitive, or social limitations make activities of daily living very time-consuming; or (3) that social limitations lead to stress, which can lead to taking sick leaves from work.

In the case of John, activity ill-health occurred in terms of temporal maladaptation, which were observed because he did not want to participate into the offered rehabilitative activities.

An *activity configuration log* (Cynkin and Robinson 1990; Soderback 1996; Yerxa and Locker 1990) or diaries (Ellergård and Nordell 1997) are either a paper-and-pen or a computerized self-assessment instrument (e.g., Soderback 1996[1]). This assessment instrument is used to measure clients' temporal balance between activity health and activity ill-health in terms of activity patterns. Temporal adaptation, i.e., the configuration of the client's occupational patterns, might be shown in the outcome factors of *satisfaction* (Sandqvist and Eklund 2007) and *meaningfulness* in relation to the client's perception of the amount of *effort* needed to accomplish the activities and of the quality of the *results*. These outcome factors are assessed by a four-point Likert scale (1 = negative value; 4 = positive value; Soderback 1996).

A validation study of the activity configuration log was performed (Soderback 1996) among 142 employees (21–60 years of age) divided into four groups of those who were on sick leave 4, 21, 52, or 97 % of the 135 observation days. The

[1] A computerized version of the activity configuration log is available from the author.

result showed a weak support for the discriminative validity between the group of the participants with the most extensive sick leave time and the three other groups, regarding the amount of time used for self-care ($p=0.02$) and work ($p=0.00$) activities and for the group's perception of how much effort they used in the performance of daily activities. Further research in this area is required. However, clinical application of this study might be used for investigation of employees in order to prevent sick leaves. The use of temporal interventions is further discussed in Chaps. 25 and 38.

The OT's Role The OT plays a supporting role in temporal adaptation, eliciting the client's feedback. The interventions directed at client's temporal adaptation are aimed at improving the balance of the temporal activity patterns, and are guided by the following principles:

- The OT *supports* the client's opportunities to participate in activities that correspond to his or her interests and values. The interventions may bring about a reorientation of the client's pattern of interests or habits, framed by how the client uses his or her time (van Deusen 1993).

In John's case, the OT supported his interest in playing poker. During these sessions, an interaction began between John and his spectrum of time-related activities. This might have supported communication and promoted healthy behavior on an ongoing daily basis that in turn might have influenced his development of a changed social role.

- The OT *offers clients meaningful occupations* that structure their day and enable social networking (see Chap. 55).

Environmental Adaptations

Environment is the "external elements and conditions which surround, influence, and affect the life and development of an organism or population" (National Library of Medicine and Health 2014), and that may impede or facilitate live.

The social, attitudinal, cultural, and physical factors that make up the environment include settings such as home, workplace, school, and community. The environment includes products and technology for personal use in daily living, communications, transportation, and recreational facilities (World Health Organization 2014a, b). The *social environment* is characterized by norms and routines. The *cultural environment* includes economic considerations, customs, beliefs, activity patterns, and societal expectations. The *physical environment* contains all objects that are natural or fabricated. Examples are plants, animals, landscape, buildings, furniture, tools, devices, and clothes. All objects are systems of products, equipment, and technology that are gathered, created, produced, or manufactured (Stein et al. 2006; World Health Organization 2014b).

Environmental adaptations involve modifications of the clients' physical environments that facilitate and enable occupational performance and promote independence in daily life and wellbeing. The interventions concern how the client's occupational performance is influenced by modifications within the person–environment–occupational transactional system (Christiansen and Baum 1997a; Kohlmeyer and Ericsson Lewin 1993; Schult 2002). Thus, the environment contains the interactive relationship between the time dimensions, active use of space, and changes in people's micro- and macro-environments that facilitate occupational performance (see Chap. 24).

The OT's role is to be a *facilitator* of the client's occupational performance by managing the removing of environmental barriers.

In the case of John, modification of the physical environment—the indoor stair—and adding the supporting handles and handrails enabled John to move back to his apartment and perform the necessary daily activities. The OT facilitates environmental adaptations, taking into account the client's cultural, social, financial, and environmental circumstances. This work is performed in cooperation with architects (see Chap. 24), landlords, and living partners.

The prerequisites for effective environmental adaptations are that the client accepts and is satisfied with the modification and feels it is meaningful and useful (Early 2001). This was true for John, who wanted to return to his apartment on the farm.

The effectiveness of the adaptation is also influenced by external circumstances. For example, the owner of the building where John lived felt it was impossible to make the apartment accessible by a wheelchair. Here, the OT is working as a *moderator* until a solution that is acceptable for all partners can be found.

- *Environmental Adaptations: Housing adaptations* are an alternation of subjects indoors of a home, as discussed in Chaps. 13 and 14, immediate outdoors and the public environment as discussed in Chap. 24.
- *Environmental Adaptations: Accessibility* entails the design of an environment that removes physical barriers and other problems (Nygren et al. 2007) and it is the application of ergonomically appropriate body positions, the ability to reach and enter physical environment. People deserve access to their physical environment, irrespective of how they transport themselves, be it by walking, by using crutches, a walker, or a wheelchair, or by driving. Accessibility interventions are aimed at eliminating physical, architectural, or communicative barriers from the environment of the home and the community, and from transportation (Smith 2001). For example, disabled people's possibilities to participate in arts and cultural events in a community (USA) were influenced by a "participatory action strategic" implemented by responsible stakeholders (Milligan et al. 2014). Good accessibility fosters the client's trust and privacy, and offers affordable and usable transportation (Coughlin et al. 2007). These factors affect clients' satisfaction with their living arrangements. Moreover, Nygren et al. (2007) showed that the more accessible the elderly perceived their homes to be, the more useful and meaningful it was in relation to their routines and everyday activities.

  - In the handbook, an *accessibility intervention* is exemplified by computer workstation adaptation (see Chap. 15). Here, the human factor and ergonomic principles and environmental changes are aimed at reducing the occurrences of work-related injuries associated with intensive computer use.

- *Environmental Adaptations: Accommodation* is aimed at facilitating people's wellbeing and independent living. Accommodating interventions are used (1) to change the position or placement of objects in the physical environment (Cook and Hussey 2002); (2) to apply objects to body structures related to movement, the nervous system, and the skin that protect joints and enable performance of daily activities; (3) to provide tools that facilitate activities of daily living; and (4) to adapt the indoor space in a building, vehicle, or vessel to use of a wheelchair of other equipment or contrariwise.

  - OTIs use accommodation principles that are adjusted to meet the clients' need for *optimal positioning* and comfortable seating in a wheelchair is discussed in Chap. 16 and while driving a car is discussed in Chap. 17.

- *Environmental Adaptations: Electric prostheses, orthotics, and splints* are artificial devices used to support or supplement clients' damaged muscles, joints, or skin most often concerning arms, hands, and the body.

  - *Electrical neuroprosthesis* is used as an intervention tool during electrical therapy to increase grasping movements among people suffering from a spinal cord or other neuromuscular injury causing arm/hand pareses. Orthoses used with an educational approach is presented in the chapter Functional Electrical Stimulation Therapy (see Chap. 41).
  - An *orthosis* for the hand is an "apparatus used to support, align, prevent, or correct deformities or to improve the function of movable parts of the body" (National Library of Medicine 2014). Orthoses applied according to Engel's biopsychosocial model and International Classification of Functioning (WHO 2014a, b) have the functional aims in decreasing abnormal muscle tone, relieving pain, providing joint stabilization, protecting vulnerable tissues, assisting functioning in clients with weak muscles, preventing or correcting deformity, and enabling valued activity and occupational participation (McKee and Rivard 2011).
  - *Splints,* which are "rigid or flexible appliances used to maintain in position a displaced or movable part or to keep in place and protect an injured part" (National Library of Medicine 2014). The aims of splints are preventive and corrective, and they provide stabilization. Splints are commonly used for the hand as well as other parts of the body. Splints help attain the best functional movements. Splints are used by people who have had (1) hand surgery due to rheumatoid arthritis, (2) a traumatic hand injury (see Chap. 18), or (3) a burn injury (see Chap. 19).

- *Environmental Adaptations: Assistive devices/assistive technology* (also called assistive technologies), adaptive equipment or equipment for self-help devic-

es (WHO 2014c). It is all equipments that replace for impairments or support functions then clients' performances of occupation is decreased. In other words, assistive devices are "not affixed to the body, [and is] designed to help persons having musculoskeletal or neuromuscular disabilities to perform activities involving movement" (National Library of Medicine 2014).

- *Wheelchair* use: finding the most suitable wheelchair, adjusted to the client's anatomic dimensions, movement-related functions, and the environment where it will be used (see Chaps. 20 and 21). Lukersmith, Radborn, and Hopeman (2013) presented 66 recommendations for prescription of a seated wheelchair or mobility scooter.
- *Assistive technology* is a developmental OTI area using advanced technology, like robots, computer systems, and applications. These innovative OTIs are represented by use among people with low vision (Chap. 22) and by managing eye-trackers to children with Rett syndrome (Chap. 23).

As for intervention media, environmental adaptive interventions for accessibility and accommodation are mediated by the following factors:

- *Physical arrangement of the home environment,* which includes arranging furniture to provide accessibility, prevent falls, and facilitate dressing (Kratz and Soderback 1990; Kratz et al. 1997; Stein et al. 2006). When the physical arrangement is optimal, it may improve people's skills (Christiansen and Baum 1997b) and activity patterns (Niva and Skär 2006).
- *Biomechanical principles,* which include gravity, force, pressure, and laws of motion. These principles are used to help maintain a functional body posture and reduce stress to the spine. For example, biomechanical principles are used to design a wheelchair.
- *Ergonomic principles,* which include (1) physical factors, such as taking micro-breaks, using energy-conservation methods, and placing joints in a neutral position and (2) psychological principles that reduce stress and increase participation. These principles are used to adapt the environment to the individual's ability and capacity, and to promote energy-saving (see Chap. 33) and injury-preventing performance of tasks.

Ergonomic principles, which pertain to the design of hand tools so as to facilitate work performance. The principles address tools, equipment, consumer products, machine systems, and workstations (see Chap. 15)

- *Human factor ergonomics*, which is used to improve technology and to promote workers' comfort and safety (Stein et al. 2006).

OT's role includes gathering information, selecting and prescribing the most appropriate devices, adapting the devices to the client, and teaching the client how to use them effectively. This role entails an interactive process with the physical, social, and cultural environment (Kohlmeyer 1993; Trefler 1997).

Universal Design

Universal design is the design of products and environment to be optimal useable to all people. It entails seven principles that are applied to people's visits and work, e.g., official buildings and city environment. Universal design and how it is applied in a library is discussed in Chap. 24.

The OT's role is usually as a consult in cooperation with a multidisciplinary team (see Chap. 46).

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Chapter 12
Environmental Adaptations for Individuals with Functional Difficulties and Their Families in the Home and Community

Laura N. Gitlin

The occupational therapist provided various items that made my life easier and comforted me. It gave me a new outlook. I realized I don't have to succumb to my physical difficulties and I won't.
An 84-year-old woman living alone at home participating in the Advancing Better Living for Elders (ABLE) project to help older adults age in place at home.

Abstract Environmental adaptation is an important intervention to help individuals with disabilities remain at home independently and ease the burden of care on their families. A range of adaptations can be considered, including removing or rearranging objects, special equipment, and adaptive tools. Providing an environmental adaptation involves assessment of a person's needs and capabilities and the environment's physical and social properties, choosing an adaptation, ordering and installing it, and training the individual and family member in its use. This chapter provides an overview of environmental adaptation as an intervention for the elderly, clinical principles, and the evidence to support this approach.

Keywords Adaptive equipment · Assistive devices · Frailty · Home modification

Definitions

Environmental adaptations refer to strategies that modify the physical environment, with the goal of supporting and enhancing everyday competencies of persons with physical or cognitive functional challenges (Gitlin 2001). There are three basic forms of environmental adaptations: assistive technology, structural changes or home modifications, and material adjustments.

Assistive technology (AT), also referred to as special equipment or assistive devices, reflects a wide range of equipment and device choices of varying complexity

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and cost. Special equipment includes various attachments to a home structure (handrails, grab bars, stair glides). Assistive devices refer to *any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities* (Technology Related Assistance for Individuals with Disabilities Act of 1988). An assistive device can be attached to the home structure or applied to or directly manipulated by a person, such as a wheelchair, walker, cane, or reacher.

Structural alterations or home modifications refer to changes in the original home structure (widening doors, lowering cabinets), including electrical or plumbing work (installation of first-floor powder room).

Material adjustments include alterations to the nonpermanent features of a home (e.g., clearing pathways, removing throw rugs, taking away carpets, adjusting lighting, rearranging furniture, and color coding or labeling objects.

Behavioral adjustments: Use of an environmental adaptation typically requires a behavioral adjustment or a change in the way a person interacts with his or her physical environment. Behavioral adjustments, for example, may include changing footwear, modifying task performance (e.g., sitting on a high stool when preparing meals), simplifying tasks (e.g., pacing self, planning ahead), or changing the function of a living area, such as converting a living room to a bedroom (Gitlin 1998).

As a therapeutic modality to enhance competencies in persons with functional challenges, an environmental adaptation is grounded in a Competence-Press Model (Lawton and Nahemow 1973; Wahl and Gitlin 2007). This model provides a broad, overarching framework allowing different types and levels of competence such as sensory loss, physical mobility loss, or cognitive decline, and environmental factors including housing standards, neighborhood conditions, or public transport to be considered. The fundamental assumption of this model for aging persons is that there is an optimal combination of (still) available competence and environmental circumstances, leading to the relative highest possible behavioral and emotional functioning for that person. The model also suggests that it is at the lower levels of competence that older people become most susceptible to their environment such that low competence in conjunction with high "environmental press" or demands negatively impacts an individual's autonomy, affect, functional capacity, and well-being. A related point is that, as competencies decline, the zone of adaptation narrows such that environmental choices that can promote well-being become increasingly more limited, although there is always an option. Within this framework, adjustments to the environment are designed to obtain the right *person–environment fit* to maximize competence.

The role of environmental adaptation as a therapeutic intervention is also supported by prevailing models of disablement, which posit a pathway or trajectory from pathology (a disease state) to performing everyday living tasks with disability. In these models, disability reflects a gap between a person's capability, the demands of a particular task, and the social and physical environment. Verbrugge and Jette's (1994) disablement model suggests the environment is highly relevant to two related aspects of competency: an individual's ability regardless of context, which is referred to as intrinsic ability, and an individual's ability as supported or constrained by the person's physical and social environment, referred to as actual disability. The implication is that the interaction between a person's intrinsic abilities and the built

environment, including both its physical and social characteristics, results in actual disability. Based on this model then, disability can be conceptualized as an outcome of potentially modifiable environmental factors which, if altered, can minimize the intrinsic limitations or challenges (Wahl and Gitlin 2007). Hence, the physical and social environment and strategies for adaptation are paramount in prevailing models of disability and well-being.

Purposes

Environmental adaptations have multiple purposes including (a) a prevention role, such as the use of grab bars for reducing the risk of a fall in the bathroom, (b) a maintenance role, such as the use of task lighting to enable continued participation in a valued activity, or (c) a compensatory role, such as the use of a mobility aid (e.g., cane) to compensate for an underlying impairment. Additionally, adaptation can enhance the ease, safety, and efficiency of everyday performance and reduce burden and hazards to families providing care (Gitlin et al. 2010a).

Method

Environmental adaptations are used with increasing frequency to address age- and health-related functional consequences that compromise daily participation in valued activities (Mann et al. 1995). As a therapeutic modality, it is typically integrated in rehabilitation and home care therapies. Care systems for this therapeutic intervention vary worldwide, with some countries integrating the approach in a sophisticated network of home and community-based services (as for example in Sweden or England). However, in the USA, most individuals who are living at home with a functional difficulty do not have access to environmental modification services unless they have a need due to an acute condition, are referred for rehabilitation by a physician, or seek such assistance themselves and pay out of pocket. Access to modification services varies widely regionally. There is a complex web of funding mechanisms to support installation and use of adaptive technologies, and there is no uniformity in assessment approaches, types of modifications, and availability of training programs. Nevertheless, there is a vast array of environmental strategies and adaptive technologies that exist that can help people with disabilities remain independent and safe in their place of residence (Gitlin et al. 2014).

Candidates for the Intervention

Environmental adaptations can be helpful to individuals with functional challenges in a wide range of settings (e.g., home, community-based centers) including hospitals (e.g., special care units), assisted living and nursing home facilities, and for

individuals with varying health and functional challenges including cognitive loss, physical limitations, or sensory changes. Individuals with cognitive impairment may benefit from adaptations involving simple changes in the living environment and ways of performing everyday tasks (Gitlin et al. 2003; Gitlin et al. 2010b). Examples of useful adaptations for individuals with cognitive impairment may include, but are not limited to, memory boards, labeling or use of other visual cues including color coding, and removal of clutter or unnecessary objects to promote way finding in specified areas in which particular tasks are performed (e.g., eating at the kitchen table). Devices such as tub benches, grab bars, and commodes are useful as well. However, more complex technologies (e.g., medication monitoring devices, stair glides) that require new learning may not always be appropriate and need to be determined on a case-by-case basis. Individuals with significant vision impairments can also benefit from a range of adaptations including, but not limited to, optical devices, color coding, environmental simplification, task lighting, or enlarged clocks, telephones, and reading materials (Horowitz et al. 2006; Wahl et al. 1999).

Recent research suggests that older adults with even subtle physical functional changes such as getting in and out of the tub or carrying out the garbage warrant the use of this intervention approach (Gitlin et al. 2006b; Szanton et al. 2011). Individuals at most risk for functional decline such as those who are more than 80 years of age, women, those with poor ambulation, or those of low education benefit even more than their counterparts from learning and using environmental adaptations (Gitlin et al. 2008). Thus, even the oldest person or persons with significant disabilities can improve by using environmental and compensatory strategies, and hence this group of elderly persons, in particular who are at most risk of frailty, should be targeted for this type of service. Although older adults are willing to alter their living environment to address their physical limitations, in general this population, particularly in the USA, is relatively unaware of and has poor access to the range of modifications possible. Limited access to services involving assessment and training in the use of equipment is a major barrier to their use, particularly in the USA. Adaptive technology services typically are not available nor are most needed devices paid for through third-party payers or health insurance programs.

The Role of the Occupational Therapist in Applying the Intervention

Effective use of environmental adaptations requires an occupational therapist (OT) to make an assessment of the person and his/her living environment, coordinate or identify a process for obtaining and installing equipment or the home modification, and then instruct the client in its use. In implementing this intervention, OTs may need to work with other professionals including a care manager who is coordinating care for the individual, a contractor or a handyman who may need to install

the device (e.g., grab bar, hand rail, or stair glide) or construct the modification (e.g., widening a door), and a family member who may need to learn how to assist or support the older adult in using the modification.

Clinical Application

Providing Environmental Modifications

Providing an environmental modification is a skilled intervention requiring knowledge of an individual's functional, cognitive, and sensory processes; an understanding of the effect of the physical and social environment on behavior; and an understanding of person–environment dynamics as they unfold in the performance of everyday activities of living (Hagedorn 2000). Individuals may approach the use of environmental adaptations with ambivalence. Thus, helping individuals identify and understand their needs and how environmental modifications can be helpful is part of the clinical process requiring clinical skill.

Assessment

Numerous environmental assessments have been developed to evaluate dimensions of settings including the private home, nursing home, or special care unit, and with specific populations, such as residents with dementia or the physically frail (Gitlin 2006; Gitlin et al. 2010a). Although there is a growing recognition of the importance of home assessment, the conceptualization and measurement of living environments remain complex. Moreover, there is no agreed upon or uniform approach, nor has environmental assessment been incorporated into routine geriatric or traditional home care in the USA.

Existing environmental assessments differ as to their measured characteristics, response formats, and source (self-report, direct observation, proxy) from which ratings are derived. Assessments are either descriptive, in which specific features are identified and described, or evaluative, in which measured dimensions represent desirable attributes, or a combination of the two. Examples of measured dimensions are physical characteristics (lighting, distances, and space); safety; affordance of daily activities (accessibility, prosthetic aids); support of orientation (way-finding); social interaction (privacy and socialization); and support of novelty, stimulation, and challenge. Response formats tend to be nominal (presence or absence of a condition), although ordinal and interval ratings have been developed to reflect the extent to which a desirable attribute is present. Ratings can be obtained through self-report, observation, or both. There is some evidence to suggest, however, that typically individuals do not accurately report their environmental conditions, and that professional observation yields more reliable information, particularly when

it concerns home safety and environmental modification needs (Carter et al. 1997; Ramsdell et al. 1989).

Environmental assessments of private residences date back to more than 40 years in gerontology, with an initial focus on neighborhood and dwelling features. More recent assessment efforts focus on home and community safety (Johnson et al. 2001) for physically frail individuals (Gitlin et al. 2002; Oliver et al. 1993) and are designed and used primarily by health professionals in the context of discharge planning, rehabilitation, enhancing safety in home care, or to determine strategies to support functional maintenance. Although agencies and OTs often develop their own environmental checklist, it is preferable to use a tool systematically developed and evaluated for its reliability and validity. Several such tools do exist. The Home Environmental Assessment Protocol is an observational tool designed to evaluate the presence/absence of features in the homes of persons with dementia that are hazardous and which support daily function and orientation (HEAP; Gitlin et al. 2002). The Safety Assessment Scale (SAS) is another tool specifically designed for persons with dementia and is available in English and French (de Courval et al. 2006). For the general population, the Westmead Home Safety Assessment is used worldwide to identify home safety concerns and as part of fall-prevention programs (Clemson et al. 1999). Also, the Safety Assessment for Function and the Environment in Rehabilitation (SAFER Tool) offers a comprehensive tool for identifying home safety hazards vis-a-vis the physical abilities of individuals (Letts et al. 1998).

Only one assessment, the Housing Enabler, systematically integrates an assessment of the person with an assessment of the physical environment. Using a transactional evaluative approach, the tool enables an OT trained in its use to rate physical features of homes based on a person's capabilities from which to derive a person–environment fit index (Iwarsson and Isacsson 1996). The derived score reflects accessibility or the extent to which an individual can access different home features. Research has shown that poor accessibility is associated with perceived lower quality of life in persons with dementia (Gitlin et al. 2014), risk for relocation, and diminished well-being (Wahl et al. 2009b).

Clinical Principles

The provision of an environmental adaptation is based on clinical principles that are common to the provision of geriatric services in general (Table 12.1). First is that the therapist must assume a client-centered stance. That is, the OT must involve the client's perspective in problem identification, decision-making, and identification and implementation of specific modifications. Individuals tend to be selective in the types of adaptations that are acceptable; individuals will often choose one environmental strategy over another to try and integrate into their daily routines based on a wide range of psychosocial, familial, and environmental considerations that are as yet not well understood. Understanding and respecting a client's preferences is an essential ingredient in this approach. If a particular strategy viewed as helpful by an OT is not acceptable to the individual, that strategy will be rejected and never used.

Table 12.1 Core principles guiding practice involving environmental interventions

Core principle	Description	Select evidentiary support
Client-driven	Collaborative approach to identify an individual's valued activities and specific performance challenges and explore environmental solutions. Individuals should be viewed as a partner who has valued information about his or her daily challenges and personal functional goals. Client preferences need to be identified and respected. Not every adaptation will be acceptable or perceived as useful to the client, so a range of adaptations should be offered and discussed, implementing only those that are acceptable	Toth-Cohen et al. (2001)
Cultural relevance and understanding	View of home as a microculture reflecting values, beliefs, and preferred approaches to carrying out daily activities of self-care. Therapist must identify and understand the specific cultural influences shaping daily participation choices and what changes in the environment would be acceptable	Brach and Fraser (2000)
Problem solving	Process of helping individuals identify performance difficulties and environmental barriers and explore potential environmental solutions. Also, serves as an approach to modeling for individuals to address environmental barriers to effective functioning	Davis (1973)
Customization	Tailoring of specific environmental strategies to match environmental specifications, person-identified concerns, capabilities, and culturally appropriate solutions	Richards et al. (2007)
Active engagement	Use of active strategies to instruct individuals in use of adaptations. Use of demonstration, role-play, and observed practices are effective	Chee et al. (2007)

Another core principle is that since adaptations occur in people's private living space, sensitivity to the meaning of objects and environmental configurations is essential. Objects and environmental setups reflect cultural preferences, long-standing values, and hidden meanings (Oswald and Wahl 2005). What may appear as a simple alteration that may be helpful to an individual (such as rearranging furniture to enhance way-finding) may disrupt a person's sense of normalcy and long-stand-

Table 12.2 Key clinical considerations

Make small or incremental changes in the environment, particularly for individuals with cognitive impairments
Only make those changes acceptable to and agreed upon by the client and family members
Use catalogues, pictures, or sample devices as exemplars so that client has realistic understanding of the possibilities
Allow ample opportunities for practice and refinement of the adaptation if necessary
Include family members if so desired by the older person in the assessment, adaptation selection process, and training

ing preferred environmental placements. Furthermore, the process of identifying environmental solutions involves problem solving with clients as to their performance difficulties and occupational goals, barriers and supports to performance, and potential environmental solutions. Yet another principle is tailoring. Solutions must be customized to the particular person–environment and cultural and occupational context, with the most effective training actively involving the client through use of demonstration and hands-on practice sessions. Each of these treatment principles is informed by evidence and reflects best practices.

The implementation of a particular environmental solution involves five basic considerations (Table 12.2). These include making small incremental changes to an environment so as not to overwhelm clients and facilitate their adaptation to the change, involving family members when appropriate to support new learning and sustained safe use of modifications, providing only those adaptations that are agreed upon, and providing education about resources for obtaining other adaptations that may be necessary in the future.

Evidence-Based Practice

Knowledge about the evidence of environmental adaptations is emerging. There are several different data sources that support this approach. First, large-scale epidemiologic research consistently shows a relationship between increasing frailty and use of adaptations, suggesting that this is one of the preferred and effective approaches for compensating for physical and possibly cognitive declines (Manton et al. 1997). Similarly, studies using population-based samples have shown that use of special equipment is associated with enhanced self-efficacy, whereas reliance on help is not (Verbrugge et al. 1997). Another source of supportive evidence for this approach is from randomized clinical trials with family caregivers and frail elders in which environmental supports are one of the treatment components. While there are few of these studies, they consistently show positive treatment outcomes including reduced falls in fall-risk elders (Cumming et al. 1999), enhanced functioning (Gitlin et al. 2006b; Mann et al. 1999; Szanton et al. 2011), reduced fear of falling, reduced risk of mortality (Gitlin et al. 2006a; Gitlin et al. 2009), and enhanced caregiver self-efficacy and the dementia patients' quality of life (Gitlin et al. 2003). As environmental adaptations tend to be embedded in multicomponent interventions,

it is difficult to tease out the specific effects of any one adaptation on a particular behavior or health outcome. Nevertheless, there is a growing consensus that environmental adaptations are an important component of multifactorial approaches to address the complex consequences of chronic illness and to prevent falls.

Discussion

Environmental adaptations mitigate impairment and disability by reducing the press in the environment or demands that exceed a person's capabilities. Of importance is that adaptations be designed to enable an individual to continue participation in valued occupations.

Existing environmental adaptation services have several limitations that must be noted. First, in many countries, and particularly the USA, there is a lack of funding and necessary supports for the delivery of this therapeutic approach. Existing community-based programs typically have restrictive eligibility requirements or programs are specific to a region, not widely available, or are limited in scope with monetary caps or restrictions on the types of environmental modifications that are available. Second, there is the lack of awareness among consumers and health professionals as to the importance of involving OTs in the assessment and training process for such adaptations. As a skilled intervention, OTs have the requisite knowledge and skill for matching persons and environments with adaptive strategies. Third, this approach requires not only an assessment by an OT but also follow-up training. Often, training and follow-up are not provided due to agency budgetary considerations. Fourth, limited research is available on environmental configurations and person–environment fit specifics that might be more amenable to one versus another environmental approach so that OTs must depend upon their own experiences and the collective wisdom of the field. Finally, the evidence is mixed as to whether environmental adaptations prevent falls in and of themselves, whereas there is stronger evidence of its benefits for reducing functional difficulties and enhancing the ability to engage in valued occupations (Mann et al. 1999; Wahl et al. 2009).

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Chapter 13
Housing Adaptations and Home Modifications

Susanne Iwarsson

When I signed the contract for this apartment, they said that it was suitable for an older woman like me, with a husband who had had a stroke. But it wasn't at all.
Client in Sweden

Abstract Worldwide, but subject to substantial variations across countries, housing adaptations and home modifications constitute important and common interventions in occupational therapy practice. Starting out from the notion that occupational performance is the outcome of person–environment–occupation (P–E–O) transactions, such interventions are applicable with all kinds of clients with occupational performance problems in the home setting. Housing adaptations entail alterations of permanent physical features in the home and the immediate outdoor environment, whereas home modifications typically are more complex interventions that often include the provision of assistive technology and related training, etc. Most clients are older people, and measures such as removal of thresholds, installation of shower stalls instead of bathtubs, and installation of handrails and grab bars are among the most common. A growing body of scientific evidence has the potential to strengthen this part of occupational therapy practice, with the ultimate goal of creating home environments that support occupational performance—and ultimately, health, and quality of life.

Keywords Accessibility · Environmental adaptation · Environmental modification · Home modification · Usability

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Background

Housing adaptations and home modifications constitute important and common interventions in occupational therapy practice worldwide. This kind of intervention is based on the theoretical notion that occupational performance is the outcome of person–environment–occupation (Christiansen and Baum 1997) transactions (Fänge and Iwarsson 2007). Environmental intervention has its roots in a post-World War II philosophy, when clients and rehabilitation practitioners discovered that despite successful functional training, war victims were not able to live independently outside the hospital setting without environmental modification (Steinfeld and Tauke 2002). Such interventions aim at reducing the demands of the physical environment in the home and its close surroundings, in order to enhance activity and participation and to promote independence (Fänge and Iwarsson 2005). In a broader sense, the goal is to promote health, well-being, and quality of life (Ainsworth and de Jonge 2011).

Definitions

The *term housing adaptation* is often used interchangeably with *home modification,* although the latter tends to be used as a broader term, including housing adaptation and other interventions in the home environment, such as home-hazard counseling and provision of assistive technology (see, e.g., Sheffield et al. 2013). Wahl et al. (2009) defined *home modification* as "all efforts to improve a given physical home environment with the aim to make it better suitable to the functional needs of a given person." Thus, to differentiate among different kinds of interventions in the home, the following definition has been suggested for *housing adaptations,* that is, modifications to the built and natural environment:

> The alteration of permanent physical features in the home and the immediate outdoor environment; i.e., the objective is to reduce the demands of the physical environment in the home and its close surroundings, in order to enhance daily activities, and promote the ability to lead an independent life. (Fänge 2004, pp 8–9)

The concepts of accessibility, design for all, universal design, and usability are often used interchangeably and without explicit definition and differentiation (Iwarsson and Ståhl 2003). These concepts have different roots (Steinfeld and Tauke 2002). To nurture the use of consistent terminology in this field, the following definitions are recommended.

Accessibility

Accessibility is a relative concept, implying that accessibility problems should be expressed as a person–environment relationship. In other words, accessibility is the encounter between the person's or the group's functional capacity and the design and

demands of the physical environment. Accessibility refers to compliance with official norms and standards, thus being mainly objective in nature (Iwarsson and Ståhl 2003).

Usability

The concept of usability implies that a person should be able to use, i.e., to move around, be in, and use, the environment on equal terms with other citizens. Accessibility is a necessary precondition for usability, implying that information on the person–environment encounter is imperative. However, usability is not only based on compliance with official norms and standards; it is mainly subjective in nature, taking into account user evaluations and subjective expressions of the degree of usability. Usability is a measure of effectiveness, efficiency, and satisfaction. Most important, there is a third component distinguishing usability from accessibility, viz. the activity component (Iwarsson and Ståhl 2003).

Universal Design

Universal design is synonymous with "design for all" and represents an approach to design that incorporates products as well as building features which, to the greatest extent possible, can be used by everyone. Universal design is the best approximation of an environmental facet to the needs of the maximum possible number of users. Universal design is ultimately about changing attitudes throughout society, emphasizing democracy, equity, and citizenship. Universal design denotes a process more than a definite result (Mace 1985, cited in Iwarsson and Ståhl 2003).

Purpose

The purpose of housing adaptation is to adapt the housing environment to the clients' needs, given their functional capacity and needs and wishes for optimal occupational performance. *Usability* and *independent occupational performance* in activities related to the home constitute the most appropriate primary outcomes of housing adaptations.

Method

Candidates for the Intervention

Housing adaptation is applicable to all clients with disabilities who have problems performing daily activities in their home setting, where the interventions are aimed

at improved usability and increased independence in occupational performance in activities related to the home by means of alterations of the physical environment.

Epidemiology

Research and available statistics show that the vast majority of housing adaptation clients are older people (Boverket 2005), most often with functional limitations due to the normal process of aging, such as difficulty in bending, kneeling, poor balance, and limitations in stamina, in turn leading to dependence on mobility devices (Fänge 2004). Housing adaptations for older people are normally not expensive in each case. However, because of current population compositions, the cost may aggregate to huge total sums. For example, in Sweden, the total annual public expenditures for housing adaptations grants exceed SEK 1 billion (Chiatti and Iwarsson 2014).

Younger adults living with disabilities caused by neurologic diseases or injuries (e.g., multiple sclerosis or spinal cord injuries), rheumatic diseases (e.g., rheumatoid arthritis), or other chronic conditions often need quite expensive housing adaptations (Fänge 2004).

Children with disabilities due to cerebral paresis, juvenile rheumatoid arthritis, or muscular dystrophy often require extensive and expensive housing adaptations, which entails repeated interventions as they grow and develop.

Settings

Housing adaptations are initiated by occupational therapists (OTs) in all kinds of settings, and the prerequisites for such interventions vary from country to country. In countries where community-based practices are well developed, such interventions are most commonly effectuated by practitioners employed in primary health care, and are run by county councils or municipalities. In countries where OTs run their own enterprises, housing adaptations are often part of their intervention arsenal. In many countries, no public grants are provided. Thus, clients have to pay for such interventions themselves, or have private insurances to cover the costs for housing adaptations.

The Role of the OT in Applying the Intervention

Housing adaptation is an intervention for which the prerequisites depend greatly on the national legislative framework as well as the housing standards and building traditions of a country. Therefore, it is not feasible to propose basic recommendations that can be generally applicable, and a globally accepted description of the clinical application is not feasible.

Hence, the role of the OT in performing the housing adaptation processes varies considerably. For example, in Sweden, if a healthcare professional (most often an OT) certifies the housing adaptation, the municipality will provide a grant to finance it. The client is the formal applicant and receiver of the grant, and municipality officials administer all applications (Fänge and Iwarsson 2007; Malmgren Fänge et al. 2013). In such a system, the OT's role is well established but somewhat contradictory in practice, combining that of an official issuing a certificate of needs for an application process governed by specific legislation with that of a registered healthcare professional delivering different kinds of measures intertwined in a client-centered rehabilitation process. In contrast, delivering housing adaptation interventions in countries where housing adaptation grants do not exist, or depend entirely on whether the client has a private insurance, naturally poses quite different demands on the OT.

In the current practice, the use of systematic procedures for housing adaptations is scarce (Malmgren Fänge et al. 2013), and the intervention, which depends very much on the individual therapist, is largely "a black box" (Fänge and Iwarsson 2007).

Results

Clinical Application

Housing adaptation interventions constitute a complex process that includes a number of specific stages, including several home visits (see Ainsworth and de Jonge 2011). Interviewing and observing the client and inspecting the home environment is mandatory.

The systematic collection of data for identification of the client's problem should be based on a person–environment–occupation transactional perspective. It requires the use of valid and reliable assessment instruments as well as qualitative data collection. For example, the Housing Enabler instrument (Iwarsson et al. 2012) can be used to structure the objective assessment of functional capacity and environmental barriers. In addition, perceived aspects of housing (Oswald et al. 2006), for example usability (Fänge and Iwarsson 1999), should be included in the data collection and respected in the planning of the individualized intervention. That is, the home must be approached as a place of meaning, and when recommending housing adaptations the measures should be as closely associated with normality as possible. Most important, housing adaptations should not be prescribed but negotiated with the clients to take into account their personal needs and preferences. Analysis of the data leads to the planning of the housing adaptation, which requires the active involvement of the client and his or her family.

Measures such as removal of thresholds, installation of shower stalls instead of bathtubs, and installation of handrails, grab bars, and ramps (Fig. 13.1) are among

Fig. 13.1 Installation of ramps at entrances is among the most common housing adaptation measures. (Photograph: S. Iwarsson; reproduced with the subject's approval)

the most common. It is necessary to consider the ergonomic working environment aspects for clients where formal or informal helpers are involved.

Housing adaptation as intervention places great demands on OTs, because they are acting upon the most private domain of a person's living environment. Potential conflicts of interest are inherent in the process (see, e.g., Chiatti and Iwarsson 2014).

Evidence-Based Practice

As the quite diverse systems across countries make comparisons between studies difficult, it is hard to evaluate the literature for scientific evidence regarding housing adaptations and home modifications. The majority of published housing adaptation evaluations lack theory-based definitions of core concepts and outcomes. According to the Cochrane reports (Gillespie et al. 2003; Lyons et al. 2003), the scientific evidence of the effects of housing adaptations and home modifications is limited. Yet, according to a literature review, including studies with mainly older people (Wahl et al. 2009) there is substantial evidence of positive effects. Positive effects were indicated on (1) functional decline (Mann et al. 1999), (2) fear of falling (Cumming et al. 1999; Heywood 2004), (3) pain and depression (Heywood 2004), (4) satisfaction and performance in daily activities (Gitlin et al. 2001; Stark 2004),

and (5) costs of healthcare and social services (Mann et al. 1999). Most recent studies on housing adaptations and home modifications show promising results (see e.g., Sheffield et al. 2013). However, regarding health economy outcomes, the scientific evidence is nonexistent (Chiatti and Iwarsson 2014).

Discussion

Housing adaptations and home modifications should be recommended as interventions that support the maintenance of independence in activities of daily living (Wahl et al. 2009) and occupational performance in general (Fänge and Iwarsson 2007). Still, there are critical methodological challenges for practice and future research (Malmgren Fänge et al. 2013). As the quotation at the start of this chapter demonstrates, another challenge is to present scientific evidence that would make some individual housing adaptations unnecessary. Applying such a health promotion approach, and using experience and knowledge generated from individual housing adaptation cases to be translated into recommendations for housing provision as part of the process of planning a society for all (Ainsworth and de Jonge 2011; Iwarsson 2005), is a challenging but important avenue for future development.

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The Case Study of Stina: Housing Adaptation

Keywords: Home modification, Housing adaptation, Objective aspects of home, Accessibility, Perceived aspects of home, Usability

Introduction

The theme of this case study is housing adaptation aimed at a person with multiple sclerosis (MS).

The student task includes:

- Identifying valid information on typical occupational performance problems in MS and their progression over time, specifically related to personal and instrumental activities of daily living usually performed in the home environment.
- Identifying aspects of home and health that need consideration and related assessment instruments for data collection prior to the planning for a housing adaptation as well as for follow-up.
- Applying clinical reasoning following the steps in the housing adaptation process, and reflecting upon the content of an efficient intervention for the person described in this case.

As a starting point, students should use the following references to gather background information:

Ainsworth E, de Jonge D (2011) An occupational therapist's guide to home modification practice. Slack Inc.,Thorofare

Fänge A, Iwarsson S (1999) Physical housing environment: development of a self-assessment instrument. Can J Occup Ther 66(5):250–260

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Wahl H-W, Fänge A, Oswald F, Gitlin L, Iwarsson S (2009) The home environment and disability-related outcomes in aging individuals: what is the empirical evidence? Gerontologist 49(3):355–367

Overview of the Content

Major Goals of the Actual Intervention The goals of a housing adaptation are to adapt the housing environment to the client's needs, given her functional capacity, wishes for optimal occupational performance, and perceived aspects of home relevant to her and the family. Ultimately, the intervention should improve the client's independence in daily activities.

Learning Objectives

By the end of studying this chapter, the learner will:

- Be able to use scientific and clinical methods presented in literature to solve the case study based on the case method.
- Be able to apply the case method in clinical reasoning to the specific case study and similar clinical situations.
- Understand the justification and ethical considerations related to housing adaptation, applying an explicit client-centered perspective.
- Write a scientific report on housing adaptations as an occupational therapy intervention.

The Background History of Clinical Case Study

Client Description Stina is 52 years old. She is married and lives with her husband and a teenage daughter. Though she has been working full time until now, she is considering a reduction of her work time to 75 %. Her husband is working full time in a job that requires much traveling, and he spends at least five nights per month away from home. The family lives in an old private house that has undergone some renovation, but would not be considered high standard. The kitchen is the most modern part of the house, as it was thoroughly renovated 3 years ago.

Stina was diagnosed with MS 3 years ago. She is experiencing increased tiredness, and now and then, she has started to feel that her balance and endurance are

not sufficient to allow for longer periods of heavier cleaning or cooking while standing, and she feels frustrated when her activity performance becomes compromised. Increasingly, she sometimes feels uncertainty when walking, in particular in the entrance staircase and during the short walk required to reach her car, usually parked in front of the house.

Occupational Therapy Interventions

At the time when Stina was diagnosed with MS by a neurologist at the nearby hospital, she briefly met with an OT and received some basic information about her possibility to get assistive devices, for example, for mobility, and assistance in how to apply for a housing adaptation. She also got a leaflet that described how the disease might impact on daily occupation and some guidance on how to adjust daily routines to maintain activity and participation. Until now, Stina has coped with her daily life situation and has not sought for any in-depth occupational therapy consultation.

The Student's Report

The following guiding questions have been identified in developing possible solutions to Stina. These questions were generated from the references found in the literature search:

- What are the major definitions and concepts used in the case?
- Which assessments should be used to determine how the housing adaptation should be planned, effectuated, and evaluated?
- Which are the short- and long-term goals for Stina?
- How can Stina maintain activity and participation?
- What is the research-based evidence for a housing adaptation?

Chapter 14
Management of 24hr-Body Positioning

Shelley Crawford and May Stinson

Superb, all OT staff handover clear instructions on how to use the new equipment and had come out several times to ensure all staff were competent at using all equipment and sleep systems

My daughter is 29 years and I would state that it is only now she is getting the care and equipment needed for her individual handicap and body needs.
Curran and Crawford (2012)

Abstract Positioning and posture underpin the ability to function and access the environment. Sustained poor positioning can have severe and life-threatening complications for those who have a limited ability to change position. It can lead to a reduced ability to engage in meaningful activities, thus impacting on the quality of life of the individual. Twenty-four-hour-body-positioning is an occupational therapy intervention which aims at correcting or maintaining posture to ensure that function is maintained. In doing so, it can prevent complications, thus reducing cost to the health-care system.

Keywords Assistive devices · Education · Lying · Participation · Posture · Seating

Definition

Twenty-four-hour-body-positioning is 'the use of any technique to minimise the effect of postural abnormality and improve function' (Farley et al. 2003, p. 449).

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Background

Twenty-four-hour-body-positioning has been researched and developed over the past 15 years, with Chailey Hertiage Clinical Services in the UK leading its clinical application and evidence base. It was originally developed to prevent musculoskeletal deformity and improve function in children with cerebral palsy (Pountney et al. 2002). However, its benefits with other neuromuscular conditions are now widely accepted (Pope 2007). Twenty-four-hour-body-positioning is an intervention that addresses all body positions that an individual adopts over a 24-hour period and focuses on promoting function and participation in occupation (McDonald and Surtees 2007; Wynn and Wickham 2009; Harbourne et al. 2010; Hutton and Coxon 2011; Maher et al. 2011). It usually involves: (a) provision of adaptive seating and/or moulded wheelchairs (Fig. 14.1); (b) night-time positioning equipment (also known as 'sleep systems'; Fig. 14.2); (c) moving and handling techniques and (d) advice and training for all care staff, professionals and family across all settings. As such, the intervention considers the environmental context of the individual (Gough 2009) and provides an individualised comprehensive 24-hour-body-positioning programme (Maher et al. 2011; Wynn and Wickham 2009). Over the past decade, there has been increasing awareness and emphasis on the clinical importance of 24-hour-body-positioning (Goldsmith 2000; Pountney et al. 2002; Humphreys and Pountney 2006).

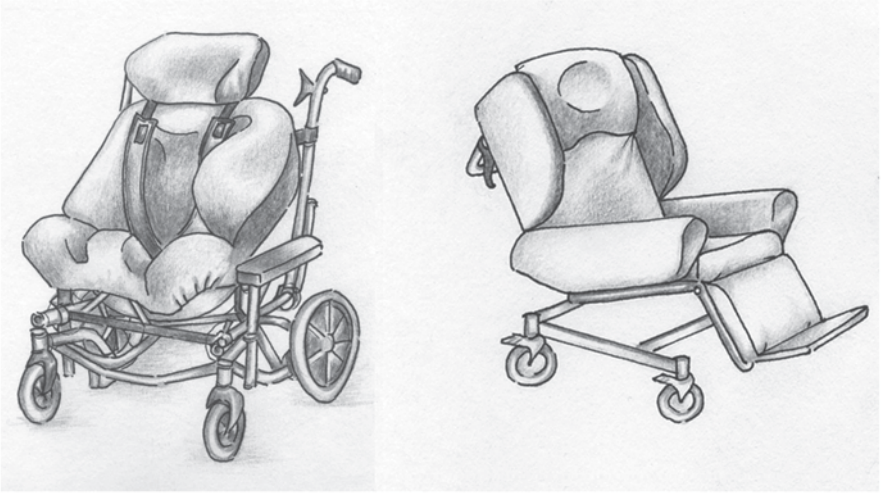

Fig. 14.1 Modular seating and a moulded wheelchair

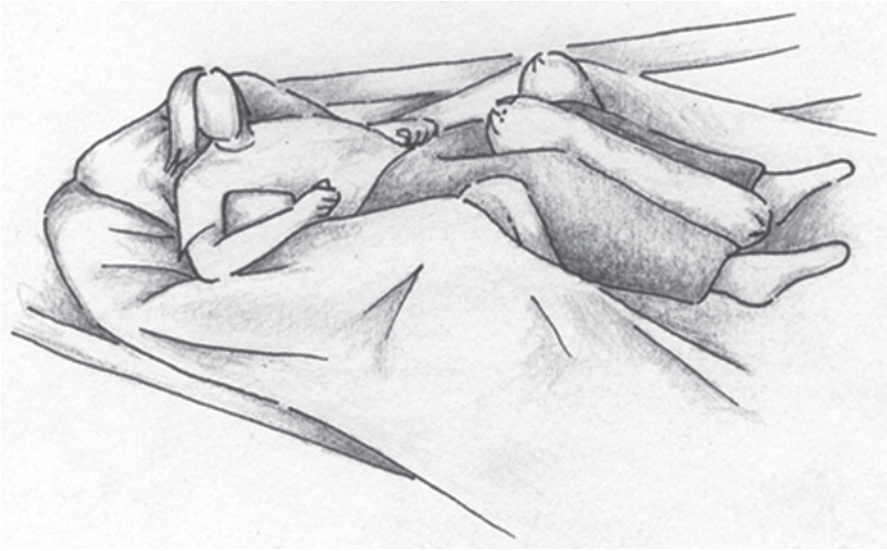

Fig. 14.2 Night-time positioning equipment ('sleep system')—supine position

Purpose

The aim is to correct, maintain or compensate for a destructive body posture, by providing adaptive equipment and advice to facilitate alignment, comfort, function and participation over the 24-hour period. The assistive devices and advice should consider the views of the client, carers and the environmental context of the individual, e.g. whether the individual attends day care or school; thus ensuring that the intervention can be implemented across all settings.

Method

Candidates for the Intervention

Candidates for the 24-hour-body positioning include children and adults who lack or have inadequate postural control and are at risk of postural deformity (Vekerdy 2007; Hill and Goldsmith 2010). This will include, but not exclusively, those with cerebral palsy, intellectual disabilities, dementia, muscular dystrophy, multiple sclerosis (MS), stroke, spinal cord injury, brain injury and Huntington's chorea. Most individuals who lack the ability to change their position would benefit from this intervention. It is important to emphasise the need for early intervention (Gericke 2006).

Epidemiology

There are no epidemiological studies to suggest the proportion of individuals who would benefit from this intervention. However, the application of 24-hour-body positioning will depend on several factors. Firstly, the prevalence of individuals with neuromuscular conditions and secondly, the availability of assistive devices and access to services which will vary from country to country and may depend on the socioeconomic climate of that country or region. It has been estimated that the number of individuals with complex physical needs will increase (Cobb and Giraud-Saunders 2010). One such example is in England, where adults with profound and multiple learning disabilities (PMLD) will increase by 1.8 % annually from 2009 to 2026 (Emerson 2009). This client group frequently utilises 24-hour positioning, and thus the application of this intervention will increase in concurrence.

Settings

Twenty-four-hour-body-positioning can be implemented in hospital, school, day care, home, nursing, respite or residential care. It should be implemented across all settings that the individual accesses. Once it has been identified that the individual is at risk of postural deformity by a carer or health professional, a referral should be made to occupational therapy to assess and manage 24-hour positioning.

The Role of the Occupational Therapist

According to Wynn and Wickham (2009), a number of distinct roles are related to the occupational therapy intervention of 24-hour positioning including: (a) comprehensive assessments (see below), (b) provision of assistive devices, (c) communicating individualised postural care programmes, (d) training of staff and carers, (e) reassessment of the individual and (f) orthotics.

Results

Clinical Application

Traditionally, occupational therapists have focused on posture and positioning for seating and wheelchairs. However, individuals may spend up to half their time in bed (Hill et al. 2009), and therefore considering posture over the 24-hour period is essential; particularly as sleep position will impact on sitting position (Hill and Goldsmith 2010). Correction and/or maintenance of posture is of immense importance

as it is recognised that it can influence respiratory function, oral intake, motor skills, digestion and level of pain, etc. (Pope 2007; Hill et al. 2009; Hill and Goldsmith 2010); and thus greatly impacts on the general health of individuals. This comprehensive intervention will assist with reducing postural-related complications, such as chest and urinary tract infections, pressure and shear injuries, joint contractures, deformity, pain and aspiration (Hill and Goldsmith 2010). It is also important for carers as it can lessen care burden by reducing tone in order to facilitate access for personal care and toileting (Wynn and Wickham 2009) as well as facilitating a safe and upright posture for assisted feeding (Redstone and West 2004; Vekerdy 2007).

Interventions

Assessment

Comprehensive assessment is an important part of the intervention (Isaacson 2013; Pountney et al. 2004). It includes: (a) documenting the position of pelvis, spine, head, trunk, hips, knees, ankles, feet and upper limbs in their current assistive devices as well as recording any problems with existing devices (Zollars 2010); (b) chest symmetry measurements taken in the supine posture on a plinth, which comprise measuring vertically and diagonally from the coracoid processes to the anterior–superior iliac spines (ASISs; Pope 2007) and from the xiphoid process to a firm surface on the left and right; (c) measurement of key joint range of motion (Ryf and Weymann 1999) tested in supine or a side-lying posture, including hip flexion/extension, hip abduction/adduction, hip internal/external rotation, hamstring range and cervical flexion/extension; (d) assessing the spine for scoliosis, kyphosis and lordosis; (e) a neurological assessment, including testing muscle power, tone and associated reactions is required (Pope 2007); (f) simulation of optimal sitting and lying postures; the therapist determines where necessary forces/supports need to be applied in order to correct or maintain positioning (Pope 2007); (g) pressure mapping if indicated (see chapter 16); (h) risk assessment which should consider risks associated with seizures, reflux/dysphagia, body temperature regulation, pressure ulcers and positioning belts; (i) manual handling assessment, e.g. what type of sling is required to assist with positioning; (j) environmental and transportation assessment; this involves ensuring that the equipment is compatible with home environment and the vehicle used for transport (Zollars 2010); (k) pulse oximetry (SpO_2 levels)—oxygen saturations in both lying and sitting postures are recorded and (l) gathering and recording important information on the client, including, the level of independence, swallowing issues, ongoing medical problems, pain management, communication, perceptual and cognitive status, sensory, proprioceptive and vestibular deficits, presence of dyspraxia and visual disturbance (Pountney et al. 2004; Pope 2007; Zollars 2010).

Assistive Devices

Specialised assistive devices are necessary to support positioning and function (Pountney et al. 2004), for example sleep systems, moulded wheelchairs or static seating (Figs. 14.1 and 14.2), bespoke shower chairs and specially designed hoist slings. Some individuals may require all of these assistive devices depending on their functional needs. The occupational therapist assesses with these devices and then prescribes to meet the client's positioning needs, e.g. a moulded wheelchair might be prescribed for positioning during the day, and an 'in chair sling' may also be recommended to facilitate ease of positioning for use with the moulded wheelchair. Furthermore, a sleep system will facilitate optimal positioning at night, and finally a tilt-in-space shower chair with lateral supports might be issued to maintain a safe position during showering. The assistive devices aim to ensure that the most functional body position is maintained over the 24-hour period.

Communicating the Information

The assistive devices and the optimal positioning of the individual within each device are photographed by the occupational therapist. Photographs are a useful method of documenting intervention and can be used to record progress (Pope 2007). Written instructions are devised to accompany the photographs, providing step-by-step instructions on how to achieve and maintain each position. For example, instructions for the wheelchair might read: (a) ensure the wheelchair is in full tilt to assist with hoisting in, (b) remove the wheelchair headrest, (c) ensure the client is hoisted into the wheelchair with hips positioned at the back of the chair, (d) fasten the positioning belt and ensure it snuggly fits below the ASISs, (e) take off the tilt and (f) reattach the headrest. The same process is followed for all assistive devices that are prescribed. This information is collated into the 24-hour-positioning programme booklet which is shared across all settings, e.g. home, day care and school. The importance of 24-hour-positioning booklets to educate carers and staff has been highlighted by several researchers (Maher et al. 2011; Hutton and Coxon 2011) to ensure adherence to the recommendations and advice provided by the occupational therapist.

Education

All staff and carers involved with the individual are educated by the occupational therapist on the importance of 24-hour-body-positioning for functioning and for preventing deformities, pressure ulcers, chest infections, etc. They are trained on the use of the assistive devices prescribed, using the individual's 24-hour-body-positioning booklet. Carers practice using the equipment and achieving the positions

shown in the 24-hour-positioning booklet until they are competent, under the guidance and supervision of the occupational therapist. This type of education and support has been found to be an essential component of 24-hour positioning (Maher et al. 2011; Hutton and Coxon 2011), and therefore the occupational therapist must make education a priority when providing 24-hour-body-positioning intervention.

Reassessment

Gibbs (2005) recommended that each client who receives 24-hour positioning should be reviewed annually. This is to ensure that the adaptive devices continue to support functioning and to record any changes in physical and social abilities. An outcome measure that allows comparisons of functional ability from one assessment to another should be an integral part of the 24-hour positioning. The outcome measure(s) selected will largely depend on the type of clients that attend your clinic.

Multidisciplinary Input

Some individuals will require input from other professionals to optimise their positioning over the 24-hour period. For example, a review of the medication from a physician may be required to assist with the management of spasticity, a dysphagia assessment may be requested from a speech and language therapist or a spinal brace may be requested from an orthotist. The occupational therapist should ensure that all referrals to other professionals are made in a timely manner.

Evidence-Based Practice

There is a growing evidence base in support of 24-hour-body-positioning with a number of authors finding this intervention enhanced comfort, musculoskeletal alignment, participation and functioning (Farley et al. 2003; Chia 2005; Gibbs 2005). Researchers also highlighted the need to implement this intervention to support physiological functioning such as respiration (Farley et al. 2003). Only one study did not support this intervention and reported that there was inadequate evidence that 24-hour positioning prevented deformities in children with cerebral palsy (Gough 2009). However, this author did highlight the importance of shifting the focus of 24-h positioning towards occupations and daily life and away from body structures. This is a reasonable recommendation as optimal positioning will enhance comfort and stability, thus freeing up body parts to engage in meaningful activities. A number of studies found that education and co-operation of carers was deemed an essential component of successful 24-hour-body-positioning (Humpherys and Pountney 2006; Hutton and Coxon 2011; Mahler et al. 2011). Table 14.1 shows a summary of the literature reviewed.

Table 14.1 Literature review of 24-h-body-positioning

Author/year	Title	Methodology	Key findings
Farley et al. (2003)	What is the evidence for the effectiveness of postural management?	Literature review of 150 articles, graded using Sackett's levels of evidence	There is a robust link between physiological functioning and posture. The importance of positioning and posture for communication, work and leisure tasks was highlighted. Eighteen studies highlighted the benefits of postural management for clients with a learning disability
Chia (2005)	Assessment for and provision of positioning equipment for children with motor impairments	Descriptive	Basic descriptive information presented on postural management in different positions, including lying, sitting and standing
Gibbs (2005)	Improving outcomes in children with disability: postural management, Mark's story	Single case study design	The importance of selecting and providing the most appropriate equipment should be based on the assessed need for that individual and should be reviewed annually. The author warns against over prescription which may restrict rather than aid function
Humphreys and Pountney (2006)	The development and implementation of an integrated care pathway for 24-hour postural management: a study of the views of staff and carers	Qualitative methodology using focus groups	Training in 24-hour-postural management for all carers is crucial. The integrated care pathway (ICP) has resulted in raising the importance of this clinical area and has improved service delivery and will improve outcomes for children and adults at risk of destructive postural tendencies

Table 14.1 (continued)

Author/year	Title	Methodology	Key findings
Gough (2009)	Continuous postural management and the prevention of deformity in children with cerebral palsy: an appraisal	No methodology reported but appears to be a literature review	There is inadequate evidence to support postural management in preventing musculoskeletal deformity in children with CP. A shift in focus away from postural management and body structure towards its benefits for environment, participation and engagement was recommended
Maher et al. (2011)	Factors influencing postural management for children with cerebral palsy in the special school setting	Cross-sectional descriptive postal survey sent to OTs, PTs, speech pathologists and teachers	Perceived benefits of postural management included prevention of deformity and pressure ulcers, facilitation of function, participation, comfort, feeding and independence, etc. The need for staff training and written postural management programmes was highlighted
Hutton and Coxon (2011)	Posture for learning: meeting the postural care needs of children with physical disabilities in mainstream primary schools in England: a research into practice exploratory study	Qualitative methodology including individual interviews and focus groups with teachers and teaching assistants from four primary schools	Teachers and teaching assistants need more training to understand the reasoning behind postural management programmes. Equipment was viewed as bulky and restrictive at times. The findings led to the collaborative development of the 'A–Z of postural care' resource which aims to address the gaps in knowledge highlighted by teachers and teaching assistants

A literature search was completed from January 2003–January 2013 using keywords such as 'postural management', '24-hour-positioning', 'postural control' and 'postural care'. Databases including PubMed, CINAHL and Medline were searched as well as searching the reference lists of key articles. Studies were included if they focused on management of positioning/posture over the 24-hour period. Studies that investigated only seating or night-time positioning were excluded as it would be beyond the scope of this chapter to review all individual components relating to 24-h-body-positioning

CP cerebral palsy, *OT* occupational therapist, *PT* physical therapist

Discussion

Twenty-four-hour-body-positioning is a comprehensive and time-intensive occupational therapy intervention and should be the cornerstone of care for those individuals who are unable to alter their position (Goldsmith 2000). As the number of individuals with complex disabilities is set to increase, the need for 24-hour-body-positioning has never been greater (Cobb and Giraud-Saunders 2010). The International Classification of Functioning, Disability and Health (ICF; WHO 2001) not only acknowledges the importance of intervention which aims to improve body structure but also recognises the need to consider the environmental and personal aspects of health. Therefore, the ICF provides a useful framework to further investigate the impact of 24-hour-body-positioning.

Conclusion

Twenty-four-hour-body-positioning is essential for preventing secondary related postural complications and for promoting function and participation in everyday life for those with severely impaired motor function. This intervention demands a high level of skill and expertise from the occupational therapist to ensure that the client's goals and full potential are fulfilled. Further research should focus on the effectiveness of this intervention with adults who have complex disability, as much of the current evidence is based on research with children. In addition, studies which assess the long-term benefits of 24-hour-body-positioning would be particularly welcomed.

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The Case Study of Gerry[1]

Keywords Education, night-time positioning, spasticity, wheelchair

Introduction

The theme of this case study is the assessment and application of 24-hour-body-positioning for an individual with severe motor and cognitive impairment.

The students' tasks include:

1. Look at Fig. 14.3 and describe in your words, the position of this individual in both lying and sitting.
2. How would you explain to residential care staff about the impact of Gerry's positioning on his ability to function? Remember to use simple language that is free from medical jargon.
3. Consider the practicalities of delivering the necessary training to staff working in a residential unit. How would you overcome these issues?

As a starting point, the students should use the following references to gather background information:

1. Barnes MP (2008) An overview of the clinical management of spasticity. In: Barnes MP, Johnson GR (eds) Upper motor neurone syndrome and spasticity. Cambridge University Press, UK
2. Raine S (2009) The Bobath concept: developments and current theoretical underpinning. In: Raine S, Meadows L, Lynch-Ellerington M (eds) Bobath concept: theory and clinical practice in neurological rehabilitation. Blackwell, UK
3. Walton K (2003) Management of patients with spasticity: a practical approach. Pract Neurol 3:342–353

Overview of the Content

Major goals of the actual interventions include: Control high muscle tone and extensor thrusts in sitting to enhance participation in activities of daily living.

Reduce lower limb spasticity in lying in order to facilitate easier access to perianal region for hygiene and easier moving and handling.

Increase postural stability, musculoskeletal alignment and comfort across sitting and lying to reduce agitation and pain.

[1] *Pseudonym*.

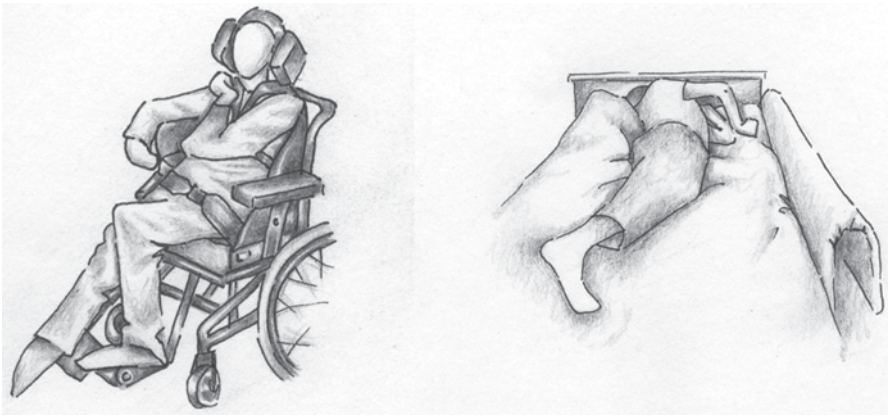

Fig. 14.3 Gerry in sitting and lying positions before OT intervention

Learning Objectives

By the end of studying this chapter, the learner will:

1. Understand the consequences of suboptimal positioning on individuals with severe motor impairment.
2. Understand the importance of a thorough assessment prior to providing 24-hour-body-positioning intervention.
3. Appreciate that lying position will impact on seating; therefore sitting and lying need to be considered together as part of an overall intervention process by the occupational therapist (OT).
4. Realize the necessity and importance of educating staff, family and carers about 24-hour-body-positioning, and the equipment prescribed to assist with this.
5. Understand how 24-hour-body-positioning is inextricably linked to the ability to participate in everyday life.

The Background History of the Clinical Case Study

Personal data: Gerry[2] is a 40-year-old gentleman, living in a residential unit with eight other individuals. He is dependent on others for all basic activities of daily living (ADLs) such as toileting, feeding and personal care. Gerry has no verbal communication and can, at times, display behaviours that are challenging. This includes continuous screaming when in the company of others. This behaviour can be managed by staff who know him well using distraction techniques. His family is

[2] *Pseudonym*.

supportive and visit as regularly as possible. He attends day care 5 days/week, but does not integrate into the group due to his frequent behavioural outbursts and high levels of agitation.

Assessment A comprehensive postural assessment was completed by an OT, lasting 2 hours. It was found that Gerry had limited ability to flex his hips; his lower limbs were grossly adducted and internally rotated. He displayed high extensor tone that increased significantly during agitation and frequent periods of screaming outbursts. His tone and extensor spasms caused considerable sliding forward in the wheelchair, and he needed to be repositioned regularly (Fig. 14.3). Carers find attending to his hygiene needs and placing a sling very difficult due to his lower limb positioning. He sleeps in a fully extended pattern whilst lying on his left side (Fig. 14.3) and will not tolerate lying on his back or right side; he sweats a lot in both lying and sitting postures and his upper limbs are flexed and internally rotated with spasticity noted.

Medical Diagnoses and Prognoses: Gerry has spastic cerebral palsy involving all four limbs. He has a severe learning disability and epilepsy which is well controlled by medication. Gerry also has bilateral hip dislocations. These conditions are not thought to impact on his life expectancy.

Reason for seeking occupational therapy: He was referred to occupational therapy by his key worker at the residential home for a review of his body positioning in his wheelchair.

Occupational performance issues: Night-time positioning was addressed and the client was supported on his left side with his lower limbs facilitated into a slightly flexed position to reduce extensor tone. A specially designed pillow was inserted between his legs to prevent excessive adduction and prevent further internal rotation. Maximum support was created and the position was maintained using sleep system brackets and a foam overlay. This aimed at encouraging hip and knee flexion which is possible due to muscular plasticity (Raine 2009), thus assisting with preparation for sitting. Care was taken to ensure that the additional supports to his night-time positioning did not affect his ability to regulate his temperature and did not impact on his seizure frequency (Fig. 14.4).

He was assessed and issued with a specialized tilt in space wheelchair with a dynamic backrest; this allowed him to access his extensor tone without compromising his positioning within the wheelchair. His lower limb position was accommodated by a customized seat base, which maintained his joint ranges, and aimed at reducing further deformity. Positioning belts were used to assist with maintenance of pelvic position (Fig. 14.4). Photographs, diagrams and written step-by-step advice formed his '24-hour-positioning booklet' and this document was shared with residential and day care staff to ensure that there was a consistent approach to his body positioning across the 24-hour period.

The OT recommended that his general practitioner should review his medication to determine if this can be adjusted to assist with management of spasticity in all four limbs. Medication is often used to assist in the treatment of spasticity (Walton

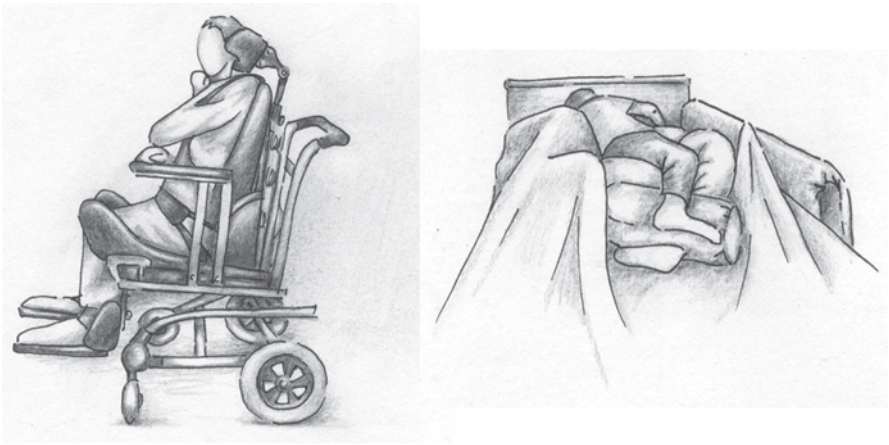

Fig. 14.4 Gerry in sitting and lying after OT intervention

2003; Barnes 2008); and alongside 24-hour-body-positioning, it is thought to provide the optimal management.

Impact on service user: Soon after the night-time positioning was introduced, care staff reported that the client began to sleep through the night for the first time in 8 years. He was therefore more rested in the morning with staff reporting fewer daily outbursts post occupational therapy intervention. Spending time in a supported lying position often reduced his agitation within day care, facilitating increased engagement and participation with peers.

Impact on carer: A service evaluation questionnaire found that carers reported a reduction in stress when providing support due to the reduction in his disruptive outbursts and his ability to now sleep for longer periods. Carers have also noted a reduction in extensor and adductor tone facilitating easier personal care and sling placement. Day care staff were delighted that the client could now spend longer periods of time within the group.

The Student's Report

These questions are generated from the available literature references and our clinical experiences:

1. Would you have tried anything else at this stage or done anything different?
2. Why do you think Gerry sweats a lot?
3. How important do you think staff co-operation with occupational therapy advice and recommendations is?

Chapter 15
Ergonomic Interventions for Computer Users with Cumulative Trauma Disorders

Glenn Goodman and Sharon Flinn

The number of computer keyboard workers with cumulative trauma disorders is as much as 12 times that of non-keyboard users.
(Weiss and Chan 2008)

Abstract This chapter examines ergonomic interventions for computer users who experience cumulative trauma disorders (CTDs) in the workplace. The complex nature of these disorders demonstrates the need for holistic, comprehensive, and personalized evaluations. Examples of occupational therapy and other interventions for these disorders and their effectiveness are reported. Recommendations for occupational therapy practice and further research are provided.

Keywords Computers · Cumulative trauma disorders · Ergonomics · Musculoskeletal disorders

Definition

Cumulative trauma disorders (CTDs) are caused, precipitated, or aggravated when recovery time is absent or insufficient following repeated exertions, repetitive movements, or awkward postures of the body (Loy 2013; Putz-Anderson 1998). Work-related CTDs are complex in terms of etiology, pathophysiology, prevention, and effectiveness of interventions.

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Background

Factors that influence CTDs include the following: (a) ergonomic and environmental (prolonged positioning in awkward postures, repetitive movements, force, sustained exertion, temperature, lighting, mechanical stress); (b) personal and psychosocial (gender, age, health habits, work style, medical conditions, anxiety, anthropomorphic, attitude, and work ethics); and (c) work and organizational (work load, time pressures, job stress, social support, control over job tasks, role conflict, job security, social contexts, supervisors' and managers' knowledge of ergonomic issues; Cook and Polgar 2008a; Foye et al. 2002; Hamilton et al. 2005; Nieuwenhuijsen 2004; Trujillo and Zeng 2006; Weiss and Chan 2008). Other work, leisure, or self-maintenance tasks can cause or contribute to the problem (Cook and Polgar 2008a; Hamilton et al. 2005).

Purposes

Occupational therapists (OTs) have training and skills to evaluate ergonomic and environmental factors, psychosocial issues, and individual characteristics related to CTDs and excessive computer use. This chapter focuses on evaluation and ergonomic interventions.

Method

Candidates for the Intervention

Seventy-five percent of households surveyed reported having a computer. The highest percent of users (85%) are aged 35–44 (U.S. Census Bureau 2013). People with *sustained or chronic pains* due to computer use are candidates for intervention. Examples of common CTDs related to computer use include disorders of *(1) soft tissues* (myofascial pain; trigger points, trapezius and sternocleidomastoid pain, ligamentous strains to back, neck, shoulder, wrist; supraspinatus tendonitis; subdeltoid bursitis; lateral and medial epicondylitis; DeQuervain's disease; trigger finger; ganglion cyst); *(2) neurovascular systems* (carpal tunnel; cubital tunnel; Guyon's canal; radial tunnel; thoracic outlet syndrome); and *(3) other general conditions* such as eye strain, dry eye syndrome, headaches, and arthralgia (Brewer et al. 2006, Foye et al. 2002; Hamilton et al. 2005; Loy 2013; Omer et al. 2004; Trujillo and Zeng 2006).

Epidemiology

Some statistics about CTDs among high-end computer users include the following:

- Incidence rates vary from 11 to 67 per 10,000 workers for workers in mathematics and computers, information services, and financial activities.
- There were 387,820 MSDs in all ownerships (work settings) with an incidence rate of 39 cases per 10,000 full-time workers.
- Workers who sustained musculoskeletal disorders required a median of 11 days to recuperate before returning to work, compared with 8 days for all types of cases.
- The number of computer keyboard workers with CTDs is 12 times that of non-keyboard users.
- The prevalence of musculoskeletal disorders has been reported to be as high as 86% among data processors.
- Yearly costs of CTDs have been estimated at over $100 billion, which is 50% more than for other work-related injuries or illnesses. (Bureau of Labor Statistics 2012; Foye et al. 2002; Hamilton et al. 2005; Keller et al. 1998; Loy 2013; Pascarelli and Hsu 2001; Trujillo and Zeng 2006; Weiss and Chan 2008; Werner 2006).
- Sixty-five of 72 female college students using laptops showed musculoskeletal complaints (Hamilton et al. 2005).

Settings

OTs typically see clients with CTDs in the workplace or outpatient clinics in conjunction with hand or orthopedic surgeons, physical therapists, ergonomists, vocational rehabilitation specialists, case managers, occupational health physicians, or nurses.

The Role of the OT in Applying the Intervention

OTs receive training in anatomy, physiology, neurology, and psychology and are skilled in activity analysis and adaptation. Often, the problems are due to a specific activity that impacts body structures, and if managed, could result in elimination or reduction of symptoms. OTs are also skilled in using interviews and observations to solve the root problem of these disorders. Restorative and adaptive approaches are used to modify the environment or to provide interventions such as rest, orthotics, therapeutic exercise, alteration of movement, and alteration of work schedule. The interventions seek to restore tissue integrity, allow for healing, or prevent further injury. OTs provide education to workers, management, and caregivers regarding

preventative, restorative, or adaptive measures. OTs have expertise in assistive technologies, ergonomic principles, and modifying a task or environment to maximize functional performance of occupations.

Results

Clinical Application

Interventions for CTD Related to Computer Use in the Workplace

Modification of the workstation can be categorized into (1) modifications that eliminate factors related to posture, force, duration, intensity, positioning, or repetitive motion that may contribute to the disorder; (2) *modifications of schedule or work activities* (including rest); (3) *use of assistive devices* not related to the workstation such as eyeglasses or orthoses; (4) *physical agent modalities,* medications, surgery, or other medical interventions; (5) *patient education* related to the condition; and (6) *behavioral interventions* such as relaxation training, exercises, stress management, and interventions to improve psychosocial function in or outside the workplace (American Industrial Hygiene Association 2013; Bernaards et al. 2007; Bohr 2000; Brewer et al. 2006; Goodman et al. 2005; Trujillo and Zeng 2006).

This chapter focuses on interventions to modify the workstation and schedules.

Modification to the Workstation

The workstation can be modified using universal ergonomic approaches or by addressing specific CTDs. Many resources offer guidelines for equipment and positioning using ergonomic principles. *Proper positioning* recommendations include approximately 90° of hip flexion, knee flexion, and ankle dorsiflexion with the head and neck in line with the torso, and the head in slight downward tilt. There should be adequate support of the lumbar spine to facilitate normal curvature of the spine. The arms should be aligned with the torso with approximately 90° of elbow flexion. Feet should be resting flat on the floor or supported by a footrest. Wrists should be neutral in all planes of motion. Assessment of proper body alignment includes observations from the front, back, and side of the individual and posture imbalances that occur at rest and during spontaneous movements (Flinn and DeMott 2013). Some ergonomists recommend standing for intensive computer use (Fig. 15.2).

- *Armrests and ergonomic* chairs should be used that facilitate correct positioning guidelines with elbow height below the "J" key, and the horizontal location of the "J" key more than 12 cm from the edge of the desk. Chairs should adjust for seat height, seat depth, angle of seat, angle of back, height of back, amount of

lumbar curve, and armrest height. Chairs should properly support the weight of the worker with appropriate padding for seat and back cushions.
- *Armrests* should be adjustable, properly padded, and large enough to support the forearm.
- The *monitor* is positioned to allow 0–35° of downward gaze at a distance that maximizes visibility for the individual user (10–30 in. or 25–75 cm from the eyes to the monitor).
- The size of the *monitor* should accommodate the visual field and take into account acuity issues.
- A padded wrist rest may be needed.
- *Glare reduction* is accomplished through lighting, glare filters, angle of the monitor, and proper shading.
- If laptops are used, detachable standard or ergonomic keyboards are recommended. Split keyboards with adjustable angles and negative slopes are preferred that reduce arm pronation and ulnar deviation during computer use.
- *Keyboard* trays should be *adjustable* for tilt, distance from desk, and height. They should tilt in a negative direction.
- *Desk height* should be adjustable if possible. If not, clearance for knees and legs should be considered before ordering an appropriate size desk.
- *Pointing devices* should be based on types and location of pain, required tasks, and physical limitations. The pointing device should match the contour of the hand, be thinner to reduce the distance between buttons, and be placed close to the keyboard. Alternatives to the mouse (e.g., trackballs) should be considered.
- *Lighting* should be adjustable for intensity, direction, and distance from work.
- *Additional environmental factors* such as temperature, ventilation, and dust should be evaluated and modified if problematic (Blatter and Bongers 2007; Brigham Young University 2005; Clemson University n.d.; Cook et al. 2000, 2004; Cook and Polgar 2008a; Fagarasanu and Kumar 2003; Foye et al. 2002; Goodman et al. 2005; Harvard University 2008; Keller et al. 1998; Lee and Jacobs 2001; Loy 2013; New Jersey Department of Health and Senior Services 2003; Noack 2005; Marcus et al. 2002; University of Connecticut Occupational and Environmental Health Center n.d.; University of Medicine and Dentistry of New Jersey 2011; U.S. Department of Labor n.d.; Weiss and Chan 2008).

Figure 15.1 demonstrates the application of the above principles.

Modification of Work Activities and Scheduling

Interventions designed to modify work activities and scheduling include the following:

- *Frequent rest breaks,* at least once an hour for continuous users, once every 2 h for noncontinuous typing, and cessation or reduction of typing for a specified time to allow healing

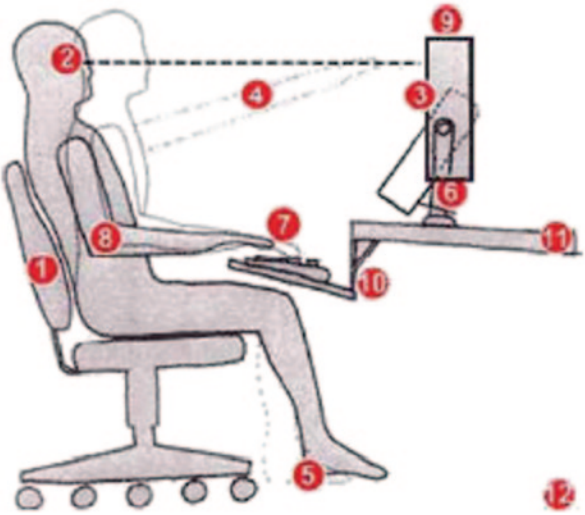

Fig. 15.1 Ergonomic guidelines for computer workstations. *1* Use a good chair with a dynamic chair back that is angled slightly to the rear. *2* The top of the monitor screen should be 2–3 in. above eye level. *3* There should be no glare on the screen. Use an optical glass antiglare filter where needed. *4* Sit at arms' length from the monitor, or further if the distance is comfortable and screen is readable. *5* Rest feet on the floor or on a stable footrest (move feet frequently for circulation). *6* Use a document holder, preferably in line with the computer screen. *7* Wrists should be flat and straight in relation to the forearms to use keyboard/mouse/input device. *8* Keep arms and elbows relaxed close to body. *9* Center the monitor and keyboard in front of you. *10* Use a negative tilt keyboard tray with an upper mouse platform or downward tiltable platform adjacent to keyboard. *11* Use a stable work surface and stable (no bounce) keyboard tray. *12* Take frequent short breaks (microbreaks) and stretch. (From Ergo on Demand Web site, http://www.ergoindemand.com/ergonomic-computer-workstation-guidelines.htm, with permission)

- *Exercises* to stretch musculoskeletal tissues, mobilize neurovascular structures, strengthen specific muscles, and provide relaxation training (Ellis and Hing 2008; Omer et al 2004; Wilkens 2003)
- Strategies to reduce eye strain (Wilkens 2003)
- *Repositioning* of equipment if symptoms occur in spite of desired or recommended positions. *Vary activitie*s to intersperse typing with other tasks throughout the day
- Analysis of all *daily activities* that require excessive force, positioning, speed, duration, or movements
- Participative training in workstation ergonomics to improve worker attributes in self-efficacy, protective behaviors, and coping (Greene et al. 2005)
- Consider *programs* (wellness, smoking cessation, weight reduction, cardiovascular endurance) that address contributing factors
- Consider an *alternative method* of input such as voice recognition, learning keyboard shortcuts, or using the mouse with nondominant extremities

Fig. 15.2 A standing workstation with antifatigue ergonomic mat can be useful to alternate postures, to remove pressure from the back, buttocks, and thighs, and to prevent the need to sit and stand repeatedly in an environment that requires this frequently. (Used with permission of www.Hayneedle.com)

- *Modification of jobs* including trading activities with another worker, modification of work schedule, and changing jobs temporarily or permanently
- Positive peer contact for workplace social support (Wilkens 2003)
- Provision of *patient education* on anatomy and disease process (Brigham Young University n.d.; Cook and Polgar 2008a; Delisle et al. 2004; Fagarasanu and Kumar 2003; Goodman et al. 2005; Keller et al. 1998; Lawler et al. 1997; Lee and Jacobs 2001; Loy 2013; New Jersey Department of Health and Senior Services n.d.; U.S. Department of Labor n.d.; Weiss and Chan 2008)

A list of assessments, resources, and specific ergonomic equipment is given in Table 15.1 to assist therapists with specific recommendations.

Evidence to Support Various Interventions for Computer Access in the Workplace

One systematic review addresses the evidence for preventing musculoskeletal and visual symptoms among computer users (Brewer et al. 2006). The following evidences were reported:

- Moderate evidence that alternative pointing devices have an effect on musculoskeletal outcomes
- Mixed evidence to support the effect of ergonomics training, alternative keyboards, rest breaks, and screen filters
- Moderate evidence that there is *no* effect of rest on visual outcomes
- Moderate evidence that rest breaks and stretching have *no* effect on musculoskeletal outcomes
- Moderate levels of evidence stating *no* effects of workstation modifications on musculoskeletal or visual problems

Table 15.1 Resources for ergonomic interventions for computer users with cumulative trauma disorders

Assessments/ guidelines	Company	Address	Web site	Other contact information
Guidelines for health computing; excellent checklist for ergonomics of computer workstation	OSHA; guidelines for computer workstations	U.S. Department of Labor Occupational Safety and Health Administration, 200 Constitution Avenue, Washington, DC 20210, USA	http://www.osha.gov/SLTC/etools/computerworkstations/	1-800-321-6742
Guidelines for health computing; resources for office furniture	University of Minnesota Department of Environmental Health and Safety	University of Minnesota, W 140 Boynton Health Services, 410 Church Street SE, Minneapolis, MN 5455, USA	http://www.dehs.umn.edu/ergo_office.htm	612-625-5422
Guidelines for ergonomics of computer workstations	Apple	Apple Corporation, 1 Infinite Loop, Cupertino, CA 95014, USA	http://www.apple.com/about/ergonomics/index.html	1-800-692-7753
Guidelines for health computing	HealthyComputing.com	12323 Caminito Mirada, San Diego, CA 92131, USA	http://www.healthycomputing.com/	619-987-0246
Online Rapid Upper Limb Assessment (RULA)	Osmond Group Limited	21 Johnson Road, Ferndown Industrial Estate, Wimborne BH21 7SE, UK	www.osmondgroup.co.uk	0845-345-0898
Display screen equipment self-assessment questionnaire (Chetty 2010)	National Health Service, Royal Free Hospital, Health, and Work Centre	Pond Street, London, NW3 2QG, UK	http://www.royalfree.nhs.uk/index.aspx	020-7794 0500-0844-8480700 (local rate number when calling from outside London)
Perceived exertion and poor perceived comfort (Lindegard et al. 2012)	Institute of Stress Medicine	Guldhedsgatan 10, 413 46 Göteborg, Sweden	http://www.medicine.gu.se/english/	+46-31-342 4205

Table 15.1 (continued)

Interventions	*Company*	*Address*	*Web site*	*Other contact information*
Ergonomic keyboard, mouse, and other devices	EnableMart	EnableMart Sales Office, 4210 E. 4th Plain Blvd., Vancouver, WA 98661, USA	www.enablemart.com	888-640-1999 (Toll Free) 360-695-4133
Ergonomic chairs, desks, and peripherals	The Human Solution	2939 W Anderson Lane, Austin, Texas 78757, USA	http://www.the-humansolution.com/	1-800-531-3746
Ergonomic keyboard, mouse, and other devices	Ergo in Demand	Ergo in Demand Inc., 4900 Industry Drive, Central Point, OR 97502, USA	http://www.ergoindemand.com/	1-800-888-6024
Ergonomic chairs, desks, and peripherals	ErgoStore Online	17319 Meadow Bottom Road, Charlotte, NC 28277, USA	http://www.ergostoreonline.com/	1-877-971-0151
Ergonomic rollermouse	Contour Design, Inc.	10 Industrial Drive, Windham, NH 03087, USA	http://ergo.contour-design.com/	800-462-6678

- Insufficient evidence to support the effect of stress management training, exercise training, lighting, workstation adjustment, video display terminal (VDT) glasses, or arm supports

Other Support Includes Two models of practice address prevention of injury and strategies for individuals who have experienced a CTD (Goodman et al. 2012). Evidence supports educational programs, forearm supports, ergonomic keyboards, ergonomic mice, and exercise/rest breaks.

Risk factors are identified for work-related neck and arm complaints among Dutch computer workers. Between 21 and 33% of the 264 workers in the study reported complaints involving the neck, shoulders, forearms, and hands. Amount of time spent on the computer, difficulty of tasks, irregular head and body posture, and previous history of complaints were identified as statistically significant predictors (Eltayeb et al. 2009).

Reduced incidence of CTDs to the neck, right shoulder, both upper and lower limbs, and back was reported following ergonomics education programs (Mahmud et al. 2011).

A flexible workspace combined with ergonomics training resulted in a significant reduction in musculoskeletal disorders and time required to complete business processes (Robertson 2007).

Findings reported by OTs support the effectiveness of the following interventions:

- Eighty-two percent of musculoskeletal or visual problems were resolved 1 year following a multifaceted ergonomics program provided by OTs and physical therapists (Goodman et al. 2005).
- A holistic intervention approach, utilized by 50 workers in a computer firm, achieved a positive outcome in cost-effectiveness, decreased lost workdays, and worker satisfaction (Lee and Jacobs 2001).
- A cost–benefit analysis showed projected savings greater than US$ 300,000 from an intervention program to reduce CTDs among computer users (Noack 2005).
- A meta-analysis found that alternative keyboard designs decrease potentially harmful awkward postures typically assumed on a standard flat keyboard (Baker and Cidboy 2006).
- In a retrospective study of 312 workers, compensation patients found positive correlations between a patient's eventual return to work, the OT's initial rating of the patient's rehabilitation potential, and the patient's own initial rating of desire to return to work (Waylett-Rendall and Niemeyer 2004).
- An evidence-based literature review suggesting several interventions (scar massage, splinting, exercise, ultrasound, and cognitive strategies) has been found to be effective for rehabilitation of work-related injuries (Amini 2011).
- A descriptive article addressed key components to successful implementation of ergonomics programs by OTs (e.g., obtaining support of senior management and developing working teams within the company; Moraes and Andrade 2012).

Conclusion

The literature suggests there is a high cost for and incidence of CTDs among computer users, but the relative contribution of the computer to these problems is debatable. Available lists of ergonomic principles and recommendations are remarkably consistent in addressing this problem. Many articles look at the effectiveness of interventions for computer users with CTDs. A few studies performed by OTs specifically addressed the effectiveness of computer workstation issues.

If OTs want to increase their contribution to ergonomic interventions for computer users, more research is needed to address the benefits of OT interventions that will stand the scrutiny of peer evaluation from other disciplines. Current evidence suggests these interventions are effective.

Technology and work behaviors with new technologies are constantly changing. More study is needed on these newer applications in work settings. There are several ergonomic implications for use of newer technologies. Examples of these include use of smartphones (Collet et al. 2010), tablet computers (Young et al. 2012), standing workstations (Husemann et al. 2009), and voice recognition (Olsen et al. 2004).

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Case Study of Betty

Keywords Computers, Cumulative trauma disorders (CTD), Ergonomics, Musculoskeletal disorders

Introduction

This case study addresses adaptation and modification of Betty's computer workstation.

The Student's Tasks Include

- Finding solutions for workstation modifications for Betty, who experience a CTD
- Identifying interventions for Betty
- Discussing work activity modifications that will increase her independence in the work environment
- Identifying individual ergonomic resources for her workstation modification
- Synthesizing information into a report

Major Intervention Goals The major goals of intervention are to: (a) decrease pain, (b) slow the progression of the CTD, (c) provide alternative solutions to work stations to decrease recurrence of CTD, and (d) allow the patient to return to work**.**

Learning Objectives By the end of this chapter, the student will be able to:

- Consult the literature to provide intervention for the case study
- Identify symptoms associated with different CTDs and apply acceptable interventions
- Identify appropriate modifications to a computer workstation for individuals with CTD
- Apply ergonomic interventions to alternate environments and situations
- Identify methods to assist individuals with CTDs to return to work

Background History of Case Study

Personal Information

Betty is 46 years old. She is 5'3" tall and weighs 145 pounds. She has been employed in the IT department at a corporate company for 20 years. She is at her computer workstation for approximately 7 h a day. Along with working, Betty man-

ages the cleaning and cooking at home. She drives her daughter to and from school activities and volunteers at her daughter's school.

Medical Information, Including Prognosis

For the past year, Betty has noticed increased pain and inflammation in her dominant right wrist. At the end of Betty's workday, she experiences numbness and tingling in her right hand. Throughout the night, Betty awakens to shake her hand due to sensory changes. Betty has noticed that her typing has slowed and fine motor activities (e.g., buttoning her shirt, tying her shoes) cause her pain. In order to adjust her wrists when working on the computer, Betty changed her posture. As a result, Betty is now experiencing neck and lower back pain at the end of the workday. In addition, Betty compensates with her left hand, and she now notices pain in that wrist as well. Betty discussed her symptoms with her physician and was diagnosed with low back pain and right carpal tunnel syndrome. The physician warned her of the possibility that the carpal tunnel will eventually affect her left wrist as well.

OT Intervention

Betty was referred to an outpatient OT. Betty received a dorsal wrist orthoses with a removable resting finger pan that keeps her wrist in neutral and immobilizes the extrinsic finger flexors in extension. She wears the wrist and finger components at night and the wrist orthoses at work during rest periods or when fatigue and pain increases. Relaxation techniques were encouraged at work and home. She was trained to reduce extreme wrist motion during her daily activities. The OT is working with Betty to readjust her work schedule to provide regular rest periods for her wrist and hand throughout the day.

In addition, the OT educated Betty on proper body mechanics for activities at work and around the house. The OT explained the use of ice or heat to the back or neck when Betty experienced pain in those regions. Betty is anxious to return to work and does not want to cause further disability to her wrists or back.

The OT evaluated Betty's workstation and suggested modifications that would improve Betty's posture while working on the computer. Factors to consider when modifying Betty's workstation include:

- Postural support
- Support for forearms and wrist
- Keeping the wrist in neutral position
- Essential job functions performed by Betty at the computer workstation

The following questions are used to guide intervention in the work space for Betty:

1. What modifications are appropriate that allow Betty to remain functionally independent at work yet meet the productivity standards of her position?

2. What evidence supports these modifications?
3. What are the advantages and disadvantages to the modifications suggested?
4. In what positions should the workstation and keyboard be to optimize functional typing for a person with carpal tunnel?
5. What can you teach a person with CTDs related to using the computer mouse?
6. What are alternative options to a keyboard and mouse?

Chapter 16
Wheelchair Seating and Pressure Mapping

May Stinson and Shelley Crawford

Pressure sores probably have existed since the dawn of our infirm species. They have been noted in unearthed Egyptian mummies, and scientific writings have addressed them since the early 1800s. (Revis 2005)

Abstract Pressure ulcers remain a common problem, incurring great cost to both clients and the health-care system. The predominant risk factor for pressure ulcers is interface pressure, that is, the pressure exerted between the body and the seating surface. Interface pressure can be measured by pressure mapping systems, and can assist with pressure ulcer risk assessment by identifying areas of high pressure and postural abnormalities, which both increase the risk of pressure damage. Pressure mapping systems are clinically useful for assisting with cushion selection. In the clinic, the pressure-measuring mat is placed between the client and a variety of seating surfaces in turn. The seating surfaces showing high interface pressure or poor pressure distribution are eliminated. Selection is then further refined on consideration of factors such as comfort, ease of transfers, and maintenance. Pressure mapping is also a valuable tool to guide therapists in the adjustment of complex seating systems. The color-coded pressure maps provide useful biofeedback to clients, caregivers, and health professionals on the importance of weight shifts and optimal postural alignment.

Keywords Biofeedback · Health care · Pressure ulcers · Technology

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Fig. 16.1 The pressure mapping system

Definition

Pressure mapping systems measure interface pressure, that is, the pressure between the body and the seating surface. High interface pressure is the predominant risk factor associated with pressure ulcers (Geyer et al. 2001; Sprigle and Sonenblum 2011). A pressure mapping system consists of an array of pressure sensors connected to computer software (Fig. 16.1).

The system output is displayed numerically and visually as color-coded maps of pressure distribution. Examples are shown: a "good" pressure map (Fig. 16.2), not requiring intervention, and a "poor" pressure map (Fig. 16.3), requiring adaptation of the seating system.

Pressure mapping arrays for clinical use have evolved from the early 1990s, and with advances in technology have become increasingly reliable. Designed as an objective method to measure interface pressure, they complement pen-and-paper pressure ulcer risk assessment tools, such as the Braden Scale (Bergstrom et al. 1987).

Purpose

The purpose of interface pressure mapping is to assist with the risk assessment of pressure ulcers and to educate clients, caregivers, and health-care professionals in pressure ulcer prevention and management.

Method

Candidates for Pressure Mapping

Pressure mapping can be used with children or adults at risk of pressure ulceration, particularly those with reduced mobility, poor nutrition, lack of sensation, and acute

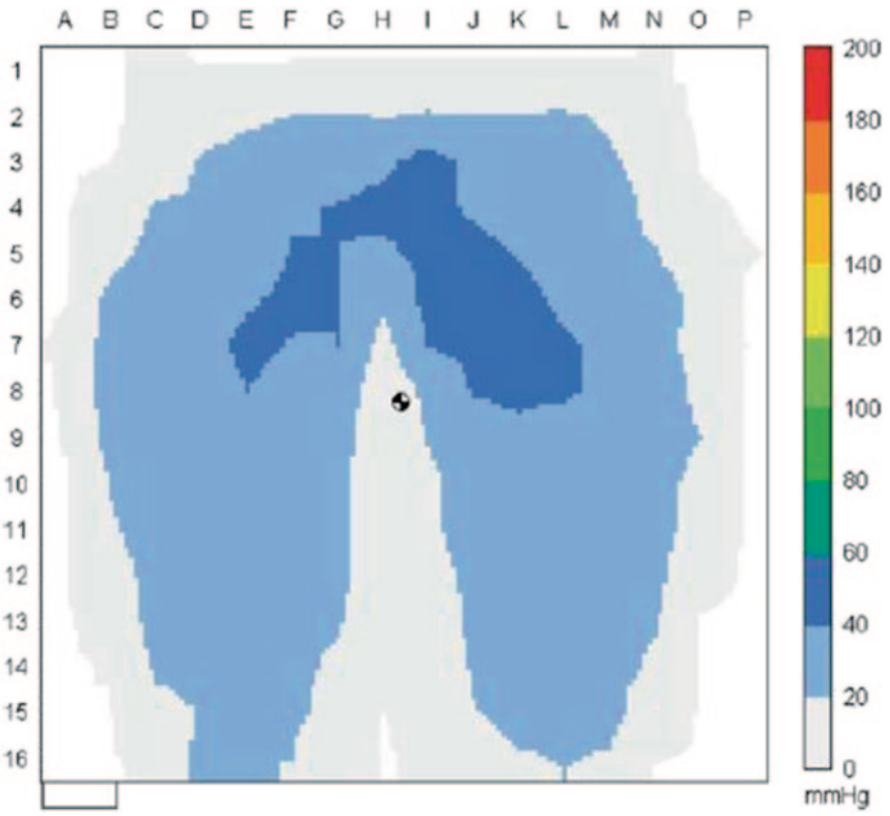

Fig. 16.2 Example of a good pressure map. There are no areas of excessively high interface pressure, and a good spread of pressure across the seating surface

or chronic illness. Examples are people who are sitting in a wheelchair or chair for most of the daytime.

Epidemiology

Pressure ulcers remain a common problem. An extensive European survey, involving 25 hospitals, showed a prevalence rate of 18.1 %, with the most frequently affected areas being the sacrum and heels (Vanderwee et al. 2007). The cost of pressure ulcers is immense, both to the client in terms of pain and decreased quality of life, and to health-care resources in terms of financial expenditure.

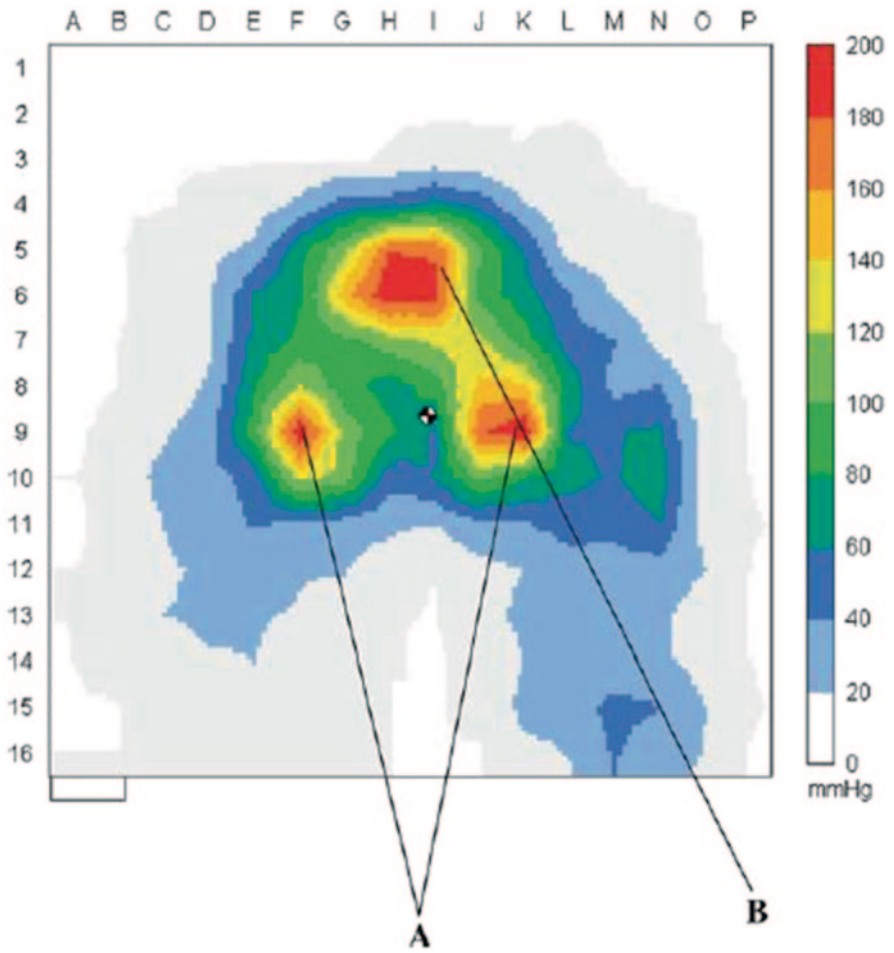

Fig. 16.3 Example of a "poor" pressure map. There are areas of high interface pressure over the buttocks (ischial tuberosities) (**A**) and sacrum (**B**) and an uneven spread of interface pressure across the seating surface

Settings

Pressure mapping systems are portable and can be used in hospitals, clinics, community settings, and clients' homes.

The Role of the Occupational Therapist in Applying the Intervention

The role of the occupational therapist (OT) is to complete the assessment process of pressure mapping. The aim is to adapt the most appropriate wheelchair or seat

cushion, and to educate clients and caregivers regarding pressure ulcer prevention and management. This process has been outlined by the International Standards Organization (ISO) protocol (ISO 2013) and is summarized as follows:

- Clients are initially positioned on a firm surface, such as a mat table, with the pressure-sensing mat placed between the buttocks and the seating surface. This identifies weight-bearing areas, postural abnormalities, and bony prominences. The latter should be confirmed by palpation.
- Clients are pressure mapped on their own seating surface.
- The adjustable parts of the wheelchair are checked, e.g., to ensure the footplates are at the correct height.
- Clients are positioned on a small number of alternative cushions in turn, selected on the basis of client needs, e.g., risk level, posture, stability, and continence.
- The pressure maps are recorded after a period of sitting time, at a consistent time point between 5 and 8 min (Stinson et al. 2002; Crawford et al. 2005a; Davis and Sprigle 2008; ISO 2013) on each seating surface.
- The OT visually ranks the maps from best to worst pressure distribution. Good pressure distribution is characterized by an even spread of pressure, including good femoral loading and no areas of excessively high pressure (Stinson et al. 2003; Fig. 16.2). Cushions showing poor pressure distribution (Fig. 16.3) for an individual are eliminated (Sprigle 2000).
- Optimal cushion selection is based on pressure maps in combination with other factors including the client's comfort, cushion maintenance, transfers, posture, and stability (Sprigle 2000).
- The OT uses the results of pressure maps to educate clients, caregivers, and health professionals. This education includes teaching clients to regularly shift weight from the buttocks and explaining what good postural alignment entails.

Results

Clinical Application

The pressure mapping system is used to assist clinicians and clients in eliminating unsuitable seating surfaces.

The results of a pressure mapping assessment demonstrate (1) sitting areas of high interface pressure, such as over the ischial tuberosities and (2) postural abnormalities, such as pelvic obliquity/rotation. The OT uses the pressure mapping results to compare seating surfaces. This procedure determines the optimal sitting surfaces for each client (Crawford et al. 2005b; Sprigle 2000) and can be used to guide adjustment of seating cushions. Pressure maps (Figs. 16.2 and 16.3) provide immediate biofeedback to clients, caregivers, and health professionals, visually demonstrating the effect of an optimal sitting posture and cushion on lowering interface pressures and thus reducing pressure ulcer risk for an individual (Fig. 16.4).

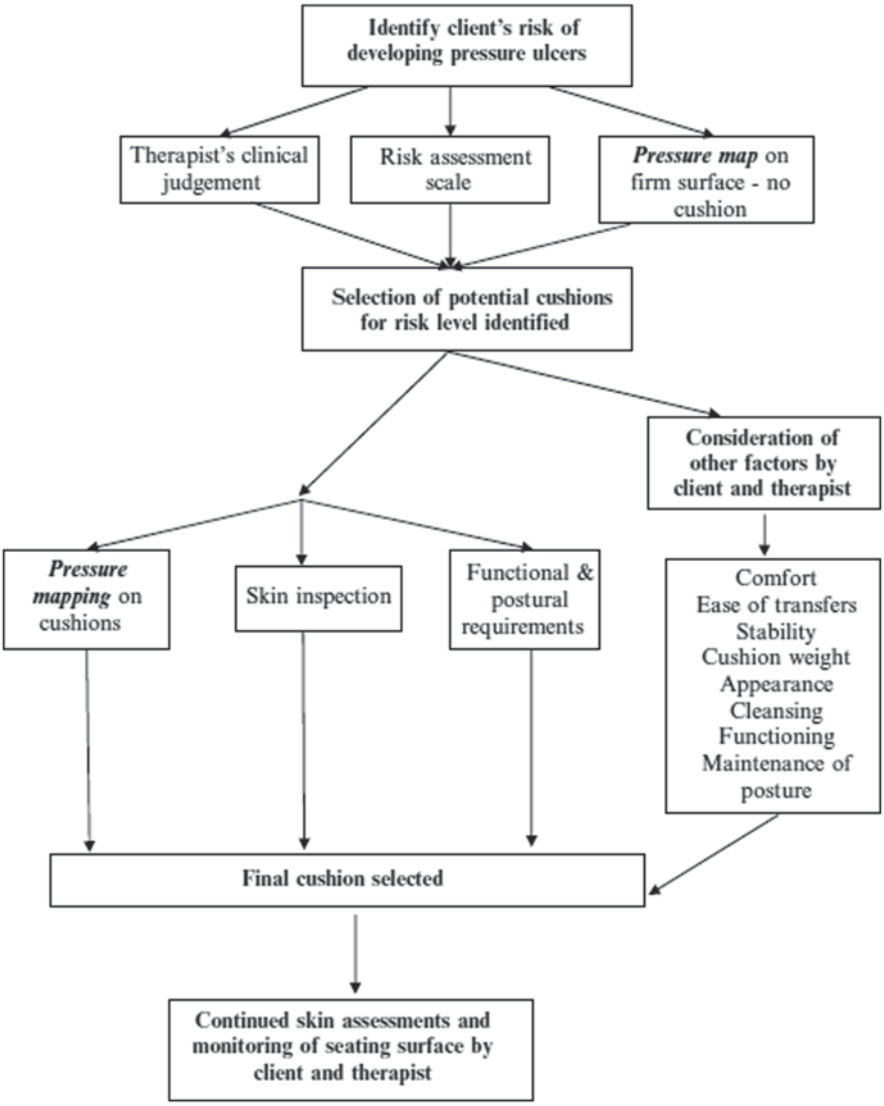

Fig. 16.4 The role of pressure mapping systems in cushion selection

The intervention includes sessions where the clients are educated on the optimal sitting position. Biofeedback is provided to the clients through visualizing pressure maps of their usual sitting position. Here, the OT demonstrates the benefits of shifting weight from the buttocks, and the effect of poor posture or incorrect placement of cushions. The client is informed about the importance of adjusting other components of the seating systems, such as the use or adjustment of wheelchair footplates and the use of tilt and recline functions (Stein et al. 2006). The pressure mapping

system also permits optimal cushion settings for high-risk clients, for example air-filled cushions or cushions with accessories.

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Pressure mapping systems provide valuable information regarding maintenance of skin integrity (International Classification of Functioning, Disability, and Health (ICF) code b810–b849). They provide biofeedback on pelvic alignment (ICF b7201) and on the effects of changing and maintaining body position (ICF d410–d429), hence assisting clinicians in the overall management and prevention of pressure ulcers.

Evidence-Based Practice

The link between high interface pressure, as measured with pressure mapping systems, and pressure ulcer incidence has been demonstrated in randomized controlled trials. Interface pressures were significantly higher ($p < 0.01$) for participants who developed pressure ulcers than for those who did not (Brienza et al. 2001; Conine et al. 1994).

Numerous research studies have used pressure mapping systems to compare pressure-reducing cushions based on interface pressure measurements (Ferrarin et al. 2000; Geyer et al. 2001; Shechtman et al. 2001; Gil-Agudo et al. 2009; Hollington and Hillman 2013). For example, the study by Gil-Agudo et al. (2009) of 48 wheelchair users with spinal cord injury showed that the dual-compartment air cushion had significantly lower peak pressure ($p < 0.05$) over the ischial tuberosities than a low-profile air cushion, a high-profile air cushion, and a gel and foam cushion.

Recent research has highlighted that a limitation of pressure mapping is that it only measures pressure at the skin surface and not the forces within the deeper tissues closer to the bony prominences. These forces, determined by computer modeling, are estimated to be 5–11 times higher than those at the surface (Gefen and Levine 2007). Until a clinically useful method of measuring forces in the deeper tissues becomes available, pressure mapping remains a valuable tool for cushion comparison and for the provision of valuable biofeedback to users.

Discussion

Pressure mapping systems require an OT's expertise in operation and output interpretation. Although expensive to purchase, the pressure mapping system has potential benefits in pressure ulcer management. Given the major financial burden

of pressure ulceration on health-care resources, the prevention of pressure ulcers remains of paramount importance.

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A Case Study

Keywords Cushions, interface pressure, pressure ulcers, ulcer sores, wheelchair

Introduction

The theme of this case study is the assessment and intervention for an individual with multiple sclerosis in relation to seated posture and pressure ulcer prevention.

The student's tasks include the following:

- Identifying the main risk factors for pressure ulcers
- Determining from the literature the interventions available to redistribute pressure in sitting, e.g., Sprigle and Sonenblum (2011)
- Considering what practical advice and information should be included when educating clients and carers in pressure ulcer prevention

As a starting point, the student should use should use the following literature for background information:

1. Sprigle S, Sonenblum S (2011) Assessing evidence supporting redistribution for pressure ulcer prevention. J Rehabil Res Dev 48(3):203–214
2. Hollington J, Hillman SJ (2013) Can static interface pressure mapping be used to rank pressure-redistributing cushions for active wheelchair users? J Rehabil Res Dev 50(1):53–60
3. Moore Z, van Etten M (2011) Repositioning and pressure ulcer prevention in the seated individual. Wounds 7(3):34–40

Overview of the Content

Major goal(s) of the intervention include:

- Maximize pressure distribution at the seating surface.
- Educate the client and carer on the importance of maintaining good sitting posture.
- Reinforce the need to self-manage pressure by regular offloading of the bony prominences.

Learning Objectives

By the end of studying this chapter, the learner will:

1. Identify the key intrinsic and extrinsic risk factors for pressure ulcer development.

2. Realize the importance of completing a detailed seating and pressure care assessment.
3. Explain how posture contributes to the risk of developing pressure ulcers.
4. Understand the clinical application of pressure mapping systems.

The Background History of the Case Study

Personal information: Bill (Pseudonym) is a 64-year-old retired school caretaker. He lives with his wife in a single-storey house. He has a level-access shower and requires the use of a hoist for all transfers. Bill is dependent on his wife and formal carers and requires the assistance of two people for all activities of daily living. He has a body mass index of 18.3 (height 178 cm, weight 58 kg).

Medical information: Bill was diagnosed with relapsing remitting multiple sclerosis (MS) 20 years ago. He displays mainly physical limitations. He is currently immobile and has been wheelchair dependent for the past 10 years. He has spasticity in both his lower and upper limbs and has low tone around his trunk. His score on the Braden Scale (Bergstrom et al. 1987) is 14, indicating that he is at moderate risk of pressure ulcer development.

Occupational therapy interventions: A tilt in space wheelchair with a viscoelastic foam cushion was issued by his occupational therapist. Twelve months later, at a pressure mapping review clinic, the occupational therapist therapy staff noted the following in relation to a pressure map recorded on his current seating and cushion: (1) poor distribution of pressure under the right femur, (2) sitting in posterior pelvic tilt as shown by contact at the sacrum, and (3) high interface pressure over all three bony prominences in contact with the cushion (both ischial tuberosities and sacrum). Using the pressure mapping protocol described in Chap. 16 above, the occupational therapist checked the adjustable parts of Bill's wheelchair and found that the right footplate was set 1 cm too high. Lowering of the footplate allowed Bill's right femur to immerse into the cushion and significantly improved the pressure distribution at the seating surface. A further two alternative cushions were then selected based on Bill's *risk level, posture, stability, and comfort,* and pressure maps were recorded on both. However, the originally prescribed viscoelastic cushion still remained the optimal choice when the adjustment was made to his footplate position. The occupational therapist ensured that Bill's posture was more upright to avoid contact between the sacrum and the cushion, and both Bill and his wife were educated on the importance of maintaining this posture and not adjusting the configuration of the wheelchair. The importance of using the tilt in space feature of the wheelchair to regularly offload pressure from the ischial tuberosities was re-emphasized. A review appointment was planned for 6 months later or earlier if requested.

The Student's Report

These questions are generated from the literature and our clinical experiences:

1. What areas of the body are at risk of pressure ulcers in sitting?
2. Which sitting postures increase the risk of developing pressure ulcers?
3. How do pressure-reducing cushions work?
4. What are the benefits of using a pressure mapping system?
5. How important is comfort when selecting a pressure-reducing cushion?
6. Why is using tilt in space important for Bill?

Chapter 17
Ergonomic Considerations for Vehicle Driver-Cabin Configurations: Optimizing the Fit Between Drivers with a Disability and Motor Vehicles

Marilyn Di Stefano and Rwth Stuckey

Mary was able to store her wheelchair in the boot, transfer into the vehicle without undue effort, as well as adjust and sit comfortably in the driver seat, optimally positioned to undertake the task of driving.

Abstract Drivers with physical impairments may face challenges associated with vehicle access and egress as well as body positioning to optimize sitting comfort and access to vehicle controls and displays. These requirements are necessary for reliable and safe completion of various operations associated with the task of driving. *Key ergonomic considerations* which impact upon vehicle driver-cabin configurations are discussed and general practice guidelines are outlined.

Keywords Driving · Driver-cabin configuration · Ergonomics · Human–vehicle interface

Background

The successful and safe completion of any task is reliant on an appropriate match between human capacities, knowledge, skills, tools and a suitable physical and organizational task environment. This enables effective human interaction with all system components, thereby optimizing potential to produce an acceptable activity outcome without causing harm. When considering the task of driving, a driver

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must be able to enter and leave the vehicle without undue effort, as well as sit comfortably within reach of all required controls and displays in order to use them effectively. Body positioning will impact upon visual access to mirrors and internal displays. In addition, head and neck position will influence sight lines to mirrors and viewing angles through the front, side, and rear windows; these are critical as monitoring the external environment is a constant component of the driving task and underpins safety. Limb position determines access and use of manual and foot controls impacting on adequate, reliable vehicle movement, and position on road.

If the driver is not positioned appropriately, they may not be able to reliably and consistently manage the task of driving which, by its nature, offers little margin for error given the complex and dynamic external environment in which it is conducted. Safety-critical events may lead to crashes causing injury or death of the driver, car occupants, and other road users. Driving is an instrumental activity of daily living which is associated with significant potential harm. Therefore, as an activity, it should be conducted under optimal conditions considering an ergonomic framework to establish the best "fit" between the driver and other task components (Bridger 2009).

Generalist occupational therapists (OTs) working with drivers who have one or more body function impairments are ideally placed to assist their clients to address the underlying driving task requirement of optimal driver access, egress, and positioning. For some drivers with disabilities, impaired body function and the use and storage of mobility aids and body appliances may provide significant challenges if driver independence is the goal. In some cases, referral to specialist occupational therapy driver assessors (OTDAs) may be required if more detailed and extensive driver evaluation and rehabilitation is required (Di Stefano and Macdonald 2010).

Definitions

Ergonomics is the study of the interaction between people, tasks, machines, environments, and systems and the interrelated factors that impact on the success or otherwise of this interaction (Bridger 2009). OTs apply ergonomics principles all the time when they assess activity performance and identify factors that can be addressed to optimize the fit between the person, task, and environment.

The ergonomic framework conceptualization is consistent with the models of human occupation or activity engagement which focus centrally on the human in a client-centered approach to assessment and interventions. For example, the model of human occupation (MOHO; Kielhofner 2008), the person–environment–occupation (PEO; Law et al. 1997) model, and the Canadian model of occupational performance and engagement (Townsend and Polatajko 2007) all feature human, task, social, and environmental elements that interact to determine successful performance in any given context.

For our purposes here, the driver is considered to be a driver of a private light motor vehicle (e.g., sedan, station wagon, or small van). The vehicle driver cabin

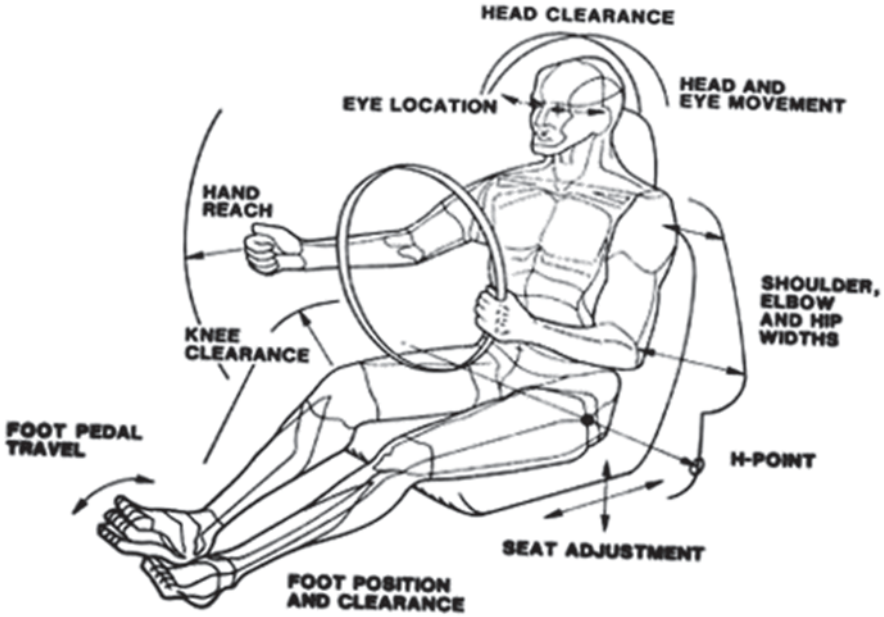

Fig. 17.1 Functional task-oriented anthropometric measurements. (Taken from Roe (1993) p. 14, reprinted with permission)

can be defined as the space envelope which contains the seat, dashboard, and driving controls, under dash lower limb compartment, and central cabin space which may house hand brake, internal mirrors, and secondary controls such as climate, navigational, and other devices. OTs and OTDAs provide services to a broad range of drivers with various sensory, perceptual/cognitive, and motor limitations (Bradshaw et al. 2013; Stav 2004; Wheatley and Di Stefano 2008). In this chapter, we focus predominantly on drivers with physical and sensory impairments in our discussion.

Of most immediate relevance to OTs addressing driver-vehicle configurations are the key elements which impact on how effectively the driver can complete the following:

- Manage access and egress: vehicle door entry mechanism/opening dimensions, sill width, body transfer from the upright to the seated position, accommodation of mobility aids either prior to or during this process (Biering-Sørensen).
- Adjusting and sitting comfortably: seat and head restraint adjustment, seat belt application, lower limb placement.
- Reaching, adjusting, accessing, and using vehicle displays and controls including the steering wheel, ignition, indicators, mirrors, speedometer, brakes, accelerator, clutch, and secondary controls including lights, horn, wipers, climate control, and cruise control. See Fig. 17.1 for a pictorial representation of key body measurements, clearances, and seat adjustments.

Purpose

The purpose of this chapter is to explore the process and general issues that OTs need to consider when assessing an individual's capacities and impairments and matching these to the available driver-cabin environment.

Method

Candidates for the Intervention

The task of driving may be performed for a range of purposes including general community mobility, paid or voluntary work, to access leisure facilities, goods and services, and to fulfill family, social, or vocational roles (Coughlin 2001). OTs may address vehicle driver-cabin configuration issues with any client of driving age with body function impairments or disabilities. Eligibility for driver-related services include (1) the client has the potential to be an independent driver, (2) they meet licensing requirements for that jurisdiction, and (3) they comply with compulsory national medical standards (e.g., Austroads 2012; Canadian Medical Association 2006; Johnson 2013). Other considerations such as access to a vehicle and financial resources to pay for OT services, vehicle modifications and specialist driving lessons, may also influence client assessment and interventions.

Frequency of Use

Driving a private motor vehicle is a common transportation choice associated with personal independence and quality of life, particularly for older people (ABS 2005; Byszewski et al. 2010). There is also evidence of a large and increasing demand for vocationally related vehicle use, as private vehicles are driven for work purposes, including incidental travel between workplaces and use as a mobile office within which to execute a variety of work tasks (Stuckey et al. 2007).

Settings

Consideration of vehicle driver-cabin configurations are included as part of the community and vocational mobility component of an occupational therapy rehabilitation intervention as well as driver rehabilitation evaluation services conducted by OTDAs.

The Role of the OT

Generalist OTs are able to consider many vehicle driver-cabin mismatches that may impact on drivers with physical and sensory disabilities. Their role is to identify simple driver or vehicle adaptations that may improve independence. Generalist OTs must identify the need for referral to OTDAs. Specialist OTDAs, who have particular expertise in driver evaluation and rehabilitation, consider in more detail the broader range of requirements that impact the task of driving. OTDAs conduct off-road and on-road evaluations which are used to identify driver needs within the real-world task environment. OTDAs may also liaise with vehicle modifiers and driving instructors as well as report to the jurisdictional driver licensing authority to address driver licensing and vehicle registration requirements (Di Stefano and Macdonald 2010; Stav 2004).

Results

Clinical Application

An Assessment Framework: Ergonomics

It is useful to conceptualize the factors which interact to determine the fit between a particular client, access/egress requirements, driving controls and displays, and other vehicle-cabin features required to optimize driver placement, comfort, and safety. A simple generic depiction of the ergonomic issues that impact on driver vehicle-cabin configurations is presented in Fig. 17.2. This shows that there are four main components: centrally (A), the driver who functions within the vehicle cabin (B), the external environment including the physical real-world immediate context (C) and the legislative, regulatory, and policy systems which impact upon licensing as well as vehicle and road system design (D). The ergonomic framework can help the OT to identify the critical aspects of vehicle driver-cabin configurations and the real-world and broader systems issues that need to be considered. For example, vehicle safety standards and registering requirements (considered within "D" in Fig. 17.2) must be considered if the modification of the driver seat or dashboard controls might interfere with safety features like steering wheel or side air bags (referred to within "B" in Fig. 17.2).

Assessment Issues: Evaluating the Fit Between Driver Characteristics and the Vehicle Cabin

There are general principles which govern good driver seating position in vehicles. These principles apply to all drivers regardless of their anthropometry (body shape and size). Table 17.1 provides seating considerations related to vehicle-cabin design

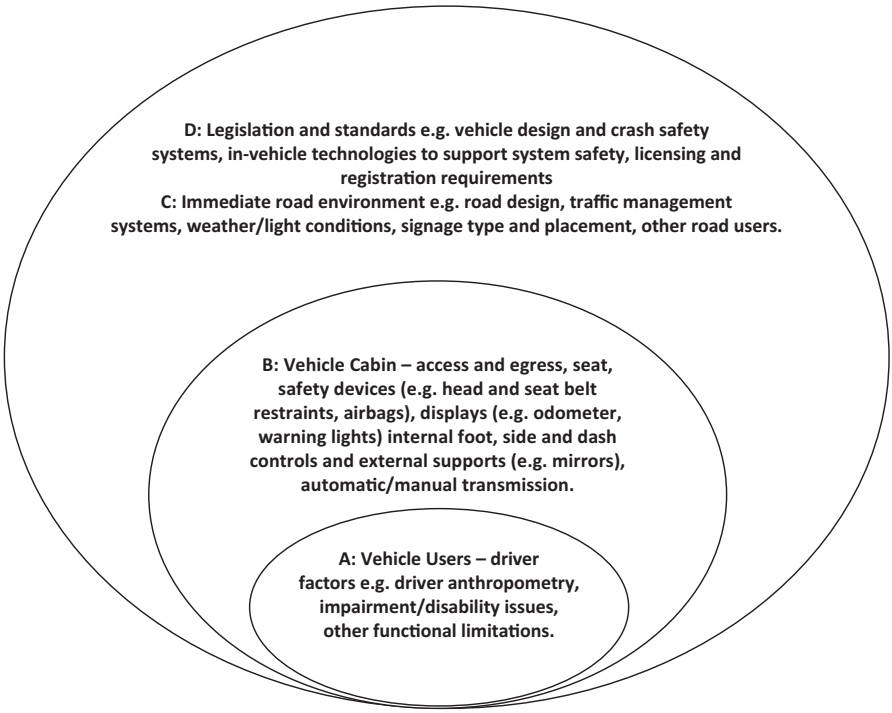

Fig. 17.2 A generic depiction of the ergonomic or systems issues that influence driver vehicle-cabin configurations or interactions

for drivers and includes issues for drivers with impairments considering the ergonomic framework. Items presented are examples only and the list is not exhaustive.

Evidence-Based Practice

Driving has been identified as a participation "enabler" and an important aspect of maintaining community engagement, particularly for people with disabilities or those living in rural or regional areas unable to access alternative transport services (Di Stefano et al. 2012; Norweg et al. 2011). As driving cessation may be associated with negative impacts on health and psychosocial status including depression and social isolation, it is important that, whenever possible, individuals can be supported to maintain driving independence (Marotolli et al. 1997, 2000). Personal driving independence, however, must be balanced with the risks associated with undertaking the activity and the potential impact on road safety of errors impacting the driver, passengers, and other road users.

The World Health Organisation (WHO) has recognized the importance of taking a systems approach when addressing road safety globally, highlighting the impor-

Table 17.1 General principles for driver seating and issues relevant to drivers with disabilities

Functional consideration	General functional principle	Driver considerations	Some examples/OT considerations
1. Seated position	Driver is comfortable with visual access and can reach all primary controls	Encourage use of backrest and head restraint	Positioning the driver correctly in the driver's seat will optimize postural control in order to see/reach essential vehicle components
		Individual anthropometric requirements are met	Optimal seating is required for safety restraint systems to work (e.g., seat belts and air bags)
		Individual limb/joint comfort and positioning to optimize function	Seating set-up may need regular reconfiguration, e.g., if vehicle is shared with drivers of different body size and shape
		Hip and ankle angles and position for optimal foot pedal operation	Individuals with special needs may need a customized approach to vehicle seating and cabin adjustment
2. Seat posture—adjustment	Hip and ankle angles are important to determine comfortable seating	Hip reference point (HRP) and ankle reference point (ARP) used as key anthropometric baseline "markers"	Ensure hip position in relation to seat pan and backrest angle is appropriate before adjusting other postural elements, e.g., check that driver is sitting with their pelvis well back in the seat with spine supported by the backrest
		Lower limb position/placement determines upper limb postural support and comfort	This encourages use of backrest and head restraint
			Adjust the lumbar feature (if available) to provide support
3.a. Seat—height for legs b. Seat—distance to pedals	Seat height should accommodate length of knee/ankle segment and floor/pedal reach	Seat height adjustment should consider hip, knee, and ankle joint comfort, and optimal use ranges	Check there is no pressure from front of seat at the back of the driver's calves when feet are on cabin floor.
		The "ball of foot" should be able to be placed on pedal (not just tip of foot) to ensure energy efficient movement	Move the seat forward to ensure feet can reach pedals and the ankle angles are at no more than about 90 degrees when feet are resting on the cabin floor

Table 17.1 (continued)

Functional consideration	General functional principle	Driver considerations	Some examples/OT considerations
		Driver's foot should be able to completely depress the brake pedal and move between pedals comfortably	The closer the driver is to the dashboard, the smaller the angle between the foot and knee joint: this may lead to discomfort and inefficient use of the foot pedals for some people; heels need to be comfortably supported and positioned on the floor
			Pedal surfaces should offer some friction to stop foot from slipping
			Check foot/ankle position which can influence leg and torso posture and stability required for both static and dynamic postural control: a flat fixed cushion may be sufficient adjustment to raise hip height and therefore reduce hip/knee angles
			For pedal operation, with heel on cabin floor, ankle active range of motion should be neutral to permit sufficient plantar flexion as required for pedal depression: if too much dorsiflexion is required when there is no pressure on the pedal, endurance can be reduced
			Ensure shoes have soles which permit kinesthetic feedback from pedals
			"Bucketing" or notably molded seat pan design may not conform to body shape limiting seated posture depending on driver anthropometry
			Seats with combination of vertical and horizontal adjustments are helpful.

Table 17.1 (continued)

Functional consideration	General functional principle	Driver considerations	Some examples/OT considerations
4. Seat—height for vision	Driver visual access needs to be sufficient to enable clear view outside of vehicle (front, sides, rear), as well as visual access to all controls	Additional cushions may help but check that seat belt use or positive are not compromised	Driver's neck needs to be in neutral (no flexion or extension), with eyes forward, comfort sight lines are up to 30 degrees below the horizontal, and should allow easy visual access to dashboard controls and displays
			Check that driver can comfortably see out of the front windscreen without tilting head (extending neck)
			Ensure visual access to speedometer and other primary displays are not impeded by the steering wheel: consider adjusting steering wheel position
			Driver should be able to see over dashboard comfortably and have clear sight lines to internal and external mirrors and when completing head check
5. Seat—distance and reach for primary controls	Ensure comfortable reaches to all primary controls Access to steering wheel should not be too close (air bag compromised) or too far—avoid too much elbow abduction	Individual anthropometric considerations as well as activity restrictions	Drivers must be able to reach grasp/manipulate the key/ignition system, steering wheel, foot pedals, indicators, hand brake, window wipers, and light controls while remaining in a comfortable seated posture without leaning forward
		Access to controls should enable appropriate manipulation	Dashboard should be no further than at wrist level distance when the arm is outstretched
			Ensure there is adequate room between the driver's chest and the front air bag and steering wheel—e.g., > 10–12 in. (25–30 cm)

Table 17.1 (continued)

Functional consideration	General functional principle	Driver considerations	Some examples/OT considerations
		Consider individual tolerances (endurance and fatigue) when limbs need to be elevated without support	Seat belt lap/sash should sit snugly across pelvis, under the abdomen (not on top of thighs) and shoulder strap diagonally across the sternum
			People with special needs may require vehicle modifications
			If vehicle controls require adaption—ensure compliance with all regulatory imperatives such as vehicle design rules and registration requirements—refer to OTDA

References: Delleman and Dul (2006), FORS (1996), Helander (2006), Herriotts (2005), Salvendy (2012)

tance of addressing five key system components: road users, roads, vehicles, post-crash responses, and road safety management (WHO 2010). OTs are well placed to assist with improving the status of road users who are drivers—particularly those with disabilities.

OT decisions around driver/vehicle matches require assessment of driver impairment and capacity, task demands, and the risks related to mismatches (Bridger 2009; Turner-Stokes et al. 1996). Ergonomics aims to minimize the risk to humans by appropriate modification of the human–task–environment fit. Implementation of risk management is most effective when the "hierarchy" of risk controls is employed. This hierarchical approach is based on the evidence that the implementation of interventions which involve physical changes or engineering controls to the tools, task, or environment are more sustainable and effective than those involving driver instruction or behavior change (Quinlan 2010; Safework Australia 2011). The evolution of vehicle safety has seen an increased use of engineering-based design improvements (air bags, automatic brake systems, etc.) as well as those which are designed to reinforce safety behaviors (audible reminders for seat belts, indicators, etc.).

Regardless of the nature of the assessed risk and related hazard or exposures, it is imperative that interventions involving modifications or adaptations comply with applicable regulatory imperatives such as design rules, occupational health and safety directives or local or international standards, or other mandatory requirements (for example, ISO 2009, 2010, 2012). The evidence base for driver/cabin in-vehicle design generally relies on the application of ergonomics principles such as universal design or anthropometric measurements which aim to accommodate 95 % of the population (see for example, Bridger 2009; Salvendy 2012). The interactions between users and the vehicle furniture, displays, controls, and other equipment relevant to the driving task, have long been well documented in ergonomics literature in terms of both physical and cognitive–perceptual characteristics, and form the starting point for expectations of population-based vehicle-user fit (Pheasant 1997; Kroemer 2009).

Variations in anthropometrics (including body shape, sizes, and weight) are generally partially accommodated via adjustments of steering wheels, head restrains or seats. Adaptation for individual users requires assessment of their particular anthropometric variables and other functional capacities in relation to the "match" with the functional "demands" of driving the vehicle in question (see Fig. 17.3). While the ergonomic literature does provide a useful starting point, there is a limited evidence base of research which addresses ergonomics, risk management, and driver accommodation specifically for drivers with a disability. Table 17.2 illustrates the use of an evidence-based risk management approach to the assessment and amelioration of some task elements in vehicle-cabin configuration, highlighting the sources of mostly low level (Howick 2009) evidence which support the element to be addressed and/or the recommended accommodations.

Fig. 17.3 Functional task-oriented anthropometric measurements

Conclusions

OTs have a significant role in maximizing the potential of people with disabilities to retain driving independence. One important aspect of this is to carefully assess the driver-cabin configuration to ensure optimal fit between the driver, seat, and the vehicle interior. This match will enhance driver comfort, safety, and posture to enable suitable ingress/egress, access to controls and displays, and to permit visual surveillance around the vehicle. This chapter has discussed some of the key factors that need to be considered by OTs responsible for assessing driving capacity as part of community mobility or more detailed driver rehabilitation services.

Table 17.2 Assessment of some task elements in vehicle-cabin use as relevant to drivers with motor/sensory impairments

Task component	Functional requirements	Potential mismatches resulting in activity limitations	Examples of possible accommodations or participation enablers	Evidence base
Getting into the vehicle				
Unlock door Grasp and move door handle Open door Move round door into vehicle seat Close door	Upper and lower limb function Eye hand coordination Grasp and manipulation Spatial awareness Balance Planning	Restricted limb and/or trunk mobility Reduced dexterity Impaired depth perception Poor balance Difficulty sequencing Anthropometric mismatches Adverse external environmental conditions, e.g., uneven surfaces, weather, lighting	Electronic locking/unlocking Wider door openings Automatic door opener/closer Modified key/handle design Modified seat design, rotating, raised, etc. Low friction seat material Additional grab points Adapted cabin height Added access steps Door sill extension Use of transfer board Lowered vehicle floor and automatic ramp/platform	Bridger (2009) Causse et al. (2012) Helander (2006) Herriotts (2005) Kroemer (2009) Ouidir et al. (2008) Pheasant (1997) Salvendy (2012) Shaheen and Niemeier (2001)
Adjusting seatbelt, seat, and mirrors				
Adjust and fasten seat belt Adjust seat angles and height Adjust seat horizontal position Adjust internal mirror Adjust external mirrors	Upper limb function Eye hand coordination Grasp and manipulation Stereognosis Spatial awareness Visual tracking Visual search	Restricted upper limb and/or trunk mobility Reduced dexterity Impaired eye–hand coordination Impaired grasp Impaired depth perception Difficulty sequencing Impaired cognition Anthropometric mismatch Demands or distractions within the external environment	Seat belt audio reminder Seat belt extensions Seat belt clasp guides Electronic mirror adjustments Other in-vehicle technologies	Bieri et al. (2014) Branowski et al. (2013) Bridger (2009) Crandall et. al. (2001) Helander (2006) Herriotts (2005) Kroemer (2009) Nees and Walker (2011) Pheasant (1997) Salvendy (2012)

Table 17.2 (continued)

Task component	Functional requirements	Potential mismatches resulting in activity limitations	Examples of possible accommodations or participation enablers	Evidence base
Starting vehicle				
Locating ignitions point Inserting key Turning key	Upper limb function Eye hand coordination Grasp and manipulation Stereognosis Spatial awareness Balance Visual search Hearing	Restricted upper limb and/or trunk mobility Reduced dexterity Impaired eye-hand coordination Impaired grasp Impaired depth perception Difficulty sequencing Impaired cognition Anthropometric mismatch Demands or distractions within the external environment	Visual cues to assist ignition point identification Jig to guide insertion point Push button rather than key ignition	Bieri et al. (2014) Branowski et al. (2013) Bridger (2009) Helander (2006) Kroemer (2009) Pheasant (1997) Salvendy (2012)
Retrieving driving and climate control-related information				
Accessing displays and other notification systems Assessing and interpreting the information	Visual search Hearing Touch Temperature awareness	Any restrictions limiting awareness of the immediate internal and external vehicle—physical, sensory, etc. Poor visual tracking Reduced aural acuity Reduced sensory function Poor temperature control Difficulty multitasking	Visual and auditory cues to support information processing Color/texture adaptations Size enhanced displays Other in-vehicle technologies	Bieri et al. (2014) Branowski et al. (2013) Bridger (2009) Kroemer (2009) Nees and Walker (2011) Pheasant and Haslegrave (2006) Salvendy (2012) Shaheen and Niemeier (2001)

Table 17.2 (continued)

Task component	Functional requirements	Potential mismatches resulting in activity limitations	Examples of possible accommodations or participation enablers	Evidence base
Using driving and climate-related controls				
Accessing controls Manipulating controls Modifying responses to controls	Upper and lower limb function Eye hand coordination Grasp and manipulation Spatial awareness Balance Planning	Any restriction limiting access to or manipulation of controls Reduced upper or lower limb range of movement, power, sensation, stereognosis, coordination, etc. Impaired depth perception Difficulty sequencing Anthropometric mismatch Demands or distractions within the external environment	Parking aid and vehicle reversing systems Alternative steering devices (e.g., hand controls, joy stick) Extended lever handles Visual, auditory, tactile, etc., cues to support appropriate behaviors Cruise/speed controls Vehicle positioning systems Enhanced braking and steering systems Other in-vehicle technologies Suitable training for use of adapted controls	Benoit et al. (2009) Bieri et al. (2014) Bridger (2009) Delleman and Dul (2006) Helander (2006) Henriksson and Peters (2004) Kolich (2003) Kroemer (2009) Pheasant (1997) Shaheen and Niemeier (2001) Salvendy (2012)

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The Case Study of Mary: Ergonomic Assessment of Driver-Cabin Configuration and Mobility Device Management for Vehicle Transport

Keywords Driver-cabin configuration, instrumental activities of daily life, motor vehicle, multiple sclerosis, physical impairment

Introduction

The themes of this case study include adjusting the cabin of a motor vehicle and managing storage of mobility aids to optimize the vehicle set-up for a person with multiple sclerosis who has mobility limitations.

The students' tasks include:

- Finding information about occupational therapy driver evaluation (e.g., Di Stefano and Macdonald 2010).
- Reflecting on their own/others' experience driving a motor vehicle and appreciating the importance of adjusting seat, head restraint, steering wheel, safety restraints, and mirrors to suit the driver height, body shape, limb length, etc.
- Understanding factors impacting on ingress and egress including body movement requirements, mobility issues, and transfer factors associated with moving in/out of the vehicle and storing mobility devices such as a wheelchair (e.g., Pellerito and Burt 2006).
- Reviewing sources of information about multiple sclerosis (MS): epidemiology, diagnosis, progression and prognosis, occupational performance issues, and common occupational therapy interventions.

As a starting point, students can use the following references to gather background and specific information:

- Anderson B, Maurer C (2006) The impact of positioning and mobility devices on driving and community mobility. In: Pellerito J (ed) Driver Rehabilitation and community mobility: principles and practice, pp 199–222. Elsevier Mosby, St Louis
- Di Stefano M, Macdonald W (2010) An introduction to driver assessment and rehabilitation. In: Curtin M (ed) Occupational therapy and physical dysfunction: enabling occupation, 6th edn. Elsevier, Philadelphia
- Pellerito J, Burt CJ (2006) The adapted driving decision guide. Elsevier Mosby, St Louis
- Stein F, Soderback I, Cutler S, Larson B (2006) Occupational therapy and ergonomics: applying ergonomic principles to everyday occupation in the home and at work. Wiley, London

Recent occupational therapy text books and reliable internet sites that discuss occupational therapy interventions for people with MS. For example:

- Buzaid A, Dodge MP, Handmacher L, Kiltz PJ (2013) Activities of daily living evaluation and treatment in persons with multiple sclerosis. Phys Med Rehabil Clin N Am 24(4):629–638
- Ricability(2010) Motoring with multiple sclerosis. Forum of Mobility Centres, London. http://www.rica.org.uk/content/motoring-multiple-sclerosis
- Pheasant S, Haslegrave C (2006) Sitting and seating. In: Pheasant S, Haslegrave C (eds) Bodyspace—anthropometry, ergonomics and the design of work, 3rd edn, pp 121–141. Taylor & Francis, London

Overview of the Content

Major goals of the actual intervention

The major goals of ergonomic evaluation and adjustment are:

1. Optimizing seating and positioning to maximize physical capacity, comfort, and safety
2. Appropriate body adjustment to permit safe, reliable use of primary and secondary vehicle controls and displays
3. Prevention of poor posture and positioning to enhance physical stamina and avoid fatigue

Learning Objectives

By the end of studying this chapter, the learner will

- Have an appreciation of driver-cabin configuration components
- Understand the factors that can be addressed, modified, and adjusted to optimize the match between the driver and the vehicle compartment, and
- Appreciate how body size and shape as well as health conditions can impact the capacities required to undertake driving

Personal Information

Mary is 45 years old. She was diagnosed with relapsing-remitting multiple sclerosis 5 years ago. Mary works part time (3 days per week) as a teacher and lives by herself in a ground floor apartment. She is about 160 cm (around 5′3″) and is petite, weighing 45 kg (about 100 pounds).

Medical Information Including Prognoses

Mary has managed to remain independent in all personal and instrumental activities of daily living despite fluctuations in her condition. She experiences regular relapses when lower limb spasticity and incoordination make it very difficult to ambulate, necessitating the use of mobility aids (wheelchair, walking frame or walking stick). On average, Mary uses a wheelchair for 1 week in every 3 weeks. She has adapted the way she performs tasks and has modified her home and work environment to enable her to sit to complete most tasks and use grab rails, a trolley or mobility aids when required.

Current Circumstances

Mary gained her driver's license when she was 18 years and regularly drove for 2 years prior to her diagnosis. Since then, she has lived in a city fringe location only a few blocks away from her workplace and shopping facilities and she has not owned a car, preferring to walk or wheel to access facilities. Mary has accepted a job promotion at another school some 20 km from her home which is accessible only by bus or car. She is faced with having to purchase a car now and resume regular driving as the most time-efficient method of getting to work is to drive.

Occupational Performance Issues and Occupational Therapy Interventions

Mary has to purchase a used car and is seeking advice about vehicle design features to suit her needs. She previously drove a sedan with a manual gear shift but needs to consider her current and future independence requirements. Mary refers herself to the occupational therapist at the MS association for assistance with community mobility—specifically she seeks assistance to manage driving with her MS.

The Student's Report

1. What prognosis and symptoms is Mary likely to encounter over the next 10 years?
2. How might these impact her occupational performance: mobility independence generally and driving specifically?

3. Considering Mary's anthropometry, social situation and health status, what vehicle design features should Mary consider in relation to driver and cabin fit for the following aspects of driving:
   - Access/egress
   - Seating
   - Lower limb pedal use
   - Environmental/climate control
   - Mobility aid storage
   - Vehicle parking?
4. Does Mary require a specialist occupational therapy driver evaluation?

Chapter 18
Splints: Mobilization, Corrective Splintage, and Pressure Therapy for the Acutely Injured Hand

Josephine Man Wah Wong

I can touch my palm with my finger pulp again after splinting program and mobilization. I'd made it.
Client

Abstract The interplay of early active and passive mobilization helps reduce edema, encourages active tendon gliding, and prevents joint stiffness after injury and operative intervention of the hands. It also enhances tensile strength of the newly repaired tendons, soft tissues, or fractured site, minimizing scar adhesion. Corrective splintage and pressure garments contribute to an effective outcome.

Keywords Corrective · Injured hand · Mobilization · Pressure therapy · Splintage

Background

The phases of the wound healing process are as follows:

- The *inflammatory phase* is the immediate vascular and cellular response to wounding that clears the wound of devitalized tissue, debris, and foreign materials. Edema dominates subsequent to vascular dilation. The length of this phase depends on the severity of the structures damaged and the tissue-handling approaches that follow. It usually lasts for about 5 days if no complication exists.
- The *fibroplastic phase* of repair lasts from 2 to 6 weeks, starting 3–5 days after the wounds occurred. This phase includes tissue granulation, collagen accumulation, and epithelialization, that is, the wound begins to heal. Here, the tensile

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strength of the wound grows, an increase that may last for about 3 weeks before reaching a plateau and then linearly increasing for at least 3 months further.
- *The maturation phase* begins as fibroblastic activity decreases and may last for years when the amount of collagen decreases and the wound becomes stronger (Smith 1995).

To maximize treatment outcome, the choice of splintage should parallel the patient's tissue healing process.

Main Principles of Splintage

Splintage serves as a protective device to rest the injured finger(s) and hand in a functional and healing position. It helps relieve pain, prevents joint stiffening, and corrects joint contractures. It facilitates hand function in daily living by positioning the weakened or deformed fingers and hand optimally to facilitate occupational performance (Wong 2002).

Main Principles of Movement Therapy Stress the Tissues of the Hand

Mobilization Through Active Motion Mobilization through early active and passive motion aims at enhancing active tendon gliding, maintaining joint mobility, and preventing potential complications.

Early active mobilization of the hand should commence after the injured structures become stabilized. It encourages the pumping action of the muscles and the subsequent gliding of the soft tissue structures (Colditz 1995). The aims are to decrease edematous fluid by mobilizing in an elevated position and facilitating finger-joint range of motion (Wong 2002).

Mobilization Through Passive Motion *Passive motion* is the mobilization of a joint by an external force intended to increase joint and soft tissue mobility (Maitland 1977). It encourages tissues to reach a maximum available length within patients' pain tolerance, provided the resistance from the tissues is respected to prevent tissue damage from overstretching.

Purpose

The ultimate goal of hand therapy is to restore maximal hand function so that the client will be able to perform occupations independently.

Method

Candidates for the Interventions

People suffering from trauma that requires surgery of the hand(s) may benefit from hand therapy conducted by occupational therapists (OTs). According to the International Classification of Functioning, Disability, and Health (ICF), the impairments relevant here concern structure of upper extremity and hand plus the function of the power of the muscles of a limb (World Health Organization 2007).

Epidemiology

In Hong Kong, the risk of a hand injury at work occurs with odds ratios ranging from 10.5 to 26.0, as shown in a matched-pair interval analysis. The risk factors are (1) using malfunctioning tools/materials, (2) using a new work method, (3) doing an unusual work task, (4) working overtime, (5) feeling ill, and (6) being distracted and rushing (Chow et al. 2007). Another example, from the USA, of the extent of the need for hand therapy is that one fourth of workers ($n = 232$) who used malfunctioning equipment or tools presented within 10 min with a hand injury (laceration, crush, or fracture; Sorock et al. 2001). Hand trauma among children and in the home and during leisure time is not included in these figures.

However, there are no exact figures for how many people suffer from hand injury that may require rehabilitation, including occupational therapy, or for how many remain with a permanent disability. In the UK in 2006, the cost of hand surgery was more than £ 100 million (Dias and Garcia-Elias 2006).

The Role of the OT

OTs should have thorough knowledge of biologic and mechanical aspects of the injured hand, plus the clinical expertise to perform accurate clinical judgments leading to an effective splinting and movement program.

Results

Clinical Application: Mobilization of the Injured Hand

Mobilization of Repaired Tendons of the Hand

Controlled active and passive mobilization of the repaired tendons should commence within 1 week of surgery (Pettengill 2005). Tendon excursion should be

limited to a safe range but great enough to provide the stress necessary to stimulate biochemical changes that promote the healing process (Evans 1995).

Table 18.1 presents an overview of the splintage common in rehabilitation of the injured hand.

Repaired Flexor Tendons of the Hand

Flexor tendon post-repair motion protocols include early-controlled forces, exerted through either passive or active motion (Strickland 2005).

The traditional *passive way of splinting* (Kleinert et al. 1967; Lister et al. 1997) caused buckling of the repaired tendon within the synovial sheath (Horii et al. 1992). This way of splinting is no longer recommended.

Recent findings verify that flexor tendon rehabilitation should be based on controlled active digital motion (Lund 2000). Here, the *controlled active flexor splint* is used (Fig. 18.1).

The *synergistic splint* (Fig. 18.2), according to the Mayo Clinic protocol, is used to increase the differences (excursion) between the two digital flexors (Cooney et al. 1989; Savage 1988). It functions at the optimal positions of the extended wrist and flexed metacarpophalanges of the hand joints to produce the least tension on a repaired flexor tendon during active digital flexion (Strickland 2005).

Controlled *Active and Passive* Motion Should be Integrated

Passive flexion movements of the interphalangeal (IP) joints of the injured finger(s) contribute to maintaining joint mobility by influencing the edematous fluid, thus facilitating the active gliding of the tendons (Duran and Houser 1995). Intervention in zone II flexor tendon injuries should include differential tendon-gliding exercise to encourage isolated gliding of the two flexor tendons (Fig. 18.3).

Repaired Extensor Tendons of the Hand

The same principles are used for mobilization of the extensor tendons. *Controlled passive extension motion using a dynamic splint* seeks to prevent dense adhesions (Fig. 18.4; Duran and Houser 1995), and to stimulate intrinsic repair processes (Gelberman et al. 1981). The *Immediate Controlled Active Motion Extensor Tendon Program* (ICAM) gives the professional recommendations on how the pair of a wrist extension splint (wrist extended 20–25°) and a *finger extension-assist* splint is designed to allow active digital flexion extension. (Fig. 18.5; Howell et al. 2005).

Table 18.1 Overview of the splintage common in rehabilitation of the injured hand

Splint entitled	Splint figure	Functions of the splint
Repaired flexor tendons of the hand		
Controlled active flexor splint	Figure 18.1	A controlled active flexor tendon splint is used to allow early active mobilization of the fingers after flexor(s) repair. The active range of motion of the injured finger within the dorsal extension block splint is governed by the splint position. Passive flexion of the finger joints is allowed to maintain their suppleness
Synergistic splint	Figure 18.2	A synergistic splint is a dynamic splint guided by wrist motion used to increase the excursion of the tendons within safe limits: from maximum wrist extension at 30° to full flexion. The interphalangeal (IP) joints of fingers are passively flexed on the "place-and-hold" principle when the wrist extends to the 30° extension block
Differential tendon gliding	Figure 18.3	Individual passive flexion of the IP joints enhances the isolated gliding of the flexor digitorum sublimis (FDS) and flexor digitorum profundus (FDP) in zone II
Repaired extensor tendons of the hand		
Controlled passive extensor splint	Figure 18.4	A controlled passive extensor splint is used to allow early mobilization of the fingers after extensor repair. The injured finger is flexed actively and extended passively by the extensor assist within a controlled range. The volar flexion block is adjustable weekly
Immediate controlled active motion splint	Figure 18.5	The immediate controlled active motion splint consists of two components. A finger extension-assist splint supports the injured finger in 20° of relatively more extension than the adjacent fingers, and the finger actively extends supported by the adjacent fingers via the extension-assist splint. A wrist extension splint supports the wrist in 20° of extension to relax the finger extensors
Mobilization and passive motion of fractured fingers		
Splints for stable and nondisplaced fractures		
Buddy splint and proximal phalanx fracture resting splint	Figure 18.6	The buddy splint straps the injured finger and the adjacent finger together to facilitate the active motion of the injured finger. The night finger extension splint holds the finger and hand in a safe position to prevent potential flexion contracture developing in the IP joints and extension contracture in the metacarpophalangeal joint

Table 18.1 (continued)

Splint entitled	Splint figure	Functions of the splint
Corrective splintage		
Belly-gutter splint	Figure 18.7	A belly-gutter splint helps correct flexion contracture of interphalangeal joints by molding a hollow space underneath the contracted joint in order to reinforce the correcting force applied by the strapping from top of the joint
Dynamic mobilizing splint	Figure 18.8	The dynamic mobilizing splint provides low-load tensile stress via its dynamic component, trying to realign the scarred tissue
Serial static web spreader	Figure 18.9	The serial static web spreader gradually widens the tightening first web by serial adjustment or splint remolding
Static progressive proximal interphalangeal joint splint	Figure 18.10	The static progressive proximal interphalangeal joint splint applies passive stretching to gradually restore the passive extension and flexion range of the joint. The inelastic component of the splint is adjusted without change to its main structures
Clinical application: Edema control		
Edema control by elevation, active mobilization, and pressure therapy		
Pitting edema	Figure 18.11	Edema retention around the injured site, or even the whole hand after the injury. Edematous fluid is movable and soft when direct fingertip pressure is applied in the early stage
Pressure finger tube	Figure 18.12	A pressure finger tube with gentle circumferential pressure will help reduce local swelling over a finger. The choice of materials used depends on the severity of the swelling
Pressure glove	Figure 18.13	A pressure glove, providing gentle and circumferential pressure, helps control swelling if all the fingers and the whole hand become swollen after injury or surgery

Mobilization and Passive Motion of Fractured Fingers

The outcomes of managing finger fractures (especially proximal phalangeal fractures) depend on whether a stable anatomic position of the fracture is achieved and whether an *early active motion program* focusing on tendon-gliding and joint mobility is conducted (Freeland et al. 2003).

Splints for Stable and Nondisplaced Fractures

Buddy taping or *splinting* (Fig. 18.6) to an adjacent uninvolved finger is sufficient to permit immediate active motion of the IP joints, enabling the extensor mechanism to act as a tension band over the proximal phalanx. *Active motion* simultaneously compresses the fracture and stimulates periosteal callus formation, initiating the

Fig. 18.1 Controlled active flexor splint

recovery of digital motion (Freeland et al. 2003). A *resting splint at night* is recommended to minimize the risk of contracture of the proximal interphalangeal (PIP) joint flexion. This splint is adapted to extend the IP joint and to keep the intrinsic tendons in a relaxed position by flexing the metacarpophalangeal (MCP) joint.

A *dorsal block splint* is used *for displaced or open fractures* repaired with surgical stabilization. This splint is intended to relax the tensions over the fracture and is used to facilitate movement (Freeland et al. 2003).

Passive motion of fractured fingers should generally not begin before fracture callus calcification has been confirmed radiologically. Normally, this occurs 10–21 days after the injury. Gentle passive flexion and extension of the distal IP joint can be allowed with fracture site protected (Freeland et al. 2003).

Clinical Application: Splintage

Corrective Splintage The OT examines the fingers and the hand through his or her "end-feel," that is, slow and careful stretching and tightening of soft tissue or finger joint(s). The result indicates the types of splintage to be used.

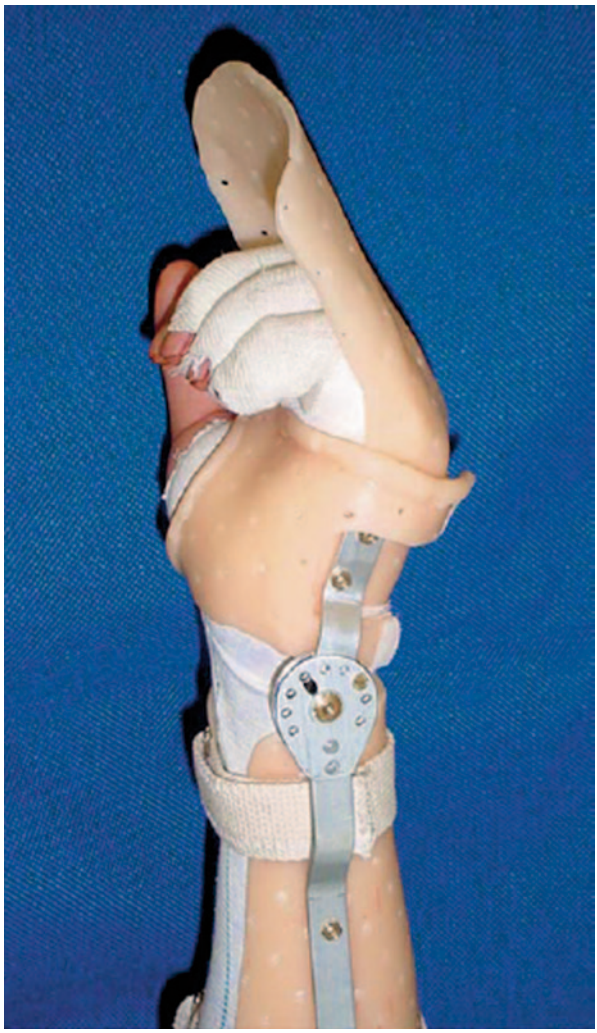

Fig. 18.2 Synergistic splint

Static Splint

A *static splint* holds the finger in one specific position that applies stress to the newly repaired tissue. Its purpose is to *prevent* joint contracture and correct the new onset of joint flexion tightness (Wong 2002).

A *belly-gutter splint* (Fig. 18.7) is intended to correct flexion tightness of the PIP joint by holding the injured finger in a safe but corrective position. The splint is positioned over the metacarpophalangeal (MCP) joints at 60–70° of flexion and with the IP joints in full extension.

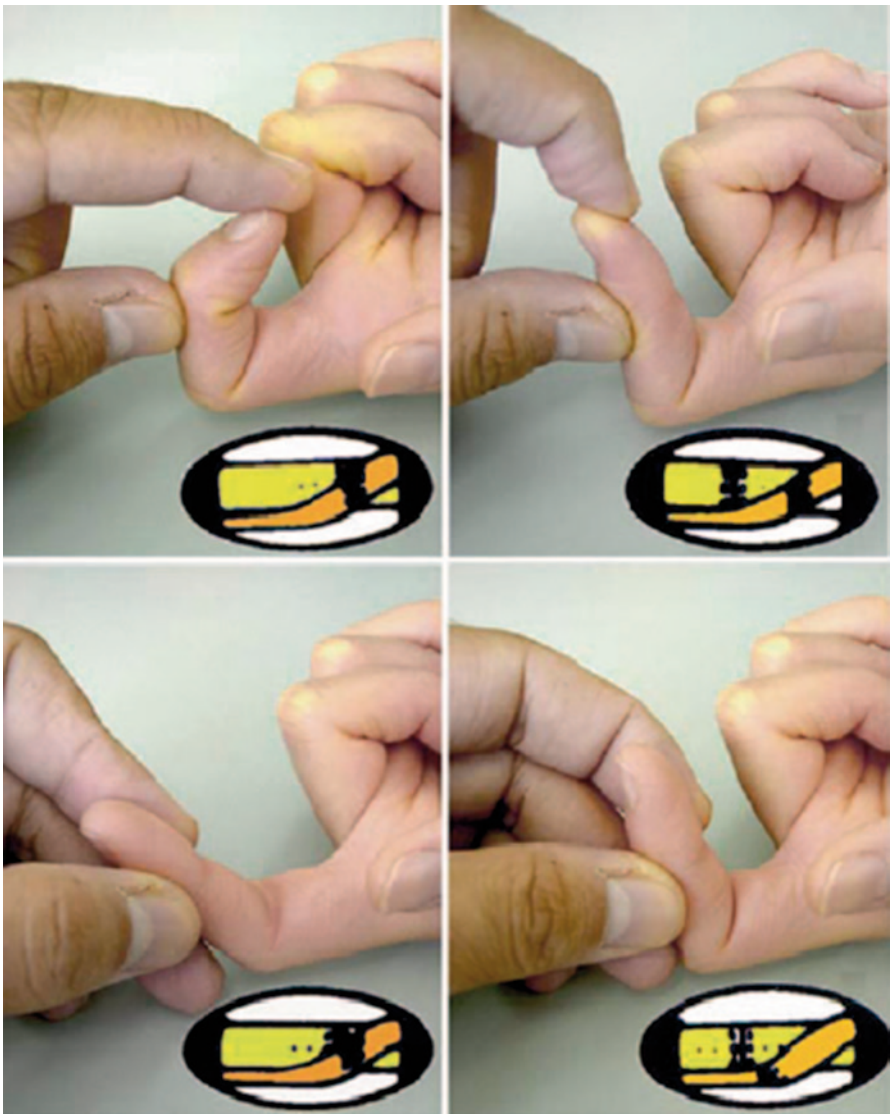

Fig. 18.3 Differential tendon-gliding splints

Dynamic Splint

A dynamic mobilization splint (Fig. 18.8) applies a passive pulling force to a specific joint in one direction while permitting active motion in the opposite direction, using energy-storing materials such as a "Theraband," rubber band, springs, and spring wire (Wong 2002). It applies a low-load constant and gentle force to realign

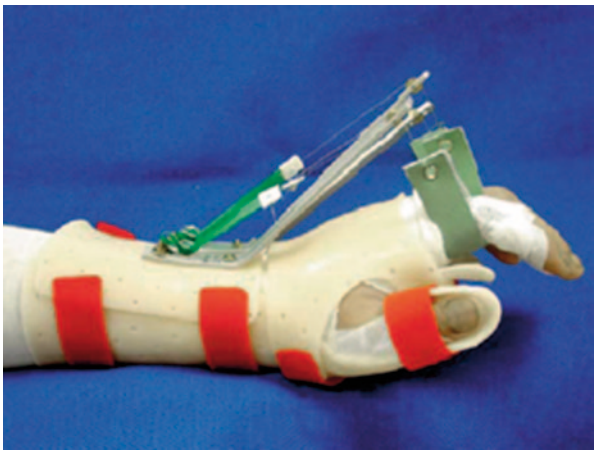

Fig. 18.4 Controlled passive extensor splint

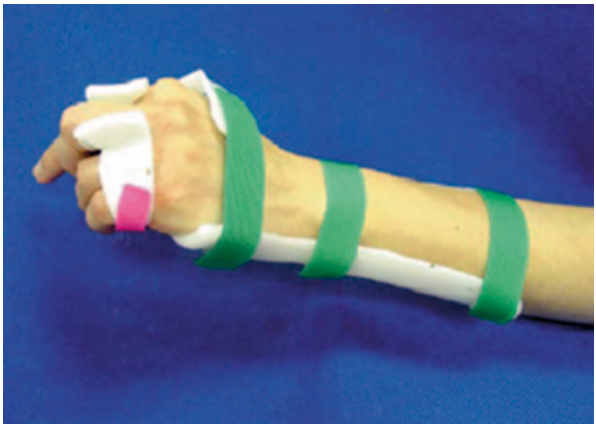

Fig. 18.5 Immediate controlled active motion splint

the soft tissue under stress, holding tension on the joint, tendon, scar, and adhesions at the maximum tolerable limit (Flowers and LaStayo 1994).

Serial Static Splint

Through periodic readjustment of position, the *serial static splint* (Fig. 18.9) provides serial stretching of a contracting or deforming tissue. After the tissue is stretched, it adapts to its stretching force by achieving the maximum tolerable length, the old splint is remolded or renewed in order to sustain the tissue at its maximum length again (Wong 2002). It also functions as a night resting splint, maintaining the "maximum gain" from the mobilizing splints used during the daytime. The first web spreader as shown illustrates how it regains the width of the first web space by serial adjustment.

Fig. 18.6 Buddy splint and proximal phalangeal fracture resting splint

Fig. 18.7 Belly-gutter splint

Static Progressive Splint

Static progressive splints (Fig. 18.10) are made up of inelastic components such as hook and loop tapes, adjustable hinges, screws, or turnbuckles to apply torque to

Fig. 18.8 Dynamic mobilizing splint

Fig. 18.9 Serial static web spreader

Fig. 18.10 Static progressive proximal interphalangeal joint splint

a joint statically at a position as close to end range as possible. These components allow progressive changes in joint position without changes in the structure of the splint (Schultz-Johnson 2002). The contracted joint or shortened tissue is positioned at its maximum tolerable length by adjusting the tension of the inelastic component to reposition the tissue at a new maximum tolerable length. This type of splint is effective over stiff joints especially during the mid-to-late scar maturation stage of healing.

Risks with Using Splints

All splintage has to be made with precautions to avoid excessive force from overstretching that will cause a prolonged increase in swelling retention and temperature around the stretched joint. Aggressive stress that produces more tissue damage than remodeling introduces more scarring, triggering the vicious circle of joint stiffening.

Clinical Application: Scar Remodeling

Corrective Splintage Through Low-Load Prolonged Stress to Induce Scar Remodeling

Dynamic or static corrective splintage is used to correct *progressive* or *static hand deformity* during the fibroplasia phase of healing. *Mobilizing splints* are applied to provide stress for remodeling collagen tissues, keeping the involved tissues in a prolonged state of mild tension, maximizing articular gliding, and tendon excursion (Brand 1995).

Static, serial static, or static progressive splints are used with increasing mechanical force to move the joint and tissue into the position opposite contracture.

Clinical Application: Edema Control

Edema Control Through Elevation, Active Mobilization, and Pressure Therapy

Persistent edema has detrimental effects on the intimately fitting gliding structures of the hand, causing pain, joint stiffness, and connective tissue adherence. Movable pitting edema (Fig. 18.11) usually dominates during the acute stage after the injury. It gives way when one applies direct fingertip pressure over the edematous area, though a soft feel is still noted during the "end-feel" of passive joint stretching. Fibrotic edema is found in the chronic stage of injury because of prolonged retention of edema fluid over the fingers and hand. Movable edema is replaced by fibrotic adhesion, limiting the gliding of soft tissues and finger motion. The "end-feel" from the joint passively stretched is stiff and resistive (Colditz 1995).

Edema control by elevation, mobilization, and pressure garment (Fig. 18.12) is essential. The involved hand should be raised to above heart level to facilitate the flow of the edematous fluid from distal to proximal. Patients are encouraged to mobilize, pumping away the edema fluid, although they may experience great resistance from the extra fluid. Gentle massage, distal to proximal, will facilitate blood circulation and mobility of the tissue layers. Compression with elastic bandage or pressure garment (Fig. 18.13) works when it applies gentle and constant pressure circumferentially distributed over the swollen hand (Wong 2002).

Evidence-Based Practice

Kleinert and Duran protocols (Cetin et al. 2001) are the major guidelines for our routine flexor tendon programs for early mobilization, while programs encouraging active tendon gliding have been under investigation to enhance treatment effectiveness (Baktir et al. 1996; Brüner et al. 2003; Howell et al. 2005; Hung et al. 2005).

Fig. 18.11 Pitting edema

Fig. 18.12 Pressure finger tube

Fig. 18.13 Pressure glove

Discussion

Research on mobilization programs for tendon rehabilitation has been thorough and comprehensive. Further studies on the management of complications such as stiff fingers due to the splinting regime, the effectiveness of pressure therapy in swelling control, and the physical properties of materials used in treatment are needed to give us insight into the choice of evidence for hand therapy in the future.

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The Case Study of John: Splinting Program for John's Fractured and Dislocated Finger

Keywords Corrective splintage, dislocation, fracture, protective splintage

Introduction

The theme of this case study concerns different functions of splintage and the importance of intermittent splinting and mobilization regime in a hand rehabilitation program for a person with finger fracture and dislocation during the initial 3 months after surgery.

The students' task includes learning of:

1. The normal bone healing process
2. Different functions of splintage at different phase of rehabilitation
3. Importance of intermittent splinting and mobilization regime in the treatment of stiffening joints

As a starting point, students should use the following references to gather background information:

1. Brand PW (1995) The forces of dynamic splinting: 10 questions before applying a dynamic splint to the hand. In: Hunter JM, Mackin EJ, Callahan AD (eds) Rehabilitation of the hand: surgery and therapy, 4th edn. Mosby, St. Louis
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4. Freeland AE, Hardy MA, Singletary S (2003) Rehabilitation for proximal phalangeal fractures. J Hand Ther 16(2):129–142
5. Maitland GD (1977) Peripheral manipulation. Butterworth, London
6. Wong JMW (2002) Management of stiff hand: an occupational therapist perspective. Hand Surg 7(2):261–269

Overview of the Content

The major goal of the interventions is to maximize the full hand function of John, facilitating him to resume independence in performances in self-care, work, and leisure.

Learning Objectives

Students should learn from John's rehabilitation process that finger joint suppleness is a prerequisite for smooth and strong tendon gliding and strength exertion; and intermittent splinting and mobilization regime is an effective way of therapeutic intervention in John's rehabilitation.

Personal Data John is a 24-year-old man, working as a computer technician. He lives with his family in public housing, and loves to play football with his friends during weekends.

Medical Diagnose and Progress John was diagnosed to have fractured his right index finger after he slipped and fell during a football match. He landed on his right index finger when he collided with his teammate. There was a chip fracture over the ulnar base of middle phalanx with subluxed proximal interphalangeal joint (PIPJ), complicated by distal interphalangeal joint (DIPJ) dislocation, which was confirmed after x-ray. Surgery was done to immobilize John's DIPJ.

Reason for Seeking Occupational Therapy He was referred for occupational therapy for prescription of splinting and mobilization program immediate after the surgery (Fig. 18.14).

During the initial assessment held on day 3 post operation, John was observed with moderately swollen right index finger with Kirschner wire (k-wire) fixation over the DIPJ. Moderate pain was reported over the PIPJ on gentle nonresistive motion. In order to start early protective motion to help reducing edema and prevent the development of joint stiffness, John was prescribed with a dorsal block hand-based splint to guard his finger motion. The dorsal block splint guided John's index finger motion from a 30° extension block to full flexion. Meanwhile, he was put on a buddy strap between his affected index finger and middle finger to prevent any varus or valgus stress over the PIPJ collaterals upon movement. He was also instructed on the proper mobilization regime and other measures for alleviating edema problem, including elevation and retrograde massage during the course of treatment. By that moment, John was well adapted by using his left hand assisting in all daily living activities, and his work duty was suspended for 2 weeks until his finger conditions became more stable (Figs. 18.15, 18.16).

During the start of the fourth week after surgery, k-wire was removed and John was suggested to wean off his dorsal block splint for free finger mobilization. The buddy strap protection continued until the end of the sixth week. Pressure finger tubes were then prescribed to foster edema control. Free nonresistive finger mobilization was

Fig. 18.14 X-ray on fracture index finger

reinforced aiming at regaining his affected finger joint flexibility. John resumed his computer work after the removal of k-wire, and he was doing well in gradual reintegration of his right hand in mouse and keyboard manipulation. However, his return to football play was still suspended until the fracture healed completely (Fig. 18.17).

Steady progress was examined according to the results of weekly hand assessments, despite of the stiffening end-feel of both PIPJ and DIPJ upon manual manipulation. Up to the eighth week after surgery, the problem of joint stiffening persisted with flexion contracture over the PIPJ and extension contracture over the DIPJ were noted. Limited active and passive flexion ranges were measured over both finger joints. Hence, corrective splintage was incorporated into John's daily treatment routine, including pressure therapy, active mobilization, and graded strengthening activities.

Fig. 18.15 Dorsal block splint with buddy strap

Fig. 18.16 Buddy straps between index and middle finger to prevent any varus/valgus stress onto the PIPJ during movement

Fig. 18.17 Prescription of pressure finger tube

In view of the problem that John's active range of index finger PIPJ extension/flexion could only achieve 30 lag/60°, during the eighth and ninth weeks, a flexion mitt was prescribed aiming at improving the passive ranges of interphalangeal joints (IPJs). It was used on top of a wrist neutral splint with a flexion volar block at the index finger in order to concentrate the stretching effect of the flexion mitt onto the PIPJ. The stretching effect from the flexion mitt could be upgraded every 5 min by tightening up when John adapted well after every 5-min trial. The wearing regime was 4–5 times a day during daytime, and every application should last for 15–20 minutes. Gentle finger mobilization in extension and flexion follows every application of splint stretching in order to upgrade the tendon-gliding excursion over the improved joint flexibility (Fig. 18.18).

Fig. 18.18 Flexion mitt with wrist neutral splint. The volar flexion block of the splint at the MPJ level is molded to concentrate the stretching force from the flexion mitt onto the PIPJ. The force is further reinforced by the white strap wrapping around in horizontal direction

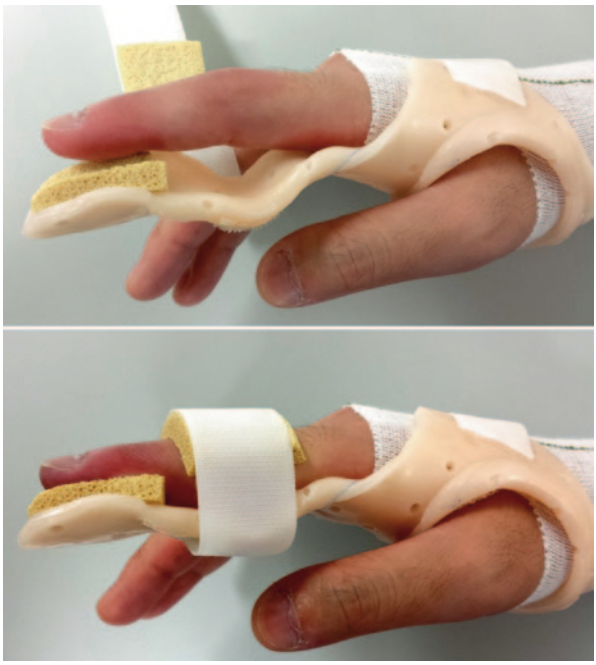

Fig. 18.19 Finger extension splint for night use to prevent further development of PIPJ flexion contracture

Another finger extension splint was provided for night use in order to correct flexion contracture developed over the PIPJ and to prevent it from further stiffening. John was reminded to have a warm soaking bath to his affected finger in the morning to ease his finger stiffness which is usually felt in the morning. At the same time, John could mobilize his fingers in the warm bath to increase the suppleness of his finger joints (Fig. 18.19).

Passive stretching splintage was further upgraded afterwards when John made his progress. A handy flexion loop made of rubber band was prescribed, replacing the flexion mitt and the wrist splint. The flexion loop aimed at upgrading the stretching effect onto both PIPJ and DIPJ, restoring the full passive range of flexion. The night extension splint continued, and the flexibility of the PIPJ was improving according to the end-feel feedback from manual joint manipulation (Fig. 18.20).

Current Circumstances At present, it was about 3 months after John's surgery; he was so happy about his progress when he reported minimal pain on index finger exertion, and flexibility of joints improved as well. Swelling problem subsided well with skin folds easily visible again over his finger. Total active and passive motion of his injured index finger was already up 90 % of his unaffected side. Pincer strength was progressing, and his work duty and daily living tasks were being performed very well without any significant problem.

Occupational performance issues showed that John is now able to resume all of his functions without significant problem, except that he is still postponing his football practice to 3 more months later until the healing of his fracture becomes more consolidated.

Fig. 18.20 Flexion loop to restore full passive flexion ranges of PIPJ and DIPJ

The Students' Report The following guiding questions have been identified in developing possible solutions to John's post finger fracture joint stiffness. These questions are generated from the available literature references and our clinical experiences.

1. What is the advantage of buddy taping a finger with a stable fracture to an adjacent uninvolved finger?
2. What is the role of a static splint on a finger with fracture?
3. What is the function of dynamic splint in collagen remodeling process?
4. Are there any alternatives for splinting such a fracture as John's?

Chapter 19
Splinting, Positioning, Edema, and Scar Management After Burn Injury

Megan A. Simons and Zephanie Tyack

After burn injury, the ultimate goal is to assist an individual to achieve optimal function and independence.

Abstract To achieve optimal function and independence, an individual relies on the combined use of a number of treatment modalities available to therapists (Parry and Esselman, J Burn Care Res 32:458–467, 2011; Simons et al., J Burn Care Rehabil, 24(5), 323–335, 2003). This chapter provides an overview of (1) the classification and epidemiology of burn injury and burn scarring, and (2) intervention modalities that aim to minimize impairment to body structures and body functions after burn injury, by using positioning and splinting, and edema and scar management.

Keywords Burns · Contracture · Cicatrix hypertrophic · Edema · Rehabilitation

Purposes

Health professionals have been treating clients with burns for two millennia. Since the 1940s, medical advances have resulted in declining mortality and shorter periods of hospitalization when burns are treated in a specialist burn unit. For over half a century, it has been recognized that morbidity is reduced if a multidisciplinary team (occupational therapists (OT), physical therapists, dieticians, psychologists, and social workers) are an integral part of burns care (Al-Mousawi et al. 2012).

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Method

Candidates for the Intervention

People with wounds caused by burn injury should be referred for occupational therapy if the wounds are severe enough to result in a long-term scar. The severity of a burn injury is determined according to the surface area affected and depth of the burn. The total body surface area (TBSA) affected is reported as a percentage (%TBSA), which ranges from < 1 to 100 %. The depth of the burn wound relates to the layers of skin that have been affected. Skin is considered to have two layers: the epidermis and dermis (Lewis et al. 2012). The dermal layer is further classified as papillary dermis (upper layer) and reticular dermis (lower layer). Traditionally, burns were classified as first, second, or third degree, depending on whether the burn was superficial, partial thickness, or full thickness. Fourth-degree burns involve underlying tissues such as muscle, fascia, and bone. However, since 2001, the main classification system used throughout the world is superficial, superficial partial, deep partial, or full thickness (Shakespeare 2001).

Superficial burns involve only the epidermis. Although painful, healing usually occurs within 1 week without any residual scarring. *Superficial dermal partial-thickness burns* involve only papillary dermis and epidermis and present with blistering and a redness that blanches. While painful, burns of this depth are expected to heal within 2 weeks and should not result in visible changes to the skin beyond 6 months. *Deep dermal partial-thickness burns* involve epidermis and dermis to reticular dermis and present with only a sensation of pressure (rather than pain), a variable color (white to red) that returns slowly after blanching, and blistering. It is usually expected that burns of this depth would take longer than 3 weeks to heal, and skin grafting is recommended to promote early wound closure and to reduce the degree of residual scarring. *Full-thickness burns* entail involvement of the whole thickness of the skin and possibly subcutaneous tissue. Skin grafting is essential since there is little potential for spontaneous healing (Lewis et al. 2012).

To obtain the objective of optimal function and independence, treatment modalities to minimize the risk of impairment to body structures and body functions must be commenced upon admission after the burn injury. If wounds are considered deep dermal partial- or full-thickness in depth on a flexor surface of the body (e.g., cubital fossa, popliteal fossa), the client is at risk of long-term functional impairment. Generally, if a burn heals spontaneously (i.e., without the need for skin grafting) with complete skin coverage of the affected area within 2 weeks, it will do so without an abnormal (red, raised, rigid) scar or functional impairment, but can result in long-term pigment changes. If healing takes more than 3 weeks, hypertrophic scarring inevitably results and can lead to functional impairment (Lewis et al. 2012). As a general rule, the depth of the burn is usually underestimated at initial presentation (Sheridan 2002), and the burn is rarely of uniform thickness (Lewis et al. 2012).

Epidemiology of Patients with Burns

Globally, the majority of burns and burn deaths occur in low- and middle-income countries, where prevention programs and the quality of acute care is not consistent (Peck 2011). The majority of burns are caused by scalding, flame/fire, or hot surfaces (Forjuoh 2006). Worldwide, burns in the under-5 age group account for almost half of burn injuries treated in emergency departments (Peck 2011). The majority of burns to young children occur as accidents in the home environment (Forjuoh 2006; Peck 2011), while adult burns occur in the home, workplace, and outdoors in approximately equal proportions (Forjuoh 2006). Most regions report scalds as causing the majority of burns to young children and the elderly. Flammable liquid burns are common from cooking accidents in developing countries and in adolescent and young adult boys experimenting with petrol and other accelerants (Peck 2011). Burns from house fires or clothing ignition generally produce the most severe and lethal injuries (Forjuoh 2006). Even in high-income countries, low-socioeconomic status of the family (lower household income, lower property value, poorer quality of housing) accounts for most of the increased burn susceptibility (Peck 2011). Other risk factors are: being male of a minority race, living in a developing country and/or cold climate, and the presence of epilepsy, peripheral neuropathy, and other physical and cognitive disabilities. Additional maternal characteristics (education, literacy, and age) are the main demographic factors associated with a high-risk of childhood burn injury (Peck 2011). Nonaccidental burn injury (i.e., abuse) in children is most frequently targeted at boys of mean age 2–4 years, often the youngest of multiple siblings. Since 2007, the incidence of intentional injury to adults has increased—specifically, violence against women and young girls. Another vulnerable population for intentional burn injury is elderly persons (Tropez-Arceneaux and Tropez-Sims 2012).

Assessment and Epidemiology of Burn Scarring

The purpose of occupational therapy intervention in the post-acute period is to prevent or reduce the impact of abnormal scarring.

Hypertrophic scarring is one type of abnormal scarring. It has been defined as the presence of abnormal scarring that remains within the boundaries of the original wound, but the repair and maturation process is prolonged and contracture is a pronounced feature; although the scar will eventually resolve and does not reoccur following surgery. The effects of hypertrophic scarring on function have been discussed as more severe than normal scar processes (Burd and Huang 2005). Most of these features are distinct from keloid scarring (another form of abnormal scarring; Stella et al. 2008), for which a key feature is extension beyond the boundaries of the original wound (Burd and Huang 2005).

The impact of scarring has been traditionally assessed by occupational therapists (OTs) by considering physical scar properties, in particular color, thickness,

pigmentation, and pliability (Sullivan et al. 1990). However, other physical properties such as surface irregularity and dryness as well as nonphysical parameters of itch and pain should also be considered. Itch and pain are important parameters to consider when assessing burn scarring, with itch reported as frequently or always affecting housework/errands, work/school, leisure/social, and sleep (Carrougher et al. 2013). The impact of the burn scarring on occupation such as daily living activities, sleep, mobility, and work/school should also be considered and have been included in burn-specific outcome measures. Adjustment to the appearance of the scarring and to scar treatments can impact on social functioning and thus is another important aspect to consider (Elsherbiny et al. 2011; Maskell et al. 2013).

The prevalence of hypertrophic scarring has been estimated to be between 32 and 72 % in a recent systematic review of burn scarring (Lawrence et al. 2012). The exact cause of hypertrophic scarring remains unknown; however, investigations to date suggest that it may be caused by a range of factors including infection of the wound (Baker 2007), and inflammatory and immunologic processes. A range of risk factors have been identified for hypertrophic scarring. According to a review of 703 burn cases, risk factors for scarring were electrical burns and sunburn, females, young age, a burn site on neck or upper limb, multiple surgical procedures, meshed skin graft, time to healing (particularly for contracted scars; Gangemi et al. 2008), and a higher percentage TBSA, full-thickness burn, and being American Indian or Alaskan Native (Gangemi et al. 2008; Thompson et al. 2013). However, the assessments of abnormal scarring were based on clinical signs and symptoms (Gangemi et al. 2008) rather than a validated measure or the total score of a scar quality measure (Thompson et al. 2013) that is of questionable validity. Thus, further studies are needed to confirm these findings. The onset of all scar types has been reported as earlier than 1 month post-epithelialization, with the peak of scar symptoms reported as within the first 6 months postburns, and improvements noted as within 12 months postburns (Gangemi et al. 2008; van der Wal et al. 2012). Wounds that need more than 10–14 days to heal are at risk of developing hypertrophic scarring and are therefore treated prophylactically (Chapman 2007).

Settings

The overall care of clients with burns depends on the depth and extent of the injury, the site of injury, their age, the degree of wound healing, the presence of infection, and the psychosocial status of the client and family. Therefore, a multidisciplinary team is required to ensure that every aspect of the client's physical, psychological, and social needs is met during hospitalization and following discharge. Complex social issues often affect the delivery of a client's care, and therefore require skilled personnel to manage adjustment to hospitalization (Phillips and Rumsey 2008). Often, for reasons of managed care or distance, clients with burns are referred to their local service providers for regular follow-up upon discharge, with less frequent reviews by the specialist burns unit. Therapists working outside a specialist burns center are encouraged to consult closely with their colleagues within the specialist units for advice and support in burn client therapy management (Simons et al. 2003).

In cases where burn scarring is likely to result from a burn, surgical intervention such as skin grafting are often performed in a hospital setting. Patients may be required to stay in hospital for long periods until complete coverage of their burn wounds is achieved. Reconstructive procedures may be required to release burn scars that tighten over time due to growth in children, or where areas remain contracted in adults. Patients may require multiple admissions for reconstructive procedures after their acute care is completed. OTs should assess whether positioning is required immediately after each reconstructive procedure and whether further scar management is required following the procedure, in consultation with the surgeon.

The Role of the OT in Applying the Intervention

The OT is an integral part of a multidisciplinary burn team, involved from the time of admission to the hospital to assess and treat impairment to body structures and function (e.g., contractures and scarring), as well as facilitating clients' ability to participate in meaningful occupation throughout their recovery to scar maturation and beyond.

Results

Clinical Application

This section describes in depth three interventions provided by OTs in burn care: splinting and positioning, edema management, and scar management.

Splinting and Positioning

Splinting is a common practice, frequently used at the time of admission to the burn unit, for full-thickness burns and after grafting (Esselman et al. 2006). Appropriate splinting and positioning may prevent contractures, compression neuropathies, and decubitus ulcers following burn injury (Spires et al. 2007). Anecdotal reports indicate splinting may also reduce acute pain immediately following burn injury. The splinting protocols commenced by Willis (1969) continue as the basis for therapeutic intervention today.

Until recently, it has been assumed that splinting acts to prevent or reduce contracture by applying a mechanical load in the opposite direction to contractile forces. However, recently reviewed cellular evidence suggests splinting may actually increase contracture (Schouten et al. 2012). Thus, new positioning options such as kinesiotaping (Bassett et al. 2010) may become increasingly important as further evidence accumulates (Fig. 19.1).

Fig. 19.1 Use of kinesio tape to promote function while improving resting position following superficial dermal burn to palm and fingers

Fig. 19.2 Contractures to wrist and fingers because of hypertrophic scarring

Burn scar contractures are defined as an impairment caused by replacement of skin with pathologic scar tissue of insufficient extensibility and length, resulting in a loss of motion or tissue alignment of an associated joint or anatomical structure (Fig. 19.2; Richard et al. 2009). Contractures are a common problem following burn injury, with an incidence of 5–40% in patients with burns reported across studies (Schouten et al. 2012). Contractures can occur not only in the extremities but also in regions such as the face, neck, and trunk. Hypertrophic scars with contracture have been found to develop earlier than hypertrophic scars without contracture and have a longer period to scar maturity. Burns of the lower limb have been found to be more likely to develop hypertrophic scarring as opposed to hypertrophic scarring with contracture, whereas neck burns have been found to be more likely to develop hypertrophic scarring with contracture than hypertrophic scarring alone (Gangemi et al. 2008). As discussed by Parry et al. (2010), assessing for trunk contracture is important as trunk mobility is likely to influence mobility of the extremities and overall function, although a survey to the occupational therapy and physical therapy special interest group of the American Burn Association (ABA) indicated the majority of therapists surveyed (56%) did not assess for trunk contracture (Parry et al. 2010).

Fig. 19.3 Anti-deformity positioning from the onset of burn care

Minimizing contractures generally involves positioning of the actual joint. Positioning promotes extension and abduction (Fig. 19.3). Specific injuries require an individualized approach (Serghiou et al. 2012). Prophylactic splinting is rarely required, except if tendons are exposed or to prevent equinus deformity from prolonged bed rest (Spires et al. 2007). In this case, the ankles are positioned in a neutral position and ranged twice daily.

Splinting of the burned area may be undertaken using a range of media (foam, thermoplastics, neoprene, and custom-made metal devices; Richard and Staley 1994). The time needed for use of both pre- and postsurgical splinting depends on factors such as the client's age, the length of time since burn injury, and the severity of the deformity (Esselman et al. 2006). Prolonged *static splinting* is often commenced following skin grafting procedures, but more intensive therapy should be started within 2–3 weeks with the splint removed for each session. Six weeks after the surgery, night splinting alone should be sufficient and may need to be continued for 1 or 2 years (Schwarz 2007). If full range of motion (ROM) is not maintained, a program of stretching is recommended. A *positioning and splinting schedule* is developed for each client by the OT in collaboration with the burn team. Once the acute phase is over, OTs and physical therapists monitor and modify exercises and splints to maintain functionality until the reconstructive phase begins. At that time, prosthetic and orthotic devices and splints focus on rehabilitating the patient, with an emphasis on activities of daily living (Holavanahalli et al. 2011).

Considerations for Treatment

Treatment intensity for splinting is determined by scar blanching (the clinical sign that the tissue's yield point is approaching) and tolerable pain (Spires et al. 2007). Skin recruited for joint movement has been demonstrated to extend far beyond the immediate proximity of the joint skin creases (Richard et al. 2009). Gentle, prolonged stretch to healing tissue at its longest tolerable length for at least 6–8 h/day has been reported to be most effective (Chapman 2007). The joint needs to be moved slowly and repeatedly to its end range several times before applying a prolonged stretch, which is maintained until the tissue blanches (Spires et al. 2007).

Splints must be "*user-friendly*," as poorly applied splints can cause nerve injury, loss of skin grafts, pressure sores, and worsening of a burn wound. Splints should avoid pressure over bony prominences and be compatible with wound dressings and topical medications. Splints fabricated of remoldable materials can be modified, as the client's needs change. Factors to consider when prescribing a splint include the area of the body injured, extent and type of injury, the functional goal being addressed, and patient adherence to the splinting regime (Kolmus et al. 2012; Spires et al. 2007). The therapist must be vigilant in providing education to the patient and/or their caregivers about the wearing regimes and risks of the splint. Splinting charts above the patient's bed and/or in nursing folders is an important communication tool between therapy and nursing staff during hospital admission (Spires et al. 2007).

Evidence-Based Practice

A recent systematic review of static splinting for burn contracture indicated that there is no high-level evidence for this widespread practice (Schouten et al. 2012) and that cellular changes stimulated by mechanical tension may actually increase the incidence of contracture. In addition, one randomized controlled study of axilla burns found no difference in clinical outcomes between patients receiving exercise only and those receiving exercise and shoulder splints (Kolmus et al. 2012). Clearly, further high-quality studies are required to determine the effectiveness of splinting including the angle of splinting that results in the best functional movement. Most studies have examined extremity contractures, with evidence lacking regarding trunk contractures (Parry et al. 2010).

Edema Management

Edema is an interstitial protein-rich substance that forms a gel-like consistency and impedes vascular clearance. The superficial lymphatic plexus resides within the dermal–epidermal junction; therefore, deep partial-thickness and full-thickness burns can cause impairment to the superficial or deep lymphatic system. Edema

arises from the lymph vascular safety system being exceeded, or lymph transport capacity being compromised (Hettrick et al. 2004).

On admission to the hospital, the severely burned client requires fluid resuscitation, which increases edema in the extravascular space that can limit joint motion (Latenser and Kowal-Vern 2002; Spires et al. 2007). Edema may also form in non-injured soft tissues postburn (Edgar et al. 2011; Kramer 2012). Edema develops within 8–12 h after burn injury and peaks at approximately 36 h (Kramer 2012). Failure to reduce edema in the first 48–72 h can result in a fixed deformity (Richard and Staley 1994). *Edema management* is especially important with hand burns due to the dependent position of the hand (Esselman et al. 2006).

Lymphedema, that is, chronic edema that is sustained for more than 3 months, is a rarely reported complication associated with burn injuries. Risk factors for lymphedema development include circumferential extremity involvement and fascial excision (Hettrick et al. 2004).

Considerations for Treatment

In the acute phase, edema likely contributes to decreased tissue oxygen diffusion and further ischemic insult to already damaged cells, with compromised blood flow increasing the risk of infection (Edgar et al. 2011; Kramer 2012). *Edema reduction* is pursued by elevation of the extremities above heart level. Elevating the hand and arm is accomplished using splints, bedside troughs, or similar devices (Richard and Staley 1994). Web spacers (i.e., strips of foam/dressing product/molds) can be placed between digits to prevent fluid collection and edema formation (Latenser and Kowal-Vern 2002), and elasticized bandages are used to decrease edema (Esselman et al. 2006). Exercise of the burned body parts helps to maintain joint mobility and muscle function (Latenser and Kowal-Vern 2002). If the patient is alert and able to participate, a program of active and active-assisted exercise is appropriate. In obtunded or critically ill patients, passive range of motion exercises to end range are prescribed to reduce contractures and functional loss.

Immediately following autografting, active and passive exercises are not performed on the limb. Depending on the type of graft, the condition of the graft wound, and the judgment of the surgeon, no exercise is performed for approximately 3 days on mesh grafts and 5 days for sheet grafts. Heterografts, synthetic dressings, escharotomies, and surgical debridements are not contraindications to exercise (Spires et al. 2007).

Wrapping burned extremities with elastic bandages when the patient is sitting or ambulating contributes to a decrease in edema and is used to avoid venous pooling, which can lead to graft sloughing (Spires et al. 2007). Should lymphedema be present, it can be managed with specific manual techniques, special bandaging and compression wraps, and remedial exercises (Hettrick et al. 2004).

The OT, in conjunction with the physiotherapist, is generally responsible for providing a positioning program, as well as either a passive or active exercise program

from the day of admission until patients are fully mobilized and exercising (Latenser and Kowal-Vern 2002). The OT enables clients to complete their daily functional tasks independently. The OT looks for the presence of edema or lymphedema using assessment tools with demonstrated reliability (such as the bioimpedence spectroscopy; Edgar et al. 2009) or the deepening of skin folds and absence of visible venous alterations and Stemmer's sign (Hettrick et al. 2004).

Education and communication among all team members, clients, and caregivers are necessary if an effective positioning and exercise program is to be successful.

Evidence-Based Practice

In one single-center study, the use of electrical stimulation in combination with standard physiotherapy significantly reduced local acute hand burn edema ($p=0.02$) and increased active hand motion ($p=0.0003$; Omar et al. 2004). Further research would benefit from a scrutiny of the methods in both adult and pediatric populations in multi-center trials, as well as focusing on the relationship between impairments to body structures and functions, and participation in a broad range of activities postburn injury.

Scar Management

Scar management interventions include compression (such as pressure garments and/or transparent face orthoses) and the use of silicone. The use of pressure as a major treatment modality for scar suppression commenced in the early 1970s, following observed improvements of scarring with the use of a pressure garment (Macintyre and Baird 2006). Transparent face orthoses (Rivers 1979) are commonly used in the treatment of facial burns, with up to 87% of therapists in North America reporting their use (Parry et al. 2012). The use of silicone gel sheeting started in 1981, with treatment of burn scars (Perkins et al. 1983). The purpose of scar management is to prevent the development of impairments of body structures and functions from hypertrophic scarring, or musculoskeletal changes, and to remediate or compensate for musculoskeletal or neurologic deficits. Hypertrophic scarring is collagen arranged in random orientation with whorls and nodules. Mechanical pressure facilitates the alignment of collagen fibers in a more parallel, normal orientation (Spires et al. 2007). Additionally, it is widely believed that pressure controls collagen synthesis by limiting the supply of blood, oxygen, and nutrients to the scar tissue and reduces collagen production to the levels found in normal scar tissue more rapidly than the natural maturation process by replacing the pressure exerted by the destroyed skin on underlying tissues. A common belief is that the application of pressure alleviates the itchiness and pain associated with active hypertrophic scarring (Macintyre and Baird 2006).

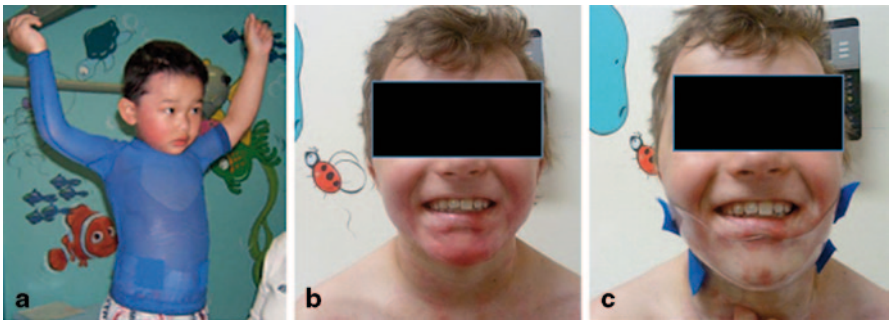

Fig. 19.4 **a** Custom-made pressure garments or (**b** and **c**) transparent face orthoses are measured and fitted when the skin is able to withstand pressure and edema has resolved

Considerations for Treatment

Pressure garments or *transparent face orthoses* are typically introduced as soon as the patient is able to tolerate pressure (Fig. 19.4). The use of pressure in the pregrafting or healing stages has been advocated by some authors to prepare the wound bed and assist graft retention. However, pressure is usually applied to healed wounds early on (i.e., in the first few days or weeks post wound healing) to prevent raised scarring and to accelerate scar maturation (Chapman 2007; Van den Kerckhove et al. 2005). Patients are usually advised to wear pressure garments continuously for at least 23 h, removed only for hygiene purposes and laundering. However, garments worn for a lesser time (i.e., a mean of 20.4 h/day) have been found to reduce hardness and thickness for a group receiving a mean pressure of 25 mm Hg (Engrav et al. 2010). Pressure is continued until scar maturation has occurred, which generally takes up to 6–18 months, and in exceptional cases up to 5 years (Chapman 2007; Macintyre and Baird 2006). Garments should extend at least 5 cm (2 in.) beyond the margins of the scar(s) in order to apply an even pressure (Spires et al. 2007). Where it is difficult to provide pressure, such as at the web spaces between fingers, additional inserts of silicone or moldable materials are required to ensure an intimate fit (Spires et al. 2007).

The amount of pressure required for maximum benefit is unclear but 15 mm Hg is regarded to be the level required for an effect based on Engrav's et al. (2010) review of literature. Regular checking of the tension in the garment is important as garments lose their tension over time, with high-pressure garments of 20–25 mm Hg losing their tension more than low-pressure garments of 10–15 mm Hg (Candy et al. 2010). The fit of the garment is assessed regularly by the therapist by visual inspection as well as by feeling the tension in the garment. Adjustments are made or new garments are supplied to ensure that adequate pressure is maintained (Macintyre and Baird 2006). The pressure achieved is not usually objectively measured during appointments. Even garments that provide low pressures of 10–15 mm Hg have been found to have some effect on scarring (Candy et al. 2010) which is an

important consideration for patients that cannot or do not attend follow-up appointments for a review of garment fit. A reduction in the pressure of the garment has been found to be higher over the first month of wear, for garments that provide pressure > 20 mmHg (Van den Kerckhove et al. 2005). It is generally recommended that the garment be replaced every 2–3 months to retain optimal tension (Esselman et al. 2006). Complications from garments have been reported as wound breakdown, skeletal deformation, growth retardation, and obstructive sleep apnea (Bourget et al. 2007; Rappoport et al. 2008).

Silicone products may be used on intact skin (van den Kerckhove et al. 2001) once the burn wound has healed either alone or in combination with pressure garments, creams and dressings in the form of silicone gel sheeting, silicone cream, or silicone oil. While no clear guidelines exist for the ideal application time for silicone products, as scar remodeling and collagen synthesis continues for over 12 months, products should be continued for at least this length of time after wound healing. Application for between 12 and 24 h a day was recommended to patients in the majority of studies reviewed (O'Brien and Jones 2013). However, children and patients exposed to hot weather conditions may be advised to graduate the wear of silicone products starting with 12 h or less initially. Strict guidelines are necessary for cleaning and disinfecting both the product and the skin. Gel sheeting may be stabilized with tape along the edge of the sheeting to prevent slippage and displacement during body movement (Van den Kerckhove et al. 2001). Complications from silicone gel sheeting (rash, ulcer, erythema, and pruritus) have been reported in over 50 % of cases (Rayatt et al. 2006). While these complications are more common in children and when the gel is kept in place with pressure garments or adhesive tape, they usually resolve when the therapy is stopped temporarily or with hygiene measures. Contraindications for use include dermatological conditions where the skin may not be intact (Van den Kerckhove et al. 2001).

Other Interventions

Education regarding the management of symptoms such as itch is important. Education can involve discussion about the reducing exposure to heat, and preventing fatigue and humidity/sweating which have been identified as the top three circumstances associated with itch (Parent-Vachon et al. 2008). The importance of applying cream, taking medication or being prescribed medication, or having a shower when itchy are additional aspects that OT can educate patients about, with these aspects reported by patients as the top three ways to relieve itch (Parent-Vachon et al. 2008).

OT may also consider a number of additional treatment modalities such as massage, education and counseling for body image adjustment, and return to school/work programs, which will not be reviewed further in this chapter.

Evidence-Based Practice

A common belief is that the application of *pressure* alleviates the itchiness and pain associated with active hypertrophic scarring (Macintyre and Baird 2006). However, a study by Candy et al. (2010) found that all three interventions studied (including pressure, silicone gel, and combined pressure and silicone gel) reduced pain over time, but not itch in comparison to the control group. All groups including the control group received lanolin massage.

There is consistent evidence to support the use of pressure to reduce scar thickness from a systematic review with meta-analysis in 2009 and several controlled studies since then (Anzarut et al. 2009; Candy et al. 2010; Engrav et al. 2010; Li-Tsang et al. 2010). On the other hand, there is mixed evidence or a lack of support for the effect of pressure garments on other physical features of scar quality such as color, pliability or hardness, and pigmentation (Anzarut et al. 2009; Candy et al. 2010; Engrav et al. 2010; Li-Tsang et al. 2010). Li-Tsang et al. (2010), in a randomized controlled trial of the effectiveness of pressure garments and silicone, found that the two treatments combined had the best effect on scar thickness.

Studies of the effectiveness of pressure garments are hampered by variability in factors such as patient compliance, degradation of garments, and the variability of body parts. Despite being instructed to wear their garments 23 h a day except for bathing, the mean wear time was 20.4 h a day for patients who completed a log of wearing time in a study by Engrav (2010). Further investigation of the most effective wearing time and level of pressure would provide a better evidence base to inform patient education. In addition, further investigation of the effectiveness of pressure garments using no pressure control groups rather than the low-pressure/high-pressure comparisons of many controlled studies would be beneficial.

Little is known about how pressures exerted on the surface of the body are diffused into the underlying tissue (Macintyre and Baird 2006) or what the optimal pressure to be applied is (Esselman et al. 2006), although pressure over grafts has been found to be lower than over scars (Engrav et al. 2010). Pressures of between 15 and 25 mm Hg across studies have generally been found to be more effective in reducing scar thickness compared to lower pressures (Candy et al. 2010; Engrav et al. 2010; Van den Kerckhove et al. 2005).

Silicones are entirely synthetic polymers generally based on a dimethylsiloxane monomer and contain a repeating unit of structure. They have a silica-derived backbone and organic groups such as SiOC chains attach directly to a silicon atom via silicon–carbon bonds (Van den Kerckhove et al. 2001). The working mechanism of silicone is unclear but the most likely mechanisms are occlusion and hydration based on evidence to date (Hoeksema et al. 2013). It is thought that hydration should benefit joint motion when used over a burn wound contracture due to diminished mechanical stress on the tissue (i.e., less tension or traction in the wound; Van den Kerckhove et al. 2001).

A Cochrane systematic review found weak evidence for the benefit of silicone gel sheeting used to prevent abnormal scarring in people prone to scarring. A re-

duced incidence of hypertrophic scarring was found compared to those who received no treatment (relative risk (RR) 0.46, 95% confidence interval (CI) 0.21–0.98). In treatment studies that examined change in scar size, silicone gel sheeting significantly reduced scar thickness (mean difference (MD) −2.00, 95% CI −2.14 to −1.85) and color (RR 3.49, 95% CI 1.97–6.15). However, all of the studies reviewed were of poor quality and highly susceptible to bias (O'Brien and Jones 2013).

In addition to improving the quality of trials, further testing and refinement of scar measures are required to obtain better evidence regarding scar management effectiveness, focusing more attention on uncommonly measured physical scar features such as dryness and the sensory symptoms of pain and itch. Further consideration also needs to be given to the patient's perspective of the effectiveness of scar management, as many studies of intervention effectiveness have used health professional's assessment of physical scar qualities or objective measures to measure effectiveness.

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The Case Study of Harry

Keywords Cicatrix, pediatric burn, rehabilitation

Introduction

The presentation of this case aims to highlight (a) the role of OT in managing burn scarring: scar management, exercises, adjustment to altered body image, education, and (b) the competing priorities that often emerge in the OT management of scarring postburn and for families where caregivers work, have social and recreational priorities, and look after other children.

The student's tasks include:

1. To identify areas at risk of contracture postburn due to scarring.
2. To outline both individual and family factors that must be considered in OT treatment.
3. To outline a scar management regimen for Harry.

As a starting point, the students should use the following references to gather background information:

1. Parry I, Esselman PC (2011) Clinical competencies for burn rehabilitation therapists. J Burn Care Res 32:458–467
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Overview of the Content

Major goal of the actual interventions are:

1. To support a person's adjustment postburn injury within the context of their biological, psychological, social, and environmental needs.
2. To minimize the impact of body impairments on function.

Learning objectives are: The student will

1. Be aware of body structures at risk of impairment postburn injury from scarring and burns scar treatments
2. Be able to propose a scar management regimen postburn injury and consider differences between a day regimen and an overnight regimen
3. Consider individual and family factors when prescribing a scar management regimen postburn injury

The Background History of the Clinical Case Study

Personal Data

Harry is a 10-year-old boy. He is the eldest of four boys, burned while making a fire bomb in his backyard. His family live three hours' drive away from the closest OT department, in an area where the temperature is above 30 °C (86 °F) for most of the year. Prior to Harry's burns, he loved playing cricket and soccer.

Harry's mother who works as an administration officer has taken 3 months off work since Harry was discharged home. She has found that Harry's scar management regime and exercises take one and a half hours to supervise and assist with in the morning as well as in the evening. He doesn't think he will be able to play cricket this season as he finds being outside in the sun exacerbates his itch (which he rates as 7 out of 10 on a numerical rating scale on his worst days). Harry's dad now prepares evening meals and takes Harry's brothers to sport training and weekend games.

Medical Diagnoses

Harry sustained deep partial-thickness burns to most of his face, neck, and upper torso with involvement of both axillae, his mandible, nose, and mouth. He also suffers from eczema.

Reason for Seeking Occupational Therapy

Current Circumstances

Harry has been home 2 weeks since being discharged from hospital. Prior to discharge, the OT fitted him with a custom-made face mask and vest (pressure garments), a TFO (a facial orthotic) and neck extension roll. Harry's neck, chin, upper torso, and axillae have signs of hypertrophic scarring with scar bands obvious in

these areas although movement is only affected in his right shoulder. Harry has not yet returned to school as he still gets very tired during the day.

Occupational Performance Issues

Harry was provided with silicone sheets to apply daily to areas not affected by eczema. Prior to discharge, the OT educated Harry and his mother regarding the potential side effects of scar management products. The OT discussed return to school and dealing with the reactions of other children prior to discharge. The OT linked in via the Internet (Skype), when Harry's mother talked to his class about Harry's experiences in hospital. Harry still has an open wound below his ear that requires a new dressing each day. The dressing is worn beneath his pressure garment. Harry's exercise and splinting regime consists of: (a) a home exercise program completed three times daily focusing on range of motion, strengthening, and endurance (provided by a physical therapist), (b) an axillae splint worn on the right side at night, and (c) a mouthguard worn at night. His creams take 30 min to put on after his bath each day and he only wears his TFO between meals as it is too restrictive to eat while in situ.

When questioned by the OT about her concerns, Harry's mum indicates she is worried about whether the look of his scars will bother him in the future and whether they will affect his relationship with others as he enters his teenage years. She also expresses concern that the bright outlook she tries to convey to Harry might be overly optimistic.

The Student's Report

The following guiding questions have been identified in developing possible solutions to Harry's scar management dilemmas and supporting his transition back to normal roles including being a student and brother/son.

Questions

1. What are the indications for use of a compression garment, silicone, and splinting program with Harry?
2. What wearing regime would you prescribe for his pressure garments and TFO?
3. Why was Harry prescribed silicone sheets for wear only in areas not affected by eczema?
4. What are the musculoskeletal risks of using a compression garment on the face and would you minimize these risks for Harry?
5. How would you consider family factors that are likely to impact on the implementation of Harry's scar management regimen?

Chapter 20
Wheelchair Intervention: Principles and Practice

Åse Brandt and Kersti A. M. Samuelsson

After my wheelchair got adapted to me and my needs, it became possible for me to cook and to go out with my friends.
Client

Abstract The purpose of wheelchair interventions is to compensate for reduced walking ability, or the lack of it, with the ultimate goal to enable the individual's activity performance and participation in society as well as quality of life. Occupational therapists working in this field have to have high-quality competence in products, health risks associated with using them, and the service delivery process. A successful solution is based on a therapeutic understanding of the interaction between the user, the assistive device, and the environment. It is especially important to note that in addition to providing mobility, a wheelchair is also a chair, which should comfortably and ergonomically seat the user while supporting effective mobility. Regular follow-ups of the prescribed wheelchair increase the professional's knowledge and secure good clinical practice, enhancing the users' occupational performance.

Keywords Activity · Assistive technology · Mobility · Participation · Quality of life · Seating

Definitions

Mobility is necessary to enable a person to carry out everyday activities and to participate in society, and it has a major impact on the quality of life. For children, mobility is a prerequisite for cognitive and social development (Dunaway

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I. Söderback (ed.), *International Handbook of Occupational Therapy Interventions,*
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et al. 2013). When mobility is difficult or impossible due to mobility limitations, wheelchair interventions enable mobility and make, in turn, activities and participation possible.

Types of Wheelchairs

Many different types of wheelchairs are available, classified by the International Organization for Standardization (ISO) 9999 International Standard on Assistive Products for Persons with Disability—Classification and Terminology as standards 12–22 and 12–23: human-driven wheelchairs and powered wheelchairs. These include wheelchairs propelled by both hands, a foot-driven type, attendant-controlled wheelchairs, scooters, and electric-motor-driven wheelchairs with powered steering (International Standards Organization 2011). In addition, a number of brands and models are available. In some countries, more than 500 different types of manual wheelchairs could be identified, while in other low-income countries only a few products are available. Moreover, new types of wheelchairs are under development, for example, intelligent powered wheelchairs, which may enable independent mobility for persons with cognitive impairments (How et al. 2013).

Background

The first known use of wheelchairs by people with disabilities was in the mid-1600s. The first wheelchairs were made of wood and hard to propel. In the 1930s, a new and relatively lightweight foldable wheelchair was manufactured. After World War II, light, easily maneuvered wheelchairs with a rigid frame were manufactured (Kamenetz 1969). The development of powered wheelchairs is much more recent. Even though the first powered wheelchair was invented in 1940, powered wheelchairs were not commonly in use until the 1960s (Woods and Watson 2003). In the last 10 years, the use of powered scooters has increased (Sund et al. 2013).

Purpose

Wheelchairs provide people with mobility limitations with the opportunity to perform daily occupations and to participate in social life. According to the United Nations Convention on the Rights of Persons with Disabilities, article 20, personal mobility is a fundamental human right, and the convention asks for production of and access to quality mobility devices at affordable cost (World Health Organization 2008).

Method

Candidates for the Intervention

The functional limitations requiring a wheelchair intervention may stem from a broad variety of diseases and may be temporary, intermittent, or permanent. Diagnoses are often diseases of the nervous system, the circulatory system, and the respiratory system, as well as injuries to the musculoskeletal system. These diseases and injuries may cause different mobility limitations, and it is the limitations that should be considered, rather than the specific medical diagnoses. Even though all age groups are represented among wheelchair users, most are older people. The reason is that mobility limitations increase with increasing age.

Epidemiology

The prevalence of wheelchair use depends on several factors. The main factor is the *availability of wheelchairs,* which varies from country to country, and is dependent on specific legislation and on socioeconomic circumstances that affect the willingness to provide for needy clients. However, the World Health Organization (World Health Organization 2008) estimates that about 1 % of the world's population needs a wheelchair, equivalent to over 65 million people worldwide.

Settings

Wheelchair interventions are initiated within the medical service at hospitals or within the social services in municipal settings. Parts of the intervention, such as assessment of the user's environment, training, follow-up, and evaluation, often take place in the user's home.

The Role of the Occupational Therapist in Applying the Intervention

In a wheelchair selection and fitting process, the role of the occupational therapist (OT) is to focus on the activity and participation in daily life and related environments. The wheelchair is often going to be used in everyday occupations, and the OT must ensure that the wheelchair fits the user for that purpose. It is of great importance that the selection and fitting processes are made in cooperation with the user and taking account of his or her preferences.

Results

Clinical Application

The clinical application is called the service delivery process, basically consisting of three steps—patient evaluation, equipment selection, fitting and delivery—as well as postdelivery and follow-up (Greer et al. 2012).

Patient Evaluation

The foundation for wheelchair interventions is establishment of an agreed goal between the user and the OT. The OT collects information about the client's occupational preferences, the Canadian Occupational Performance Measure (Law et al. 1998) or the Individually Prioritised Problems Analysis (IPPA; Wessels et al. 2002) may serve as a tool in this process. The client's cognitive and functional ability as well as relevant environmental conditions are evaluated: physical capacity, joint range of motion, sensibility, body image, balance, and muscle tone are examples of aspects that should be considered at this stage before selecting the type of wheelchair. The physical environment, such as the home environment and the outdoor surroundings, could be a hindrance as well as a support and must be considered (see Chaps. 12 and 13).

Equipment Selection and Delivery

Based on patient references and evaluated body functions, device requirements are identified. It is often necessary to accomplish trials of several devices before making the final device selection.

The subsequent step is fitting the wheelchair. Mobility is the primary aspect in wheelchair fittings, and the OT considers aspects related to the interface between the user and the wheelchair. The wheelchair is a replacement for other seating furniture, and therefore the user's seating comfort and support is another fundamental aspect that has to be taken into account. Risk factors related to wheelchair use have to be considered, such as pressure sores (see Chap. 16), back and shoulder pain, deformities, and discomfort; (Samuelsson 2002). It must also be kept in mind that the wheelchair has to be fitted so that the client is able to perform activities of daily living (ADL) and participate in society. Fitting a wheelchair to the client's needs is highly specialized requiring wide knowledge about wheelchair adjustment and about the potential advantages and risks.

Seating

A wheelchair of any type should fit the user in height, width, and depth. The seating posture is important since an upright seat position supports the cardiovascular and respiration function (Stein et al. 2006; Stewart 1991; see Chap. 14). The key to the seating posture is the pelvis. A close-to-neutral pelvic rotation, and no lateral tilt, supports the natural spine curvature, and reduces the risk for high local under-seat pressure. Hip and knee angles affect the pelvic rotation, and it is important to know and understand this relationship (Engström 2002). Back and seat angles of the chair together with the wheelchair cushion and back support can be adjusted to provide optimal seating support. A strap-adjustable back support on manual wheelchairs is preferable over a nonadjustable sling back support, because it makes it possible to "mold" the support to the individual user. A contoured seat cushion is often preferable since it supports stability. In case of a risk for pressure sore, a pressure mapping system should be used in the evaluation process (see Chap. 16).

Manual Wheelchairs

Propelling a manual wheelchair is hard work, especially outdoors. To minimize rolling resistance in a manual wheelchair, an adjustment of weight distribution might be effective. The wheels' angles are also relevant, since they may affect rolling resistance and propelling efficiency in a most significant way (Kauzlarich 1999); that is, the rear wheels should be slightly cambered, which places the wheels close to the user and makes the wheelchair easy to turn. The center of the shoulder joints should be over the hub of the rear wheels, and the fingertips should reach the hub for efficient push angle and joint movement (Boninger et al. 2003).

Risk Factors

A lot of manual wheelchair users suffer from back, neck, and/or shoulder pain (Samuelsson 2002). Deformities which might lead to pressure sores and/or impaired respiratory function, a restricted range of motion as well as discomfort, are other complication risks associated with sitting for long periods. Wheelchair fitting and body posture are fundamental in counteracting these risks. A good range of motion in hips, knees, and pelvis enables the wheelchair user to attain a comfortable and optimal seating position. Wheelchair cushions, lumbar supports, and other equipment are helpful tools in this fitting process.

Powered Wheelchairs

Since it is physically demanding to propel a manual wheelchair, a powered wheelchair may be considered. Different modes of controlling powered wheelchairs are

available, such as joystick, steer, sip and puff, and switches. The selection of these available tools should be based on tests in the environments where the wheelchair is to be used.

Environment

It is important that the environment where the wheelchair is to be used is accessible for wheelchairs. Outdoor environments in the community may be difficult to change directly and instead advocacy may be required. If the wheelchair is to be used indoors in the client's home, this may have to be modified to accommodate wheelchair accessibility.

Postdelivery

Training

It is of great importance that the client be trained in the use of the wheelchair until the necessary skills are acquired, such as managing curbs and other physical barriers (Hosseini et al. 2012). Training increases the wheelchair user's confidence (Sakakibara et al. 2013), which, in turn, has been found to be a strong predictor for participation (Rice et al. 2013). Several standardized tests and training programs are available, and for instance the Wheelchair Skills Program (WSP; Dalhousie University 2013) is available in several languages. Training should be carried out both indoors and outdoors (Lois 2004).

Follow-Up

A wheelchair fitting requires follow-up to be sure the chair appropriately fits the user. Examples of follow-up outcomes are: user-estimated comfort, mobility aspects, and the user's satisfaction with the wheelchair. A simple general follow-up could include the Quebec User Evaluation of Satisfaction with Assistive Technology 2.0 (QUEST; Demers et al. 1997). When follow up is needed in case of risks for pressure sores or pain, a pressure mapping system, a visual analogue scale describing pain, and the Wheelchair User Shoulder Pain Index (Curtis et al. 1995) could be of help.

Outcome

Outcome assessment is increasingly being demanded. For this purpose, randomized controlled studies are generally preferred, but usually this is not possible for

legal and ethical reasons (Anttila et al. 2012), and that is why the pre–post study design often is more realistic. For outcome assessment, psychometrically sound effect evaluation instruments should be used.

Evidence-Based Practice

Evidence of outcomes of wheelchair interventions is limited, especially regarding how the client uses the wheelchair and how it facilitates the performance of daily occupations and social participation. A systematic review of activity and participation outcomes of mobility device interventions did not identify any studies on manual wheelchair interventions, but two pre–post studies on powered wheelchair outcomes were found (Salminen et al. 2009). One study on stroke patients' powered wheelchairs showed that the users' activity problems had been substantially reduced, and that participation in the most investigated activities increased (Petterson 2007). Another study found that powered wheelchair interventions positively affected the users' social lives (Davies et al. 2003). Later studies have confirmed these results for adults (Samuelsson and Wressle 2013; Hermansson et al. 2013; Löfqvist et al. 2011; Rushton et al. 2013) and also for children (Rousseau-Harrison and Rochette 2013).

Research supports the positive effectiveness of wheelchair interventions (Boninger et al. 2003; Corfman et al. 2003; Hoenig et al. 2003) on independent living, while attention is also drawn to some of the adverse outcomes earlier mentioned (Bottos et al. 2001; Brandt et al. 2004; Mann et al. 2004; Petterson et al. 2006).

There is very little reserch available about wheelchair cost-effectiveness, but recently a study indicated that powered wheelchair and scooter interventions seemed to result in societal economical savings (Samuelsson and Wressle 2013).

Discussion

An optimal wheelchair and seating system is a human right (World Health Organization 2008) for people with an impaired walking ability or the lack thereof. OTs have an important professional role in wheelchair interventions. Their professional knowledge enables them to understand clients' daily occupational needs, abilities, and contexts. The options of wheelchairs and accessories are enormous, and the importance of knowledge in all relevant details is necessary for being able to perform an optimal fitting.

Even though it often is apparent that wheelchair interventions are effective, higher-quality research is required, especially regarding occupational performance and health economic outcomes.

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Case Study

Matching Maria's Present Occupational Status to a Wheelchair: A Multifaceted Task

Keywords: Activity, Client-centered, Ergonomics, Evaluation, Participation, Prioritization

Introduction

The theme of this case study is to select a wheelchair and to match the wheelchair to the client's needs, considering both mobility and seating as well as risks for the client.

Important references are:

- Engström B (2002) Ergonomic seating: a true challenge: seating and mobility for the physically challenged: risks and possibilities: when using wheelchairs. Posturalis Books.
- Stein F, Söderback I, Cutler SK, Larson B (2006) Occupational therapy and ergonomics. applying ergonomic principles to everyday occupation in the home and at the work, 1st edn. Whurr/Wiley, London/Philadelphia, pp 92–116

Overview of the Content

The aim of this case study is to come up with a suggestion for useful assessments, suggestions for solutions, and how to evaluate results.

The students' tasks include:

- How to identify information that is needed in order to come up with a suggestion for a solution
- To identify risk factors to be considered
- To plan how to train Maria for efficient wheelchair use
- To identify how to follow-up and evaluate the suggested intervention

The Background History of Maria

Personal Information The client is a female (Maria), 42 years of age, suffering from multiple sclerosis (MS) for more than 10 years. Maria is married and has two children (12 and 14 years of age). She lives with her husband and children in a villa with a big garden just outside the city. Maria works part-time at the office of a car

dealer where she has been working for more than 10 years. She handles the bookkeeping and billing, and is very pleased with her work.
Maria drives her own adapted car to and from work; she has the responsibility for most household activities such as cooking, washing, and cleaning, while her husband does the grocery shopping. Maria drives her children to and from various activities and is an active parent both at school and in the leisure activities of her children. Her husband has a company of his own and works a lot.

Medical Information During the latest couple of months, Maria's disability has increased. She is now unable to walk more than a very short distance. Maria has realized that she will need some kind of wheelchair to cope with her everyday life, and therefore she seeks help from her occupational therapist (OT). Maria asks the OT for a wheelchair which will fit her and her needs.

Occupational Therapy Intervention When meeting her OT, Maria identifies several needs related to her reduced balance, and problems in moving around by walking, both indoors and outdoors. She informs the OT that she needs a wheelchair, which is easy to transport, since she needs to bring it with her in the car. It is also important that it is possible for her to sit and work in the wheelchair, if needed. At home, the wheelchair will be used mostly outside in the garden where Maria likes to take care of all the flowers. Since there are some gravel paths in the garden, Maria is afraid that it will be very hard to propel a manual wheelchair there. The wheelchair must also be easy to propel since Maria moves about a lot at her workplace. There are no stairs at her workplace and all doorways are wide enough for a wheelchair.

The Student's Report

The following guiding questions are to be considered in developing possible solutions to Maria.

- What do you need to know more about Maria's physical conditions, which might have an effect on the choice of the wheelchair product and how it should be fitted?
- Are there other aspects of activity and participation that you need to ask Maria about, before making suggestions on a final solution?
- Do you see any risk related to wheelchair use, which you should keep in mind and consider in the matching process?
- How would you like to follow up results from this intervention?

Chapter 21
Assistive Technology Devices for Children with Disabilities

Sigrid Østensjø

Assistive devices might widen the gate to everyday activities and participation for children with various impairments.

Abstract Optimizing home and community participation of children with disabilities is an important outcome for pediatric rehabilitation. The literature demonstrates that assistive technology (AT) can produce beneficial outcomes for the children and the caregivers, but it also shows that the use of AT devices is far from always being successful. One key factor for success seems to be the active involvement of the child and the family throughout the AT intervention processes.

Keywords Activities of daily living · Assistive technology · Caregiver · Communication · Disabled children · Play and playthings

Background

Traditionally, intervention for children with disabilities was based on impairment-oriented models, focusing on changing the child. More recently, interventions have emerged that emphasize the interaction among child, tasks, and environmental factors. The International Classification of Functioning, Disability and Health (ICF/ICF-CY; World Health Organization 2001, 2007) has proved to be a valuable framework for classification of rehabilitation interventions. Within this framework, compensatory strategies, such as assistive technology devices (ATD), are receiving equal priority with other interventions in achieving child- and family-based activity and participation goals. Moreover, a family-centered approach to services emphasizes the active involvement of the child and the family in deciding on and implementing ATD in their everyday life (Judge 2002).

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Definitions

AT interventions include both the assistive devices and the practitioner services associated with device acquisition and usage. An assistive device is commonly defined as "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities" (Assistive Technology Act of 1998 2004). The Tech Act defines AT service as "any service that directly assists an individual with a disability in the selection, acquisition, or use of an AT."

Purpose

AT interventions are provided to children with disabilities for at least four purposes: (1) to remediate or augment an impairment, (2) to support the child's development and functional independence, (3) to enhance the child's participation in home and community life, and (4) to lighten the day-to-day caregiver burden.

Method

Candidates for the AT Interventions

Children with different types of impairments causing activity limitations are provided with ATD. Cerebral palsy (CP; International Classification of Diseases (ICD-10) G80; World Health Organization 2010) is the most frequent motor disorder in childhood. The motor impairment is often accompanied by disturbances of sensation, cognition, and communication (Rosenbaum et al. 2007). Thus, children with CP are likely to face various challenges in performance and participation in everyday activities (Østensjø et al. 2003). Most studies on usage and outcomes of ATD include children with CP.

Epidemiology

The utilization of ATD differs a lot between countries, due to factors such as funding, organization of the service delivery systems, and professional training (Long et al. 2003, 2007). In Norway, about 4% of the child population (0–19 years) was provided with ATD from the National Insurance Scheme (Ministry of Labour 2010). Nine of ten preschool children with CP were reported to use ATD to support *mobility*, *self-care*, and *social functions* when devices were supplied free of charge to the family (Østensjø et al. 2005). Eighty percent of the devices belonged to children with severe limitations in gross motor function (Gross Motor Function Classification System, level IV and V; Palisano et al. 1997). About 10% of the devices were not in regular use.

Settings

The setting for AT interventions is day-to-day activities, conceptualized as activities and participation in the ICF-CY. ATD are delivered for use at home, kindergarten and school, and recreation and leisure.

The Role of the Occupational Therapist

Pediatric occupational therapists (OTs)—as members of an interprofessional team—are in a position to identify and promote AT services to children with disabilities in collaboration with other rehabilitation and educational professionals. For more complex needs, such as advanced seating systems or augmentative and alternative communication (AAC), rehabilitation specialists and technology suppliers may assist community-based AT providers.

The ICF-CY is recommended as a framework to guide AT interventions by encouraging practitioners to consider interventions directed at one dimension, e.g., adaptive seating aimed to improve upper extremity control, in the context of other dimensions, e.g., the ability to use a computer (activity) and playing virtual reality games with friends (participation).

For successful integration of ATD in everyday life, it is crucial to involve the child, the family, and other daily cousers (e.g., teachers and school assistants) in the assessment, selection, implementation, management, and follow-up of AT solutions.

The Matching Assistive Technology and CHild (MATCH) assessment process can be used to ensure that child and family goals drive the selection and implementation process (Federici et al. 2009). Moreover, careful monitoring of progress toward the desired outcome is essential.

Results

Clinical Application: The Use of ATD in Everyday Life Settings

Commonly used devices for *mobility and transportation* among children with CP are standers, hand or body support walkers, running bikes, manual and powered wheelchairs, adapted tricycles or bicycles, pushchairs, mobile seating systems, and car seats (Østensjø et al. 2005; Rodby-Bousquet and Hägglund 2010).

Adapted seating, non-skid mats, eating and drinking utensils, height-adjustable bathtubs, and toilet seats are often used to assist performance and participation in *self-care activities* (Østensjø et al. 2005). Seating systems vary from a proper-size chair with seat belt to more individualized and complex options involving head, trunk, leg, and arm supports.

Play is a fundamental aspect of a child's development and learning (Brodin 1999; Besio 2002). Among preschool children with CP, a variety of equipment are in use to enhance *communication* and *playing*: most often, low-technical communication aids, adapted sitting furniture, switches, special toys and games, keyboard modifications and computer software, and swings (Østensjø et al. 2005). A review of the use of AAC concluded that various methods can be used to improve infant and toddler's intentional communication, including signs and gestures, aided low-technical methods (pictures and graphic symbols), and/or high-technology systems (voice output communication; Branson and Demchak 2009).

Barriers for Use of ATD in Everyday Life

Parents have several reasons for infrequent use of devices for mobility, self-care, communication, and play that include the appropriateness of the devices, time constraint for use, housing accessibility, transportation problems, feeling less natural, and lack of immediate and ongoing training (Østensjø et al. 2005). The most common barriers for use of high-technology communication systems were a lack of confidence with technology, limited quality and reliability of the device, and limited availability of technical support (Baxter et al. 2012).

Studies exploring children's experiences with the use of ATD show that adults' and children's perspectives are not necessarily congruent. Devices such as a walker and manual or powered wheelchairs that were perceived as enablers for participation at school were infrequently used in home environments due to differences in lifestyle and preferences between contexts (Huang et al. 2009a, b). The students' functional and psychosocial perspective on ATD was confirmed in another study. Devices were more often abandoned if they that did not have immediate benefits (e.g., preventive orthoses) or if they made the students feel different or deviant from their peers (e.g., a wheelchair recommended for use outdoors for children with limited walking abilities; Hemmingsson et al. 2009).

From a professional perspective, the effective use of AT also seems to be rather complex. Three broad areas of shortcomings in service delivery have been identified in the literature: failures in involving the child and the family, insufficient assessment models and instruments, and inadequate staff training (Copley and Ziviani 2004; Long et al. 2007; Desideri et al. 2013).

Evidence-Based Practice

Systematic reviews can provide an important way to increase the clinical utility of AT outcome research depending on the level of evidence of the original studies. In the field of AT, there are few randomized controlled studies to assess the effectiveness of ATD. Furthermore, evidence-based knowledge concerning ATD selection and advisory process is limited (Bernd et al. 2009).

Impact of Assistive Devices on Child Functioning

A review, including 51 studies, concerning the impact of ATD on child-focused outcomes concluded that the use of ATD seemed to have positive influences on the children's self-care and mobility (Henderson et al. 2008; Rousseau-Harrison and Rochette 2013).

Reviews that have systematically assessed adapted seating found inconclusive evidence on the impact of this intervention on postural stability, trunk extension, upper limb functioning, and cognition. The author concludes that both original studies and the reviews must incorporate greater specificity of the child's functional level and suggest use of the ICF-CY to classify outcome measurement (Ryan 2012).

Reviews regarding the effectiveness of AAC have tended to consider predominately low-technology aids, with evidence suggesting positive outcome of use of the Picture Exchange Communication System, in particular (Baxter et al. 2012). The results for high-technical methods were inconclusive with considerable individual variations in outcomes following intervention.

Relatively few studies have assessed the influence of ATD on playing and social interaction. Evidence indicates improved participation in interpersonal relationships and play following a wheelchair acquisition (Rousseau-Harrison and Rochette 2013). Østensjø et al. (2005) found that one of five parents of preschoolers with CP experienced that various sitting furniture and adapted toys and games enhanced the child's playing and the parents' participation in the play situation. A review on the impact of computer AT found that computer-based technology, such as virtual reality games, allow children with disabilities to be an equal playing partner with peers (Chantry and Dunford 2010). In a single study of toddlers with severe sensory, motor, and cognitive impairments, three of four children learned to use switches to control adapted toys and other devices through basic technology intervention (Sullivan and Lewis 2000).

Effect of Assistive Devices on Caregiver Function

A recent review of the impact of ATD on family caregivers of children with physical disabilities included four single studies and a previous review of 11 studies. The results suggest that ATD can have a positive influence on family function and caregiver burden (Nicolson et al. 2012, 2013). Østensjø et al. (2005) reported that devices such as pushchairs, manual and powered wheelchairs, and a suitable van facilitated caregiving in mobility, while seating systems, height-adjustable bathtubs, and shower and changing tables lightened caregiving in children who could not sit independently. The fewer studies on caregivers, compared to child outcomes, suggest that a family-centered approach to AT services is not sufficiently covered in research.

Discussion

Although ATD have potential for enhancing the functioning, participation, and caregiving among children with disabilities, success is not guaranteed due to the complex, multifaceted, and dynamic nature of ATD and service delivery. One key factor for success seems to be the active involvement of the child and the family throughout the AT intervention processes.

Conclusion

AT has become an important rehabilitation strategy to support functioning in children with motor impairments and their participation in everyday life. More rigorous research is necessary concerning the types and extent of technology used with children with disabilities in different settings, how it is being used, how integral it is to the development of children with disabilities, and how effective it appears to be in achieving child and family goals and outcomes over time.

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The Case Study

Keywords Assistive technology devices, cerebral palsy, children's view, school

Introduction

The theme of this case study concerns the complexity of assistive technology device (ATD) use and provision within a school context. The case is based on a recently completed research project exploring participation opportunities in children with cerebral palsy (CP) when they started primary school.

The students' task include:

1. Finding evidence for use of ATD to enhance occupational performance and participation in children with disabilities
2. Identifying facilitators and barriers for effective use of ATD
3. Reflecting on how to involve the child in implementation of ATD in their everyday life

As a starting point, the students should use the following references to gather background information:

Bernd T, De Witte LP (2009) Existing models and instruments for the selection of assistive technology in rehabilitation practice. Scand J Occup Ther 16(3):146–158. doi:10.1080/11038120802449362

Eliasson A, Krumlinde-Sundholm L, Rösblad B, Beckung E, Arner M, Ohrvall A, Rosenbaum P (2006) The manual ability classification system (MACS) for children with cerebral palsy: scale development and evidence of validity and reliability. Dev Med Child Neurol 48(7):549–554

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Palisano R, Rosenbaum P, Walter S, Russell D, Wood E, Galuppi B (1997) Development and reliability of a system to classify gross motor function in children with cerebral palsy. Dev Med Child Neurol 39(4):214–223

Overview of the Content

The major goal of assistive technology (AT) intervention in a school context is to support the student's performance and participation in pedagogical and social activities.

The learning objects are to:

- Increase the student's knowledge about the role and effectiveness of ATD's in children with disabilities
- Be aware of the importance of a user-centered approach to AT provision

The Background History of the Clinical Case Study

Eve goes to an ordinary primary school. The family is supported by an interprofessional team and she has an Individual Education Plan (IEP). The use of ATD is not incorporated in the IEP.

Eve is diagnosed with dyskinesia CP with four-limb involvement. She has speech problems not producing intelligible speech. Her gross motor function was classified according to Gross Motor Function Classification System (GMFCS) level III (Palisano et al. 1997). She maintains floor sitting by using a "W-sitting" (sitting between flexed and internally rotated hips and knees). When sitting in a chair, she requires pelvic support to maximize hand function. She is unable to walk without a device. With respect to hand function, she has abilities to handle a limited selection of easily managed objects in adapted situations (Manual Ability Classification System, MACS, level IV; Eliasson et al. 2006). Her communication abilities was classified according to level III by the Communication Function Classification System (CFCS; Hidecker et al. 2011), which implies that she is communicating effectively with familiar partners, but not with unfamiliar.

The school assistant is waiting for Eve when she arrives in a taxi, and helps her into the posterior walker called crocodile. In the wardrobe, she assists her in taking off the jacket and into the powered wheelchair. Eve moves to the classroom; on her way to her desk, she has a small talk with Ida, her best friend from kindergarten. The assistant supports her into the height-adjustable working chair and fastens the seat belt (Fig. 21.1). She puts on a dynamic Lycra glove on her right arm to enhance hand function, which was a prioritized goal of the parents ("*improve grasp function*") and the teacher ("*improve pencil grasp*") and the child herself ("*learn to put on a necklace*").

It is time for break and outdoor play. The assistant asks: "Do you want the crocodile or the Petra?" (running bike). "The crocodile," Eve answers and hurries out, in the direction of a little ice pond in the end of the school yard (Fig. 21.2). Throughout the break, she slices on the pond along with some other students (Fig. 21.3).

Fig. 21.1 Eve sitting in her height-adjustable working chair doing schoolwork

Looking at the photo where she is sliding, Eve tells, “I do skating” (articulation unclear, Ida, her friend helps to translate). “How did you do it?” (10 s pauses). “Run, slide, jump, and slide.” “Have you done this before?” “No, (6 s pauses) I love it, it is fun, fun to slide.”

As the students were going to start eating lunch, Eve began to cry. The assistant was not near; the teacher came up to her, but Eve did not succeed in communicating that the dynamic Lycra suit has to be opened. A RollTalk, with speech synthesis, recommended by the OT, had been mounted on her powered wheelchair 1 month ago to support communication, but was not operative.

In the English class, later in the afternoon, all the students were sitting on benches, with the exception of Eve who was standing in her moveable stander (Fig. 21.4). When she looked at the photograph of this situation, she spontaneously says, “It hurts to stand with the orthoses.” “It hurts, but how was it when you were sitting on the floor, as you did throughout ‘The student’s choices activities’?” “It hurts too.” “Is there any time when the orthoses do not trouble you?” “When I sit in the chair.”

The Student’s Report

The following guiding questions have been identified in developing possible solutions to management and follow-up of ATD in a school context. These questions are generated from the available literature references and our clinical experiences:

Fig. 21.2 Eve in the "crocodile" on her way to the ice pond

Fig. 21.3 Eve skating in her "crocodile" on the ice pond

Fig. 21.4 Eve standing in her moveable stander in the English class

Questions:

1. What functions might be affected in children with CP according to the ICF framework?
2. What are important goals for use of ATD in a school context?
3. What is the evidence for effective use of ATD?
4. How can the ICF framework be used as a guide for AT interventions?
5. How can an ATD be an enabler to social participation?
6. How can OTs work with school staff to make communication more effective for children with problems in producing intelligible speech?
7. How to involve the child in the implementation of preventive and supportive ATD in school life?
8. What are the key messages about AT interventions in children with disabilities from this case study?

Chapter 22
Low Vision Intervention: Decision Making for Acquiring and Integrating Assistive Technology

Al Copolillo and Tony Gentry

> *The occupational therapist and optometrist were very helpful and introduced me to a lot of technology. The OT had a pretty good grasp of the technology and was fairly abreast of what was available. I take my hat off to her.*
> Client

Abstract Occupational-therapy intervention can enable strong, independent decision making primarily related to assistive device acquisition and use for clients with *low vision*. In developed nations, occupational therapists (OTs) provide interventions for older adults with acquired vision impairments more frequently than for any other population. Therefore, the information here will be applicable mostly to that age group. This chapter explores two main topics: (1) the decision-making process involved in acquiring and integrating low-vision assistive technology for clients with low vision and (2) the types of assistive technologies available to clients with low vision.

Keywords Assistive technology · Low vision

Definition of Assistive Low-Vision Technology

"Low-vision assistive technology is any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional visual capabilities of an individual with a disability" (adapted from the general definition of the US Assistive Technology Act of 2004; Relton 2005). Assessment, provision, and training in the use of an assistive product are essential elements of this model. The occupational therapy scope

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of practice includes assistive technology (AT) intervention for low vision and other impairments.

Categories of low-vision assistive devices are as follows:

- *Handheld magnifier:* portable magnifier designed to be carried by the user.
- *Stand magnifier:* magnifier placed over the material to be viewed; designed primarily for reading, in a stationary situation, usually while the user is sitting at a table.
- *Closed-circuit television* (CCTV): a video magnifier; items to be viewed are placed under a camera, and magnified images are projected onto a television screen for easier viewing.
- *Controlled area lighting:* high-intensity, glare-controlled light for reading and detail work.
- *Screen magnification and voice output readers:* accessories or software available to assist with computer use.
- *Accessibility settings and mobile applications for smartphones, personal digital assistants (PDAs), and tablet computers.*
- *Activities of daily living (ADL)/instrumental activities of daily living (IADL) adaptive devices:* a variety of low-vision devices used throughout the home and community to enhance visibility, reduce risk of injury, or enable use of other senses to compensate for vision loss.

Background

Persons with vision impairment may require substantial assistance to acquire low-vision assistive devices and integrate them into their daily routines. Since visual input is so essential to searching for and examining the wide range of ATs one might choose, the vision impairment itself can pose a barrier to accessing the technologies. Persons with vision impairment must often rely on others for this process, especially in cases of severe vision loss. The information they receive comes from a variety of sources of varying degrees of reliability. Occupational therapy from skilled low-vision specialists that simplifies access to AT is, therefore, greatly appreciated, and is often life changing for persons with low vision and blindness. However, for this population, improving access meets only part of the need. Other important components of successful intervention include assisting the low-vision client to choose the right technology by experimenting with a variety of devices; customizing use through exploration of specific device characteristics; moving from controlled, therapist-guided device acquisition and use to independence in the natural environment; and adjusting to lifestyle changes imposed by vision impairment.

Purpose

The main purpose of using low-vision AT is to optimize usable vision and compensate for vision loss. Persons with low vision use AT mainly for reading and writing. Therefore, ADLs requiring these skills, such as reading medicine bottles or recipes, paying bills, interacting with the Internet, and text messaging and reading mail are often improved with AT. Reducing the risk of injury is another main purpose for the use of AT. For example, simple devices that improve depth perception and contrast on stairs or reduce the potential for spilling hot liquids are frequently used.

Method

Candidates for the Intervention

Major causes of blindness worldwide are cataract, glaucoma, and age-related macular degeneration. The most prevalent diseases leading to blindness and low vision in developed nations are macular degeneration, diabetic retinopathy, and glaucoma. OTs provide services to clients with these diagnoses but also design interventions for people with vision loss from stroke, traumatic brain injury, and multiple sclerosis.

Epidemiology: World Statistics on Vision Impairment

World Health Organization data from 2010 set the worldwide prevalence of vision impairment in excess of 285 million people, of whom 39 million were blind and 246 million have low vision (Mariotti 2012); the majority of low vision and blindness occurring in people 50 years of age and older.

Cataract, typically remediated through ocular surgery in developed countries, is the leading cause of blindness and low vision in developing countries and globally due to increased incidence plus the limited availability of surgery (Mariotti 2012). Throughout the world, the prevalence of visual impairment is substantially greater for people with diabetes (Center for Disease Control and Prevention 2004).

Settings

Service Provision Process

Low-vision rehabilitation services are provided in a variety of health system contexts and by health professionals with a wide range of training backgrounds,

including low-vision specialists, vision rehabilitation teachers, orientation/mobility specialists, and OTs. Among the specialists in low-vision rehabilitation, OTs typically obtain training through continuing education and post-degree programs and courses (Copolillo et al. 2007). Throughout the world, there is a vast shortage of low-vision health-care practitioners trained to provide rehabilitation services (American Foundation for the Blind 1999). This represents a barrier to adequate care of persons with vision impairment and reduces the potential for obtaining and using devices in a timely and effective manner.

When low-vision rehabilitation services are available, referral by ophthalmologists and other physicians is limited and often delayed (Crews 2000). Patients who may have benefited from rehabilitation early in the disease process frequently become aware of such programs only after their vision impairments have become severe. Anecdotal evidence from practitioners indicates that intervention early in a progressive eye disease process can be highly beneficial because it is easier to learn to use adapted strategies, apply methods for finding AT, and make appropriate environmental adaptations when available vision is at its highest. As low vision approaches blindness in progressive eye diseases, the challenges to learning and initiating adaptive strategies for the first time become substantially greater and decrease the potential for success.

Types of Low-Vision Services

Low-vision rehabilitation services are provided in both group and individual therapeutic venues. Health-promotion and self-management programs are effective methods for teaching persons with low vision and blindness about available ATs and their application. Group interactions provide opportunities for individuals to make decisions about what devices to acquire and how to integrate them into their lives (Brody et al. 2005; Girdler et al. 2010; Eklund et al. 2008).

Within some health-care systems, occupational therapy practitioners primarily intervene with clients with low vision on a one-to-one basis. Patients are seen in low-vision rehabilitation programs, typically with a two-person rehabilitation team consisting of either an ophthalmologist or optometrist and an OT. Additional professional services may be provided regularly by psychologists, nurses, or orientation/mobility specialists, but services from these professionals are more frequently acquired through referral from the low-vision rehabilitation team.

In a low-vision rehabilitation program, the physician conducts detailed eye examinations and interviews patients to determine the extent of their disability. The physician prescribes optics and identifies appropriate magnification and lighting needs. The OT collects specific information about the client's performance of basic ADL and IADL, work skills, and recreation and leisure activities, thus taking the basic results of the physician's vision testing and identifying the impact of the vision loss on performance of daily activities. The OT's evaluation leads to interventions that assist the client in performing desired activities by further identifying the functional extent of usable vision, teaching the client to make the best use of it and

providing training in the use of ATs to compensate for vision loss during everyday activities (Warren 1995; Warren et al. 2006).

The Role of the OT

Occupational therapy practitioners working in low-vision rehabilitation collaborate with their clients to develop multifaceted interventions. Identification and use of all available vision and compensation for vision loss are the primary objectives. Activities that rely particularly on reading skills, communication, and mobility are frequently at the core of the intervention. Therefore, technologies that improve the ability to read and write, increase safety and ease of mobility, improve performance of IADL, and, on a lesser scale, basic ADL are identified and explored in the rehabilitation process.

Results

Clinical Application

Making Decisions About Use of AT

As part of the process of acquiring new skills in rehabilitation, the client is assisted in finding the most useful ATs and environmental adaptations for performance of desired activities. The client and therapist work together to perfect the use of the devices and adaptations, primarily through practice in multiple settings and under various conditions. Through exposure to a variety of technology resources, including the Internet and local, national, and international vision associations, the client learns a process of accessing, acquiring, and integrating needed technologies. Clients learn to judge the usability of technology by questioning its application in multiple settings, comparing costs, and seeking or requesting trial use before finally deciding to accept devices for longer term or permanent use.

Decision making is a special form of problem solving in which, from a variety of potential solutions, the client identifies the most satisfying outcome (Yates and Patalano 1999). This requires the OT to compare and contrast possibilities and weigh benefits against obstacles. This complex procedure depends on the client's individual problem-solving strategies. How the problem is defined, life experience, familiarity with the problem, and the impact of the environment all contribute to decision making (Berg et al. 1998).

ATs for Low Vision

A wide variety of AT devices are commercially available to the client with low vision. Low-vision rehabilitation programs often keep devices on site to allow clients

to find ones that best fit their needs and practice using them before purchasing or accepting them for ongoing use.

Magnification and Controlled-Area Lighting

The most appropriate and useful technologies for persons with low vision provide the right combination of magnification, controlled-area lighting, and proper contrast for optimizing usable vision. Finding the right magnifiers and lighting options, therefore, are two of the main responsibilities of the OT practitioner working with persons with low vision. There is a wide range of magnifiers available, typically divided into *stand* and *handheld* varieties. Stand magnifiers are used on a flat surface. The user learns to place the magnifier over the item to be read or examined and to look through it at an optimal distance and position from it. Stand magnifiers can have lighting attached and can include glare filters. Examples of how a stand magnifier might be used include reading a newspaper, book, or letter while seated at a desk or table. Handheld magnifiers are designed for the user to carry; their usefulness is in being portable. They are often smaller and lighter than stand magnifiers. The key to their use lies in learning to distance the magnifier correctly from the object to be observed and then to place the head and eyes in the optimal position and at the correct distance from the magnifier. This varies according to the level of magnification of the magnifier and the size of the object. Examples of the use of handheld magnifiers are reading labels on items in a grocery store, price tags on clothing, dosage on prescription medicine bottles, or menus in a restaurant. High-intensity lighting or filtered lighting to reduce glare are often built into magnifiers or used in combination with them. Figure 22.1 shows both stand and handheld magnifiers and accompanying lighting systems that improve functional vision. Magnifying software applications (apps) for smartphones, PDAs, and tablets leverage the device's onboard camera to provide onscreen magnification. *Lumin* (for Apple iOS devices) and *Your Magnifying Glass* (for Android devices) turn these products into portable hand scanners with zoom-capable magnifying (iTunes 2013).

Closed-Circuit Television

Magnification, lighting, and contrast are also the main features on CCTV, which many people with vision impairment regard as a life-changing device (Copolillo and Teitelman 2005). The user places an item on a platform below the magnifier; the item is enlarged to a set magnification and projected onto a television screen directly in front of the user (Fig. 22.2). For many, the cost of these items is an inhibiting factor, especially in health-care systems where AT is not reimbursed, as is the case for most health insurance in the USA.

Fig. 22.1 Handheld and stand magnifiers

Personal Computers and Computer Software

Personal computers (PCs) and the Internet have become popular for people with mild-to-moderate visual acuity problems. Many software systems purchased with PCs have built-in disability resources that can be turned on by the user, allowing for such adaptations as changes in background and print, and icon color and size. Other software, such as Zoom-Text, Jaws, and Kurzweil, are commercially available. These screen-magnification devices provide some variety of contrast adjustment, and audible text, all features that may be appealing to persons with vision impairments. When used in conjunction with voice-driven software, such as *Dragon Naturally Speaking,* word processing, text messaging, e-mailing, and web-based

Fig. 22.2 Closed-circuit television

work and consumer activities can be managed without need of a keyboard or mouse (Nuance.com 2013).

Mobile Devices: Communication Access and Vision-Related Apps

When touch-screen mobile devices first emerged in the mid-2000s, their smooth glass surfaces and lack of a mechanical keyboard seemed to ignore the needs of people with vision impairment. How was one to navigate virtual buttons on a glass screen? Apple, the manufacturer of the iPhone, iPad, and iPod soon addressed this deficiency, however, by providing a pair of accessibility settings that have rapidly made mobile devices navigable. The gesture-based screen reader setting *VoiceOver* reads aloud anything onscreen. When passing a finger across the screen, a single tap generates a spoken description of any app icon touched. A double tap activates the app. Users with vision impairment can quickly learn to navigate a touch screen using this setting. *VoiceOver* also reads text messages, documents, and any other written material that appears onscreen. The voice-activated digital assistant *Siri* is a useful companion to *VoiceOver*. When activated with a tap-and-hold gesture on the home button, *Siri* follows spoken word commands to search the Internet, record reminder alerts, set calendar dates, or record and send text messages. With these apps, vision-impaired people can access virtually all of the same mobile device features available to sighted users. Users of Google Android OS devices can do the same, using an accessibility setting called *TalkBack.* This app provides voice navigation, screen reading, and on some devices a form of vibration feedback onscreen (this feature, known as haptic touch, selectively vibrates a portion of the glass screen to simulate a button).

A growing number of add-on apps are designed to assist users with low vision, many of them built to take advantage of onboard cameras and the *VoiceOver* or

TalkBack settings. As noted previously, apps designed to magnify text or images use mobile device cameras to allow the smartphone or tablet to work as a magnifying scanner. Other apps read paper money denominations, identify objects, colors and light sources, or add voice-driven directions to GPS-based maps. In most cases, these apps are inexpensive, allowing a user to acquire a suite of ATs onboard a smartphone or tablet that are quite versatile and affordable, providing users' unprecedented access to news, communication options, and the world around them. See Table 22.1 for a list of apps designed for users with vision impairment (iTunes 2013; Playgoogle.com 2013).

Adaptive Devices

There is a wide variety of devices designed to compensate for vision loss while simplifying daily routines and improving safety (Fig. 22.3). Extra-large universal remote controls, extra-large calendars, large-print books, watches with magnifying lenses, and liquid-level indicators are among the many items that can be purchased. As more people acquire vision impairments, Internet resources for online shopping have become more sophisticated and accessible to the low-vision community. Occupational therapy practitioners should strive to stay up-to-date on these resources so that they can teach clients how to navigate through them and make needed viewing adjustments. Some online Web sites offer opportunities for contacting vendors and for consumers to receive electronic alerts when new equipment becomes available. OTs knowledgeable about such features will be more helpful to their clients.

How Low-Vision Rehabilitation Enables Independence

Low vision creates major disruptions in family life, employment, and social interaction, and often leads to functional dependence and depression (Cimarolli et al. 2012). While AT improves function and decreases problems with mood and depression (Raasch et al. 1997), older adults unfamiliar with the devices and how to acquire them may experience difficulty in deciding about their initial and ongoing use.

Obstacles to the Use of AT

While obtaining assistance for purchasing AT seems to be improving, cost appears to remain a primary barrier to acquiring all AT, including low-vision devices (Carlson et al. 2001; LaPlante et al. 1992). Limited knowledge of the varieties and types of device available also contributes substantially to either never acquiring devices or delaying acquisition (Leonard 2002; Mann et al. 1993). Once solutions to these barriers are found, older adults face other concerns in the process of making decisions. For example, with self-images altered from disability, older adults

Table 22.1 Mobile device applications for people with vision impairment

App	Cost (US)	What it does
iOS (Apple products)		
Looktel Money Reader	$ 9.99	Uses camera on iOS devices to read denominations of paper money out loud. Reads dollars and euros
TapTapSee or oMoby	Free	Uses camera and Wi-Fi to identify any object
Lumin		Uses camera to magnify any observed object or material
VoCal	$ 1.99	Spoken word reminders
RxmindMe	Free	Set medication reminders using VoiceOver; receive spoken word prompts
Ariadne GPS	$ 5.99	This app links Google Maps and the VoiceOver accessibility feature on iOS devices to read aloud locations and directions. You can drag your finger over a map for spoken map reading. Crossing a street causes your iPhone to vibrate. You can use it to find stops on a bus, too
Voice Brief	$ 2.99	One touch reads aloud email, weather, news, Facebook feeds, etc. in clear and natural voices. Free lite version if you want to try it out
VM Alert	$ 1.99	This app uses the camera on your iOS device to detect motion and alerts you with a gentle audio alarm
List Recorder	$ 0.99	Works with VoiceOver and Braille displays, allowing you to make audio or text lists
Talking Scientific Calculator	Free lite or $ 4.99 full	Uses VoiceOver to read calculations aloud. Also has brightly lit enlarged display
Flashlight	Free onboard	Turns screen into a bright flashlight
Light Detector	$ 0.99	Uses camera to track light sources, emitting a sound that intensifies as you approach the light (good for finding exits, windows, turning off lamps, etc.)
Color ID	Free	Spoken word identification of colors. English or Spanish
Chime	Free	A clock app that chimes the hour, half hour, and quarter hour
Vision Sim	Free	This app demonstrates what it is like to have various visual impairments. Point the device at anything, and the camera dims appropriately, using filters that simulate the impairment
Android OS Apps		
Dragon Dictation	Free	If you do not have Siri or use an Android device, dictate to this app and it will create a text version for you to use (also for iOS)

Table 22.1 (continued)

App	Cost (US)	What it does
Dragon Go	Free	Again, works like Siri. Speak into your device with the app open and it will search the web for you ("Where is the nearest ice cream shop," for instance). Does not, however, speak to you, as Siri does (also for iOS)
Google Goggles	Free	Works with camera, TalkBack, and Wi-Fi to identify objects, paper money, etc
Magnify	Free	Uses camera to magnify objects
Voice Reminder	$ 1.69	Spoken word reminders
Super Bright Flashlight	Free	For devices with LED flash
Read Aloud	Free	Reads newsfeeds aloud in a natural voice
Color ID	Free	Spoken word identification of colors. Spanish or English
Hourly Chime	Free	Hourly chime alarm, customizable, has vibrating alarm option

Fig. 22.3 Examples on adaptive devices

often ask how assistive devices might change others' perceptions of them and their own sense of roles, responsibilities, and status in their families and communities (Copolillo 2001; Gitlin et al. 1998).

Questions about one's capability of using a device arise, and older adults react to them by examining whether they are young and healthy enough to manage, sometimes concluding they are too old and too sick (D'Allura et al. 1995). Older adults' perceptions that device use is not yet warranted can also delay the decision to search for, acquire, and integrate a device (Copolillo 2001). Some studies indicate that stigma and a potential for marginalization are considered when deciding when and under what circumstances to use devices (Copolillo 2001; Krantz 2012). An advantage of using vision-enabling tools on smartphones and other handheld devices is that they are the same device that everyone else uses and therefore do not have potential for being stigmatizing.

In addition to the negative attitudes toward low-vision devices, other problems that may affect device use include increased dissatisfaction with the devices as vision worsens (Mann et al. 1993), and quality and quantity of training in their use. AT practitioners must factor in these changes and provide avenues for follow-along and adaptation as needs and situations change. Poor ability to transfer what has been learned in a training environment to the community can also hamper ongoing device use (D'Allura et al. 1995). Again, the OT managing assistive devices must strive to incorporate training to use them in the contexts, where these tools will be used, so as to promote more successful adoption.

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Case Study of Darius: Use of Assistive Devices to Overcome Low-Vision Impairment

Keywords Assistive technology, Macular degeneration, Vision impairment

Introduction

The theme of this case study is use of assistive technology with a client with vision impairment from macular degeneration.

The student's tasks include:

- Reviewing the wide range of options available for magnification, lighting, home adaptation, and computer app technologies for use by the client.
- Reviewing the challenges of acquiring and learning to use assistive technologies for people with low vision.

Overview of the Content

Major Goals of the Intervention

The goal of the intervention for Darius is to assist him to find and use assistive technology that allows him to function independently in his home and remain active in his community.

Learning Objectives

By the end of this chapter, student will be able to:

1. Identify likely candidates for use of assistive devices,
2. Discuss the process of service provision and the variety of low-vision services, and
3. Identify the variety of low-vision technologies available to people with low vision.

Background

Personal Information

Darius is a 60-year-old man, formerly employed as an electrical engineer. He lives alone in a three-level townhouse in a suburb of a mid-sized city. About 1.5 years ago, Darius began to experience problems with reading. The lines were wavy and his vision seemed blurred in spots. As his vision deteriorated, Darius began having problems completing projects on time at work. He eventually was dismissed with early retirement from his position. His supervisor assured him that the dismissal was not related to his vision loss, but Darius felt uncertain about it. He also began to have serious problems in his marriage of 8 years which eventually might be ended in divorce. He has no relatives living in the area. He continues to drive in the daytime.

Pertinent Medical History

Darius was diagnosed with macular degeneration, wet type. His vision continued to deteriorate over several months and then, following ophthalmologic treatment, stabilized at 20/180 acuity in the best eye. He has been diagnosed with clinical depression for which he takes medication and sees a psychotherapist once a week.

Occupational Therapy Interventions

Evaluation in Darius's home by an OT revealed the following:

- Darius loves good food. He likes to prepare meals when at home but also loves dining out. He especially likes trying new restaurants.
- Money management is a challenge for him. He uses a computer software program for online bill paying and account reconciling but still has difficulty reading the computer monitor.
- He plays golf but is dependent on friends to take him to the course. Friends are hesitant to golf with him because he requires several attempts to hit the ball and needs someone to help him find the ball.
- Darius uses a telescopic lens to assist him with driving. He only drives in the daytime and only very short distances.

The Students Report

The following guiding questions have been identified in developing possible solutions to Darius:

1. What added information is needed to sufficiently determine Darius's assistive device needs in the home and community?
2. What client-centered goals should the OT develop with Darius to move him toward safe, independent living?
3. What assistive technology devices should the OT recommend for Darius?
4. What additional therapeutic services might the OT recommend to Darius?

Chapter 23
Eye Tracking: Eye-Gaze Technology

Judy A. Lariviere

I like the Tobii eye-gaze system, because it's fast and accurate. When I used a switch access device, it would take me at least twice as long to find my comments. With Tobii, my comments are more accessible, so it's easier to say what I mean and be myself. Gabriela Cellini.

Also see Steve Gleason—former National Football League (NFL) Player who lives with Amyotrophic Lateral Sclerosis (ALS) and is using a Tobii EyeMobile with a Microsoft Surface. He was featured in a Microsoft advertisement during the Superbowl in Feb 2014. Here is a link to his video "No White Flags" https://www.youtube.com/watch?v=JObFlEvc-Eg

Abstract With ongoing advancements in eye-tracking technology, more individuals with complex communication needs (CCN) and who have limited arm and hand movements are exploring the use of eye-gaze technology for accessing their augmentative and alternative communication (AAC) devices. This chapter outlines the various factors that need to be taken into account when evaluating an individual's ability to use this technology; many of these relate to the roles and functions of an occupational therapist as a member of a multidisciplinary team. Clinical research examining the suitability of eye-gaze technology for various populations is limited; documentation of its effectiveness is based on individual's testimonials or reports. A case study highlights the role of the occupational therapist in conducting eye-gaze trials with a girl with Rett syndrome.

Keywords Accessibility · Assistive technology · Augmentative and alternative communication (AAC) · Eye-gaze technology · Eye-tracking technology · Gaze interaction

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Background, Definition, and Usability

Eye-tracking systems use infrared lighting and cameras to determine the location or item on a computer screen at which an individual is looking or fixing his or her gaze (Fager et al. 2012).

Eye-tracking technology has evolved over the years through its application to research in marketing, usability as it relates to scanning and processing of information displayed on web pages, as well as psychological research. With advances in eye tracking with infrared technology over the past 10 years, the application of this technology as a computer interface for individuals with complex communication needs (CCN) and severe motor disabilities has been explored (Fager et al. 2012). Beginning in late 2008, manufacturers of augmentative and alternative communication (AAC) devices introduced eye-gaze systems that could interface to and function on portable AAC devices powered by rechargeable batteries. Prior to this advancement, AAC devices with the eye-gaze technology required an independent power supply (i.e., AC power supply). Earlier eye-gaze systems were more often explored as an access option for literate adults who essentially were "locked in" by their motor limitations, but who needed a means of expressive communication (Ball et al. 2010; Fager et al. 2012).

Basic research usability. Eye-tracking technology has multiple research uses in the field of *marketing and advertising* for identifying features, colors, or placement of graphics and text which capture and hold an individual's visual attention and focus (Purits and Söderback 2013). Eye-tracking research is gaining widespread application in *studying human function*. Results gained insight into the communication potential and cognitive abilities of individuals with disabilities by studying their fixation and gaze patterns to presented visual stimuli, e.g., in girls with Rett syndrome (Djukic and McDermott 2012; Djukic et al. 2012) and individuals with Autism (Norbury et al. 2009; Wagner et al. 2013).

Clinical usability. Today, the *eye-gaze technology* has widespread application to persons with physical disabilities which affect their hand and upper extremity use; it provides a direct means of access to onscreen keyboards, customized layouts of buttons on pages with symbols, words, or phrases for face-to-face communication using an AAC device or written expression through email or social media. Complete hands-free control of Windows-based applications is possible as advancements in eye-gaze technology hardware and software provide options for performing mouse functions, and most recently, touch-screen gestures on a tablet, such as the Tobii EyeMobile, using one's eyes (Tobii Technology 2013; Fig. 23.1).

Literate adults use the eye-gaze technology to access an onscreen keyboard for written communication, email, and social networking. When using an onscreen keyboard, it is often used in conjunction with word prediction and abbreviation expansion so that a user does not need to spell full words that he or she is typing.

Eye-gaze technology can also be used to access other software applications that are available on a computer-based AAC device including web browsers for researching information or accessing online services such as banking or shopping, for reading digital books, magazines, or news articles, and for entertainment purposes such as watching movies, listening to music, or playing games.

Fig. 23.1 Tobii EyeMobile on Windows 8 Pro tablet supported in an upright position on Daessy C-shaped desktop stand. © 2012 Daedalus Technologies, Inc. Tobii Gaze Selection interface is displayed on the right side of the screen, which in conjunction with Tobii's Windows 8 Functions Overlay, gives users hands-free access to Windows 8 apps through the eye-gaze technology (Tobii Technology 2013). © 2013 Tobii Technology. (Photo: Judy Lariviere)

Purpose

This chapter focuses on how eye-gaze technology is used to help *people with disabilities* access an AAC device, also known as a speech-generating device (SGD), to support face-to-face and written communication, and increased independence (Fager et al. 2012; Tobii Assistive Technology 2012; Tobii Technology 2010).

How eye-gaze technology works as an access interface. Eye-tracking systems use infrared technology in a remote eye-gaze accessory that is connected a computer. Invisible, but safe levels, of infrared light illuminate the user's eyes and create reflections off the surface of the eye. Cameras in the remote eye-gaze accessory capture the image of the reflection of the light off the cornea and pupil (Tobii Technology 2010). Complex mathematical computations are performed by the computer to determine the direction of the gaze on the computer screen; in other words, the location or button at which the user is looking or fixing their gaze. As soon as the mouse pointer moves to this location of the screen, selection of the specific item/button containing a symbol/picture, word(s), letter, individual selections, or activations are made in one of three ways: (a) dwelling or maintaining gaze or visual attention on a location for a preset length of time, or (b) by blinking, or (c) through activation of an external switch that essentially performs a mouse click (Fager et al. 2012; Tobii Technology 2010).

Most eye-gaze systems have communication software that integrate a "snap-to-grid" feature that works by automatically moving the mouse pointer to the center of the nearest item or button on the screen where a person's eye gaze is detected. This represents an easier motor pattern, especially for children learning to use an eye-gaze system for communication, in comparison to the level of skill and accuracy required for controlling the mouse or cursor movements in an open Windows environment through mouse emulation or recently developed gaze interaction techniques.

Method

Candidates for the Intervention

Eye-gaze technology is becoming more widely used and is suitable for children and adults with various disabilities, including the following:

- *Severe physical disabilities* and *developmental disabilities* (Fleming et al. 2010)
- Autism (Norbury et al. 2009)
- *Motor disabilities* (Chin et al. 2008; Najafi et al. 2008),
  - Amytrophic lateral sclerosis (ALS; known as Lou Gehrig's disease/motor neuron disease; Ball et al. 2010);
  - Cerebral palsy
  - Stroke/aphasia (Wallace and Bradshaw 2011)
  - Spinal cord injury (Boatman 2013);
  - Other individuals with CCN who rely on eye movements for access to an AAC device (Fager et al. 2012) including Rett syndrome (RTT; Baptista et al. 2006; Didden et al. 2010).

Little information is currently available about the selection criteria for prescribing eye-gaze technology across all of these diagnostic groups.

Settings

Assessment of the ability to benefit from using eye-gaze technology as an access method for SGD or a computer can take place in a variety of settings, including a hospital, clinic, home, work, and/or educational settings. When an individual has access to their own eye-gaze system, he/she may use it at home, school, work, and other settings in the community.

The Role of the Occupational Therapist

Prescription of eye-gaze technology, in the USA, is most frequently based on its use with SGDs or AAC devices for face-to-face communication. Funding of SGDs is often approached from a medical standpoint and dependent upon a detailed report from a speech-language pathologist (SLP) and a letter of medical necessity from a physician. This documentation must demonstrate that using a SGD with an eye-gaze accessory enables an individual to independently communicate his/her needs to caregivers across various environments.

With the application of eye-gaze technology to populations with more complex access needs, a thorough *assessment process* will depend upon the participation of a multidisciplinary team including the client, parent(s), family members, SLPs, occupational therapists (OTs), teachers, and other members of the educational team, physicians, and in some cases, opthamologists. The OT's role is to participate in assessments regarding an individual's access to and selection of an AAC device, computer, or tablet by providing information about the individual's physical abilities with respect to:

- The position(s) in which he or she will access the eye-gaze system and the *positioning of the eye-gaze system in relation to the user's eyes* across these positions; natural head and body movements in these positions and how these may impact use of an eye-gaze system. This information would assist in determining which eye-gaze systems to include in a trial based on the dimensions of the system's track box. This track box represents an invisible area in front of the eye-tracking cameras within which the user's eyes and head can move and continue to be tracked or have eye fixations captured.
- The individuals' *natural range of eye movements and pattern of gaze* (i.e., tendency to look up or down), visual tracking with one or both eyes in relation to items presented on a computer screen, field of vision, and length of natural gaze or visual fixation and/or ability to make a controlled blink are important for identification of the selection technique with an eye-gaze system.
- *Sensitivity to contrast of colors* or inability to shift gaze away from specific colors.
- The individual's previous experience in using other access interfaces and why these met with limited success. It is important to document that the user has *tried and used other access methods* such as a switch(s), joystick, optical head pointer, and how these affected his/her ability to use an AAC device to communicate.

This information supports the multidisciplinary team in reviewing the features of available eye-gaze systems and identifying the eye-gaze systems that would provide the best match to the individual's physical, cognitive, and literate profile and for inclusion in eye-gaze trials.

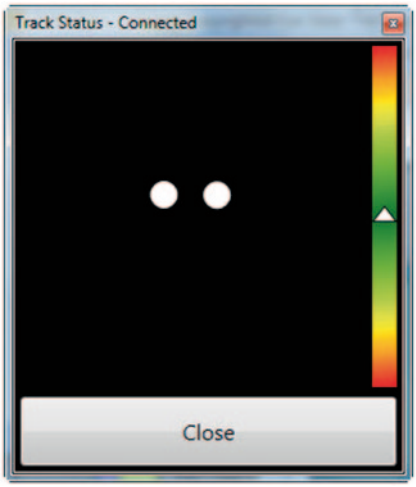

Fig. 23.2 Track Status Window on Tobii I-12. © 2013 Tobii Technology. The white dots show the position of the user's eyes in relation to the eye-gaze accessory or cameras. The white arrow in the middle green portion of the vertical bar on the right side of the Track Status Window indicates that the device is positioned at a suitable distance from the user's eyes. (Photo of the screenshot: Judy Lariviere)

Results

Applications of Eye-Gaze Technology

The *assessment process* takes place over multiple sessions and a trial period of 2 weeks to 1 month, depending upon the age and disability of the client and the application of eye-gaze technology for communication with software or for windows control. It is recommended that users be evaluated using at least two different eye-gaze systems as each eye-gaze system functions differently.

The clinical assessment process consists of the following:

1. Identifying the *locations and positions* in which the individual will use the eye-gaze system.
2. *Positioning the eye-gaze system* in relation to the individual's eyes. The system's *Track Status Window* is retrieved and shown on the computer display to assist with positioning the user's eyes vertically and horizontally in relation to the eye-gaze accessory (Fig. 23.2). An indicator in the Track Status Window or camera view shows when the computer or AAC device with the eye-gaze accessory has the optimal working distance from the user's eyes. Whenever the user or computer/AAC device is repositioned, it is important to display the Track Status Window to ensure that user's eyes are positioned for optimal access and use. Positioning the user's eyes in relation to the Track Status Window is often confused with the calibration procedure, which is completed the first time an individual uses the eye-gaze system.
3. Initiating the calibration process after an individual's eyes are located in the Track Status Window. During the calibration procedure, an individual needs to look at and maintain his/her gaze on specific points on the screen while multiple images of the eyes are taken. The calculated distances of the gaze from the

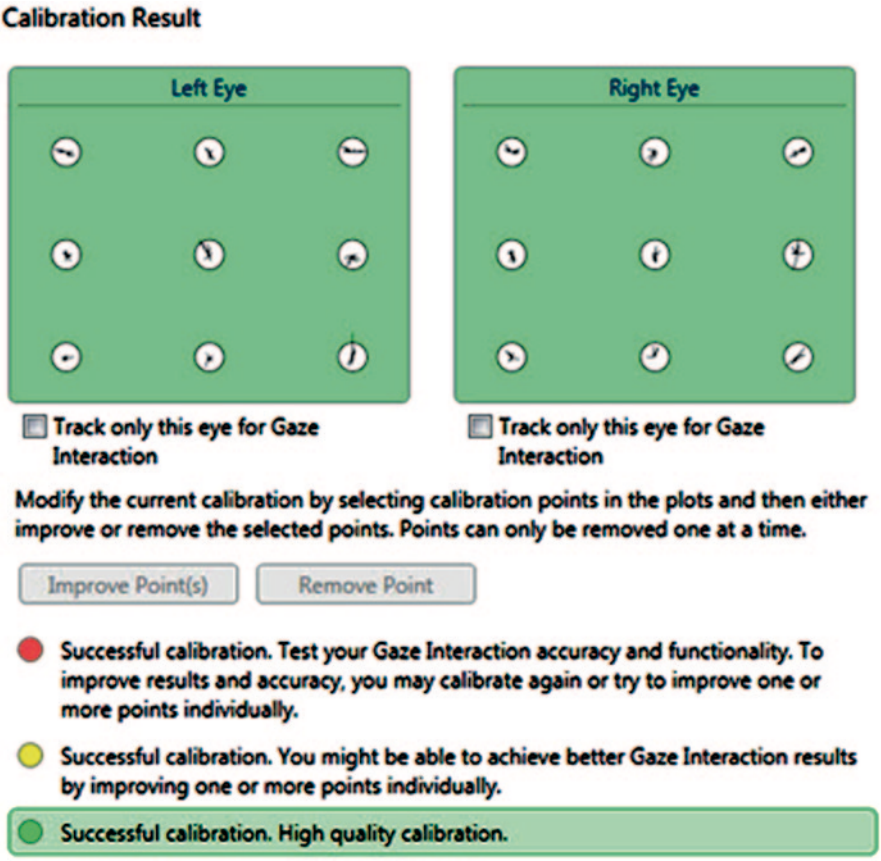

Fig. 23.3 Calibration result of a successful 9-point calibration on a Tobii I-12. © 2013 Tobii Technology. The markings in the center of the circles indicate that the individual fixed and held his/her gaze on the presented visual stimulus during the calibration process. (Photo of screenshot: Judy Lariviere)

calibration points are represented by lines extending outside the calibration area. After calibration has been completed, the results of the process are displayed (Tobii Technology 2010; Figs. 23.3 and 23.4). In cases where a poor calibration is obtained (Fig. 23.4), an individual's parent or sibling can calibrate the system for them as their eyes represent a close genetic match. This strategy ensures the individual is using the eye-gaze system with a high-quality calibration.

4. The communication-based software that will be used on the AAC device will often be determined by the individual's SLP based on his/her assessment of the communication and language abilities dependent on the individual's age, literacy skills, communication skills, symbol, and onset of their disability.
5. Determining the *mounting system*(s) to be used. A mounting system refers to the structure that supports or secures the eye-gaze system in space, often in an

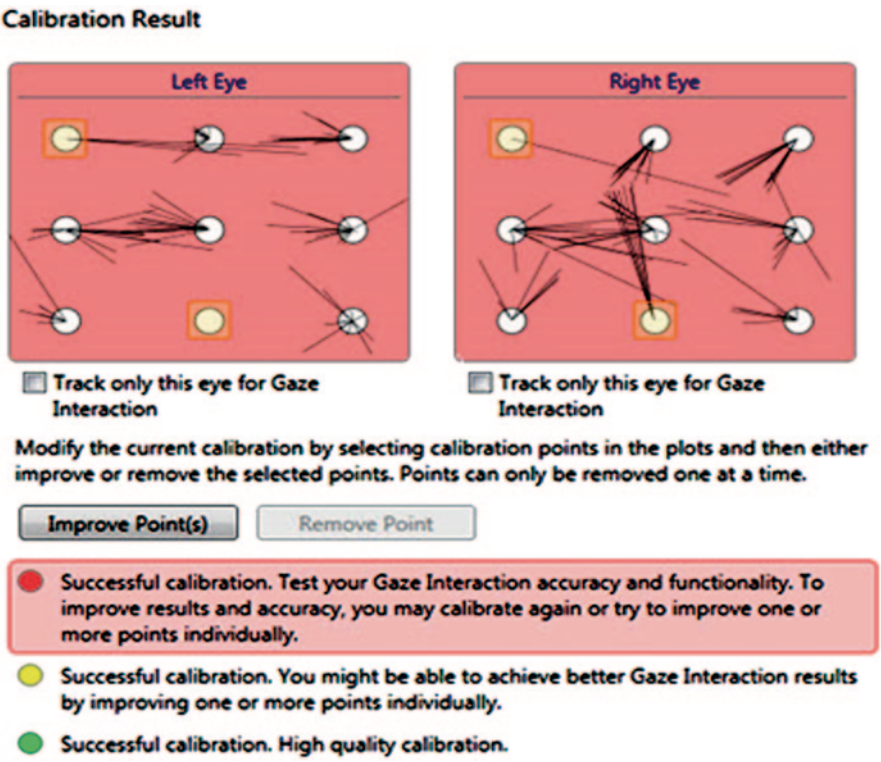

Fig. 23.4 Calibration result of a 9-point calibration on a Tobii I-12 where the user has shifted gaze from the points during the process.© 2013 Tobii Technology. Although the Tobii I-12 reports the calibration as successful, it is suggested that the calibration results may need to be improved through calibrating again or improving one or more points individually. This screenshot shows that the bottom middle gaze point for the left eye needs to be calibrated as the left eye's fixation on this point was not registered during the calibration process. (Photo of the screenshot: Judy Lariviere)

upright or vertical plane, in relation to the position(s) of the user's eyes and head during use of the system. There are various types of mounting systems available for positioning the eye-gaze system for when a user is sitting in a wheelchair or at a desk or table in a classroom, lying down in bed, or standing at a table.

The mounting system will be used to support the eye-gaze system, often in an upright position, in various locations at home, school, work, and in community. Sometimes, users need two different mounting systems to ensure they have access to eye-gaze technology in different positions and settings. For example, a wheelchair mount will meet the need for accessing the device when the user is sitting in their wheelchair but another mount is necessary when he/she is lying down, etc. A rolling floor mount may meet the needs for when a user is at home but a table mount may be more suitable for when sitting at a desk in school.

6. *Trial period*. Then, the individual borrows or rents the device so he or she gains experience in using it to interact with their communication partners in the settings where it will be used.

7. *Integrating* the technology into the client's activities of daily life (ADL). The usefulness of eye-tracking technology is dependent upon the OT's knowledge about human factors and ergonomic design. For example, *positioning* of the client's eyes and the eye-gaze module, the track box and screen sizes, in relation to his/her eyes, tolerance for head and body movements the *software* used for communication, and representative symbol sets. OTs can also contribute valuable input to the *design and layout* of the pages on a screen based on their evaluation of an individual's natural eye-gaze patterns and range of eye movements in horizontal, vertical, and diagonal directions.
8. Recording eye gaze patterns. Clinicians can use Tobii Gaze Viewer software (http://www.tobii.com/en/assistive-technology/north-america/products/software/tobii-gaze-viewer/) to record and view an individual's gaze patterns when he or she is using any application with a Tobii eye tracking accessory. The data can be saved as an image(s) or a movie(s) for playback. The tracking data provides information in the form of heat maps (showing where a user has focused his/her visual attention) and gaze plots (showing the order in which a user has looked at different locations or images/buttons on a screen). Tobii Gaze Viewer gives OTs an assessment tool that provides objective measures for evaluating an individual's access to different areas of the screen, as well as various sizes and layouts of pictures/buttons, using an eye gaze system.

Evidence-Based Practice

General. Most of evidence-based research examines eye tracking and patterns of gaze rather than the users' actual use of eye-gaze technology for communication and other ADL activities. Until now, users' use and emotional experiences of using eye-gaze technology are documented by "stories" like Steve Gleason's (Microsoft 2014). Additional testimonials from people who experience greater independence, access to social networks, return to work, and enjoy artistic expression are available on the Tobii technology homepage http://www.tobii.com/en/assistive-technology/global/user-stories/. Therefore, scientific RTC studies are required.

Evidence-based clinical practice from the author's clinical experiences. An eye-gaze trial page set for girls and women with Rett syndrome that has been programmed in Tobii Communicator (Figs. 23.5, 23.6 and 23.7) for use on Tobii eye-gaze systems (© Lariviere 2009–2014). This page set has been used in more than 200 eye-gaze trials with girls and women with Rett Syndrome while they attend their clinic appointments at Katie's Clinic for Rett Syndrome (UCSF Benioff Children's Hospital Oakland, USA).

The trial page set was specifically designed for *girls with Rett syndrome* based on their natural eye movements from left to right across a page and ease in looking either up or down (Lariviere 2011; Figs. 23.5, 23.6 and 23.7).

Tobii C12 with CEye Module, and more recently, Tobii I-12 and Tobii's EyeMobile, have been used at the clinic as the Tobii eye-gaze systems have one of the largest track boxes. These eye-gaze systems continue to track a girl's or woman's eyes while she also naturally moves her head and upper body.

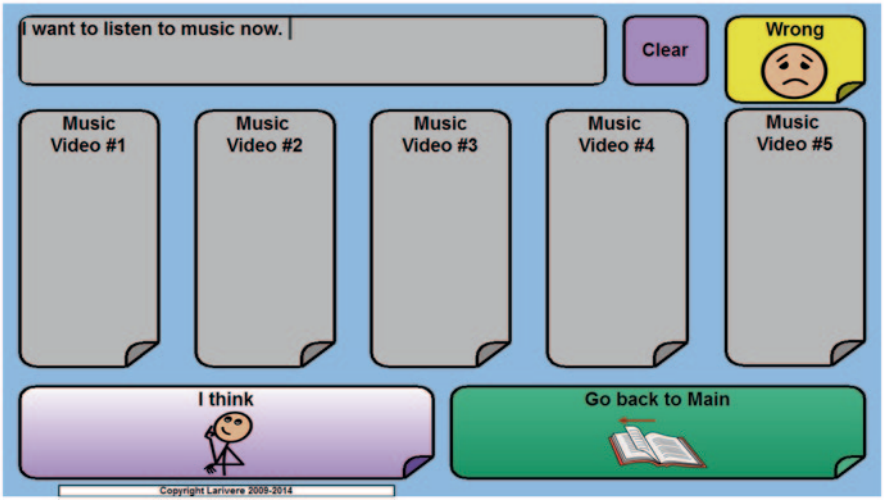

Fig. 23.5 Screenshot of music video page from © Lariviere 2009–2014 Eye Gaze Trial Page Sets for Individuals with Rett syndrome in Tobii Communicator (Lariviere 2009). © 2000 SymbolStix. © 2013 Tobii Technology. (Photo of screenshot: Judy Lariviere)

Music. This software was programmed with two or three of a girl's favorite music videos based on parental report along with pictures representing the content of the videos. A girl selected from among five choices (Fig. 23.5). In addition, she controlled the playing of the selected video by stopping and restarting the video or returning to the main music page to choose a different music video (Fig. 23.6). These music pages were designed to be highly motivating to engage the girls as they naturally looked at the pictures, especially those of a familiar character or a person in it (Djukic and McDermott 2012), to find their favorite videos.

These clinic sessions were videotaped. In reviewing the videos and documenting the selections made, the results showed that the girls showed a preference for their favorite music through repeated selections of it. They also quickly learned how to navigate back to the main music page where they could select from among five different music videos. Moreover, the videotapes showed that their eyes started to fatigue after 15–25 min of their introduction to eye-gaze technology. When they showed signs of fatigue, the girls and women were taken to a "Something's wrong" page (Fig. 23.7) and the available options were named. The girls often repeatedly selected the buttons, "I'm tired" or "I need to rest my eyes" and then looked to the therapist or parents to acknowledge their selection and respond to what they were communicating.

Given Tobii Communicator included a "snap to grid" feature, this enabled the eye-gaze system to determine the locations of where a girl's eyes were fixing or gazing and then shift the focus or mouse pointer to the center of the nearest icon or button on the screen. This feature reduced the motor demands involved in using their eyes and supported their use of the different pages in Lariviere's Eye Gaze Trial Page Set for girls with Rett syndrome to communicate their intent or preference.

Fig. 23.6 Screenshot of music video player page from © Lariviere 2009–2014 Eye Gaze Trial Page Sets for Individuals with Rett syndrome in Tobii Communicator (Lariviere 2009). © 2000 SymbolStix. © 2013 Tobii Technology. (Photo of screenshot: Judy Lariviere)

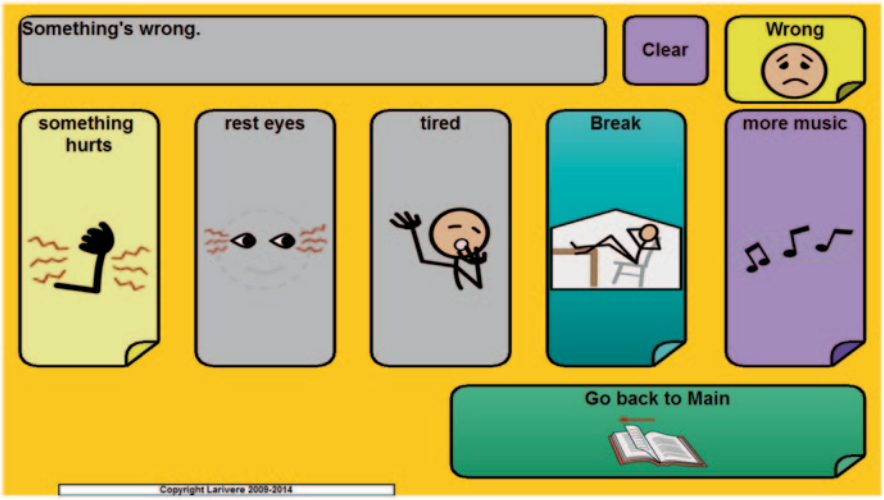

Fig. 23.7 Screenshot of Something's wrong page from © Lariviere 2009–2014. Eye Gaze Trial Page Sets for Individuals with Rett syndrome in Tobii Communicator (Lariviere 2009). © 2000 SymbolStix. © 2013 Tobii Technology. (Photo of screenshot: Judy Lariviere)

Discussion

The ongoing improvements in the field of eye-gaze systems are increasing the affordability of eye gaze as an access method that can be explored with many more individuals with disabilities. It is important for clinicians to be open and willing to explore this access option with their clients, particularly when other methods of access to an AAC device or computer have met with limited success or are very slow and laborious. Eye-gaze technology provides a means of direct selection using one's eyes that mirrors what can be accomplished through pointing or accessing a touch screen with one's index finger. There are many factors to consider when preparing for and conducting an eye-gaze trial. It is important for clinicians to increase their knowledge about eye-gaze technology and become familiar with the features of the different systems that are available. This will enable multidisciplinary teams to identify the two most suitable eye-gaze systems to include in eye-gaze trials with an individual with CCN.

Conclusion

Eye-gaze technology and use of computer-assisted devices have tremendous potential for helping people with motor and other disabilities to communicate and receive information and thus become more independent in their daily life at home, school, and work.

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A Case Study of Shri Living with Rett Syndrome

Keywords Access, augmentative and alternative communication (AAC), communication, eye-gaze technology, Rett syndrome

Introduction

The theme of this case study concerns the occupational therapist's (OT) role in evaluating the features of an eye-gaze system, including its setup and configuration, for supporting the access and communication needs of children or young adults with Rett syndrome (RTT). Rett syndrome is a rare genetic postnatal neurological disorder that occurs almost exclusively in girls, but can be rarely seen in boys. Apraxia and severe physical challenges affect their ability to speak, walk, eat, and in many cases, use their hands. Cognitive assessment in children with Rett syndrome is extremely difficult; recent eye-tracking research and detailed accounts of what girls and women are expressing spontaneously using an *augmentative and alternative communication (AAC) device* with eye-gaze technology are providing insight into their true communication and learning potential.

Moreover, this case study demonstrates the role of OTs within a multidisciplinary team in terms of identifying those tasks or activities in which a child with RTT may use an AAC device with eye-gaze technology to actively engage throughout the day, both at home and at school. In these situations, the eye-gaze system represents a means for a girl to use communication as a means for participating rather than relying on more passive hand-over-hand physical assistance during these activities.

The occupational therapy interventions (OTIs) addressed in this case study also have applications to other children and adults with CCN and severe motor disabilities.

The students' tasks include:

1. To recognize the unique role of an OT as a member of a multidisciplinary team in analyzing an individual's natural range of eye movements, field of vision, length of visual fixation, head and body movements, and how this information can be used to identify the most suitable eye-gaze system.
2. To identify the importance of seating and positioning in relation to eye-gaze technology, the positioning of a person's eyes relative to the "track box" of an eye-gaze accessory, the length of dwell and visual feedback settings for effective use of an eye-gaze system, as well as strategies for successful calibration of the system.
3. To identify how a child or young adult with RTT can use an eye-gaze system to socially interact with communication partners and direct their actions in completing various classroom and leisure activities rather than always relying on participation through hand-over-hand physical assistance.

As a starting point, students should use the following references to gather background information:

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Overview of the Content

One of the major goals of the OT's intervention was to identify an eye-gaze system that was easy for Shri to access using her natural range of eye movements, quick to set up and use in her classroom environment, and provided her with efficient ways to communicate her physical and emotional needs related to her sensory regulation. In conjunction with Shri's AAC specialist and parents, the OT also played a role in setting up and configuring the settings and design of the vocabulary pages on the eye-gaze systems being trialed so that these would support Shri in her communication. The OT played a role in supporting how Shri used her eye-gaze system in different settings to communicate and actively learn and participate in classroom activities, and have independent access to some leisure activities at home based on her interests.

Learning Objectives

1. To identify those factors to consider in identifying the best positioning and configuration of the eye-gaze technology that is most effective for Shri, and others with Rett syndrome, during trials with different systems and when using her own AAC device with eye-gaze technology.
2. To recognize the role that Shri's natural range of eye movements play in customizing vocabulary pages in terms of size of buttons and page layout to support ease of access.
3. To identify those activities in which Shri and other children with RTT can actively participate through social interaction or communication using an AAC device with eye-gaze technology throughout her day.

The Background History of the Clinical Case Study

Personal Data Shri was a 9-year-old girl with Rett syndrome. She lived at home with her mom, dad, and older brother. She attended an elementary school where she was enrolled in a third-grade classroom with other students with disabilities.

Shri was nonverbal and her eyes represented her best means of access to a communication device. She used a Prentke Romich Company (PRC) ECO2 with ECO-Point with Unity 45 Sequenced language system (Fig. 23.8). Shri received funding for this speech-generating device with eye-gaze accessory through insurance based on the recommendation from her AAC specialist. An OT was *not* involved in the trials and selection of this device.

Prior to this time, Shri used a communication device, Tango, which had a dynamic touch-screen display consisting of six vertical buttons arranged horizontally across the middle of the device (Fig. 23.9). Shri had limited hand function, which is why she did not consistently have sufficient control and strength to press the larger arrow buttons on the Tango for navigating between topics. Although she could use a single switch with her left hand in combination with automatic auditory scanning set to only scan the arrows and outer buttons, this method of access was found to significantly slow down her interactions with her family members and her classmates. As a result, she often directed her communication partner to change between topics or to different areas of the Tango vocabulary using partner-assisted scanning. Her communication partner would say out loud the different choices to which Shri could navigate, such as "*more choices*; *new topic*; *home*; *poptalk,*" etc. and when Shri heard the choice she wanted, she would give one of her "*yes*" responses to her communication partner.

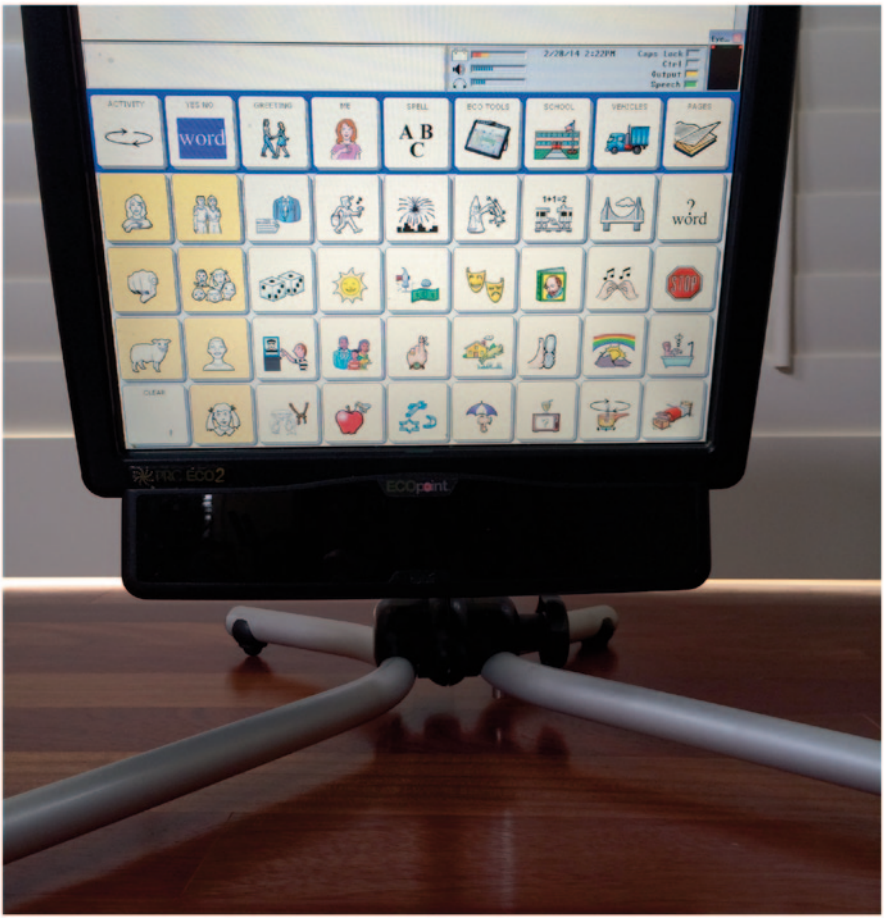

Fig. 23.8 Prentke Romich Company (PRC) ECO2 with ECOPoint with Unity 45 Sequenced vocabulary/language system. (Photo: Judy Lariviere)

Fig. 23.9 Tango AAC device. The horizontally arranged six buttons in the middle of the device were activated through a touch display or screen. The arrows surrounding the screen supported navigation between the dynamic display screens for accessing additional vocabulary on the same topic and for changing topics. The outer buttons provided access to the home screen, alphabet, volume control, and PopTalk, which included high-frequency, quick phrases. (Photo: Judy Lariviere)

Disability

Shri's motor and speech disability. She was not able to walk independently, but she walked with support of an adult from behind her for short distances and was pushed in a manual wheelchair for traveling longer distances at school or in the community. She could sit unsupported on the floor in ring sitting or using a supportive seating insert secured to a wooden chair. At school, she sat in a wooden chair with adaptations and standby supervision. Shri was *unable to speak,* thus she was introduced at a young age to AAC devices, so that she had access to a voice to express herself. Shri could use her full left hand to activate raised and large buttons on her musical toys when highly motivated as this emotional engagement helped her to overcome her apraxia or challenges with motor planning. She did not have the ability to grasp and hold objects or isolate her index finger to touch or press keys on a keyboard or iPad. Shri relied on using her eyes with an intense stare to connect socially with people in her life. She had various ways to communicate a "yes" response or to indicate her agreement with a statement including looking at her communication partner, raising her eyebrows, vocalizing, smiling, and increasing her rate of breathing. In addition, Shri used various means for giving a "no" response by looking away or keeping her body very still.

Reason for Seeking Occupational Therapy

Given Shri's motor challenges in accessing all areas of the screen using her eyes with her ECO2 with ECOPoint in combination with the limited gains she demonstrated in her communication abilities, Shri's mom requested the assistance of an OT with an expertise knowledge in assistive technology to explore Shri's access to an AAC device incorporating eye-gaze technology. In collaboration with Shri's new (AAC) specialist who was also a speech language pathologist, trials were conducted with various AAC devices incorporating eye-gaze technology to determine the communication device that would support Shri's ease of access using her eyes.

When working with Shri using her ECOPoint, the OT identified that she experienced difficulty in accessing buttons on the right side of the screen with the most difficulty in selecting buttons in the lower right corner. These observations were consistent with her parents' report. Shri's parents had taken her to an ophthalmologist who determined that she did not have any visual field cuts or other undiagnosed problems with her vision. It was identified that Shri had many sight words and the 2-hit Unity did not build on her ability in this area. As text was not displayed on the buttons with this language system, Shri had to make her selections based on the meaning of the icons and their location. It was also noted that combining words together in the correct sequence to access single words was very physically demanding for her, based on her apraxia. As an interim measure to increase Shri's success in her interactions with her communication partners at home and at school, the ECOPoint version of The Dynamic Communication Book for Girls was pro-

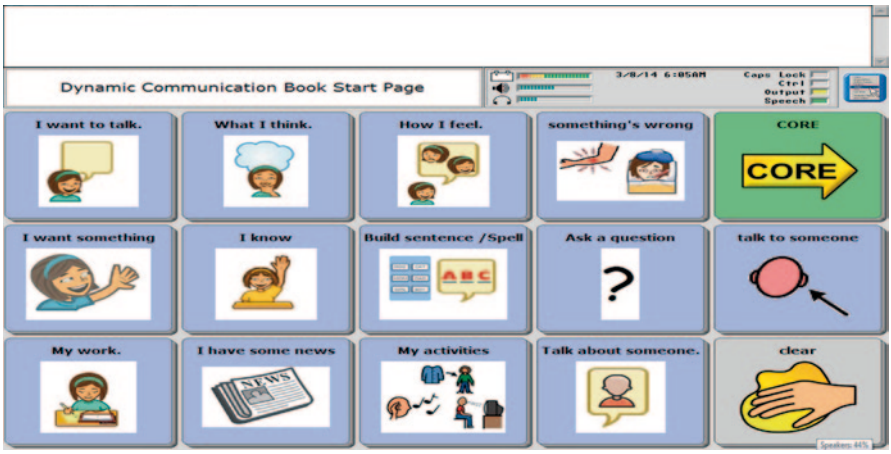

Fig. 23.10 Screenshot of start page of Pati King-DeBaun's Dynamic Communication Book © 2010 Creative Communicating, set up in Prentke Romich Company's ECO2 PASS Demo software. © 2014 Prentke Romich Company. (Screenshot taken by Judy Lariviere)

grammed onto her eye-gaze device (Fig. 23.10). This comprehensive communication system was developed by Pati King-DeBaun based on her integrated model of communication instruction.

Shri already had previous experience in using an eye-gaze system, so she was given access to the Dynamic Communication Book for Girls. The layout was customized in the same way that her OT had already developed for girls with RTT. This layout was based on the girls' natural eye movements from left to right across a page and their ease in looking either up or down (Fig. 23.11). Shri was first introduced to Tobii's EyeMobile because of its smaller screen size and the ability of this eye-gaze system to keep tracking one's eyes with head and upper body movement.

Given Shri's apraxia, it was difficult for her get a good calibration with the EyeMobile.

Calibration is the process during which an individual needs to focus their visual attention for a few seconds on visual stimuli, displayed in the form of a circle, image, or small video, at different locations on the screen in a predetermined sequence for a 5- or 9-point calibration of the eye-gaze accessory. Therefore, her mom calibrated the eye-gaze systems during the trials, because her mom's eyes represented a close genetic match to Shri's eyes and it was important for Shri to use a good calibration for improved accuracy in her selections in all areas of the screen. Each time Shri used the EyeMobile, Shri's eyes were first located in the Track Status window for optimal positioning of the eye-gaze system in relation to her eyes. The dwell, the setting that determines how long Shri needed to look at a button in order to select it, was set to approximately 397 ms given she experienced difficulty in sustaining her gaze longer than this to select the button with her desired message. The visual feedback was also set to a red clock so that her communication partners could see when she was looking at a specific button but not long enough to select it using the

Fig. 23.11 Tobii EyeMobile with main page from Pati King DeBaun's Dynamic Communication Book for Girls © 2010 Creative Communicating in © 2009–2014 Lariviere Eye Gaze Layout in Tobii Communicator. © 2013 Tobii Technology. The EyeMobile was supported on a Daessy C-Shaped Desktop Mount. © 2012 Daedalus Technologies, Inc. (Photo: Judy Lariviere)

dwell setting so that her communication intent and motor approximations could be acknowledged (Fig. 23.12).

Shri had the opportunity to use the EyeMobile for a 2-week period at home. She also had a few opportunities to try out using the EyeMobile at school. Shri's access to and use of the Tobii I-12 with a dwell of 600 ms was also evaluated over a 2-week trial period at both home and school, as these represented the primary locations where she would be using these AAC devices to interact with her family members, teachers, therapists, and friends (Fig. 23.13).

The screen Shri used was slightly larger on the Tobii I-12; Shri was observed to experience more difficulty in accessing the buttons on the far right of the screen. The option of reducing the size of the displayed pages within Tobii Communicator was used to decrease the height and width of the page set to 80 % and position it in the top left corner of the screen (Fig. 23.14).

Using this feature, the page set was shifted to the top left of the screen to accommodate Shri's reduced visual field when using the page set so that she could easily access the buttons positioned on the right side of the screen (Fig. 23.15). In addition, the Tobii I-12 was positioned to the left of midline to build upon Shri's ease in

Fig. 23.12 Screenshot of Visual Feedback settings for Gaze Interaction used with Shri on Tobii eye-gaze systems. © 2013 Tobii Technology. (Photo of Screenshot: Judy Lariviere)

Fig. 23.13 Tobii I-12 with main page from Pati King DeBaun's Dynamic Communication Book for Girls in © 2009–2014 Lariviere Eye Gaze Layout in Tobii Communicator © 2013 Tobii Technology. The Tobii I-12 was supported on a Daessy C-shaped desktop mount. © 2012 Daedalus Technologies, Inc. (Photo: Judy Lariviere)

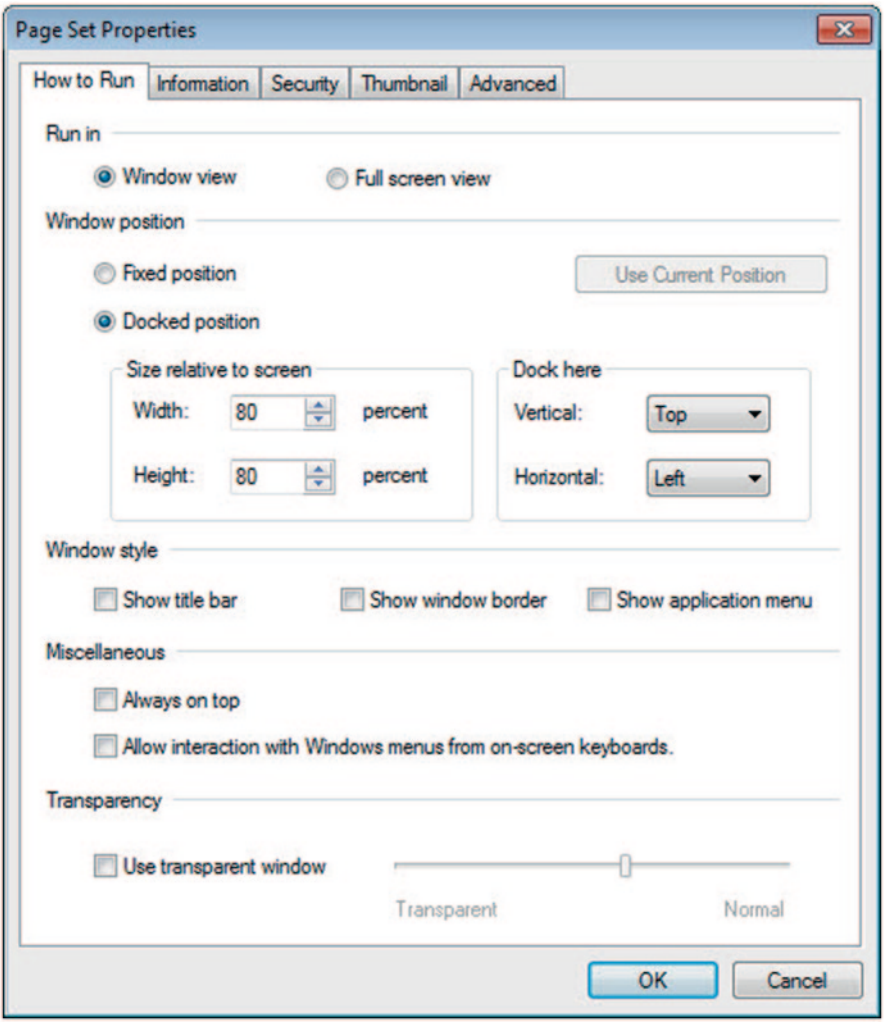

Fig. 23.14 Screenshot of Page Set Properties feature in Tobii Communicator showing settings for reduced Window view with the docked position of 80% width and height in the top left corner of the screen. © 2013 Tobii Technology. (Photo of the screenshot: Judy Lariviere)

looking to the left and her increased difficulty in accessing buttons on the right side of the screen. These adjustments assisted her in accessing all of the buttons on the page so that her access supported her communication.

Current Circumstances

Shri received a Tobii I-12 after funding was approved for this device. Shri was given access to Pati King-DeBaun's Dynamic Communication Book that was programmed

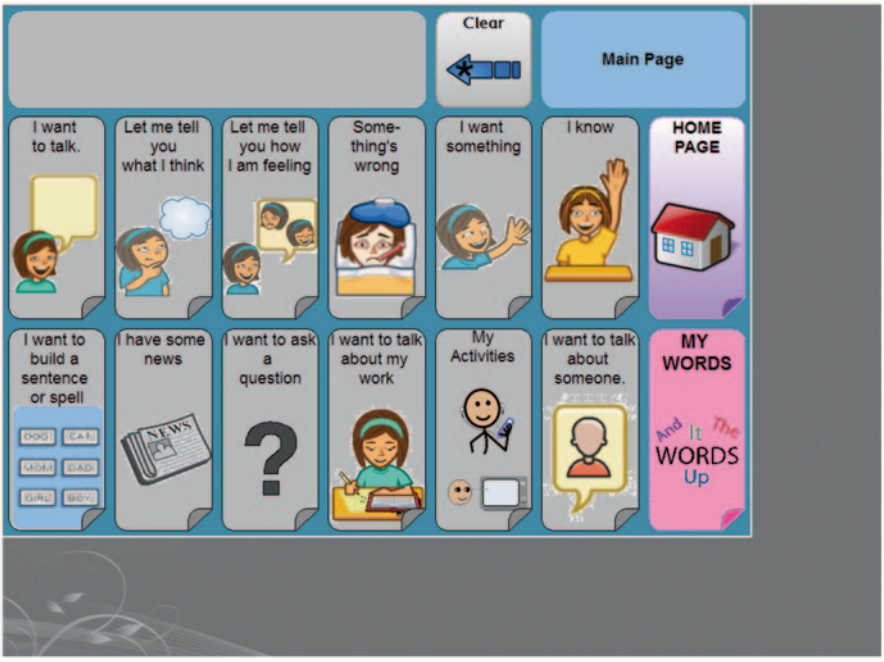

Fig. 23.15 Screenshot of Window view of Tobii Communicator with the height and width of the page-set set to 80% relative to the screens size and positioned in the top left corner of the screen. Page set properties feature in Tobii Communicator showing settings for reduced Window view with the docked position of 80% width and height in the top left corner of the screen. © 2013 Tobii Technology. (Photo of the screenshot: Judy Lariviere)

in Lariviere's eye-gaze layout,[1] which supported ease of access for girls with Rett syndrome. Through her use of the Dynamic Communication Book, Shri had access to vocabulary for greetings, expressing feelings, opinions, indicating when she needed or wanted something or someone, asking questions, and participating in activities for home such as directing another person in reading a book, cooking, playing with a doll, watching television, going shopping, etc.

Occupational Performance Issues

Because Shri had limited hand use, she required assistance with her work related to learning and participation in various classroom activities (i.e., reading, writing, art, and music), leisure in independently accessing books she could read silently or have read to her, access to music, and music videos. More specifically, she re-

[1] Screenshot of activity page from Pati King DeBaun's Dynamic Communication Book for Girls in © Lariviere 2009–2014 eye-gaze layout in Tobii Communicator.

quired hand-over-hand assistance to pick up and hold a crayon or pencil and make marks on the page but did not have a way to actively participate in art class or other classroom-based activities involving arts and crafts. She also experienced difficulty in turning pages of a book because of her hand function but showed an interest in independently accessing books she could read on her own. Shri was developing her independent writing skills using technology; words that she spelled phonetically with a communication partner using partner-assisted scanning with an alphabet flip-book, represented close approximations to conventional spelling. She also loved music, but did not have a way to independently access and play a selection of songs, like other children using an MP3 music player.

The Student's Report

The following guiding questions have been identified in developing possible solutions:

Questions

1. Based on the background information about Shri, what are some important considerations for her from a vision and positioning perspective that will support her ease of access to her Tobii eye-gaze system?
2. Taking into account Shri's occupations at home and school, what areas in the near future would you recommend be included or programmed into her Tobii eye-gaze system to help her fulfill these roles?

Additional information

Lariviere J (2009) Eye gaze trial page sets for girls with Rett syndrome. Can be purchased by contacting J Lariviere by e-mail at judy@assistivetech4all.com

Tobii Technology AB (2010) Tobii eye tracking: an introduction to eye tracking technology and Tobii eye trackers. Tobii Technology Whitepaper January:3e11 http://www.tobii.com/Global/Analysis/Training/ WhitePapers/Tobii_EyeTracking_Introduction_WhitePaper.pdf. Accessed 26 Feb 2014

Chapter 24
Universal Design as a Workplace Accommodation Strategy

Jon A. Sanford and Susan Stark

Abstract Universal design is an accommodation strategy that is compatible with the International Classification of Functioning, Disability and Health (ICF) constructs of activity and participation. It is rooted in a rehabilitation paradigm that integrates human factors with social equity approaches into accommodation practices that provide opportunities to achieve both usability and inclusivity for employees with all types and levels of ability across their work life as well as the life of the work. This chapter introduces the reader to universal design principles and accommodation strategies aimed at enhancing work outcomes for employees over time and across abilities.

Keywords Universal design · Workplace accommodations · Work activity · Workplace participation

Purpose

Universal design (UD) is an accommodation strategy that is compatible with the International Classification of Functioning, Disability and Health (ICF). It is rooted in a more assimilative rehabilitation paradigm that integrates human factors and social equity approaches into accommodation practices that provide opportunities to achieve both usability and inclusivity for people with all types and levels of ability. Moreover, by integrating accommodation within the basic concept of the design itself (Imrie and Hall 2002), UD becomes the norm rather than the exception. As a result, UD is an accommodation strategy that introduces a seamless, integrated system of everyday design (e.g., all employees have the same workstations) that facilitates work activity and promotes participation among all employees, regardless of ability (Sanford 2012). By considering the collective needs of a group, as

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well as those of the individual, UD enables all workers to perform work activity and participate in the work milieu. This chapter introduces the reader to UD principles and accommodation strategies aimed at enhancing work outcomes for employees over time and across abilities.

Background

UD in the workplace can enable engagement in work tasks and participation in work roles for employees with all types and levels of abilities. Conceptually, UD does not view disability as a single point requiring specialized intervention, but a *continuum of ability* that considers the widest possible range of body shapes, dimensions, and movements. Moreover, it is an approach to workplace accommodations which allows for contextual (i.e., considerations for coworkers, organizational policies, physical environment, cost, etc.) rather than individualized interventions (Sanford 2012).

The Role of Workplace Accommodations Workplace accommodations play a major role in enabling individuals with disabilities to gain and maintain employment (Gamble et al. 2006; Williams et al. 2006; Yeager et al. 2006). In countries throughout the world, accommodations are required by law to enable individuals with disabilities to perform essential functions of their jobs. However, unlike the removal of physical barriers in public facilities, specific accommodations are not mandated by accessibility codes and standards. Rather, removing barriers to work activity is typically accomplished through a variety of individualized intervention strategies, including assistive technologies (AT), accessible designs (AD), and adaptive strategies.

The Social Nature of Work Despite the success of workplace accommodations in facilitating work tasks, employees with disabilities continue to experience lower levels of employment, job satisfaction, and productivity than those without disabilities (McAfee and McNaughton 1997; Schur et al. 2009; Uppal 2005; Yelin and Trupin 2003). A major reason for these disparities in work outcomes is the way in which workplace accommodations have been understood and implemented.

Historically, success in the workplace has relied on the skills and talents of an employee to complete essential work tasks. While human capital remains vitally important, workplaces now rely increasingly on face-to-face and other interpersonal interactions (i.e., social capital) for success (Kraut et al. 2002).

Social interactions not only relate to job functions but are also strongly correlated with participation and sense of belonging through a sense of a group or organizational identity, and an employee's position within it (Dawes 1991). Social interactions also foster a sense of inclusion and involvement related to a variety of positive work outcomes, including increased individual and firm productivity, increased job satisfaction, greater organizational commitment, career advancement, and less turnover among employees (Guthrie 2001; Pearce and Randel 2004; Randel and Ranft 2007; Whittaker et al. 1994).

Changing Paradigms Unfortunately, as social interactions have assumed a much greater role in the twenty-first century workplace, the prevailing paradigm of activity-focused accommodations aimed at completing essential job tasks has failed to ensure positive work outcomes. As a result, a considerable body of research suggests that job performance (and its correlates including well-being, job satisfaction and productivity) is a function of participation (e.g., social interactions) as well as activity (e.g., job tasks) goals. In fact, among employees with disabilities, lower job satisfaction and productivity outcomes have been linked primarily to *poor social interactions* in the workplace (Uppal 2005).

In contrast to traditional activity-focused approach embedded in disability policies, the International Classification of Functioning, Disability and Health (ICF; WHO 2001) offers an alternative conceptual paradigm in which activity and participation are independent, albeit interrelated constructs that are equally important rehabilitation goals. Activity, "the execution of specific tasks or actions by an individual," resides firmly in the domain of the individual without necessitating interaction with others. Participation, "involvement in a life situation," exists within inclusion in the broader social context of employment, social roles, social relationships, independence/interdependence, and assimilation (Dijkers 2010; Rochette et al. 2006). Clearly, traditional activity-focused accommodation approaches accommodations will not, by themselves, meet both of these goals. Rather, an alternative strategy directed at facilitating both individual work tasks and group inclusion is required.

Definitions

Universal Design is the design of all products and environments to be usable by all people to the greatest extent possible without the need for adaptation or specialized design (Mace et al. 1991). In contrast to specialized AT and AD accommodations that are added into the work environment, UD is everyday design of products, technologies, interfaces, hardware, and spaces that is integrated into the work environment to facilitate both activity (through increased usability) and participation (through enabling inclusivity). Because UD does not merely provide access for some, but usability and inclusion for all, UD accommodations have a better likelihood than specialized accommodations to enhance job satisfaction and productivity among employees with disabilities.

Principles of UD Developed almost 5 years before the ICF by a group of experts representing completely different design professions, the seven principles of UD (Connell et al. 1997) capture both activity and participation outcomes though performance goals and guidelines. Participation through inclusivity is the basis of the first principle of equitable use. Activity through usability is reflected in the other six principles: flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use.

Principle 1: Equitable Use The workplace should provide the same means of use for everyone (e.g., the same entry no step entrance). This not only avoids segregating

and stigmatizing users but also eliminates the need for specialized designs or making additional accommodations for employees over time. Equitable use also promotes inclusion by providing opportunities for individuals to participate in activities with others. It does so by facilitating engagement in activities when, where, and with whom one wants or needs to engage in activities.

Principle 2: Flexibility in Use The workplace should accommodate a wide range of individual preferences and abilities by being tolerant and forgiving different abilities; facilitating and adapting to the user's levels of precision, accuracy, and pace; and providing multimodal inputs that enable an individual to choose the method of use, such as manipulating an input device with either hand (or foot), eye gaze, or voice commands.

Principle 3: Simple and Intuitive Use Regardless of the user's experience, knowledge, language skills, or level of concentration, any design should be easily understood, natural, intuitive, obvious, and spontaneous. To accomplish this, complexity should be eliminated, and information should be presented in a manner that is consistent with its importance and one's expectations, such as a sequence of buttons that have a green start button at the beginning and red stop button at the end.

Principle 4: Perceptible Information To effectively communicate essential information to employees who have a variety of abilities, multimodal sensory outputs (e.g., sight, hearing, touch, taste, and smell) should convey information in as many different ways (e.g., pictorial, text, sound, speech, vibration) as possible. Regardless of the modality, legibility of information should be maximized by providing adequate contrast between the information and its surroundings (e.g., white text on a black background) and differentiating key elements (e.g., start with green button).

Principle 5: Tolerance for Error Error is an issue of personal safety (e.g., tripping over a computer cable stretched across the floor) as well as preventing inadvertent mistakes that can lead to frustration and loss of time, data, or money. To minimize hazards and unintended actions that could have adverse outcomes, accommodations should have fail-safe features and warnings, and discourage unconscious actions in tasks that require undivided attention.

Principle 6: Low Physical Effort Low physical effort is not only ease of use as in absence of physical strain but also efficiency, comfort, and minimizing fatigue. To accomplish these outcomes, the environment should eliminate or minimize strength, sustained force (e.g., holding a key down to complete a typing task); and repetitive and simultaneous actions (e.g., control-alt-delete).

Principle 7: Size and Space for Approach and Use Size and space cover the amount and configuration of space (e.g., a workspace with a wheelchair turning radius); the shape and size of hardware/products to accommodate variations in hand and grip (e.g., drawer handles that are large enough to grasp); and the arrangement of elements to enable important work elements, such as an informational display, to be clearly visible, accessible, and obtainable regardless of stature or mode of travel.

Method

Candidates for Intervention

Barriers to Activity and Participation Despite the broad range of essential job tasks, across all types of employment, research suggests that workplace accommodations can be categorized by a set of generic work-specific activities. Based on a meta-analysis of workplace accommodations (Zolna et al. 2007), the most commonly reported barriers to activity and participation were related to: *getting in/out and around the worksite, using the workstation, and engaging in interpersonal communication.*

Epidemiology of Activity and Participation Limitations

The Nature of Barriers

Getting In/Out and Around a Worksite Although getting in/out and around common work spaces, including parking, meeting rooms, and lunch areas, does not directly impact performance of job tasks, it is necessary for both work activity and participation. For workers with lower-extremity limitations, mobility problems at the worksite are caused by decreased range of motion, strength, speed, and accuracy, which manifest in travel difficulties such as walking on surfaces that are uneven or in poor condition, using stairs and getting through doorways. For employees with these limitations, common barriers to mobility include: condition or width of paths of travel (e.g., uneven surfaces or poor maintenance), stairs or level changes (greater than 0.5 in.), location of supports (e.g., handrails), and obstructions at doorways.

For employees with upper-extremity impairments, mobility problems are related to decreased range of motion, strength, speed, and coordination. These limitations are manifest in difficulties using handrails to climb stairs or ramps, operating door handles, and using keys due to: the size, shape, texture, and location of gripping surfaces (e.g., handrails, door handles) and the amount of force required to open a door.

Employees with vision limitations have difficulty finding their way due to difficulty seeing the path of travel, including obstructions or drop-offs (e.g., stairs and curbs). Common workplace barriers for these employees include: light levels of a glare on pathways, visibility of edges and landmarks; visual contrast; and dark/light transitions, obstacles in the path of travel and way finding, and orientation cues. Employees with cognitive limitations encounter similar difficulties with way finding and orientation way due to a lack of reinforcing and repetitive information (e.g., signs) to differentiate important design features or to act as prompts and reminders.

Using the Workstation A workstation is a designated space in which many, essential work tasks are performed. Workstations are found in almost all workplaces and

range from a traditional desk to a workbench to large machinery. Performing work tasks at a workstation typically requires using: (1) a work surface including using work tools, and (2) a computer and communication technologies.

Using the work surface The work surface not only contains much of the equipment and materials used to conduct work tasks, but those items must be positioned in locations relative to the worker so they can be easily accessed. Such requirements have implications for people who have limitations in mobility, positioning, and reach. Workers with lower-extremity motor limitations who use wheeled mobility aids typically have difficulty pulling under work surfaces that are designed for chairs with lower seat heights. Typical barriers to employees who use wheelchairs to access their work surfaces include: height of the work surface or obstacles (e.g., drawer) that prevent access to the work surface. For employees with reaching limitations, the design and layout of the work surface, including slope of the surface and location of items on the surface, can also make it difficult to reach and grasp work tools or the work, itself.

Using Computer and Information and Communication Technologies Computing requires using a variety of input (e.g., keyboard and mouse) and output (e.g., monitor, speakers) devices that create barriers to individuals with motor, sensory, and cognitive limitations. Use of input devices, such as a keyboard and mouse, requires reach, repetitive hand function, fine motor control, eye hand coordination, grasping, fingering, and range of motion and touch sensitivity as well as sight. As a result, size, shape, layout, or sensitivity (e.g., amount of force required to activate) of input devices can create barriers to workers with upper-extremity motor limitations who may have difficulty reaching all of the keys, pressing down on keys, pressing the right key, and grasping and manipulating a mouse. Additionally, many workers with vision or cognitive limitations may have difficulty picking out the right keys due to lack of visual and tactile contrast, lack of nonvisual input modes such as speech, and lack of nonvisual feedback such as audible clicks to confirm input.

In contrast, output devices pose barriers to employees with vision limitations; the primary barrier to use of output devices is seeing text and images on a computer monitor due to glare, low resolution and contrast, size of objects/fonts on the screen, and lack of alternative output formats such as audio description. Conversely, for employees with hearing limitations, barriers derive from the lack of visual information to augment the audio output.

Like computer input and output devices, employees with limitations in hearing, speech, vision, motor, and cognitive limitations are likely to have difficulty using information and communication technologies (ICTs; e.g., phone, Skype, the Internet-meeting software) due to size and shape of the devices, visual qualities of screens, auditory qualities, and lack of alternative inputs modalities. As a result, screens can be difficult to see; targets can be difficult to hit accurately; and handsets can be difficult to remove, hold, and replace.

Engaging in Interpersonal Communications Many barriers to interpersonal communication are associated with physical barriers to mobility in common areas.

When an employee does not have access to all common areas of the workplace, he/she may not be able to engage in either serendipitous interactions with coworkers in informal spaces (e.g., a hallway) or formal interactions in common work areas, such as conference rooms. Similarly, barriers that limit access or use of coworkers' workstations will limit formal interactions. In contrast, employees with limitations in speech and hearing are likely to have difficulty with interpersonal verbal communication due to the acoustical environment (e.g., reflective surfaces and lack of sound absorbing materials), ambient background noise that can be distracting or muffled speech, lack of room amplification, and lack of alternative, non-auditory means of conveying information.

Results

Occupational Therapist's Use of the Most Appropriate UD Strategies

Getting In and Out of the Workplace UD solutions enable all employees to enter and exit in the same manner. As a result, there is direct access from all potential drop-off points (e.g., parking, public transit, and sidewalk) to the entrance(s) used by employees.

Sloping walkways (i.e., less than 1:20 slope) are the most advantageous entry feature as they enable all individuals to get to an entrance in the same manner, with low effort, while at the same time being integrated with the overall context of the worksite and community. In the absence of one point of access/egress for all users, flexibility is increased by providing multiple means of getting to the entrance, such as wide-tread-low-riser steps in addition to a ramp or lift, that are integrated into the overall design. Paths to the entrance, including changes in level, are smooth, hard, slip-resistant surfaces to minimize risk of falling and are wide enough to accommodate several people side-by-side, whether they are walking or using mobility devices.

To identify specific routes and places along the routes, surface materials and pathway edges contrast in color and texture (e.g., brick); edges are clearly defined by grass or planting beds, curbs, or fences; and there is a comprehensive, multisensory information system with strategically located, high-contrast, directional signs that provide visual, tactile, and auditory information. Paths are evenly illuminated by lighting operated by motion detectors or timers; emergency communications and video surveillance equipment are at strategic locations along the route.

The employee entrance(s) is/are well marked and clearly visible from the route(s). The doorway is differentiated from the rest of the building by higher lighting levels, contrasting materials (e.g., glass versus masonry), color, and/or form making it easier to identify from the path. At the doorway, the entrance is level with the exterior and interior surfaces and there is sufficient space to maneuver any travel

Fig. 24.1 Sloping walkways that are integrated into landscape and have well-defined edges (e.g., low walls and planters). These enable all users to get to the entrance in the same manner. These features exemplify principles: P1. Equitable use, P2. Flexibility in use, P4. Perceptible information; P6. Low physical effort, P7. Size and space for approach and use, P8. Social integration and P9. Contextual integration

aids, including mobility devices, strollers, or bicycles. An automatic door operated by a pressure switch on the ground, motion sensor, or radio frequency identification (RFID) reader provides hands-free operation. The door opens wide enough for employees to pass through easily while carrying backpacks, briefcases, packages, and other work materials, or using mobility devices (Figs. 24.1, 24.2, and 24.3).

Moving Around the Worksite Inside the worksite, layout of the spaces and circulation is consistent with employees' expectations. Circulation, both horizontal (i.e., hallways) and vertical (i.e., ramps, elevators, and lifts), is clearly visible from the entrance, uncluttered with furniture and free of level changes in the direct path of travel. When level changes occur in a corridor, tactile and visual warnings are provided at the top, and when possible, ramps, rather than using stairs, are used so that traffic can continue to flow in the direction of travel. Corridors are wide enough to accommodate two people side by side, whether they are walking or using mobility devices.

Corridors and paths of travel across open spaces are differentiated by changes in flooring materials, textures, and color. Continuous handrails along corridors assist individuals with balance and gait limitations and tactile information on the handrails identify specific rooms along the corridor for employees who have difficulty

Fig. 24.2 For buildings that do not require controlled access (i.e., are not locked), motion sensor entrance doors enable hands-free access/egress to/from a workplace. This feature enables: P1. Equitable use, P3. Simple and intuitive use, P5. Tolerance for error, P6. Low physical effort, P7. Size and space for approach and use, P8. Social integration, and P9. Contextual integration

Fig. 24.3 For buildings that have controlled access, keycards with embedded RFID tags permit hands-free access if the reader is located in the path of travel and at a height that will enable a keycard located on a wheelchair or in an employee's purse/pocket to be read. The RFID reader demonstrates principles: P1. Equitable use, P2. Flexibility in use, P3. Simple and intuitive use, P5. Tolerance for error, P6. Low physical effort, P7. Size and space for approach and use, P8. Social integration, and P9. Contextual integration

seeing or are just not paying attention to where they are going. The multisensory signage system includes high-contrast multimodality signs that use tactile, visual, and auditory information as well as landmarks, such as statues or columns that are strategically located to identify destinations or decision points (Fig. 24.4).

Lighting is even with gradual transitions between spaces. Changes in flooring materials between spaces should be smooth, yet contrast in color and texture. Walls made of different material and with different color and texture than flooring will

Fig. 24.4 Redundant and multisensory way-finding systems, including color changes in signs and floor colorings as well as tactile information on wall and handrail signs exemplify principles: P1. Equitable use, P2. Flexibility in use, P3. Simple and intuitive use, P4. Perceptible information; P5. Tolerance for error, P8. Social integration, and P9. Contextual integration

reflect sound differently and provide way-finding information. In multilevel buildings, the slope of stairs between levels is as gradual as possible with handrails at multiple levels on both sides. Stairs as well as an elevator or vertical lift are located in convenient places to minimize the distance that any employee has to travel.

Using the Workstation Rather than large open areas, where job tasks permit, individual workspaces have high sound-resistant walls to minimize ambient noise levels and enable each worker to control the noise levels in his/her own workspace. Workstations are arranged and oriented to enable employees to have visual access to coworkers in order to communicate effectively (Fig. 24.5).

Using the Work Surface Every workstation provides sufficient knee space and toe clearance below the work surface to enable employees of any stature and chairs with a range of seat heights (including wheelchairs) to be as close to the workstation as possible. Work surfaces provide sufficient space and locations for work items, controls, keyboards, and other work objects within easy reach, thus enabling their use by the maximum number of workers. Those items that are used most frequently are located in the closest positions possible. In most cases, employees can reach and use controls and work items with the least change in body position; however, the chair that slides along the entire length of the work surface enables workers to also adjust their position for all work items, equipment, and controls to be within reach.

Computing and Using ICTs Most computer equipment is plug and play to accommodate a variety of alternative input devices (e.g., mouse, keyboards, voice input). Input devices are wireless to provide flexibility and come in a variety of shapes, sizes, and configurations to increase comfort and reduce fatigue. All workstations are equipped with a high-contrast, large screen monitor on a tilt-adjustable stand that raise, lower, and tilt to reduce eye, neck, and back strain. In addition, all computer systems are capable of having dual monitors and a second monitor is available for those who desire one. To complement the large monitors, employees are

Fig. 24.5 Universal design features that provide flexibility, such as large workspaces that locate all objects within reach, enable easy access to all parts of a workstation and facilitate work tasks for individual workers and teams. These features illustrate principles: P1. Equitable use, P2. Flexibility in use, P3. Simple and intuitive use, P4. Perceptible information, P5. Tolerance for error, P6. Low physical effort, P7. Size and space for approach and use, P8. Social integration, and P9. Contextual integration

encouraged to use screen enlargement and contrast enhancement options that are built into the computer's operating system. Finally, the workspace is configured to enable employees to access computer drives and other peripherals (e.g., printers and scanners) with either hand.

Interpersonal Communication To enable face-to-face communication, all communal spaces and individual workspaces are usable by any employee, regardless of ability. Meeting spaces are located near workstations and have a direct path of travel to make spaces easy to find and to minimize travel time. Routes throughout the worksite are continuous without obstacles or level changes; use contrasting colors and floor materials; and provide high-contrast, large-text, iconographic, and tactile information to identify spaces and aid way finding.

Informal meeting spaces (e.g., copier, coffee pot, or water cooler) are intentionally and strategically located with extra space and casual seating provided where employees have the opportunity for serendipitous encounters. Meeting spaces have sufficient space and are equipped with chairs and tables to facilitate social interaction between all employees and groups of employees regardless of the ability or use of assistive devices. Tables have movable chairs and can be arranged in different configurations to enable use by differing size groups and employees with and without mobility aids. There are no obstructions to enable clear lines of sight so that communication partners can clearly see each other and any visual information in the work environment. There is a good acoustical environment to ensure that important information is intelligible and reverberation time and characteristics are optimized by minimizing hard reflective surfaces and using sound absorbing

materials on walls, floors, and ceilings or covering windows with shades/curtains. Background noise is minimized to ensure that unwanted noise is not distracting and does not mask speech and other important information. Formal meeting spaces are equipped with assistive listening systems that amplify sound for employees with hearing limitations.

Evidence-Based Practice in Workplace Accommodations

While logic suggests that UD is an effective workplace accommodation strategy for all employees across their work life as well as the life of the job, there is little empirical evidence about the costs, benefits, and effectiveness of UD accommodations with which to inform the practice. Limited research suggests that UD is more usable not only for people with disabilities but also for everyone (Danford 2003; Saito 2006). A few studies of workplace accommodations have demonstrated that UD has the potential to reduce costs, decrease absenteeism, and sick leave, improve the organizational bottom line by preventing workplace injury and illness, and improve employee retention in organizations (Hendrick 1996; O'Neill 1998; Oxenburgh et al. 2004).

Unfortunately, a variety of factors including the lack of measurable criteria for defining UD (i.e., objective measures of UD as opposed to descriptive principles) and a historical lack of interest in evidence-based practice have limited research. Whereas the first barrier requires a technical solution, the latter is an artifact of the profession. Historically, the aggregate knowledge base of workplace accommodations has been dominated by anecdotal case studies (Butterfield and Ramseur 2004). Whereas case study evidence is useful for setting precedents, and, ultimately, if enough case studies are reported, for suggesting trends, the practice of workplace accommodation is better described as driven by practice-based evidence rather than evidence-based practice (Sanford and Milchus 2006).

Clinical Application from an Occupational Therapist's Perspective

Introduction Beth is an occupational therapist (OT) consultant specializing in environmental design to support function in everyday life. She has worked with architects, contractors, and designers on projects applying expertise UD principles, e.g., apartments for older adults, designed to reduce risks of falling, schools that include children with disabilities, and long-term care units for older adults with dementia. Her primary client is a major international architectural design firm HJK (Herman, Josephson and King) in metropolitan St. Louis, MO.

Present UD Project Beth has been hired by HJK to serve as a member of the design team for a new commission. The aim is to update the systems, employee spaces, and stacks of a *historic library*. *Beth's task* is to ensure the library will meet the needs of all library users, including staff and visitors of all ages and abilities. Beth has

been hired as the UD consultant to ensure the new design will support a variety of different types of disabilities inclusively. She will work as a member of the team to ensure UD is employed at all stages of design and construction.

Workplace The building will support 50 employees including directors, managers, librarians, library assistants, IT, human resources, network administrations, facilities managers, maintenance, and security. The library has made a commitment to *hiring people with disabilities. There is an active* supported employment program that trains people with varying levels and types of disabilities to become active, wage-earning members of the workplace. The program supports four to nine youth and adults. Many of these training program participants have become permanent members of the staff in a variety of positions. The library's programs *serve* a variety of *people with different types of disabilities,* including these with visual, hearing, mobility, upper-extremity motor, psychological, and cognitive limitations. Although the public spaces in the library are accessible, the older employee spaces have not been designed for people with disabilities. Narrow hallways, narrow doorways, stairs, high shelving, poor lighting, poor contrast, and poor acoustics are all present in the employee spaces.

Financials The building has received a grant from a local philanthropist for the renovation.

The Process of Implementing UD Initially, Beth finds herself at a crossroads with the design team. The member of this team argued for a traditional design that can potentially be adapted in the future for people with disabilities and Beth argued for a more inclusive, UD space.

Results

During a team meeting, Beth presented her arguments and ideas why the new building's spaces (including spaces for employees and company members) needed to be designed inclusively and in accordance to UD.

Beth's objective arguments for choosing UD as the method for the project are:

- Since people with disabilities often experience barriers that prevent them from full participation in all areas of life, including work, a more inclusive strategy which aims to make the environments, products, communication methods, information technology, and services accessible, usable, and understandable to as many as possible, such as UD, will result in a final project that is usable by multiple stakeholders and is socially responsible (Bjork 2013).
- Lack of accessibility in the library has been identified as a potential discriminatory practice (Booth 2012). The library Bill of Rights indicates the library has the responsibility to provide materials for the enlightenment of all people the community library serves. This means that the fullest use of any resource should be given to the greatest number of people. Libraries, as providers of public space and digital content, have a responsibility to promote equitable access to all users (American Library Association 2009). The library as an institution has made a commitment to UD (Booth 2012). The same rights should be extended to library employees.

Examples of how the UD principles will be implemented in the library employee space include:

Principle 1: Equitable Use The library should provide the same means of use for everyone. The employee entrance will be modified for a zero grade entrance to avoid segregating and stigmatizing employees with disabilities. The new entrance will also improve safety by providing an additional entrance for use when a fire or disaster occurs. Equitable use will also promote inclusion by providing opportunities for individuals to participate in activities with others. In this case, the employee kitchen, employee restrooms, and break room will be universally designed so employees can participate in all aspects of work.

Principle 2: Flexibility in Use The library will be designed to accommodate a wide range of individual preferences and abilities by being tolerant and forgiving of different abilities; facilitating and adapting to the user's levels of precision, accuracy, and pace; and providing multimodal inputs that enable an individual to choose the method of use, such as manipulating an input device with either hand (or foot), eye gaze, or voice commands. In this case, the new elevator to the stacks will be designed to accommodate different sensory impairments, with controls and hardware that can be accessed in a variety of methods (voice, touch).

Principle 3: Simple and Intuitive Use Regardless of the user's experience, knowledge, language skills, or level of concentration, information presented to employees in the library will be easily understood, natural, intuitive, obvious, and spontaneous. For example, the signage in the library will be created using a color system, number, and pictorial system to identify spaces, locate services in the library, and indicate office spaces.

Principle 4: Perceptible Information To effectively communicate essential information to employees who have a variety of abilities, multimodal sensory outputs (e.g., sight, hearing, touch, taste, and smell) should convey information in as many different ways (e.g., pictorial, text, sound, speech, vibration) as possible in the library. For example, the signage will *also* provide large-print, high-contrast lettering with Braille.

Principle 5: Tolerance for Error To minimize hazards and unintended actions that could have adverse outcomes in the library, the design throughout the building will have fail-safe features. For example, the coffee pot and stove will have an automatic turnoff system and will disengage after a predetermined period of time.

Principle 6: Low Physical Effort The library will be designed to require low physical effort. Examples of how this principle will be implemented include floor surfaces with no thresholds and cork tile that offers low friction but comfort when standing and entrances with sensors to open doors without pressure.

Principle 7: Size and Space for Approach and Use The library will be designed using an open-concept central work area with quiet workspaces for work requiring more concentration. The layout will be flexible to accommodate a variety of

activities and abilities. Other examples of how the shape and size of hardware to accommodate variations in hand and grip include lever-type handles or U-shaped pulls throughout the employee spaces.

Because UD principles can be implemented beyond the design of the space, Beth has worked with the staff who will be purchasing new products and machines in the employee space to learn about the principles and how to evaluate products for use in the new space. For example, paper towel dispensers that do not require hand cranks were identified as important for the bathrooms. Beth identified a new tool to rapidly assess products of UD and has instructed the library staff to use it. The Rapid Assessment of Product Usability & Universal Design (RAPUUD), a 12-item user-report tool based on the seven principles of UD (Lenker et al. 2011). The tool is succinct and psychometrically sound, and embodies traditional usability principles, as well as UD principles. The instrument can be used with a variety of products and results in a description of strengths and weaknesses that the staff can use to make a decision about the product under consideration. They have made it a part of the new evaluation process for all new purchases.

Discussion

The ways in which workplace accommodations are understood and implemented, result in disparities in work outcomes. First, accommodation practices are focused on improving work activity. The underlying assumption of this approach is that enabling performance of *individual work tasks* will result in positive activity outcomes. These positive outcomes, in turn, will result in positive participation outcomes. Second, accommodation practices are focused on barrier removal, intended to remove barriers to task performance for an individual employee by adding individualized AT and AD accommodations. These accommodations compensate for an employee's functional limitations at a point in time, but ignore endemic problems in the work environment for employees at other points in time or even for the specific employee should his or her abilities decline.

Despite well-documented case studies of conventional accommodation practices improving task performance, there is little evidence that using AT and AD to remove barriers to individual work tasks alone will engender participation of employees with disabilities. In fact, traditional accommodation practices not only draw attention to a person's impairment with the potential for stigma and social exclusion but can also negatively impact participation by segregating and isolating workers with disabilities, thus leading to adverse work outcomes.

Clearly, UD, as an accommodation strategy, makes good sense—for workers, employers, and society. Yet, despite its appeal, there are few good examples of UD in the workplace. This problem is not inherent in UD itself, but rather results from a variety of policy and practice barriers (including lack of awareness and evidence) that have limited its use as an accommodation strategy. Clearly, the lack of large-scale outcome studies leaves a significant gap in our general understanding

of what works, for whom, and at what cost across individuals, job tasks, and work environments. Such information is vital to making more informed decisions about workplace accommodations in practice.

Conclusion

As the workforce becomes increasingly diverse, UD as a workplace accommodation strategy has the potential for enabling workers of all ages and abilities to participate equally and productively throughout their work–life cycles. UD potentially eliminates, or at worst, reduces the need for specialized accommodations, thus saving resources that might otherwise be required to accommodate workers and enabling all employees to use and share the same resources. This can increase the pool of potential employees for any job as well as lower the cost of hiring new employees and the promotion of old ones. Most importantly, UD strategies can enhance a sense of inclusion, belonging, and participation. Not only are these critical to increasing well-being, job satisfaction, and productivity for individual employees but they also enable employers to attract and retain a competitive workforce—ultimately resulting in increased profitability and success.

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Chapter 25
Temporal Adaptation for Individuals Living with Serious Mental Illness in the Community

Shu-Ping Chen, Terry Krupa and Megan Edgelow

> *I found the intervention helpful because it allowed me to monitor my activity, and thus I could see my progress. I am happier being productive and useful; I am proud of my improvements and the better use of my time.*
> Client

Abstract This chapter provides a brief description of an occupational therapy intervention (OTI), entitled *Action over Inertia*, and is designed to address the time use and activity patterns of individuals living with serious mental illness in the community. The aims are to improve clients' health and well-being and promote recovery through occupation. The intervention uses (1) a client-centered practice approach, (2) evidence-based occupational participation strategies, and (3) education techniques to effect change. Initial pilot testing of the intervention established its clinical acceptability, relevance, and utility, and suggested positive changes in the amount of time spent in activities, and reducing the amount of time sleeping.

Keywords Activity health · Activities of daily living · Mental disorder · Occupational balance · Quality of life

Definitions and Background

Occupational therapy interventions (OTIs) that focus on occupational health address activity participation and time use patterns with a view to improving personal health and well-being. These OTIs are based on the notion that the human impact of social roles and activities cannot be understood separately from how time is al-

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located to these activities and how they are experienced. Several related concepts, including *occupational balance, meaningful time use, and temporal adaptation*, have been used in the current occupational therapy literature to advance knowledge and theory of activity health.

Theoretical perspectives on *activity health* explain the complex relationship among human activity patterns, time allocation, and health. Two important foci are the concepts of "*engagement*" and "*balance*." These perspectives place emphasis on how activity patterns are represented and experienced over the course of typical days and weeks and how human health is impacted through meaningful participation in activity. Optimal activity patterns provide opportunities for a range of experiences that contribute to health and well-being.

Occupational therapists (OTs) have been involved in advancing an evidence-informed activity health perspective as a public health strategy (Moll et al. 2013). The relationship between activity patterns, time use, and public health has been recognized internationally for decades. Many countries routinely collect national data about how people spend their time through time use surveys, and this information allows for comparisons of activity patterns between populations, identifies potential health and well-being risks, and assists with national planning and policy development.

In occupational therapy, there has been a particular interest in the time use and activity patterns of people living with disability and other health-related circumstances (Hunt and McKay 2012; Pentland et al. 1998; Soderback 1999). For example, for people with serious mental illness and older adults at risk for activity disruptions, a broad range of health and community adjustment outcomes have been associated with activity participation and time use patterns, including improvements in personal satisfaction and a sense of meaning, quality of life, adjustment to illness and disability, maintaining biologic rhythms, and better community integration (Bejerholm and Eklund 2007; Eklund and Leufstadius 2007; Ng et al. 2011).

Purpose

The primary purpose of this OTI is to modify daily activity patterns so that clients will experience improvements in a range of outcomes associated with health, well-being, and community participation. The OTI is developed in the form of a *clinician/client workbook* titled *Action over Inertia: Addressing the Activity-Health Needs of Individuals with Serious Mental Illness* (Krupa et al. 2010a).

Method

Candidates for the Intervention

Action over Inertia has been developed for adults with serious mental illness who are living in the community. Specifically, it has been designed for those individuals

(e.g., with a diagnosis of schizophrenia or major affective disorder) who experience (1) significant occupational disengagement as reflected in a lack of investment in and emotional detachment from activities and (2) significant occupational deprivation reflected in a lack of involvement in activities emerging from forces of social and cultural exclusion or stigma (Krupa et al. 2009, 2010b).

Epidemiology

Serious mental illness includes a group of mental disorders that are characterized by diagnosis (e.g., schizophrenia and major affective disorders), significant disability, and long-standing duration (Schinnar et al. 1990). While the prevalence of mental illnesses in the adult population is quite high, estimated in the range of 10–20 %, the prevalence of *serious* mental illness is much lower, at about 2–5 % (U.S. Department of Health and Human Services 1999; World Health Organization (WHO) 2001).

Time Use Patterns Among People with Serious Mental Illness

Recent studies have demonstrated that disrupted time use patterns are common among people with serious mental illness. Their activity patterns are characterized by under-occupation, day–night reversal, fewer hours in productivity activities, and an inordinate amount of time spent in passive and isolated activity (Bejerholm and Eklund 2004; Eklund et al. 2009; Farnworth 2003; Krupa et al. 2003; Leufstadius et al. 2006; Minato and Zemke 2004). These activity patterns disengage people from meaningful occupations that enable health and well-being and place them on the margins of important roles and activities associated with full citizenship and community belonging (Krupa and Chen 2013). The reasons for these activity patterns are complex, but factors include disruptions in the experience of activity associated with impairments of mental illness, very high levels of unemployment and subsequent difficulties maintaining a productive daily rhythm, high levels of stigma and discrimination that lead to exclusion from social roles and activities and inequity in access to health and social services, high levels of poverty, and limited experiences and networks connecting people to community roles and activities.

Settings

The *Action over Inertia* has been designed for use within assertive community mental health outreach services that aim to facilitate the social recovery of individuals with serious mental illness. OTs have also reported adapting the workbook for use in groups.

Table 25.1 Determining relevance of the *Action over Inertia*: activity patterns

The individual may find the OTI beneficial if they meet three or more of the following criteria √
The person's daily activities demonstrate an imbalance among self-care, productivity, and leisure
The person spends a large amount of time without defined activity on a day-to-day basis
Much of the individual's day is spent in passive activities or rest
There is a lack of organized routine/structure to the person's daily activity
The person's daily activities limit his/her contact with others
The person's daily activities limit his/her access to a range of community environments
The person cannot define activities/occupations that are meaningful or of personal interest
The person experiences distress, or is easily overwhelmed in activity
The person's involvement in activity is impacted by a limited experience of enjoyment

OTI occupational therapy intervention

Table 25.2 Determining relevance of the *Action over Inertia*: realizing the benefits of activities

If six or fewer are checked, then this may be a helpful OTI for the individual √
Client engages in activities that provide the opportunity for…
Skill and/or knowledge development
Making a contribution to society
Gaining physical health benefits
The enjoyment of beautiful things
Self-expression and creativity
A range of social interactions
Meeting personal goals and experiencing accomplishment
Expressing personal values
Earning a personal income
Giving to others, such as family and friends

OTI occupational therapy intervention

Results

The relevance of the OTI is determined by individual clients and service providers in a collaborative manner, and is guided by the evaluation of activity patterns, both those promoting and disrupting well-being (Tables 25.1 and 25.2).

Practice Process

The *Action over Inertia* is intended to be used in partnership between the OT and the client. The practice process includes:

- *Collaborative evaluation of activity patterns*: The therapeutic performance process begins with engaging clients, either individually or within a group treatment setting, in *collecting information on their actual time use* over the course of a

MY CURRENT TIME USE LOG

Name: _____ Date: _____

Therapist's name: _____

In the chart below, fill in how you have recently spent a typical day.

Time	Activity	Where?	The activity was done: alone/with someone else
7:00 am			
7:30 am			
8:00 am			
8:30 am			
9:00 am			
9:30 am			

Time log continues for a complete 24 hour cycle

Fig. 25.1 Daily Time-use log

few typical days. Daily time-use logs (Fig. 25.1) are used to keep track of activities engaged in, the location of these activities, and social contacts during these activities.

- *Reflecting on personal activity patterns*: The evaluation is followed by a process of guided reflection on time-use patterns, including several dimensions of time use. For example, the OT and client discuss the time-use patterns with respect to (a) balance, (b) level of occupational engagement, (c) passive and active participation, (d) structure and routines, (e) meaningfulness and personal values, (f) satisfaction, (g) social interactions, and (h) access to community environments. The process involves a personal evaluation by the client of dimensions that might be changed to enhance personal well-being.
- *Making quick changes in activity*: Clients are enabled to identify a few "*quick and simple activity changes*" to gain momentum in activity participation. "*Exhorting to action*" is a key skill of enabling that includes inspiring, encouraging, lending energy, influencing, rousing, and inducing.
- *Providing education about activity, health, and mental illness*: Clients are also provided with *education* about the relationship between serious mental illness, activity involvement, and time use as well as information about the potential health and citizenship benefits of activities. The link between activity participation and recovery is explicitly considered.
- *Making longer-term changes*: The client is engaged in *exercises* to plan for longer-term changes with regard to *time-use* and activity *involvement*. Long-term activity planning (Fig. 25.2) directly addresses the supports and resources anticipated and required to overcome activity challenges.

Planning for Activity Change

Name: _____

1. List ONE desired activity change: _____
2. What challenges or issues do you expect might arise in making this activity change?

✔	Challenges	Examples	How can this challenge be reduced or managed?
	Personal learning		
	Material resources		
	Illness management		
	Emotional needs		
	Managing social judgments		
	Activity modifications		
	Social supports		
	Other		

Fig. 25.2 Planning for activity change

- *Sustaining and evaluating activity changes*: Finally, changes in activity patterns and actual time use are monitored and plans refined accordingly. Emphasis is placed on both the performance and experience of activity participation. The OT is encouraged to use motivational and teaching techniques to facilitate the client's commitment to the process of change.
- *Effectiveness*: OTs are also engaged in evaluating their practice context with a view to enhancing the profile of activity health as a legitimate concern of service provision, and to ensure changes in health and well-being through activity are captured in service evaluations and continuous improvement initiatives.

The Role of the OT

While *Action over Inertia* is grounded in the domain of occupational therapy, it could be implemented by other health care team members, consistent with the focus on advancing interdisciplinary practice in community mental health. However, it is advised that an OT with a good understanding of activity health be involved. The OT acts as the leader of the OTI and thus has roles as coach, supervisor, teacher, and the evaluator of the OTI within the service.

Evidence-Based Practice

As mentioned previously, activity participation and time use have been associated with overall well-being and quality of life for people with serious mental illness. The construction of psychometrically sound and sensitive measurements of occupational engagement, such as the profiles of occupational engagement in persons with schizophrenia (POES), has advanced both clinical applications and research in the area (Bejerholm et al. 2006; Bejerholm and Eklund 2007).

The *Action over Inertia* is new and to date has been subject to limited research. The OTI does integrate evidence-based practices throughout. For example, the OTI focus on rapidly engaging individuals with serious mental illness in personally and socially meaningful activities while providing support is consistent with evidence-based supported participation models in the community mental health field (Bond et al. 2008; Davidson et al. 2004). In addition, this intervention integrates educational strategies consistent with evidence-based psychoeducation (Xia et al. 2011).

A pilot study of *Action over Inertia*, using the randomized controlled trial method, demonstrated a positive change. Specifically, an increase in activity participation in relation to a reduction in the amount of time spent sleeping for individuals with serious mental illness who participated over 12 weeks within the context of receiving services from assertive community treatment teams. The increase in activity versus sleep in the treatment group was statistically significant ($p < .05$); however, there was no significant change in other dimensions of time use patterns. Qualitative feedback from OTs and clients supported its clinical utility and indicated that the OTI was considered useful and well structured. The 12-week time frame of the pilot study was considered too brief to lead to major changes in activity patterns (Edgelow 2008; Edgelow and Krupa 2011). The content of the intervention approach was revised based on feedback from this research.

Discussion

OTs may need to advocate for the implementation of *Action over Inertia* within community-based treatment teams. The reason is that occupation-focused interventions typically receive little priority compared to biomedical treatment, housing support, and crisis management (Thornicroft et al. 2011). Demonstrating how changes in activity health are related to community stability and integration for people with mental illness may be an important aspect of these advocacy efforts. Due to the complex, dynamic, and highly individualized nature of human occupations and the extent to which inertia may have settled into the daily lives of individuals, the OTI itself may be lengthy, perhaps requiring several weeks or months for meaningful change. While the *Action over Inertia* itself does not evaluate any particular forms of activity, OTs should keep in mind the extent to which involvement in productivity, specifically education and employment, is considered integral to successful community integration and socioeconomic recovery from mental illness (Waghorn

and Lloyd 2005). While *Action over Inertia* is delivered in the context of community mental health, there has been interest in applying the theory and practice of activity health to other settings. For example, Lipskaya-Velikowsky and colleagues (Lipskaya-Velikowsky et al. 2013) recently applied *Action over Inertia* for the inpatient context, and that is currently being evaluated.

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The Case Study of Alex: Using *Action over Inertia* to Address Activity Health

Keywords Activity participation, Activity health, Community-based occupational therapy, Interventions -time use

Introduction

The theme of this case study concerns activity health for a person with serious mental illness.

The Students' Tasks Include

1. Finding information about the meanings that OTs have ascribed to participation in occupations
2. Learning about theories of motivation and drive as they relate to occupation
3. Describing factors associated with the profound levels of occupational disengagement often experienced by people with serious mental illness, including illness-related factors; psychological factors; and social factors
4. Identifying principles of enabling activity patterns associated with health and well-being among people with serious mental illness

As a starting point, the students should use the following references to gather background information:

1. Eklund M, Leufstadius C, Bejerholm U (2009) Time use among people with psychiatric disabilities: implications for practice. Psychiatr Rehabil J 32(3):177–191
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Overview of the Content

Major Goal of the Actual Interventions

The major goal of the time use intervention is to offer a well-defined and evidence-based approach to enable people with serious mental illness to engage in activity patterns that contribute to health and well-being.

Learning Objectives

By the end of studying this chapter, the learner will be able to:

1. Apply dimensions of activity patterns associated with health and well-being to individuals with serious mental illness living in the community
2. Apply elements of the Action over Inertia intervention process to the specific case study and similar clinical situations
3. Anticipate the challenges that are likely to emerge in the process of changing activity patterns of people who experience serious mental illness

Background History of the Clinical Case Study: Alex

Personal Information

Alex is 28 years old. He lives in a shared living situation in a home located in a poorer socioeconomic district of a small city. Like the other residents, he had no responsibility for the care of the house, his own living space, or preparation of meals. His parents live about 2 h away by car or bus, but he speaks to them on a regular basis by phone. Alex was diagnosed with schizophrenia during his first year of university studies. Following his first episode of the mental illness, he became involved in entry-level employment positions, but over the years, he had fewer and fewer work experiences and opportunities. He has also lost touch with his friends and other social connections. He sees a worker from his community mental health team weekly; mostly, they have focused on monitoring his illness, and making sure his housing and finances are stable.

Current Circumstances and Reason for Occupational Therapy

At the OT's first home visit, Alex had difficulty offering a picture of himself through his current activities. He was socially isolated, despite the almost continual presence of other people in his home, and he rarely ventured into community environments beyond those associated with his mental health services. He could identify few activities he regularly engaged in beyond basic self-care. He responded to the

OT's questions with short answers and rarely initiated conversation. He was unable to spontaneously offer information about his preferences and values in activity. He described his lifestyle as "empty" and recalled that it had been a long time since he had anything he could describe as an "interest." However, after the OT shared information about activity health and the potential for positive change, Alex expressed some tentative interest in working together to address his issues.

OTIs

The OT supported Alex in his own process of self-reflection and explained how "time-use-logs" could be used to understand his time and activity patterns. With these reflections, Alex and the OTs discussed how the logs showed he had fewer physical and social activities that he would like in his life, and how limited his access to community environments had become. They also noted that he had some social connections that had potential to be developed further. The OT suggested that Alex might make quick changes to his activity profile by adding one or two small activities over the next week. Alex was cautious, but said he would give it a try. During a later visit, he reported that, building on his good relationships with the homeowner, he helped with raking and bagging a mass of fallen leaves. Alex liked the physical exercise it provided and enjoyed the outdoors. He also spoke briefly to a neighbor who was passing by the house and shared a joke about the upcoming winter and the snow it would bring. He found that he didn't have the clothing and shoes he needed for the activity. Together, the OT and Alex considered how this problem might be overcome. They visited a local neighborhood clothing exchange and found some suitable clothing.

Over the course of working together, the OT and Alex discussed how involvement in activities influences well-being, and how experiences with mental illness can impact activity participation. The OT provided information in an accessible manner that would not overwhelm Alex, but rather engage his interest and help him feel empowered to change his activity patterns. The OT provided some reading material about activity, health, and recovery to share with his family.

After making several small and quick changes to his activity patterns, Alex was able to focus on how to move from quick changes to make longer-term changes. Alex was encouraged to plan for one or two activity changes at a time. In this way, they could plan for personal support and manage potential challenges. Alex decided to focus on his participation in family activities. Alex and the OT spoke to his family members and organized potential activities. For example, a cousin who lives close by helped him to set up an e-mail account through the local library, and together, they posted weekly messages to family members who lived far away.

As his confidence grew and he found the activities rewarding and enjoyable, Alex continued to his next plan: securing an opportunity to earn some money. Again, Alex and the OT reviewed potential possibilities and considered how his current activities could translate into paid activities. This required a bit more planning. While Alex liked the idea of translating his recent gardening activities to a paid job, he anticipated many difficulties in assertively "selling" himself to potential clients.

With more research, they found a local peer support group had organized a business around causal work in the community. Alex began working with the business, and his job involved him in part-time landscaping work with a local community center.

Over 6 months, Alex made considerable changes in his activity patterns. While the activity changes seemed small, they built up to some important experiences in his life. He was more physically active, had more social contacts, was visiting a range of community environments, and began to engage in productive work. Jamie continued to meet Alex to support his changes and provided education and consultation related to time use and activity health to other members of the community mental health team who worked with Alex, so that these positive changes could be further supported and enriched.

The Student's Report

The following guiding questions have been identified in relation to particularly important points to consider in this case study of Alex. These questions are generated from the available literature references and clinical experiences:

Questions

1. Alex has a diagnosis of schizophrenia. What illness-related factors might help to account for his minimal engagement in activities? How did Alex's living situation contribute to his activity patterns? What psychological factors might have impacted his activity patterns?
2. What challenges would the OT have expected in using daily time use logs with Alex? What strategies might the OT have used to enable Alex's involvement in completing the logs?
3. What enabling skills would the OT have used to support Alex in the process of making quick changes in his activities? What enabling skills would the OT have used to facilitate longer-term changes?
4. When considering the study of Alex, what do you expect were some of the challenges he faced in making quick changes to his activity patterns? How might these challenges have been addressed by the OT?
5. What specific information would the OT share with Alex about the link between activity participation and recovery in serious mental illness?
6. What outcome measurements might the OT use to capture the changes in Alex's activity patterns?

Part III
Interventions: The Occupational Therapist Teaches and the Client Learns

Fig. 1 **a** Traditional education. Rangoon. Myanmar/Burma. Photo: Ulf Karbin, **b** Abbey school for girls. *Thimphu, Bhutan*. Photo: Naum Purits **c** Untraditional education the in nature. Mount Pfänder, Bregenz, Germany. Photo: Ingrid Söderback (The photos Fig 1a – 1c are unrelated to occupational therapy.)

Chapter 26
Interventions: The Occupational Therapist Teaches and the Client Learns or Relearns

Learning Interventions: Overview

Ingrid Söderback

Abstract This part of the Handbook surveys the occupational therapy learning interventions (OTIs) in which the occupational therapist's (OT) role as a teacher (educator) of the client is explained. The learning interventions are represented in the Handbook with (1) teaching strategies in the context with degenerative diseases; (2) cognitive teaching approaches through the dialogue technique; (3) program for active learning: energy conservation; (4) psychoeducation; (5) neuromusculoskeletal and movement-related learning: (a) programs for remediation of movement and hand gripping and (b) programs for sensory functional training; and (6) occupational rehabilitation programs. Natural and intermediary learning are introduced, and the latter is illustrated by the case of Jane. The therapeutic learning process is described. Therapeutic teaching theory approaches, such as behavioral and cognitive programs for active learning applied in clinical practice, are summarized. The various teaching facilitators or therapeutic media, such as reinforcement strategies, dialogue techniques, decision making, strategies, sharping, and mediated learning related to therapeutic teaching, are presented and exemplified with clinical use. The OT's role in rehabilitation teamwork is presented.

Keywords Cognitive · Movement related · Neuromusculoskeletal · Participation · Psychosocial · Sensory functioning · Teaching · Teaching facilitators · Traumatic brain injury · Work related

Introduction

"Learning or relearning interventions" focus on the client's response to participate in teaching situations. These situations should be outlined at the level to which the client assimilates and internalizes knowledge that his/her doing (occupational process) becomes a part of his/her habits, behavior, or nature. In other words, "learning is the client's process of acquiring knowledge, skills and attitudes from

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Fig. 26.1 The OT's role as teacher (educator) in OTIs aimed at clients' learning or re-learning

studies and instructions, experience" (Institute of Education Sciences 2008). It is a set of cognitive processes adapted to the client's present environmental circumstances (Schwartz 1991). Learning contributes to defining ourselves, to living in social groupings, and to saving our vital energy. The latter occurs because a task does not need to be learned anew every time one wants to do it. Instead, the new information and experience is assimilated to existing cognitive schemas, or represents an accommodation and revision of existing brain schemata.

The Occupational Therapist's (OT) Role Among the OT's main roles (see Chap. 3) the teacher[1] role dominates as it has some influences in all occupational therapy learning interventions (OTIs). The OT as the teacher is a *traveling companion,* not the doer. He/she *guides, coaches,* and *facilitates* the client's occupational performance (e.g., see Chap. 33). In this way, the client is taught to initiate the performance of tasks that are adapted to the actual context (Fig. 26.1).

The outcome of learning intervention is "a change in an individual's capacity to respond to the environment and is associated with practice or experience" (Abreu and Hinojosa 1992). Thus, the learned results are evident in the person's function, skills, attitudes, habits, and behavior. A favorable outcome of learning interventions helps the client acquire new, more adaptive, and effective doing knowledge.

[1] Here, teacher is synonymous with educator.

Learning

Natural Learning

For most people, learning continues throughout their life, and mostly with no involvement of a teacher. Natural learning arises from human beings' biologic instinct: people meet new, unknown, and unpredictable situations and new challenges when performing occupations in their daily life (Schwartz 1991).

Intermediary Learning

Most people with a permanent disability need intermediary learning with professional teaching that is one of the OT's roles. This kind of teaching participation in learning interventions occurs intermittently during one's lifetime or initially after a disability has arisen.

These learning interventions are symptom oriented and aim at *maintaining, improving,* or *restoring* functioning (i.e., are directed to various body functions and structures) or disabilities (i.e., are directed to impairments, activity limitations, or participation restrictions, according to the International Classification of Functioning Disability and Health; ICF; World Health Organization 2014). Thus, interventions are adapted to match the client's symptoms with the task to be performed.

The diagnoses and disabilities of the clients who may be candidates for symptom-oriented learning interventions are shown in Table 4.1 in Chap. 4, and are exemplified in the case of Jane (see below). Here, the teaching and learning process constitutes a base for the interventions aimed at preventing ill-health and supporting wellness (see Part V).

The Case of Jane

Jane was 54 years old and was divorced several years ago. She was a highly qualified woman in her career, and the mother of four adult children. She lived alone in an apartment. During a day at the beach, 3 months ago, together with some women friends, Jane became unconscious and fell flat on her face. She was taken to a neurologic hospital for acute care. Jane underwent surgery for a cerebral hemorrhage caused by an aneurysmal rupture. Jane recovered, and now has no motor impairment, and when talking with her, no specific cognitive impairment is obvious. Before discharge from the rehabilitation hospital, Jane was to spend at least two weekends at home to ascertain whether she needed assistance from the community care services.

On a Monday morning on the rehabilitation clinic ward, Jane returned after her first home leave weekend. I was there to investigate another client's need for assistance with eating. I noticed that Jane was eating a huge amount of food, as though she was famished! I realized something must be wrong.

Later that day, Jane came to the training kitchen to take the Intellectual Housework Assessment (IHA; Soderback 1988b). Jane was asked to cook lunch, including baking bread rolls and making potato soup. (Remember that Jane had spent years cooking for her four children.)

I had set out all the ingredients and utensils on the kitchen counter. To begin with cooking the stock, Jane would need to measure half a liter of water and open two small packets of stock cubes. Jane read the recipe aloud and talked to herself about what she had to do. She picked up the stock cubes, one in each hand, and stood there, but did nothing for several minutes. I asked, "What should you do with the stock packets?" Jane answered that they should be opened and the contents put into the pot, but she did nothing until I took one of the packets and demonstrated what to do.

This observation during the IHA showed that Jane had a cognitive impairment, that is, disturbances of higher cortical functions. These disturbances can occur with a lesion to the frontal region of the brain. Clients' behavior is characterized by "no sign of disturbance of movement, gnosis, praxis, and speech; nevertheless, …their complex psychological activity was grossly impaired…. They are unable to produce stable plans and became inactive and unspontaneous" (Luria 1980).

This cognitive dysfunction might also explain Jane's behavior at breakfast on the ward. When I asked her, she admitted that she had not eaten a full meal for the 4 days she was at home! I realized that Jane needed an OTI with cognitive teaching approach (Chaps. 30 and 31) to *relearn* how to initiate and perform her wanted and necessary housework tasks independently (Söderback 1988c, 1991).

Thus, for Jane and clients with similar problems, the OTI become an ongoing relearning process.

Theoretical Approach to Therapeutic Teaching

Therapeutic teaching focuses on the teaching approaches of the OT uses. The application is based on OTs' use of their professional and pedagogical knowledge, including activity analysis/synthesis, and disability and disease information (see Chap. 4). Teaching/education is aimed at imparting the client's new or changed attitudes, habits, behavior, and/or knowledge that influence his/her way of doing occupations.

The following factors are crucial for designing a client's therapeutic teaching process: (1) a realistic intervention goal for the client, (2) prognosis of the medical diagnosis or disease, (3) disability status, (4) present condition (i.e., if the client's status is expected with little change, progressive or improvement), and (5) present capacity for learning (Niestadt 1998). The combination of these factors contributes

to the OT's choice of appropriate therapeutic teaching, that is, a *behavioral* or a *cognitive* theoretical approach, or combinations of these, used to conduct the interventions (Schwartz 1991).

The Therapeutic Teaching Process

The OTI approach is a dynamic and continuing process in applying the open system theory (Levine 1991; von Bertalanffy 1968). This dynamic process is distinguished by the interaction among the OT, the clients' performances of occupations (tasks/activities), and the environmental context.

A fundamental component is the *therapeutic instructions* the OT uses to *provide the client with cues* for task performance (Sabari 2001). These instructions are intended to result in the client's doing of the tasks.

The teaching process is mediated by various tasks and activities, such as grooming, dressing, cooking, cleaning, playing games, reading, calculating, performing simulated tasks or work tasks, or handicrafts (Ludwig 1993; Söderback 1988c). (For meditated learning, see below.)

Teaching the Behavioral Learning Approach Connected with Neurological Degenerative Diseases

In a *behavioral teaching* approach, an antecedent stimulus (S) induces a behavioral response (R). Here, the OT acts as an *instructor* (S). He or she gives sequentially one instruction for each component of the task. For example, "(1) Take the pot. (2) Hold it under the tap. (3) Turn on the tap. (4) Half-fill the pot with water." The client acts (R) according to each of the instructions.

This is a *training* approach. The OT is responsible for how the task should be performed. The client is expected to memorize this prescribed solution, which, it is hoped, will be repeated next time. The prerequisites are that the task is prepared and performed in exactly the same manner, situation, and environment (Sabari 2001). For further studies, it is recommended to use the term *errorless learning*. An extensive number of studies are available, for example, among clients with severe memory disturbances after brain injury (Lee et al. 2013).

Participating Clients

The behavioral teaching approach is relevant to clients with *neurologic degenerative diseases* (e.g., Alzheimer's disease, people with severe cognitive disabilities), and those with static prognoses. In this Handbook, it is represented in Chaps. 27, 28, and 29). They have lost their ability to learn, or have very restricted ability to

store and recall information (Hadas and Katz 1992). The approach is also relevant to clients who have given up their will to perform daily tasks or are not allowed by relatives to perform, tasks that they in fact should be able to do (Söderback and Lilja 1995). These clients need another person to do the tasks for them. At best, they are able to perform one or two components of a task, though successful performance requires use of very simplified instructions.

One clinical application of behavioral teaching is *habit training*. The intervention consists of having the client daily and habitually repeat the task or routine. Practicing these daily routines is expected to "contribute to healing among clients living with severe mental illness" (Reed 1998).

Teaching Facilitators

The behavioral teaching approach includes *reinforcement strategies* for how to apply *instructions* to clients suffering from dementia. The teaching uses a specified form of problem solving (Gitlin et al. 2005; also see Chap. 27), or a model for home interventions (Graff 2008; also see Chap. 28) developed to support daily activities.

When giving the instructions, the OT chooses the most suitable hierarchy level depending on the client's present level of learning capacity. A top-to-bottom approach in connection with analysis of the task's degree of difficulty is used to determine what hierarchy level is effective (Allen 1985; Allen et al. 1992). When the most appropriate level is used, it will initiate the client's action to complete the task. This hierarchy of instructions includes the following:

- *Guided movement.* The OT needs to do the same action, which the client is expected to perform. For example, it might entail putting a comb in the client's hand. The OT may keep her hand above the client's hand and follow the client's movement. When successful, this gives the client a feeling of competence.
- *Simplified demonstrations for imitation*. The simplified demonstration approach was effective in the case of Jane. The OT demonstrated how to open one of the packets of stock cubes. Then Jane followed the OT's movements and was able to imitate the action. This simplified demonstration initiated Jane's action, and she was able to complete the task.
- *Visual signs*. In the case of Jane, the OT had prepared the session by having put all the ingredients and utensils on the kitchen counter. Their visibility prompted the initiation of action, which may have helped Jane to start the procedure of boiling the stock. However, this level proved too difficult for Jane's current capacity for transferring of learning.
- *Verbal instructions* are used in both behavioral and cognitive therapeutic teaching. These instructions have to be modified by *quantity* (how much should be said), *complexity* (the construction of the language, such as clarity, consistency, logical sequence), and *moderation* (the loudness of the voice). The OT tried to instruct Jane verbally, but this instruction level was too difficult for Jane to follow.

- It might be concluded that instructions to Jane should mainly include demonstrations intended for imitation, gradually increasing visual signs and then verbal instructions (Schwartz 1991).

Teaching the Cognitive Dialogue Technique Connected with Brain Injury

The Client's Role

The *cognitive* teaching approach requires the client's *active participation* during the information processes. Preferably, the client should develop an effective way of performing the tasks. The effect of this approach is *learning,* which results in the client's *acquisition of assimilated or accommodated, retained knowledge,* applicable in a variety of situations and environments. In other words, the learned knowledge might be *generalizable* (Sabari 2001).

Learning originates in the cognitive process that is of value for the client when manage unexpected situations, to become a member of society, for developing personal identity and internal adaptations (see Chap. 11). Moreover, through the learning process, the client might increase awareness of the consequences of the disability (Schwartz 1991).

During the *cognitiv*e teaching process, the client is the prime actor, in whom active memory and reflective brain processes are in play. Here, the genesis of learning acquisition lies in the schemata of conceptions stored in the brain and that are possible to recall. When new knowledge is added to these schemata, either assimilation or accommodation occurs.

Greatly simplified, in *assimilation processes,* new information is added to existing schemata, and in *accommodation,* the organization of existing schemata is altered (Schwartz 1991). The latter process is probably the most used in OTIs among adult clients with recent remedial diseases or disabilities and where the sessions seek to promote the client's *relearning* on how to perform daily occupations.

The OT's Role

Here, the OT acts as "the agent who plans and structures" occupational performance "in such a way as to effect beneficial changes for the client" (Schwartz 1991); that is, the OT acts as a *coach,* using various teaching facilitators (see below) to promote the client's learning process.

The term *teaching facilitator* is associated with the term *learning strategy,* meaning that the OT uses various teaching techniques during the learning process. These techniques (1) assist the client in overcoming occupational obstacles; (2) help the client to focus, be motivated, pay attention, and persist with, and accomplish daily

occupations that present difficulties, and not give up; and (3) promote the most rational principles for improving problem-solving (Katz 1992; Schwartz 1991).

Teaching Facilitators

In the cognitive teaching approach, the following teaching facilitators are used with people suffering from brain damage (see Chaps. 30 and 31). However, they apply also to active learning programs in psychoeducation (see Chaps. 34, 35, 36).

Dialogue Technique

Dialogue technique is one of the most important facilitators in the cognitive teaching approach. The client is expected to be the prime mover in the communication process. Dialogue takes place between (1) the client and the task performance and (2) the OT, the client, and the task performance. The latter form contains speech, facial expressions, gestures, body language, and action, which constitute a base for developing the strategies (see below) used to complete tasks. The fundamental principle of the dialogue technique is how the OT designs the questions that direct the client's action.

An example of how to apply the dialogue technique: A 4-year-old girl and I were peeling and cutting up potatoes together. The potatoes had to be divided into at least four pieces to fit into a ricer. The girl cut the oval potatoes in half. Then she placed the oval side on the cutting board, so that when she started to cut, the potato slipped away. For me, the easiest way to instruct her would have been to pick up the potato and place it flat side down (the behavioral teaching approach).

> Instead, I asked, "Why do you think the potato slipped away?" She responded, "It thinks it was fun." I asked, "Do you want every potato to slip away like that?" "No." "Then what is the best way to put the potato on the cutting board?" She immediately placed the flat part of the potato down on the board, saying to it: "Now you should not play. I want to eat you!"

Here, I was teaching by using the dialogue technique that had become ingrained in me. Moreover, I am convinced that the girl had assimilated new knowledge into her current repertoire. This situation corresponds to many occasions that will be applied in the cognitive teaching of people with mental, motor, or sensory impairments.

Strategies

Strategies are "organized plans or sets of rules that guide action in variety of situations" (Sabari 2001). The clients use strategies, that is, behaviors and thoughts, that differ from those they have used earlier (Schwartz 1991). For example, learning strategies for the OTIs with people with neurovisual impairments (see Chap. 32). A variety of strategies are used to facilitate the learning process:

- *Associations and imagination* prompt the client to create ideas containing connections between two elements. For example, associations may accompany relearning of logical functions, such as sequential performance of a task. This application is addressed in Chap. 31 for clients suffering from brain damage (Liu et al. 2004). The goal is that the client relearns to plan and execute daily living tasks.
- *Self-speech-induced facilitation* is used to assist simple movements such as reaching for and lifting a glass, in clients with Parkinson's disease (Maitra et al. 2006; also see Chap. 43), and in stroke patients (Kwakkel et al. 2004).
- *Prompting* occurs when the OT or the client initiates a task performance with a perceptual modality not normally used. The prompt should at best result in the client automatically completing the task.

Here, is an example of using strategies with prompting as the teaching facilitator: A woman was suffering from verbal amnesia, and thus had difficulty naming objects. This impairment caused a serious speech disturbance. In the learning situation, the OT used pictures of objects. The client's speech was prompted by writing the first letter of the word on the palm of her left hand—a sensory modality. Using this prompting strategy decreased the client's frustration and was helpful. After a few learning sessions, she used this prompting on her own (Söderback 1991; Stein et al. 2006).

- *Feed-forward and feedback* is the form of dialogue that occurs *between the client and the task* to be performed. The client's usual habits are confronted with new ways of performing occupations, which may results in completion of the task.
- *Feed-forward* refers to a problem-solving process where dialogue technique instructions are used. The aim is to prevent clients from doing tasks in ways that run the risk of mistakes or damage.
  - Example: A client is to learn to move from his bed to his wheelchair by himself. The client might be asked in beforehand to explain how to position the wheelchair, adjust the height of the bed, and how to carry out the transfer before the task is actually undertaken.
- *Feedback* is the client's response to his or her performance of an action or task. Such responses make the client aware of success or failure and are a way of changing occupational behavior.
- The teaching process is facilitated by using *intrinsic or extrinsic feedback* (Sabari 2001).
  - *Intrinsic feedback* concerns the client's learning through designing instructions based on the use of a single *perceptual input modality* or combinations. The modalities are verbal/auditory; visual includes the use of drawings, signs, and physical touch; and visuospatial orientation includes movement guidance, tasting, smelling, or combinations thereof (Hadas and Katz 1992). The choice of appropriate modalities may be decisive for the client's success in performing daily occupations (Hadas and Katz 1992; Simon 1993). Investigation of the client's learning style may reveal what combination of perceptual modalities is most effective (Schwartz 1991).

Examples:

a. A blind person uses his or her tactile sense and hearing ability to compensate for visual loss.
b. The OT teaches clients suffering from intellectual dysfunctions to use the most effective combinations of perceptual input modalities, which may enable them to complete a task. For example, for clients with difficulties in perceiving correct spatial orientation (visuospatial dysgnosia), the information input may be strengthened by adding tactile, motor, and verbal perceptual inputs.
c. In contrast, for clients with information-storing impairments (memory dysfunction), the information process may be strengthened by using as many perceptual modalities as possible, including encoding aids like imagination or categorization of information (Söderback 1981, 1988c, 1991).

   – *Extrinsic feedback* concerns learning that occurs as reactions to perceptual input from the environment (Sabari 2001). The client's experienced result arising from completion of a task may affect the client's accommodated or assimilated knowledge (Guiffrida 1998). Numerous pedagogic aids may be used to bring about extrinsic feedback, such as films, lectures, diaries, biofeedback, and performance of critical tasks. Here, it is important to use a task that motivates the client to act in a realistic context (Schwartz 1991).

Examples of extrinsic feedback:

- Four clients with right-hemisphere stroke and deficits in spatial orientation to the left of their body (unilateral neglect) participated in Intellectual Housework Training (Söderback 1988a, 1991). Video recordings were used to document the clients' actions. The films were shown to every client. Watching the video involved mirrored views; that is, the client perceived his neglected behavior in his right field of vision (with normal perception). The views gave the client feedback about his or her neglect behavior through viewing how she or he placed cakes on a baking plate (Soderback et al. 1992).
- Lifestyle interventions use feedback from monitoring, and review of dialogues and diaries is used among clients suffering from anxiety disorders (Lambert et al. 2007; also see Chap. 37).
- Electronic equipment for biofeedback is used for making the client aware of a negative internal process that is causing ill-health. Electric signals show the client's degree of muscle tension, blood pressure, heart rate, and skin temperature. The measurement results are used for feedback that gives the client an opportunity to gain voluntary control over processes or functions (Bain 1993). Biofeedback is often a part of stress management, where progressive relaxation, relaxation responses, meditation, yoga, t'ai chi, and music therapy accompany the intervention. The aim is to reduce hyperarousal of the sympathetic nervous system (Stein 2002).
- Electronic equipment is also used for electrical stimulation of paretic muscles (Stein and Roose 2000, see Chap. 41).

Mediated Learning

Mediated learning is based on the OT's analysis and synthesis of a *selected activity* (see Chap. 4) that offers the client meaning and purpose. *Activity analysis* is the OT's way to identify the sequential steps that constitute the task, that is, the performance components. This analysis is used for moderating a task's degree of difficulty by changing the number of components to be done and the time required for completion. *Activity synthesis* is a process for integrating performance components with the client's symptom(s). It has applications in mental, neuromuscular, or sensory biologic theories and depends on the client's present developmental level. The OT's teaching is based on his or her broadly medical, psychological, sociological knowledge (Hadas and Katz 1992; Lamport et al. 1989; Söderback 1988c). The results of a therapeutic session depend on whether the client understands the rationale, the goal, and what is to be learned (Ludwig 1993; Söderback 1988c). This teaching approach is advocated by Govender and Kalra (2007).

Teaching Programs for Learning Connected with Mental Diseases

The specific intervention programs exemplified below are distinguished by the messages they convey for the management of various illnesses. Often clients are taught in small groups (see, e.g., the description of psychoeducational groups in Chap. 34) for a set of lessons. These include theoretical information about the disorder and its consequences for performance of daily activities as well as help with practical application to daily life activities. The educational approach is varied, but ordinary lessons comparable to adult education are used, and extrinsic feedback is expected to improve the client's knowledge and behavior. Ideally, active learning is applied, where the client is effectively engaged in understanding and suggesting solutions to impediments to perform daily activities (Johannessen 2000; Stein et al. 2006). The clients are promoted to use their functional resources to maintain occupational performances during longer time and with less fatigue or pain.

Energy Conservation Course

Energy conservation teaching focuses on occupational performance methods that require the client to use as little energy as possible. The aims are to make the client aware of how much energy is required to do the task (Matuska et al. 2007; also see Chap. 33). Energy conservation intervention is used among clients' suffering from neuromuscular impairments that cause fatigue, such as multiple sclerosis, muscular dystrophy, cancer, diagnoses with symptoms of exhaustion.

Psychoeducational and Social Skills Training

Psychoeducational and social skills training may be appropriate for clients with chronic mental ill-health (Buchain et al. 2003; also see Chap. 36). Clients participate in simulated or real-life learning sessions, such as role-playing, management of money and medication, and leisure activities. Teaching situations aimed at gradual improvement and control of interpersonal behavior such as anger (Cowls and Hale 2005; also see Chap. 34) or substance use disorders (see Chap. 37). *Reinforcement,* including assertive responses, nonverbal behavior such as voice volume adjustment or speech duration, or conversional questions, is used. The OT acts as a moderator, giving feedback on the client's behavior (Crist 1993; Lieberman et al. 1993). This approach is used among clients with acute schizophrenia (Chan et al. 2007; also see Chap. 35) to improve insight into their disorder and promote health. The aim is that the client reinforce his/her own strengths, resources, and coping skills by using strategies to be better able to deal with lasting symptoms. The teaching process is mediated by occupations performed in a social context.

Teaching Functional Relearning

Programs for Remediation of Movement and Hand Gripping

Neuromusculoskeletal and movement-related educational programs are based on neurophysiologic theory applied to activity performance in daily life. The aim is to reorganize motor function systems, and the programs are intended for clients suffering from brain damage or spinal cord injury (Warren 1991).

Traditionally, the Rood (Royeen et al. 2001) and the Brunstrom (Pedretti 2001) approaches, proprioceptive neuromuscular facilitation (Pope-Davis 2001), or neurodevelopmental treatment, such as the Bobath approach (Terms 2001), are used.

The following newly originated neuromuscular relearning interventions presented in this Handbook represent approaches to remediation of neuromuscular motor dysfunction:

- *Immersive or nonimmersivetechnology* is used to identify effective training strategies applied to virtual reality (Henderson et al. 2007; also see Chap. 39).
- In *constraint-induced movement therapy* (CIMT), the client may wear a restraining mitten on the less involved, more active hand/arm for 90% of waking time. He or she participates in movement-learning sessions (Bowman et al. 2006; also see Chap. 40) with performance of real daily living tasks (Sterr et al. 2006; Stevenson and Thalman 2007). The approach is grounded in learning theory, and on findings on the brain's adaptive capacities through the neural networks. "[The OT's work contains] coaching, cheerleading, reminding, changing, and contemplating" (Boylstein et al. 2005).
- *Musculoskeletal preventive and remediation educational programs* are exemplified in the Handbook by the *Looking after Your Joint Program* for people with

moderate to severe rheumatoid arthritis (Hammond 2004; also see Chap. 42). An extensive intervention program aimed at improving joint stiffness caused by a hand injury includes integrative and problem-focused teaching in combination with an external adaptive process where active and passive low-load stress mobilization and corrective splinting occur (Man Wah Wong 2002; also see Chap. 18). Clients with upper limb motor function is educated a physical OTI (see Chap. 39)

Programs for Improvement of Sensory Functional Training

Sensory functional training programs are directed at children with congenital impairments and at clients suffering from neuromusculoskeletal pain.

- *Sensory integration therapy* is used with children with cerebral paresis or mental retardation. This age-developmental–mediated learning focuses on control of sensory input for stimulation of the child's somatosensory and vestibular sensations that bring about pleasurable, playful, and accomplished functional movement-based activities (Stein and Roose 2000; Walker 1993). Sensory integration (Ayres 1979) in combination with neurodevelopmental and vestibular stimulation is intended to increase motor and learning abilities among children with cerebral paresis and mental retardation. The OT facilitates the child's learning though vestibular perceptual and environmental stimulation (see Chap. 44).
- *Movement schema* is a low-intensity training program combined with the administration of botulinum toxin A, which is used to improve movement patterns among children with cerebral paresis (Russo et al. 2007; also see Chap. 45).
- The management of chronic pain (see Chap. 47) and, in this connection, restoration of function (see Chap. 48) is intended to improve the client's knowledge of and ability to sustain working.

Teaching in Occupational Rehabilitation Programs

Programs for participation in programs concerning working life are based on *ergonomic and practical principles* as presented in Chap. 49. Numerous programs aim at teaching participation in working life (see examples in Chaps. 47, 48, 49, 50, 51 and 52). Here, people with mental ill-health (see Chap. 51) can get help with individual placement and support in a job (see Chap. 52). The same educational services are offered for aiding transitions from childhood to adulthood (see Chap. 52). However, some important programs are missing, such as work hardening (Ogden-Niemeyer and Jacobs 1989) and the criterion-referenced multidimensional job-related model (Söderback et al. 2000). There is an extensive development in this subject with use of a lot of coaching approaches, see, for example, Chap. 38, why the readers are recommended to study the newest published literature.

OTs are members of rehabilitation multidisciplinary teams for teaching clients who participate in such programs, e.g., occupational rehabilitation programs. The

various ways of team organizations and OTs' role in these teams are described in Chap. 46.

Conclusion

This chapter restricted the discussion to the OT's role as teacher mainly on an individual client-centered base. Here, OTs' aim is to create optimal learning situations for clients with impairments or disabilities. In the teaching process, the client's current function is the basis for choosing learning approaches, aimed at improving his/her occupational performances.

Client education is nowadays recognized as a major component of OTs' everyday practice. The education is delivered in many different situations, not only to the individual or groups of clients but also to relatives (see Chap. 28) and other health-care professionals and team members, and it includes many different forms (DeCleene et al. 2011). In other words, an extensive variation of pedagogical approaches is needed, which all OTs are expected to master. DeCleene et al. (2011) denounce this as a shortage in present curricula for OTs' education. Nevertheless, the fact remains that the availability of scientific studies and comprehensive client-centered pedagogical literature is so far very restricted, and why research with this theme is recommended for the future.

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Chapter 27
Problem Solving: A Teaching and Therapeutic Tool for Older Adults and Their Families

Laura N. Gitlin

> *The OT needs to have effective communication skills, respecting a family's values and understanding where they're coming from.… That's critical, even more than knowing her intervention strategies.*
> Family caregiver

Abstract Problem solving is integral to clinical reasoning and everyday occupational therapy practices. It can also be a systematic therapeutic modality for identifying client or family caregiver concerns and teaching new approaches to self-management. This chapter presents a systematic approach to help occupational therapists (OTs) identify target problem areas and potential modifiable contributing factors when working with older adults and families. The approach is applicable to a broad range of clinical problems associated with the consequences and management of chronic illness and provides therapists with an important tool for actively engaging clients in self-management.

Keywords Caregiving · Chronic illness · Client-centered care · Cultural competence · Self-efficacy · Self-management

Definitions

Problem solving is integral to the clinical reasoning process and everyday practices of occupational therapists (OTs). Problem solving, however, can also be a systematic therapeutic modality for identifying client or family caregiver concerns and teaching new approaches to self-management. Problem solving as a therapeutic tool is critical to manage complex health problems such as chronic illness or functional challenges that typically occur as people age or to identify and minimize the daily care concerns confronted by family caregivers that are burdensome and devalue quality of life. Using a systematic problem-solving approach that directly involves the older adult or

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family member in the clinical reasoning process helps to form a care partnership. The approach reflects a person-centered and person-directed approach, helps therapists to identify a person's care preferences and empowers individuals to participate in, take ownership of care solutions, and direct their own care planning.

Background

One theoretical approach in problem solving is the transtheoretical model of behavioral change, which suggests that behavioral change involves small incremental steps in which individuals move from (1) a stage of precontemplation in which a problem is not recognized; (2) to contemplation, in which a problem is recognized but the course of action remains unclear or the person is ambivalent; (3) to action, in which a person is ready to try new approaches; (4) to maintenance, in which a person is ready and has successfully made changes to enhance his or her performance; (5) seeks strategies to maintain these gains (Prochaska and Velicer 1997; Rose et al. 2010). The stages of readiness may help to clarify how to effectively engage an older adult or family member.

Purpose

Problem solving as a therapeutic tool involves the purposeful engagement of an older adult or family member in a specific process to identify and solve an identified healthcare challenge. The purposes of a problem-solving approach are manifold and include the following: (a) to model and instruct client as to a process for thinking about and solving everyday caregiving or health and functional problems; (b) to actively engage the client in a dynamic process to identify modifiable contributors to problems and their solutions; (c) to enhance self-efficacy and empower the client to own the health problems as well as the solutions derived from this process; (d) to help establish a therapeutic partnership in which the OT and client are equal, with each bringing unique knowledge and skills to solve a complex challenge; the OT brings their unique training, knowledge of techniques, and the evidence; the client brings their understanding and knowledge of their daily challenges and what has worked or not for them previously.

Method

Candidates for the Intervention

Inclusion Criteria

Problem solving as a teaching tool is a helpful therapeutic approach when working with *family caregivers of persons with dementia* who are struggling with managing

troublesome behaviors (e.g., wandering, agitation, repetitive questioning) or functional challenges (e.g., resistance to care, ambulation difficulties); with older adults with functional difficulties (e.g., unable to bathe, climb stairs); or with individuals with chronic illness in which lifestyle modifications, such as diet, exercise, medication adherence, are necessary (Chodosh et al. 2005; Farrell et al. 2004; Gitlin et al. 2003, 2006, 2008, 2012 Kales et al. 2014; Lorig et al. 2001).

Exclusion Criteria

Problem solving may not be helpful with some clients who are so distressed or depressed that they are not able to focus on the process. Also, this approach may not be helpful to individuals with executive dysfunction, other cognitive impairment, or for whom moving through a step-wise problem-solving process may be too confusing or overwhelming. Nevertheless, some aspects of problem solving can be helpful even in these cases. For example, eliciting the person's perspective of the problem area and previous strategies employed may be helpful. The OT would need to be careful to not overwhelm the client with too many processes, steps, and strategies; this is particularly the case for individuals with low readiness.

Signs of Readiness for Participation in Problem Solving

The problem-solving model suggests that older adults with health challenges in the precontemplative and contemplative stages may not fully understand the disease and the need for behavioral or environmental changes. Such changes may be viewed as stigmatizing and threatening to one's lifelong preferred self-care methods. For this stage of readiness, continued support, providing education, and suggesting small changes that can have a big impact on the presenting problem may be most appropriate.

Once a better understanding of the disease or health condition is achieved, then problem solving and brainstorming will be more useful. This is in contrast to the client at the active or maintenance phase who is proactively seeking lifestyle and environmental adjustments to reach their personal functional goals or overcome health challenges. In this case, engagement in the problem-solving–brainstorming process may be very much welcomed and embraced as a helpful tool (Gitlin and Rose 2013; Rose et al. 2010).

Settings

Problem solving can occur in any setting including home, outpatient, nursing home or assisted living facilities, hospitals, or community settings.

The pace by which to proceed through the problem solving steps for any client remains a clinical judgment.

The Role of the OT

The role of the OT in facilitating problem solving and systematically engaging a client in this process is critical and consistent with the emerging principles of geriatric care (Reuben 2007), patient-directed and patient-centered care, and the inclusion of patient preferences to direct care planning. OTs possess the unique combination of skills required to integrate environmental, social, and person-based factors (including cognitive and functional) in the problem-solving process from which to derive a multifactorial profile of the client, the presenting problem(s), and potential solution(s).

Results

Clinical Application: The Problem-Solving Intervention Model

Genesis

Problem solving is central to clinical reasoning and at the heart of all health professional practices. It has been more formally and systematically developed by psychologists as an active and systematic therapeutic tool for use in psychosocial and behavioral interventions (Cuijpers et al. 2007). There are many variants of problem solving, which range from broad clinical reasoning to more structured, manualized approaches represented, for example, by problem-solving therapy (PST), which has been tested extensively in randomized trials for patients with depression (Gellis and Kenaley 2008). However, a systematic approach to problem solving can be useful in occupational therapy encounters involving older adults or their family members, in which the focus of treatment is on functional performance difficulties or concerns stemming from the need to manage the consequences of chronic illness. The problem-solving approach presented here draws upon traditions from psychology that focus on behavior as an outcome of antecedents and consequences; its most recent variant was tested in a series of dementia caregiver interventions (Belle et al. 2006; Gitlin et al. 2003, 2010), sponsored by the National Institutes of Health (NIH) 12-year Resources for Enhancing Alzheimer's Caregiver Health (REACH) I and II initiatives. It has also been tested in intervention studies targeting physically frail older adults (Gitlin et al., 2006; Szanton et al., 2011).

Main Principles

A problem-solving approach is a part of a larger movement toward *consumer-directed health care*. A consumer-directed approach relies on informed consumers to direct their own health-care choices and participate in disease management. Emerging chronic disease care models emphasize patient-oriented care with patients

Table 27.1 Talking points to introduce problem solving

Let's discuss the problem area/behavior that you have identified
As we discuss the problem area/behavior, I will take notes. This will help us identify some of the things that may be contributing to the (name the problem or behavior)
First, can you describe the problem or what happens?

and families as partners on a care team (Bodenheimer et al. 2002; Kales et al. 2014). Chronic disease care models are founded on the premise that patient activation or engagement in one's own care is necessary to achieve better health-care outcomes (Hibbard et al. 2004). Thus, of importance are interventions that use techniques that actively engage patients and involve them in their own health management. Problem solving offers therapists a tool for actively involving and promoting the clients' engagement. It also provides a mechanism for obtaining more in-depth knowledge of a client-identified problem from which to tailor or customize strategies to fit the particularities of the person–environmental context. Tailored interventions allow for a more patient-centered focus. This focus has been shown to be more advantageous than a prescriptive, one-size-fits-all approach, which typifies current health-care practices (Chee et al. 2007; Richards et al. 2007).

The problem-solving approach discussed here is based on the assumption that for any behavior or challenging problem, there are identifiable antecedents or potential triggers, specific characteristics of the behavior/problem itself, and consequences or responses to the behavior/problem that potentially exacerbate the presenting problem and which can be removed or minimized to ameliorate the presenting problem.

Content of Problem-Solving Model: The ABC Approach

This model is referred to as the ABC approach, in which A = antecedent, B = behavior, and C = consequence. The client's functioning is examined as a consequence of each of these components and their interaction.

The *goal of problem solving* is to identify each component and fully characterize an identified problem in order to discern modifiable contributory factors. From this, *strategies* are developed and implemented to address specific modifiable factors with the goal of minimizing or eliminating the presenting problem.

Problem solving makes the underlying clinical reasoning explicit that OTs typically engage in, but in such a way as to enable clients to effectively contribute to solving their self-identified problems. Prior to actively engaging in problem solving with a client, it is important to provide a brief explanation as to its purpose, as listed in Table 27.1.

Six Basic Steps

The approach involves six basic steps outlined in Table 27.2.

Step 1 starts with an agreement on the identified problem (e.g., unable to prepare a small meal) or behavior (e.g., gets lost in neighborhood). Moving through the

Table 27.2 Six steps in problem solving with older adults and family members

Steps	Description
Problem identification	Identify a specific problem area that is challenging to the client and/or family caregiver
	Examples of a problem may be Difficulty engaging in desired activities such as visiting with friends/family Climbing stairs quickly to use bathroom Managing challenging behavior associated with dementia
Evaluate antecedents to problem, context in which problem occurs, and consequences of problem	Understand the antecedents of a particular problem area are important for identifying particular solutions for the target problem
	Examples may be What preceded a dementia patient's catastrophic reaction The context in which a problem occurs (e.g., older adult takes diuretic but has difficulty climbing stairs to bathroom in a timely manner) The particular consequences (e.g., caregiver raises voice; or older adult stops taking diuretic) Evaluation involves a semi-structured questioning approach along with either role-play or direct observation of performance and assessment of the environment
Brainstorming	Identify potential solutions by having client/family member help generate a list of what works and what has not worked in the past and what they might consider trying
Identify potential solutions	Select those solutions from the brainstorm list that client/family member agrees to and that have therapeutic potential
Implement identified strategies and modify as needed	Implement strategies, reevaluate client progress, and make adjustments as needed, always informing client/family member of why a particular strategy worked or did not work
Generalize process	Name and frame process and steps so that client/family member can use them as a tool for newly emerging challenges once occupational therapy is concluded

process, the initially identified problem is refined or modified. However, in some cases, the OT discovers underlying or different problems to be the real problem or concern. One of the strengths of this approach is that it facilitates a greater understanding of the underlying issues that are causing client distress and helps to uncover the troublesome components of a behavior or a performance deficit.

In *step 2*, the client is asked to tell his or her story. As the client describes the problem, the OT takes notes and probes using the questions presented in Table 27.3. It is important to be familiar with the probes so that questioning can proceed

Table 27.3 Problem solving worksheet TARGET PROBLEM AREA OR BEHAVIOR. (Source: Adapted from the NIH REACH initiative, and retested in various interventions to address behavioral symptoms in persons with dementia and functional challenges in persons with functional difficulties, Schulz et al. 2003)

What is the behavior/problem area?	Notes
❑ Take a minute and describe what client does	
❑ Listen to the words used by clients as to how they describe the problem area, whether they understand the disease, if they have unrealistic expectations	
Why is this behavior/area a problem?	
❑ "People react differently to problems/behaviors. What about this problem/behavior really gets to you?"	
❑ "What bothers you?"	
❑ "Why does this get on your nerves?"	
❑ "Can you list the reason(s)?"	
❑ "What effect does this problem/behavior have on you?"	
❑ "How does it make you feel?"	
"*How would you like this problem/behavior to change*?"	
❑ "When would you consider the problem solved?"	
❑ "What would make it seem to you that it was better (tolerable)?"	
❑ "What would make you feel better about this problem?"	
"*Why do you think this problem/behavior happens*?"	
❑ "Do you see any specific causes or triggers?"	
❑ "What do you think is contributing to the behavior?"	
❑ "Think about what happens right before the behavior occurs"	
❑ "Can you recognize any cycles or patterns?"	
❑ "What happened right before the problem occurs?"	
"*When does the problem/behavior happen?*"	
Time of day?	
Days of the week?	
❑ "When does the problem/behavior begin?"	
❑ "Can you recognize any cycles or patterns?"	
❑ "What happened right before the problem/behavior occurs?"	
❑ "Does the problem/behavior happen constantly?"	
❑ "How often does the problem/behavior happen"	
"*Where does the problem/behavior happen*?"	
❑ "Is there a unique place in the house?"	
❑ "Does it only happen in certain places?"	
❑ "Are there places where it does not happen?"	
❑ "Have you changed the surroundings? If yes, did it get worse or better when this happened?"	
"*Who is around when the problem/behavior occurred*?"	
❑ "Do other people help care for you or your family member?"	
❑ "Do you care for other people or children?"	
❑ "Is the problem/behavior influenced by other family members/friends?"	
❑ "How do other people react to the problem/ behavior?"	
❑ "Any special sleeping arrangements?"	
"*What have you tried*?"	
❑ "What do you do when she/he does this?"	
❑ "Have you tried anything that hasn't worked?"	

Table 27.3 (continued)

	Notes
❑ "Have you tried anything that seems to help?"	
❑ "How often have you tried doing that?"	
Additional information	
❑ "Has your doctor been told of this problem/behavior?"	
❑ "If yes, what has your doctor recommended?"	
❑ "Do you or your loved one have hearing problems?"	
❑ "Do you or your loved one have vision problems?"	
❑ "Do you or your loved one have pain?"	
❑ "Are you or your loved one stressed?"	

smoothly and occur within the flow of a conversation and the client's story telling. The questions in Table 27.3 can be asked in any order and serve to keep the client focused and engaged. The OT needs to identify the who, what, when, and where of the identified problem, and thus the probes help the OT and the client to flesh out details that may not be provided initially by the client.

Step 3 entails engaging the client in either a role play or a simulation, or making a direct observation of the performance challenge or context in which a problem behavior occurs. The purpose of this step is to obtain additional information about the context of the problem, especially environmental supports and constraints or the particular management and communication approaches or level of functionality of the client. Following a role-play or observation, the client is asked whether it represented what typically happens. From the problem-solving and observation approaches, the OT may be able to offer an immediate strategy to address the problem. In some cases, it may not be possible to observe the problem/behavior immediately following the ABC interviewing, but it is very helpful if this can occur either in the same or in a near future session. The ABC approach can be used in combination with a standard observational tool, for example, to determine home safety or a standard tool to assess functional performance, or behavioral symptoms.

Step 4 is referred to as "brainstorming." To initiate it, the brainstorming process is explained to the client in this way:

> Now that we have discussed the different aspects of the problem/behavior and how you feel about it, let's think about possible ways of handling it. Let's spend about 10 min or so on thinking about possible solutions. This is called "brainstorming." The purpose of brainstorming is to consider all possible solutions without judging whether they will work or if they are doable at this point or whether you want to try it. Let's take turns thinking of possible strategies. I will record all of our ideas and then we will look at each idea we come up with to see what you think about them. Remember, for right now, we are just going to list solutions. After we have a list, we will then talk about each idea in detail to see if it would work for you.

A simple worksheet for brainstorming (adapted from the NIH REACH initiative) is shown in Table 27.4.

Here are some suggestions for conducting the brainstorming:

- It is important to emphasize that while there is no wrong or right solution, those generated should be realistic. A statement such as "I wish the disease would go

Table 27.4 Brainstorming worksheet. (Source: Adapted from NIH REACH II initiative, Schulz et al. 2003)

Target behavior/ problem:_____
List possible solutions: Consider solutions that minimize complexity of the environment in which the behavior/problem occurs, simplifies tasks (number of steps, performance approaches), how activities are setup, how communications occur, role of social support and social resources:
____1.
____2.
____3.
____4.
____5.
____6.
____7.
____8.
____9.
____10.
Note: Place * next to acceptable solutions; X next to unacceptable solutions; ? next to solutions for future consideration.
Consider organizing strategies according to categories: those that address the physical environment, task complexity, communication (relevant in caregiver-identified problems), activity engagement, social resources, medical management.

Adapted from NIH REACH II initiative. Schulz, et al. (2003)

away or that I will be cured" is not a realistic or acceptable brainstorming item. Statements such as these suggest that clients need more help in understanding their condition, and that while there may not be a cure, there are strategies that may be helpful so that they can continue to achieve their personal goals.

- Brainstorming can be uncomfortable for some clients who may be at a loss to identify a strategy. Thus, it is helpful and important for the OT to offer the first strategy to provide a concrete example of what is meant by a potential solution. For clients who continue to have difficulty identifying potential solutions, it is helpful to ask them to describe what has worked and what has not worked in the past to address the problem. This often triggers ideas and helps the client understand that in fact they can come up with specific solutions to their problems.
- It is important to allow sufficient time for a client to generate an idea and to praise any response from the client. Some clients may need more time, whereas others will move through this exercise quickly.
- Although there is no specific number of strategies that need to be generated, anywhere from five to ten strategies are helpful to have listed. For some clients, three to five strategies may be less overwhelming. While the OT may be aware of many more potential strategies, it is important not to overwhelm a client and to proceed at a reasonable pace that allows the client to absorb the information and strategies.
- Brainstorming can be as short as 10 min or as long as 20 min, depending on the level of engagement and number of solutions a client seeks to list. It should not be much longer than that however.
- In brainstorming, it is helpful for the OT to think in terms of overarching categories of types of strategies such as those that may address environmental barriers, communication issues, or task complexity.
- Strategies can be reorganized by the OT according to these particular modifiable factors after brainstorming as a way of further educating clients as to the

different strata in their living space that are potential contributors to functional/behavioral challenges.

Most OTs can identify strategies on their own without engaging a client in a brainstorming. However, brainstorming is an important step in problem solving for several critical reasons: (a) it illustrates for clients a process they can use when new problems arise once therapy is completed; (b) the process helps to directly involve clients in their own self-management and gives them ownership of it; (c) it is empowering and validating since clients begin to see that they can generate solutions to their own problems; (d) it provides a mechanism for securing a client's agreement to try a new approach, which in turn enhances the likelihood that the agreed upon strategy will in fact be attempted. Thus, brainstorming serves as a *therapeutic tool* and should not be shortchanged.

In *step 5*, at the completion of the brainstorming session, the OT explains the next steps using these suggested talking points:

> We discussed different aspects of the problem area/behavior that is troublesome to you, how you are feeling, and things that you have done. Also, we now have a list of possible ways of managing the problem/behavior. Let's agree upon and take a closer look at each of the specific strategies you will try.

For each strategy generated, starting with the first, the OT reads the strategy to the client, who is asked (1) if it is a feasible one for him or her to use, and (2) if he or she would be willing to try it. The OT rules out any strategy that the client rejects outright or feels strongly that he or she would never try or for which the OT does not believe would be effective. For the latter, the OT should explain why the strategy would not be appropriate.

For strategies for which the client shows some hesitation, the OT can suggest returning to that strategy at another time to see if it might be helpful. For strategies that the OT believes will work, but are rejected by the client, it is important to provide a rationale for why it may be effective and suggest that the client consider it as a possible approach in the future. Each strategy is labeled on the list as (1) completely rejected by the client, by placing an X next to it; (2) a "maybe," in that the client is unsure but the OT believes it would be effective, by placing a question mark by the strategy; or (3) acceptable to the client, by placing an asterisk (*) by the strategy.

In *step 6*, for the strategies the client agrees to, the OT demonstrates the strategy and then observes the client performing the strategy.

Throughout, it is important to praise the client, inquire as to whether the strategy appears helpful, explain why the strategy may work, and tweak or modify the strategy to fit the client's environmental context based on the therapist's initial observation of how the client performs the strategy.

At the end of an intervention session, it is important to help clients identify when and how they will use each of the strategies.

The problem-solving questioning phase and brainstorming process should both occur sequentially within one face-to-face treatment session. This typically requires 20–30 min to complete.

If necessary, demonstrating and practicing agreed-upon strategies can occur in a separate face-to-face session, but again it is preferable if this is completed in the same session as the problem solving and brainstorming.

Clients should be given the brainstorming sheet so that they can refer to the list of solutions that were identified and to the agreed-upon ones that they should try prior to the next treatment session.

This process can be repeated for any number of identified problem areas in subsequent therapeutic sessions. The more it is used, the easier it becomes for clients, who learn how to use the process on their own. Also, the OT should explain to the client how they can use this approach on their own to solve newly emerging problems that may occur in the future.

Clinical Considerations

There are several challenges that OTs will confront when using problem solving as an active teaching tool. First, some clients may be uncomfortable engaging in this process, and may find the process not in keeping with their expectations for a more prescriptive, top–down practice model approach. In this case, it is beneficial to fully explain (1) the purpose of the approach, and (2) how it can be helpful for the client and/or the caregiver. Some clients may become distracted or have difficulty concentrating or sustaining the problem-solving and brainstorming engagement process. For overwhelmed clients, there is a tendency to stray from the initial presenting problem, and it is necessary for the OT to keep the discussion on track. A primary challenge is identifying one particular problem area, as problems are often complex and multifaceted. It may be discovered that the initial identified problem really represents two or more related issues, each requiring its own problem-solving and brainstorming process. Alternately, through problem solving, it may be discovered that the problem initially identified is not actually the problem at all. This can occur with the clients who may not fully grasp the nature of their conditions, or with the overwhelmed clients who may not be able to disentangle the underlying problem that is causing their distress. Brainstorming too can be uncomfortable for some people who may not be able to think off the top of their head as to possible solutions. Nevertheless, most clients typically find this process very validating and they are surprised how much they do know and can act on to address the areas that they have identified as problematic.

Discussion

Some form of problem solving is at the core of most evidence-based interventions involving family caregivers or individuals with functional challenges and chronic disease self-management needs. As a systematic questioning and brainstorming

process, the approach helps clients clarify the characteristics of a presenting problem and potential ways in which it can be addressed.

The process serves as a teaching tool to uncover a client problem and the modifiable contributing factors as well as a mechanism for identifying viable solutions. Moreover, clients learn to use a tool for addressing problems that may emerge in the future. Furthermore, and perhaps most importantly, the technique itself promotes self-awareness and enhances self-efficacy (Bandura 1986) in that clients derive control over specific behavior-event contingencies that may have previously deterred functional goal attainment. Naming and framing the process for the client following the successful completion of a problem-solving exercise is important, particularly for those in the active/maintenance phase of readiness. In this way, the clients can fully own this technique, and it can become part of their personal repertoire for disease self-management at the completion of a therapeutic encounter. As chronic health problems present challenges, which change over time, the therapeutic goal of problem solving is not only to solve the problem at hand but also to provide the client with a strategy for managing future challenges. While the technique outlined here has been successfully used in interventions with families and persons, individuals with chronic disease self-management needs and functional difficulties, more research is required to evaluate the benefits of different approaches to problem solving and iterations of this technique with clients from diverse socioeconomic and cultural backgrounds and with a wider range of problem areas.

Although engagement in problem solving may not match every client's needs and abilities, therapists have the requisite professional knowledge and skill to be able to modify the process to accommodate different levels of abilities. An approach such as that proposed here, which is systematic yet flexible, is an important part of the tool kit that OTs can bring to the patient/family encounter.

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The Case Study of Using Problem Solving for Marie, Living with Alzheimer's Disease and her daughter Donna

Keywords: Behavioral symptoms, Caregiver burden, Caregiving, Problem solving

Introduction

The theme of this case study concerns family challenges associated with caring for a person with moderate stage dementia and the use of problem solving to identify discrete problem areas and potential solutions.

The students' tasks include:

1. To determine strategies to help Donna manage her mother's behavioral symptoms and to also be able to take better care of herself.
2. To work with Donna to identify underlying patterns and mutable factors that may be contributing to her mother's behaviors.
3. To apply problem solving to come up with a set of strategies Donna agrees to try.

As a starting point, students should use the following references to gather background information.

Important references are:

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Overview of the Content

Major goal of the actual interventions are to

- Enable the caregiver to prevent, minimize, or reduce behavioral symptoms of her mother
- Enhance the mother and the caregiver's quality of life
- Enable the caregiver to find time for herself

Learning Objectives

By the end of studying this chapter the learner will:

1. Understand how to apply problem solving with families caring for persons with dementia
2. Identify potential strategies (behavioral, environmental) that can minimize behavioral symptoms
3. Examine the interactions of persons with dementia, their care environment, and impact on families

The Background History of Mary and Her family

Personal Information

Marie is an 80-year-old female diagnosed with Alzheimer's disease 4 years ago. She lives with her daughter, Donna, and her daughter's husband and two teenage sons in a ranch house in a suburban area. Marie has her own bedroom, sitting room, bathroom, and kitchenette in an "in law" suite attached to the family home. Marie was a full-time wife and homemaker who never worked outside the home. Her husband passed away in 2000, and she came to live with Donna a year later as she was having difficulty keeping up with her finances, shopping, and other basic tasks of daily living.

Marie prided herself on her homemaking skills. She was a great cook and loved to bake. She enjoyed knitting and was an active community volunteer first with the children's school and later (as they grew older) with her local church. She stopped driving her car right after her diagnosis, as she was afraid to drive.

Marie's daughter reports that she appears to be easily agitated, highly anxious, and keeps repeating the same questions over and over with her (e.g., where are you going? When are we eating?). She has been resisting going out of the house for family dinners at the local restaurant or to attend church. She tends to become anxious and fearful when it is time to leave the house for anything (appointments, outings, etc.).

Donna is finding it increasingly difficult caring for her mother and attending to her other responsibilities including a part time job in her local school system, being there for her two sons and husband, attending to her household responsibilities, and taking care of herself. She is feeling very stretched and indicated she is having

difficulty sleeping, feels very tired and alone, and feels very sad everyday to see her mom the way she is now. Donna wants help but is reluctant to ask anyone else to help her with her mom. She also can be a perfectionist and wants things done a certain way in her home.

Medical Diagnoses and Prognoses

Marie has dementia, most likely of the Alzheimer's type. She is in the moderate stage of the disease, which is a progressively degenerative disease process. Her short-term memory is poor and she is having increasing difficulty initiating, planning, and organizing activities she used to do (e.g., cook a meal) demonstrating executive functional challenges. She continues to have some insight, although limited, of her cognitive changes. She is becoming increasingly agitated and confused as she loses her cognitive abilities. She is in relatively good physical condition with no other chronic conditions. Her vision is good with glasses but she is experiencing some hearing loss although she does not wear a hearing aid. While her ambulation in general is good, she did fall 6 months ago—she tripped over the carpet and fell to the ground. She was bruised but no bones were broken.

Reason for Seeking Occupational Therapy

Marie is experiencing behavioral symptoms, which prompted her physician to be concerned about her home safety and daily function. She suggested occupational therapy to assess Marie's safety at home and to work with the caregiver to teach her behavioral management skills.

Occupational Performance Issues

Marie used to cook but is having difficulty knowing what to do in the kitchen. This frustrates her. She is also having increasing difficulty dressing and bathing herself, but she does not want any help from her daughter. She is starting to look a little raggedy which is not like her previous self.

The Student's Report

The following guiding questions have been identified in developing possible solutions for Marie and Donna. These questions are generated from the available literature references and our clinical experiences:

Questions

1. What specific questions would you ask the caregiver to learn about her mother's presenting behaviors?
2. What would you like to learn about Marie's day?
3. What would you like to learn about the relationship of Donna and her mother?
4. What aspects of the physical and social environment would you want to learn about and/or for which you may have potential concerns?

Chapter 28
Teaching and Supporting Clients with Dementia and Their Caregivers in Daily Functioning

Maud J. L. Graff

Look, he is happy doing the gardening by himself with these adaptations. Now, I don't feel helpless anymore and I have time to do my own activities.
A caregiver wife

Abstract Community-based occupational therapy for clients with dementia and their caregivers is a client-centered and family-centered intervention that enables clients with dementia to participate in meaningful activities of daily living (ADL) in their own environment. It enables caregivers to support these clients in these ADL activities and reduces the caregiver's burden. Occupational therapists (OTs) achieve this outcome, first, by analyzing the life stories and the needs and motivations for meaningful daily activities of these clients and their caregivers in the past and present, second, by setting feasible goals together, third, by enabling clients with dementia to do meaningful activities in ways that will enhance their ability to participate by using strategies to compensate for their cognitive decline, and fourth, by modifying the client's environment to better support participation. Caregivers are trained in supervision and problem solving, in using cognitive and behavioral strategies to change their coping behavior, and reduce their burden of care.

Keywords Behavioral interventions · Caregiver burden · Coping · Dementia · Community based · Environmental adaptations · Home modifications

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Definition

Dementia is a chronic and degenerative disease that causes disorders of memory, behavioral problems, and loss of initiative, of independent functioning in daily activities, and of participation in social activities. These problems (1) decrease the well-being of people with dementia and their caregivers (Graff et al. 2007), (2) put pressure on the family and friends' relationships (Coen 1998; Graff et al. 2006a, b; Jepson et al. 1999), and (3) cause high healthcare costs. Several studies have proven that multicomponent interventions, which are individualized, tailor-made, and focused on patients and caregiver needs and on feasible goals, are most effective in dementia (Brodaty et al. 2003; Droës et al. 2011a; van Mierlo et al. 2012; Olazaran et al. 2010; Smits et al. 2007; Spijker et al. 2008). Therefore, there is a need for individualized multicomponent programs that are focused on activating and training people with dementia in meaningful daily activities to prevent loss of initiative, independence, and social exclusion.

Community-based occupational therapy for clients with dementia and their caregivers is such a multicomponent, individualized, and tailor-made *client-and-caregiver-centered intervention*. The intervention enables clients to participate in meaningful activities of daily living (ADL) in their present environment, and helps caregivers to support these clients with dementia in these activities and reduce their caregiver burden. These definitions follow the World Federation of Occupational Therapists (WFOT 2004), the Canadian Association of Occupational Therapists (CAOT 2008), the consensus of guidelines of this community-based occupational therapy program (Graff et al. 1998, 2000, 2003, 2006b; van Melick et al. 1998, 2000), and the Dutch Foundation of Occupational Therapy (Kuijper et al. 2006).

Development of the Intervention

This client–caregiver-centered intervention (van Melick et al. 1998, 2000; Graff et al. 2010) was developed during 1996–1998 by a workgroup of occupational therapy experts in a consensus process (Graff et al. 1998, 2000). Its feasibility was tested (Graff et al. 1998, 2000), and the contents and process of community occupational therapy were identified through a qualitative case study analysis (Graff et al. 2006b). Accordingly, in 2008–2010, this community occupational therapy intervention for older people with dementia and their caregivers was described as a program, consisting of the theoretical and evidence-based background (part 1); the intervention guideline in which the step-by-step intervention is explained and illustrated with descriptions of practical cases (part 2); observational assessments, questionnaires and interview assessments, and guides (part 3); and a DVD with practical case examples (Graff et al. 2010). This book was also published in French (Graff et al. 2013), Italian (Graff et al. manual 2013; book in press), and English languages. Last year, this translated manual was piloted and adapted to the UK situation (Wenborn and Graff et al. manual 2014).

Purpose, Rationale, and Objectives

The intervention is directed to *clients* with dementia and their *caregivers*. The focuses are on conducting optimal adaptation of the limitations caused by the dementia clients' cognitive decline. The aims are improvement of problem solving and coping behavior, and maintenance of skills that enable clients to participate in meaningful everyday activities. The aims for the caregivers are to give them support, and to facilitate their burden so that they, in turn, encourage the clients' participation in meaningful ADL. The intervention goals are based on the needs, interests, beliefs, habits, and roles of both clients and caregivers. This intervention approach is based on the model of human occupation (MOHO; Kielhofner 2008) and narrative methods (Hasselkus 1990; Riopel-Smith and Kielhofner 1998, Kielhofner et al. 2004), and also on the advice process and consultation methods. Here, information originating from clients' and caregivers' stories, beliefs, needs, interests, habits, roles, norms, and goals are interpreted for use in the goal-setting and intervention processes, and caregivers are coached how to deal with the consequences of dementia in daily life situations.

Method

Candidates for the Intervention

The intervention is directed at all people with *mild-to-moderate dementia* (Mini-Mental State Examination; MMSE score of 10 to 24; Folstein et al. 1983), who are living in the community, and at their caregivers (partners, family members, neighbors, or friends) who support them at least 1 day a week, or at people living in homes for the elderly and their caregivers.

Epidemiology of Dementia and Caregiving

Dementia is one of the three major diseases that make the largest demands on healthcare (Meerding et al. 1998; Wimo et al. 1998, 2003, 2006), and is a major cause of disability and care burden in the elderly (Jönsson et al. 2006). In 2002, in the Netherlands, nearly 1 % of 65-year-olds suffered from dementia. This percentage rose with increasing age to around 40 % in people aged 90 and over. In 2050, it is predicted that 2.2 % of 65-year-olds will suffer from dementia. Older people with dementia (age > 65 years) are mostly women (80 %). Of the younger people with dementia (age < 65 years), the mean age is 59 years; here 50 % are men and 50 % are women (Dutch Health Council 2002). In 2003, dementia was responsible for 5.3 % of the total healthcare costs, which was 14 % of the age-specific total costs for people aged 75–84 and 22 % for people aged 85 and older (Slobbe et al. 2006).

In 2002, 39% of dementia patients needed continuous care, 38% needed home care daily, 23% needed home care occasionally, and 60% of community-dwelling dementia patients had a need for daily or continuous care.

In 2010, the worldwide number of people with dementia was estimated to be 35.6 million. This number is expected to grow to 135 million by 2050 (Ballard et al. 2011; Alzheimer's Disease International 2013). A similar trend is expected in the Netherlands, where the number of people with dementia is estimated to grow from 243,000 in 2011 to 565,000 in 2050 (Dutch Alzheimer Association 2011). About 70% of the people with dementia live at home and are cared for by informal caregivers, who are mostly family members (Dutch Alzheimer Association 2011). Most are the partners (70%) or daughters (28%) of people with dementia. About 750,000 people deliver care for more than 8 h/week and for longer than 3 months, and 150,000–200,000 caregivers report a very high burden of care (Dutch Health Council 2006). Therefore, it is important to implement effective and efficient healthcare interventions that increase the independence and well-being of people living with dementia, decrease caregiver burden, and permit a more efficient use of scarce healthcare resources (Smits 2007; Spijker et al. 2008; Olazaron et al. 2010; Droës et al. 2011a; van Mierlo et al. 2012).

The policy for elderly people and ageing pursues a deinstitutionalization of care (Ministry of Housing, Regional Development and the Environment & Ministry of Public Health, Welfare and Sports 2007) which is in line with the desire of elderly people to remain at home for as long as possible, acknowledging that, as the disease progresses, admission to a nursing home is inevitable.

In the Netherlands, there are about 3800 OTs who work both in the community and in institutes (NIVEL 2012). Because most people with dementia live at home, community occupational therapy for people with dementia and their caregivers has become a common intervention in the last decade. In the Netherlands, community occupational therapy intervention is for all people who have occupational therapy-related problems covered by public health insurance.

In the Netherlands, there are 3.73 million caregivers.

Settings

Occupational therapy aimed at clients with dementia and their caregivers is an intervention consisting of ten sessions delivered in 5 weeks or more, which is conducted at the client's home, in a community-based occupational therapy program, but can also be offered in homes for the elderly (Graff et al. 2006b, 2010; Kenens and Hingstman 2003). Referrals to occupational therapy are made from geriatricians, neurologists, psychiatrists, and elderly care specialists of outpatient services, memory clinics, hospitals, nursing homes, homes for the elderly, outpatient mental health services, community health services, and by general practitioners.

The Role of the Occupational Therapist in Applying the Intervention

With this client–caregiver-centered intervention, the caregiver acts as the expert of his own caregiving situation. In such an extensive, interactive, and complicated intervention situations, the OT has different roles for different intervention approaches. The OT has the role of a *supervisor and teacher* when the cognitive and behavioral approach is conducted on the client and caregiver, and fulfills the role of a *coach* and a *consultant* when acting together with the caregivers and the team members.

Results

Clinical Application

Both clients and caregivers are actively involved in this process.

The Strengths, Needs, and Case Formulation Phase

This phase is conducted by performing interviews with the dementia client and the caregiver. For analyzing the story of the client with dementia and the caregiver, narrative techniques are used, such as the occupational performance history interview (OPHI; Kielhofner et al. 1998; Riopel-Smith and Kielhofner 1998; Kielhofner et al. 2004) and the ethnographic interview (Hasselkus 1990; Gitlin 1995, 2005). The stories of both the client and the caregiver are analyzed in relation to the needs, interests, beliefs, habits, roles, and motivation for meaningful activities. The process is completed with the clients' and the caregivers' expressed desire to choose and prioritize their most important problems in occupational performance. Each one of these interviews is interpreted together with the story of the OT.

The story of the OT is based on the observations of (1) the clients' skills in performing a meaningful ADL, (2) the caregivers' coping skills to deal with the client's problems, and their skills in supporting the clients' performance, and (3) the social and physical environment. This phase covers four sessions.

The Goal Setting and Intervention Planning Phase

The goals are stated based on the results of all three stories (the story of the client, of the caregiver, and of the OT) of the strengths, needs, and case formulation phase and are set and prioritized in cooperation with both the client and the caregiver in cooperation with the OT during one session.

Phase of Implementing the Intervention Plan

The interventions are tailor-made to each individual client and caregiver's circumstances and adapted to their personal abilities, and the actual possibility of adapting the social and physical environment. This phase contains five sessions over 5 weeks.

The following strategies, or combinations of them, are used:

- *The rehabilitation strategy*. The clients perform tasks in natural ways, and thus demonstrate their skill levels.
- *The cognitive and behavioral strategy.* During these sessions, caregivers are taught how to cope with the client's behavior and to solve problems that occur. Moreover, the caregivers are trained to support the client's meaningful tasks. The aim is to reduce the caregiver's burden of care and to improve the caregiver's participation in their own meaningful activities. The caregivers learn about the client's disease and behavior, technical skills (task simplification and communication skills), problem solving, and home modification skills.
- *The compensation strategy* includes the client's learning how to use strategies, such as verbally rehearsing sequential steps, which compensate for their cognitive decline. For example, the OT teaches a client with dementia how to perform one of the gardening activities by using appropriate strategies, such as first saying the steps that will be performed during this activity, accordingly looking around for environmental adaptations and instructions, and listening to verbal cues of the caregiver, and making use of these environmental adaptations, cues, and instructions.
- The OT conducts environmental adaptations, such as simplifications in the environment with the use of visual or hearing memory aids and written sequential task plans.

The Intervention Eases Impairments, Activity Limitation, and Participation Restrictions

The effect of occupational therapy should be based on its quality, that is, on whether or not a goal is reached. For example, if the client is able to perform only one meaningful activity several times a week, this result may improve the client's occupational performance and participation in ADL, decrease the caregiver's burden, and increase the client's or the caregiver's quality of life, mood, and well-being (Graff et al. 2006b).

Evidence-Based Practice

Outcomes of this client–caregiver-centered intervention are diverse, client- and caregiver-driven, and measured in terms of participation in ADL, competence, or satisfaction derived from participation.

This client–caregiver-centered community occupational therapy program was evaluated in a pilot study that assessed its quality and practical usefulness, and which was evaluated as "good" (Graff et al. 1998, 2000). The caregiver role and the client–caregiver-centered intervention were identified by describing the process and contents of the program by a qualitative study based on case study analyses (Graff et al. 2006b).

The research design for the effectiveness study was tested and determined based on a feasibility study ($n = 12$ clients and caregivers; Graff et al. 2003). Accordingly, the effectiveness of community-based occupational therapy for older people with dementia and their caregivers ($n = 135$) was evaluated in a randomized controlled trial (RCT). In this RCT in the Netherlands, the intervention was proven effective in improving the participants' daily functioning (skills and need for assistance), mood and quality of life, and the caregiver's sense of competence (Graff et al. 2006a, 2007). The results were supported by Gitlin et al. (2001, 2005) and by Steultjens et al. (2004).

Moreover, community-based occupational therapy was found to be cost-effective (Slobbe et al. 2006; Graff et al. 2008) in terms of a significant high proportion of successful treatments and a decrease of costs of healthcare consumption from a societal perspective. Successful treatment was based on a clinically relevant improvement on all three primary outcomes measures: on clients' skills in daily functioning, on client's need for assistance, and on the feeling of competence in the caregivers (Graff et al. 2008).

National and Cross-National Implementation

Community occupational therapy for older people with dementia and their caregivers (COTiD) was proven (cost-)effective in improving the daily functioning, feelings of competence, quality of life, mood, and health status of older people with dementia and their caregivers in an RCT in the Netherlands (Graff et al. 2006a, 2007, 2008). However, this was not found in a German pragmatic multicenter trial (Voigt-Radloff et al. 2011a, b). The COTiD intervention was not adapted to the German culture before this intervention was implemented and evaluated on effectiveness. Moreover, OTs had no experience and limited training in the program before the start of the pragmatic RCT in German routine care. Baseline results showed no room for improvement, although the patients' cognitive status scores on the Mini Mental State Examination (MMSE, Folstein et al. 1983) were comparable. Cultural differences in client–caregiver and professional characteristics as also implementation problems played an important role (Voigt-Radloff 2011a, b). In different implementation studies on psychosocial interventions in dementia, it was found that even when interventions have shown to be effective in research, these benefits evidenced do not necessarily translate when the intervention is implemented in routine care (Berwick 2003; Grol and Wensing 2004; Wensing and Grol 2007). This was also found in an RCT aimed at implementing COTiD in routine care in the Netherlands.

Nationwide strategies for implementing COTiD in routine care appeared to be partly effective. This is due to barriers in bridging the gap between research and practice, like quality of professional networks, professional and organizational barriers (Döpp et al. 2011, 2013a, b, Leven et al. 2012). Bridging the gap between different cultures is even more difficult. At this moment, COTiD is translated in four different languages—German (unpublished research version, Voigt-Radloff et al. 2008), English (adapted UK version, Wenborn et al. 2014, in press), French (Graff et al. 2013), Italian (Graff et al. 2014, in press), and Spanish is in progress. It was found that European implementation and research on (cross-)national implementation and evaluation of this COTiD program needs a careful preparative process comparative to the Medical Research Council framework for development and evaluation of complete interventions (Medical Research Council 2010; Campbell et al. 2000, 2007). According to this, it is important to first translate the program and accordingly develop country-specific COTiD programs; second, to get an understanding on access to and quality of care delivery; and, third, on barriers and facilitators for effective implementation, on implementation strategies, and intervening factors before effectively implementing evidence-based psychosocial interventions, like evidence-based occupational therapy interventions, in other countries. In the UK, since 2012, a research project has been started where we follow these steps of the MRC framework to cross-nationally implement this evidence-based COTiD intervention to the UK (Orrell and Wenborn 2011).

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Case Study

Mr. and Mrs. Smith learn to deal with the consequences of the dementia in daily life.

Keywords Stories client and caregiver, setting goals together, effective strategies, problem solving

Introduction

The theme of this case study concerns teaching and supporting clients with dementia and their caregivers in daily functioning.

The students' tasks include:

- To make use of the principles of the evidence-based community occupational therapy in older people with dementia and their caregivers (COTiD) program.

As a starting point, students should use the following references to gather background information:

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Overview of the Content

Recently, the gerontologist psychiatrist referred Mr. Richard Smith to occupational therapy. *The intervention aim,* was defined in the referral to occupational therapy is:

> to improve Mr. Smith's daily living skills and to advise and train his caregiver in effectively supervising Mr. Smith in these daily activities.

Learning Objectives

By the end of studying this chapter, the learner will be able to understand the components of the COTiD program.

The Background History of the Clinical Case Study

Mr. Smith is 71 years old and lives with his wife in a self-built bungalow. Last week, he was told that he has mild dementia. Besides this, he has decreased mobility due to Parkinson's disease, and he has hip problems. In the past, these were the reasons that he retired early, at the age of 55 years. After he retired, he built with a colleague, who is a friend of his, the adapted bungalow. Because the house is all on one level, only a few adaptations were needed to accommodate the limitations caused by his hip problems and Parkinson's disease. He hopes that he and his wife can live independently for as long as possible in their own bungalow. His 70-year-old wife looks after him and provides the necessary care because they both do not want paid home carers coming to them. However, at the moment, his wife complains of back pain because she has too much to care for.

Mr. Smith says that he does not experience problems at the moment. However, he reports that he has problems with starting up activities, he is getting a bit slower than he used to be, and he says that he has problems with more complex activities, like driving a car and cooking a meal. He says that he takes life the way it comes, and he does not complain.

His wife reports that in some ways she feels better since being told about his diagnosis of dementia, as she now realizes that the disease is causing her husband's problems that she had already noticed. However, she is finding it difficult to accept the diagnosis of dementia and its consequences. However, she is irritated by his loss of initiative and his slowness; and she does not know how to stimulate and supervise her husband in carrying out activities. She is afraid for the future.

Questions What is the central message to the specific OT intervention? What information do you need more from Mr. and Mrs. Smith, and how will you collect this information?

Case Study Process

1. Case formulation phase

The occupational therapist (OT) decides to first talk to Mr. Smith about his life story and makes use of the occupational performance history interview (OPHI). The OT wants to know who Mr. Smith is and who he was in the past, for example, what interests, habits, roles, norms, and beliefs he had in the past, and what these are now. The OT wants to know what meaning his daily routine and other leisure activities have now to him and had in the past. Also, the OT wants to know if he has goals for now and in the future and what these goals are. The OT tells him this shortly after she has explained to him what occupational therapy can offer. She tells him that she wants to talk to him separately, without his wife. She says that she will also talk with his wife separately, about how she finds caring for him, as well as her own needs and goals for the future. The OT explains also to his wife that she will visit her to talk with her separately. The OT will make use of the ethnographic interview when she talks with Mrs. Smith about her life story, meaningful activities, and how she experiences caring for her husband. The OT explains to both of them that after these separate talks, she accordingly will come back to observe some meaningful activities they are used to perform. The OT explains that once she has this information, together with Mr. and Mrs. Smith, she will be able to start setting goals for the occupational therapy intervention.

Questions How would you set goals for Mr. and Mrs. Smith? What steps would you perform and what aids could you use?

2. Goal-setting phase

The OT has made a list of interests and meaningful activities that Mr. and Mrs. Smith have each told her that they would like to do in the future. First, she summarizes them in the meeting with Mr. and Mrs. Smith together, using cards on which she already has written some of these meaningful activities. Mr. and Mrs. Smith can add if there are meaningful activities missing.

Mr. Smith's interests are: gardening, singing in a choir, doing aspects of the housework, wood carving, horse riding, visiting friends, and playing with their grandchildren.

Mrs. Smith's interests are: flower arranging, visiting friends, chatting to friends by phone, playing with their grandchildren, cycling, fitness classes, and cooking new recipes.

Second, the OT let Mr. and Mrs. Smith separately and accordingly together prioritize the most important meaningful activities they would like to work on in occupational therapy intervention and together with Mr. and Mrs. Smith, the OT formulated global goals.

Questions What goals do you think Mr. and Mrs. Smith would formulate separately and what are shared goals?

The global goals Mr. Smith formulated are**:***to have a more meaningful life; and to continue living in their own bungalow for as long as possible.*

The global goals Mrs. Smith formulated are: *to have more time for herself; to know how to supervise her husband in daily activities and to motivate him to be less passive; to continue living in their own bungalow for as long as possible; to care for her husband without assistance from others.*

Third, the OT writes the most important individual and/or joint goals (priorities) on a goal-setting form, as much specified as possible, which they all aim to work on in occupational therapy. Once these are agreed, she asks them to score their goals in terms of their current performance, and to rate their satisfaction with this performance. The caregiver also scores the goals of the client with dementia, from her perspective. She also has her own goals which she scores. The client with dementia only scores his own goals.

Questions What were the goals and scores you think they prioritized to work on you think? Define the ways of achieving Mr. and Mrs. Smith's goals and their shared goals and write them down. Accordingly, score these goals from the perspective of Mr. and/or Mrs. Smith.

These are the goals the OT defined together with Mr. and Mrs. Smith to work on in OT intervention:

- Supervising Mr. Smith in an adequate way that he initiates a meaningful activity he wants to perform, and make effective preparations and adaptations to the activity with which he will be able to perform the activity independently.
- Arrange more time for Mrs. Smith herself to make flower decorations by getting Mr. Smith started on a meaningful activity by using adaptation and instructions of the activity by Mr. Smith himself.
- Making use of a whiteboard, agenda, and alarm for Mr. Smith to remember the gardening, meal preparation, and other important daily activities.
- Doing tasks in the garden by Mr. Smith himself with the use of his effective strategies and with the use of a short instruction ahead given by his wife (or use of signs and written instructions/or verbal instructions or pictures) and adaptations in the physical environment in the garden (signs, alarm, chair half way to remember the break).
- Preparing the vegetables for the meal by Mr. Smith himself in his own way and speed (describe what this is in his case).
- Visiting friends together in a way Mr. Smith does not feel overwhelmed by their friends and will get enough time to explain what he wants to tell and will only be supported in his talk when he needs this, and that Mrs. Smith can talk to her friends separately.

Questions What could be the intervention strategies the OT would propose to train Mr. and Mrs. Smith to reach the goals of?

3. **Phase of Implementing the Intervention Plan** The OT's proposed intervention strategies are:

- Intervention aimed at improving Mr. Smith's skills by using compensatory methods (including use of only effective strategies and adaptations in the physical and social environment), combined with improving Mrs. Smith's supervision skills.
- Intervention aimed at improving Mrs. Smith's problem-solving skills and the ability to cope with the burden of care.

The implementation of the intervention plan phase will focus on:

- Improving Mr. Smith's skills through adaptation of the environment (like memory aids, instructions, simplifying the environment) and using his most effective strategies in an efficient way
- Improving Mrs. Smith's problem-solving and coping skills

Mrs. Smith is very committed but requires more information on her husband's conditions—Parkinson's disease and dementia. At the moment, there are many frustrations between the couple which might be improved with more knowledge of the conditions. The OT is planning on increasing Mrs. Smith's insight in these diseases by:

- Explaining the symptoms of both the diseases and their effect on daily life
- Using concrete situations or behaviors during this phase to apply approaches that may be of use (for example during the vacuuming and cooking activities)

Mrs. Smith has always adopted the "grin and bear it" attitude. It is very important for her to have all her daily activities under control. It is important to adapt the intervention to fit in with her daily routine, to coach her in ways she could supervise her husband in managing his limitations, while, at the same time, being aware of the need to maintain her own occupational balance.

Question How could you improve the problem-solving skills of Mrs. Smith? Which steps should you perform?

In order to improve Mrs. Smith's problem-solving skills, the OT will use the consult method, which contains of eight steps. In this method:

1. Mrs. Smith and the OT agree that Mrs. Smith is the expert of her own problem situation and that Mrs. Smith, together with the OT, is responsible to find a suitable solution for the problem they are faced with.
2. Together with Mrs. Smith, the OT observes and analyses Mr. Smith's daily activities (such as cooking)—what strategies he uses and which are effective strategies, how the task is carried out, and what his and Mrs. Smith's emotions are about carrying out this activity.
3. Following this, the OT meets with Mrs. Smith alone. In this session, the OT coaches Mrs. Smith to describe and analyze what the problem in this activity is.
4. And to discuss what they have tried already, evaluate how it worked out.
5. Accordingly, Mrs. Smith is asked to look for feasible alternatives to perform this activity in an effective way.
6. After this, she is coached by the OT to find a possible solution, the OT therefore uses the sentence "How could you achieve that …" (=the HOCYA formula).

Solutions can be effective ways of adapting or preparing the task, simplifying the environment, using effective cues and ways of approaching Mr. Smith.
7. Accordingly, they decide to perform the activity to this possible solution.
8. Afterward, they evaluate how this possible solution worked out. It is possible to use this consultation method more than once until Mrs. Smith is able to follow it through well.

The OT and Mrs. Smith work together very closely and at an equal level to find a solution that works for everyone.

The Student's Report

The following guiding questions have been identified in developing possible solutions to Mr. and Mrs. Smith. These questions are generated from the references found in the literature search:

What are the interests, habits, routines, roles, experiences, and motives of Mr. and Mrs. Smith and what were these in the past? (What came out of the OPHI and ethnographic interview?)
What are meaningful activities for Mr. and/or Mrs. Smith? And which activities would they prefer to carry out in a more effective way? (Also, information from OPHI and ethnographic interview)
What are the problems they face when performing these activities? What did they tell you and what have you observed?
What are the important goals for Mr and/or Mrs. Smith? Describe the five most appropriate goals you formulated together with them.
What strategies of Mr. and of Mrs. Smith are effective in performing these meaningful activities and which are not?
What are the possible solutions to perform the preferred meaningful activities in an effective way? Describe what problems you analyzed together with Mrs. Smith in each of the prioritised activities, what she already had tried together with her husband, and formulate possible solutions you decided for together with Mrs. Smith. (Make use of the consult method).

Formulate the occupational therapy intervention plan for these five prioritized goals and solutions you formulated and describe how you would implement this intervention plan, which steps you would perform, and how you would supervise these people during the implementation of the intervention plan.

Chapter 29
Occupational Therapy Services for Elderly with Severe Dementia

Ji-Hyuk Park, Joo-Hyun Lee and Yeong-Jo Kim

> *I am happy because I come to do these activities with my friends.*
> A client participated in occupational therapy program for dementia

Abstract The elderly with severe dementia tend to decline physical ability as well as mental ability. Due to functional declining, the elderly with dementia is getting more dependent on caregivers. On the last stage of dementia, functional declining has negative effects on quality of life not only in the elderly with dementia but also in caregivers. Occupational therapy services are aimed to improve the quality of life for the rest of their lives in people with severe dementia and their caregivers. This chapter explores two main therapeutic approaches for person with severe dementia: (1) interventions to improve physical ability and (2) interventions to reduce behavioral and emotional problems.

Keywords Caregiver burden · Occupational therapy · Quality of life · Severe dementia

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Definitions and Background

The last stage of dementia is defined based on scores of global scales such as score 3 or more on the clinical dementia rating (CDR; Meuser 2001), score 12 or below on the mini-mental status examination (MMSE; Folstein 1975), and score 5 or more on the global deterioration scale (GDS; Schmitt and Wichems 2006). The life expectancy is about 2–3 years, although it may be shorter or longer for any individual (Chang 2006). In the late stage of dementia, it is hardly possible to improve cognitive function unlike the early stage. Also physical functions decline more dramatically in the late stage than those in the early stage. In addition to cognitive interventions, we suggest extra interventions to maintain physical function or to reduce the behavioral and emotional problems until death (Chang 2006).

Although the study about elderly population with dementia is actively being progressed worldwide, it is reported that there are many studies about people with mild to moderate, while very few studies about those with severe dementia (Herrmann et al. 2007). Severe dementia induces more complex problems, including cognitive impairment, behavioral and emotional change, limited physical ability of a person than those with mild dementia (Chang 2006). As functional ability sharply deteriorates due to these symptoms, the person with severe dementia may become increasingly dependent on the caregiver (Hansebo and Kihlgren 2002). Therefore, the deterioration of function affects quality of life negatively not only in people with severe dementia but also in their caregivers such as family members and friends (Arango-Lasprilla et al. 2010). Therefore, occupational therapists (OTs) need to provide interventions both for people with severe dementia and for caregivers to improve their quality of life.

Purpose

The main purpose of occupational therapy for patients with severe dementia is to focus on to maintenance of limited physical function and reduction of behavioral and emotional problems rather than on improvement of cognition function. Further, OTs need to consider quality of life for caregivers as well as for people with severe dementia.

Method

Candidates for the Intervention

The occupational therapy is directed at all people with severe dementia (as defined above) who are living in the community, residential care home, psychiatric hospital or ward, or geriatric health-care facility.

Epidemiology

It is estimated that there are now 36.5 million elderly population with dementia worldwide, and it will be increasing 65.7 million by 2030 and 115.4 million by 2050 (Wimo and Prince 2010). There are nine countries with the largest number of people with dementia in 2010, following China (5.4 million), the USA (3.9 million), India (3.7 million), Japan (2.5 million), Germany (1.5 million), Russia (1.2 million), France (1.1 million), Italy (1.1 million), Brazil (1.0 million; Prince et al. 2013). As elderly population is also increasing in Asia, there is a rapid increase in dementia prevalence rate. For example, the survey in Japan represents that the number of dementia patient was 100 million in 1990, and it will be increased to 262 million by 2015 (Kim and Han 2012). In South Korea, the number of elderly with severe dementia is also rapidly increasing, and it is estimated that there are now over 400,000 elderly populations with dementia, and it will reach to 770,000 by 2020 (Seoul University Hospital 2010).

As dementia is a progressive disease, there is a high proportion of dementia patients on severe stage. In research about dementia prevalence of nine Organisation for Economic Co-operation and Development (OECD) countries, it reported that the prevalence of severe dementia patients could be as high as 24% in females and 14% in males, older than 85 years (Moise et al. 2004).

Settings

The occupational therapy for patients with severe dementia is conducted in a geriatric psychiatric units, health-care facilities, special dementia hospitals, day care centers, or home-based/community-based settings.

Results

Clinical Application

The interventions to *maintain physical function* include strengthening exercise, balance and flexibility training, as well as aerobic fitness. The duration and frequency of the programs each varied from 7 weeks to 12 months and between biweekly and daily. Also, the duration of each session varied between 20 and 75 min (Burge et al. 2012; e.g., see Fig. 29.1).

The following contents are examples of *physical interventions:*

- Strength training: exercise is mainly used, resistive bands, and focused on upper and lower major muscle groups
- Balance and flexibility training: exercises including shifting center of gravity, forward and backward walks, and chair sit to stands
- Aerobic fitness: brisk walking was the primary activity (Steinberg et al. 2009)

Fig. 29.1 Theraband exercise for strength training

Fig. 29.2 Snoezelen therapy for sensory stimulation

The *Snoezelen therapy* (multisensory behavior therapy; Staal et al. 2007; e.g., see Fig. 29.2) is a multisensory environmental approach leading participants to various sensory such as vision, hearing, tactile sense, vestibular sense, proprioceptive sense, olfactory sense, and taste. The structured activities consisted of programs, including physical stimulation such as massage; sensorimotor stimulation such as pressure and squat; visual stimulation such as color, light, and shade discriminations. The practice is of total 24 sessions of 2 sessions per week. Protocols are for 25–30 min per session, and individuals are guided by an OT (Ro et al. 2011; Pagliano 1999).

Music therapy is the intervention used where individualized music that was related to special memories of each participant for positive emotions such as pleasure

or joy. The participants listened to the selected music via a CD player. The music is offered to participants for 1 week and then practical training was conducted for 5 days (Sakamoto et al. 2013).

The Snoezelen and music therapy (Sakamoto et al. 2013) are interventions applied to *reduce the behavioral and emotional problems*.

Since caregivers too have stress due to high dependency on the patient, OTs need to provide an *educational program for caregivers,* including practical advice strategies to manage effectively person with severe dementia (Nobili et al. 2004). *Educational interventions for caregivers* consisted of discussions provided by OTs for 90 min and one separate home visit. Especially educational interventions provided by OT include strategies to prevent and manage behavioral problems, to maintain and improve the patient's residual functional abilities, to modify home environments, and to limit dangerous situations such as fall (Kim et al. 2012a). OTs also can be provided with an information manual about managing the elderly with severe dementia.

According to the international guideline, it is recommended to use occupational therapy intervention for elderly people with severe dementia (Korczak et al. 2013).

The Role of the OT

OTs evaluate individuals with dementia to identify their strengths, impairments, and performance areas needing intervention (Schaber 2010). OTs provide therapeutic activities, including crafts, physical exercise, cognitive training, and sensory activities, to improve physical and cognitive functions of participants on their own occupations. Moreover, an important role of OTs is to provide education to caregivers, especially in the late stage of dementia.

Evidence-Based Practice

A study by Steinberg et al. (2009) demonstrated that the home-based exercise program, including aerobic fitness, strength training, and balance and flexibility training, for person with severe dementia had positive effect on hand function and lower extremity strength. These findings of evidence-based practice can assist to guide management with severe dementia patients. The Snoezelen therapy may reduce behavioral problems and additionally improve activities of daily living in hospitalized people with severe dementia (Staal et al. 2007). Among Snoezelen equipment, participants had a high preference for familiar sensory such as a bubble tube and projector, but negative response for unfamiliar sensory such as aroma diffuser and optic fibers (Kim et al. 2011). Music therapy showed positive effects on emotional state of people with severe dementia (Sakamoto et al. 2013). The educational interventions for caregivers improved stress management skills while caring for person with severe dementia (Nobili et al. 2004).

Finally, based on a systematic review (9 studies including 751 people), Kim et al. (2012b) concluded that OT interventions based on sensory stimulation was an effective intervention to improve behavioral problems.

Discussion

This chapter demonstrates that occupational therapy services enable the person with severe dementia and caregivers to improve the quality of life. Especially, among these services, physical training and Snoezelen sensory stimulation therapy have positive effects on physical and emotional aspects for the clients. In conclusion, occupational therapy services were essential to the people with severe dementia.

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The Case Study: Effects of Occupational Therapy Intervention with Mr. Kim

Keywords Occupational therapy, severe dementia, quality of life

Introduction

The theme of this case study concerns intervention effects of occupational therapy for a person with severe dementia.

The student's tasks include the following:

- Finding information about condition and progression of severe dementia
- Making intervention plan for assessments and activities applied with severe dementia patient
- Synthesizing the information into a report

As a starting point, the students should use the following references to gather background information:

Boller F, Verny M, Hugonot-Diener L, Saxton J (2002) Clinical features and assessment of severe dementia. A review1. Eur J Neurol 9(2):125–136

Burge E, Kuhne N, Berchtold A, Maupetit C, von Gunten A (2012) Impact of physical activity on activity of daily living in moderate to severe dementia: a critical review. Eur Rev Aging Physical Activity 9(1):27–39

Chang E (2006) Palliative care dementia interface: enhancing community capacity project (Doctoral dissertation, University of Western Sydney)

Folstein MF, Folstein SE, Mc Hugh PR (1975) Mini-mental state: a practical method for grading the cognitive state of patients and for the clinician. J Psychiatric Res 12(3):189–198

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Overview of the Content

The major goals of the OT intervention are (1) to reduce behavioral and emotional problem and (2) to improve the quality of life.

Learning objectives

By the end of this chapter, the learner will be able to:

- Understand the symptoms and the specific problem behaviors of a person with severe dementia in report.
- Be able to use a literature review on the case study in the person with severe dementia.
- Be able to apply treatment about severe dementia patient related to case study and similar clinical situations.

The Background History of Clinical Case Study

Personal Information

Mr. Kim is 78 years old. He lives with his wife in farm village. He had worked on the farm over the past 30 years. He has an active, positive character and is a "crowd-pleaser" in health center.

Medical Information

The results of initial cognitive assessment showed a score of 5 on the GDS (Schmitt and Wichems 2006). In results of the initial depression and quality of life assessment, he received 1 of 15 maximum score on Geriatric Depression Scale Korea (GDS-K) version (Kee 1996) short form and 78 of 100 maximum score on geriatric quality of life (GQL; Lee et al. 2003). These results demonstrated that he had severe cognitive impairment but was on positive status of emotion and quality of life.

Occupational therapy interventions were provided once a week for 10 weeks in the health center. Thetreatment session was of 2 h and included cognitive training related to memory and activity program such as making a cup using rubber clay (e.g.,

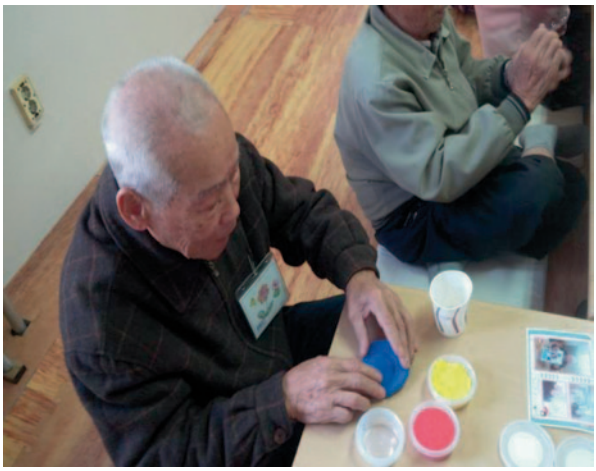

Fig. 29.3 Making a cup using rubber clay

see Fig. 29.3), cooking Korean traditional food, designing autumn poster, playing YutNori (Korean traditional board game; e.g., see Fig. 29.4), and Theraband exercise. During cognitive therapy using the workbook, Mr. Kim generally conducted well about visual perception task, but he had lacked concentration while receiving visual memory task. As the session progressed, he had failure of his memory but maintenance of visual perception. When he participated in physical and cognitive activity programs, he had great interest and active participation, but he had some problems related to cognitive and emotional aspects.

For example, when making a cup using rubber clay, he had difficulty with making right a cup shape. Eventually, he made two hands of a cup. The next day, he played YutNori with other people. YutNori is a Korean traditional four-stick game,

Fig. 29.4 Playing Korea traditional board game

and it is usually played in traditional holidays. The game is played with two or more teams in turns. Each team has four markers and plays with board, which has 29 blocks. The game is won by the team who bring all their markers home first. When he played YutNori with people with mild to moderate dementia, he also had difficulties getting along with them because he was confused about the procedures and rules of the game.

When ten sessions were completed, we carried out a posttest. The results were 6 on GDS, 3 (cutoff score) on GDS-K, and 91 on GQL. These results showed that cognitive function decreased, but he had positive effects on improved emotional status and quality of life. In conclusion, this case study demonstrated that occupational therapy intervention has positive effects on emotion and quality of life for person with severe dementia.

The Student's Report

The following guiding questions have been identified in developing possible solutions for Mr. Kim:

How well do Mr. Kim's present occupational performance abilities suit to the activities he perform (as described above)?

Is it possible to modify the applied activates to better suit Mr. Kim's present occupational performance ability?

Which are the short- and long-term goals for Mr. Kim?

Chapter 30
Metacognitive Occupation-Based Training in Traumatic Brain Injury

Jennifer M. Fleming and Julia Schmidt

It wasn't until the client watched the video of himself trying to cook dinner that he understood that he needed to use a checklist to keep on track.

Abstract Clients with impaired self-awareness following brain injury may benefit from an occupation-based approach to metacognitive training that uses real-life meaningful occupations in a supported therapy context. Metacognitive training in real-life contexts aims to improve clients' intellectual awareness by demonstrating the impact of impairments on activities and participation, and thereby facilitate realistic collaborative goal setting and strategy use. Occupational performance provides familiar structured experiences that allow for the development of online awareness including error recognition and error correction. Training strategies include the use of self-prediction before occupational performance; self-monitoring and self-checking during performance; and self-evaluation, verbal or video feedback, and education following performance. The occupational therapist plays a supportive role and monitors the client's emotional responses. A growing body of research evidence supports the use of occupation-based metacognitive training.

Keywords Brain injuries · Closed head injuries · Cognition · Human activities · Metacognitive strategies · Self-awareness

Historical Development of Cognitive Teaching Approaches

Education has traditionally been incorporated as a component of cognitive rehabilitation by occupational therapists (OTs) alongside remedial and adaptive approaches to intervention (Unsworth 1999). Teaching clients and their family members about

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the nature of cognitive impairments and providing feedback on cognitive performance is fundamental to assisting clients in understanding and accepting limitations in occupational performance. While most early research on the link between self-awareness and engagement in and feedback on functional performance was from the field of psychology (e.g., Berquist and Jacket 1993; Klonoff et al. 1989), this approach falls naturally within the domain of occupational therapy (Katz 2011).

Research evidence for a systematic occupation-based approach to the assessment and treatment of intellectual functions in people with acquired brain damage was first provided by Soderback (1988). This randomized trial of 67 patients demonstrated that intellectual functions improved using intellectual training approaches that incorporated functional tasks (housework), pen-and-paper tasks, and a combination of both approaches to a greater extent than regular occupational therapy rehabilitation (Soderback 1988). Abreu and Toglia (1987) presented a cognitive rehabilitation model for occupational therapy, which emphasized the teaching/learning process as an important component of therapy. Over the past two decades, authors have emphasized the link between cognition and occupation in rehabilitation, and Katz (2011) includes a series of chapters describing sophisticated occupational therapy models that incorporate metacognition.

Definition

An occupation-based approach to metacognitive training (Fleming et al. 2006) uses real-life meaningful occupations in a supported therapy context to assist clients with brain injury to *develop self-awareness* and, in turn, facilitate realistic goal setting and strategy use. It is based on neuropsychological theories of the role of the frontal lobes in self-awareness. *Metacognitive strategies* and training techniques are drawn from the multicontext treatment approach proposed by Toglia (1998, 2011).

Background

Occupation-based metacognitive training emerged from work in the 1990s that emphasized the importance of timely, specific, consistent, and respectful feedback to clients about the nature of limitations in task performance (Barco et al. 1991; Mateer 1999). Subsequently, Toglia and Kirk (2000) proposed a model of self-awareness that highlights the dynamic relationship between clients' self-knowledge and beliefs about their abilities, e.g., intellectual awareness and the situational or "online" awareness generated during occupational performance, e.g., error recognition, error correction, error anticipation, and behavioral compensation. The authors recommended intervention strategies that engage the client in familiar structured experiences that allow for self-monitoring and evaluation. The premise of occupation-based metacognitive training is that the online experience of limitations during occupational performance facilitates the development of the client's intellectual awareness or self-knowledge.

Purpose

Occupation-based metacognitive training aims to remediate clients' metacognitive functioning by assisting them to recognize the extent of brain-injury-related impairments, and their impact on activities and participation. Gains in self-awareness can then be used as a starting point for realistic collaborative goal setting and selection of appropriate compensatory strategies, with the ultimate aim of improving occupational performance.

Method

Candidates for the Intervention

Occupation-based metacognitive training has been designed for use with adults with traumatic brain injury and other acquired brain injuries (such as stroke) that result in impairment of metacognitive functions (including self-awareness) mediated by the prefrontal cortex. It is intended to improve function including body structures of the brain (International Classification of Functioning, Disability, and Health (ICF) codes 1100–1103) and specific mental functions (ICF codes b140–b189). Impairments targeted are described using various terms including *impaired self-awareness, denial of disability, lack of insight, unawareness, anosognosia,* and *dysexecutive* syndrome.

Epidemiology

There are no specific epidemiologic statistics as to the proportion of clients who may benefit from the intervention. However, occupation-based metacognitive training is not considered appropriate for all people with brain injury who display impaired self-awareness. In particular, clients who present with denial of disability, which is primarily the result of a psychological defense mechanism, may experience psychological distress if confronted with difficulties during occupation-based training. These clients are more likely to respond to psychological support, counseling, or psychotherapeutic approaches to facilitate adjustment (Fleming and Ownsworth 2006). An occupation-based approach is considered more successful with clients whose impaired self-awareness is primarily due to neurologic damage such as injury to the prefrontal cortex and impaired executive function. In contrast to clients with defensive denial of disability who tend to respond to feedback in a resistant or angry manner, clients with neurologically based impaired self-awareness have a more surprised or indifferent response (Katz et al. 2002).

In a cluster analysis study of 84 participants with acquired brain injury (Ownsworth et al. 2007), only 14 % were classified as having poor self-awareness, which

appeared to be due to neurologic deficits in error self-regulation. Therefore, it could be assumed that this approach may be applicable to approximately 14% of people with acquired brain injury, although this requires further investigation. The investigation may also be useful for clients who have impaired self-awareness due to environmental factors such as lack of opportunity to experience injury-related disabilities due to either the recency of injury or the high levels of assistance by others (Fleming and Ownsworth 2006).

Settings

Occupation-based metacognitive training is designed for use in real-life contexts so that activities can be meaningful and relevant to client's goals. Occupational performance in the client's natural environment allows the client to make direct comparison with preinjury performance. It is, therefore, most applicable to community-based rehabilitation settings where therapy occurs in the client's home, workplace, or local community. However, the intervention can be used in rehabilitation settings using simulated activities, or environments which approximate real-life contexts such as an occupational therapy kitchen.

The Role of the OT

The OT uses collaborative goal-setting techniques to select appropriate target occupations and grades activities to provide sufficient challenge to the client. Before task performance, the OT introduces metacognitive training strategies, e.g., self-prediction of number of errors or self-estimation of time for task completion. During the client's task performance, the OT provides prompts to encourage self-checking (e.g., stop every 2 min to check the recipe) and self-questioning (e.g., *Am I paying attention? Have I missed any steps?*). The "pause, prompt, praise" technique is an effective approach to encourage self-identification and correction of errors during task performance (Ownsworth et al. 2008; Schmidt et al. 2013). This involves pausing for 5–10 s when the client makes an error to allow opportunity for self-correction, followed by a nonspecific prompt if the error is not detected (e.g., *Stop for a minute and check what you are doing*). If the error is not identified, then the therapist provides a specific prompt and facilitates problem solving. Following task completion, the OT encourages the client to self-evaluate, provides verbal or video feedback, educates the client about the nature of any identified problems, and facilitates selection of appropriate compensatory strategies. The OT plays a supportive role by closely monitoring the client's reaction to experiential feedback at all times and intervening should any emotional distress or excessive frustration be displayed. The aim of the OT is to make the clients' experience a positive one of self-discovery and problem solving, which will result in gains in self-awareness being translated into productive functional gains rather than a failure experience.

Results

A Brief Guide to Clinical Application of the Intervention

The OT assists clients in choosing an activity that is relevant and meaningful to their occupational goals, and in which their current performance is limited. For clients with very low levels of self-awareness, this can be done in consultation with a family member. Examples include meal preparation, shopping, washing the car, ironing, writing a job application, taking lecture notes, or a leisure activity. It is important that the selected activity present a level of "just-right" challenge, which allows some success so as not to be overwhelmingly difficult, but at the same time provides opportunity for errors or difficulties to become apparent. Using metacognitive techniques such as self-prediction of performance before engaging in the activity, and time-monitoring, self-checking, self-evaluation, and self-questioning during and after the performance, discrepancies between the client's predicted and actual performance are highlighted (Toglia 2011). Task performance may be videotaped to enhance the client's self-evaluation. Other techniques include role reversal, in which the OT performs the task and the client detects errors (Toglia 1998). At the end of the session, the client and OT discuss any difficulties that the client experienced and use this improved self-knowledge as a platform to generate realistic therapy goals and choose relevant compensatory strategies. In subsequent sessions, the same process is repeated with the incorporation of compensatory strategy training.

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Occupation-based metacognitive training is aimed at the remediation of impairments in metacognitive functions including error recognition, error correction, self-awareness, and strategy selection. It also targets activity limitations in the specific areas of occupational performance that are selected by clients as meaningful and challenging for them, by facilitating use of the appropriate strategies. This can have a flow-on effect in mitigating participation restrictions and enhancing engagement in valued occupational roles.

Evidence-Based Practice

While earlier intervention studies employing occupation-based metacognitive training have provided level IV case study evidence of its effectiveness (Fleming et al. 2006; Katz et al. 2002; Landa-Gonzalez 2001; Ownsworth et al. 2006), a recent systematic review (Schmidt et al. 2011) provided level Ia evidence supporting the use of metacognitive-based interventions with a feedback component. The

review included a meta-analysis of data from three randomized controlled trials (Cheng and Man 2006; Goverover et al. 2007; Ownsworth et al. 2008) with positive results indicating that feedback interventions improved both self-awareness and occupational performance. In addition to feedback, all three trials incorporated an occupation-based approach and other aspects of metacognitive training such as goal setting, self-predictions of performance, experiential feedback, self-regulation strategies, and client education. Further level II evidence was provided by a recent randomized controlled trial which compared the use of video, verbal, and experiential feedback in the context of an occupation-based intervention (Schmidt et al. 2013). Participants with traumatic brain injury ($n=54$) completed four meal preparation sessions incorporating the "pause, prompt, praise" technique. Following each session, participants received either (1) a combination of video and verbal feedback, (2) verbal feedback only, or (3) no additional feedback beyond the experiential feedback during occupational performance. The group receiving the video feedback showed significantly greater gains in self-awareness than the other two groups. However, all groups showed significant within-group improvements suggesting that the occupation-based metacognitive training approach was useful (Schmidt et al. 2013).

Discussion

There is mounting research evidence that occupation-based metacognitive training is effective in improving the occupational performance of some clients with acquired brain injury. Clients are supported in the context of a safe therapeutic relationship to experience brain-injury-related activity restrictions and to develop strategies for dealing with them. Arguably, this is preferable to clients' attempting to reintegrate into the community and experiencing repeated failures without support. Nevertheless, with any attempt to facilitate the development of self-awareness, there is a *risk of emotional distress* for clients as they become aware of the extent of postinjury changes. The OTs' clinical reasoning skills are required to determine those clients for whom low self-awareness is more reflective of psychologically based denial, and to refer these clients to more intensive counseling to facilitate adjustment to their loss before participating in occupation-based training. However, further research is needed to test the suitability of occupation-based metacognitive training for particular types of clients.

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Ownsworth T, Fleming J, Shum D, Kuipers P, Strong J (2008) Comparison of individual, group and combined intervention formats in a randomized controlled trial for facilitating goal attainment and improving psychosocial function following acquired brain injury. J Rehabil Med 40:81–88
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The Case Study of Linda Participating in Occupation-Based Metacognitive Training Using Video Feedback

Introduction

This case study concerns a participant in the randomized controlled trial of feedback interventions (Schmidt et al. 2013). Linda participated in the occupation-based metacognitive intervention and was assigned to the intervention group that received a combination of video and verbal feedback on her occupational performance. This group demonstrated the greatest treatment effects.

The student's task includes (1) reflection on the OT's role, (2) discussion of intervention options, and (3) consideration of methods of evaluating intervention outcomes.

The following references are important to understand the measures used in the case study and to provide background knowledge for discussion:

Fleming JM, Ownsworth T (2006) A review of awareness interventions in brain injury rehabilitation. Neuropsychol Rehabil 16:474–500

Lovibond SH, Lovibond PF (1995) Manual for the depression anxiety stress scales, 2nd edn. Psychology Foundation, Sydney

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Schmidt J, Fleming J, Ownsworth T, Lannin NA (2013) Video-feedback on functional task performance improves self-awareness after traumatic brain injury: a randomised controlled. Neurorehabil Neural Repair, Online access.

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Overview of the Content

Aim

The aim is to reduce the number of cognitive errors made during meal preparation (online awareness) and to improve self-knowledge (intellectual awareness).

Learning Objectives

By the end of studying this case study, the learner will:

- Understand the application of a metacognitive occupation-based intervention in brain injury rehabilitation
- Appreciate the use of video feedback to improve self-awareness and functional performance in a client with severe brain injury
- Learn examples of ways to monitor outcomes within a therapy intervention.

Background History of the Clinical Case Study

a. *Personal data*: Linda was a 49-year-old inpatient in a brain injury rehabilitation unit. She sustained a traumatic brain injury from a fall down the stairs and was in the acute hospital for 2 months before admission to rehabilitation. Prior to the accident, she lived with her supportive husband and one adult child in a two-storey home in an urban area. Linda worked full time as a sales assistant and had a high-school-level education.
b. *Medical diagnosis*: Linda's Glasgow Coma Score (6 at the scene; Teasdale and Jennett 1974) and her length of posttraumatic amnesia (16 days) indicated a severe injury. A computed tomography (CT) scan showed a left subdural hemorrhage and a left occipitoparietal haematoma. Other injuries included a right temporal bone fracture, laceration to her forearm, and right facial nerve palsy. Functional impairments included right hemiparesis, reduced fine motor ability, and impaired balance. She had no relevant past medical history. Neuropsychological assessment indicated relatively intact global cognitive function with some areas of weakness including basic visual attention, planning, and organization. An occupational therapy functional assessment showed that Linda had impaired attention, memory, and judgment and displayed signs of impulsivity during various occupations.

Prior to intervention, the Awareness Questionnaire (AQ; Sherer 2004) was completed to determine Linda's level of intellectual awareness (Table 30.1). The discrepancy between her self-rating and the therapist's rating was positive at baseline indicating that she underestimated the extent of her brain-injury-related limitations. Linda completed the Depression, Anxiety and Stress Scales (DASS-21) to identify any symptoms of emotional distress (Lovibond and Lovibond 1995). Her scores were within normal limits (Table 30.1). Linda's prognosis was largely unknown because outcomes from severe brain injury are highly variable. However, the cognitive impairments that Linda experienced tend to have a significant impact on psychosocial function in the domains of independent living, work, and interpersonal relationships.

Table 30.1 Linda's assessment results

Assessment	Baseline	Post-intervention	Follow-up
Awareness questionnaire (AQ)[a]			
Therapist rating	43	50	53
Participant rating	64	51	64
Discrepancy rating	21	1	11
Depression, anxiety and stress scale (DASS-21)[b]			
Depression	2	1	0
Anxiety	2	0	2
Stress	1	2	0

[a] AQ score range 17–85
[b] DASS-21 score range 0–21

c. *Internal and external environmental circumstances*: As Linda was an inpatient, the intervention had to be conducted within the hospital environment not in a real-life environment. The occupational therapy kitchen was utilized to simulate a naturalistic environment for meal preparation. To increase the client-centeredness and meaningfulness of the activity, the therapist asked Linda to choose a meal from three options. She chose to prepare spaghetti bolognaise for dinner.
d. *Reasons for seeking occupational therapy consultation*: Linda received occupational therapy as part of her multidisciplinary rehabilitation. She was invited and agreed to be involved in a clinical trial evaluating the effectiveness of feedback interventions (Schmidt et al. 2013). Linda was randomly allocated to the group that received a combination of video and verbal feedback.
e. *Occupational needs*: Linda had goals to return home, be independent with daily tasks such as her self-care routine, prepare breakfast and lunch, and return to her recreation and leisure activities.

Questions Regarding Occupational Therapy Interventions

1. What metacognitive techniques could the therapist use before, during, and after engagement in occupational performance to improve outcomes?
2. What is the role of the OT in the intervention?
3. How would you know if the intervention was effective?
4. What alternative occupational therapy interventions are available?

Summary of the Results

The first step in the occupation-based metacognitive intervention involved Linda and her therapist establishing the steps and sequence of the task. A checklist of the steps was developed to provide a rating scale for self-evaluation. Linda then

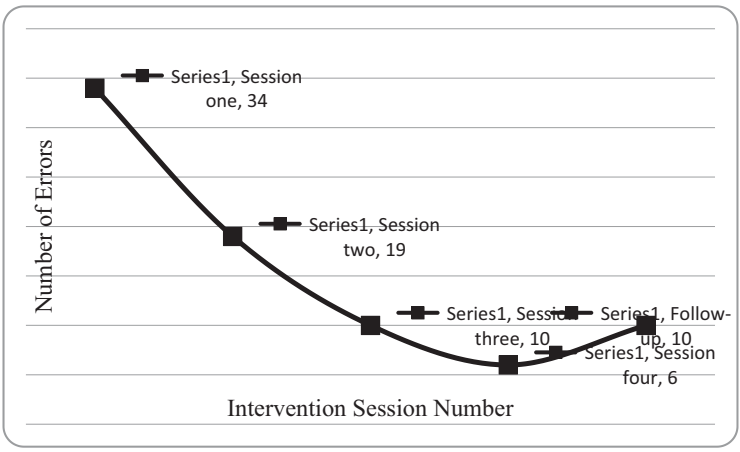

Fig. 30.1 Number of errors made in each intervention session

prepared the meal. The therapist provided appropriately timed prompts and feedback, using the "pause, prompt, praise" technique and videotaped Linda's performance.

After each meal preparation session, Linda and the therapist independently rated her performance using the checklist they had developed. Then, Linda and the therapist watched the video of the meal preparation together. During the viewing, they identified errors or aspects of performance that could be improved on, effective use of compensatory strategies, and other areas of strength. They also discussed discrepancies in their ratings on the checklist.

Linda prepared the same meal and received feedback on four occasions over a 2-week period. The first time Linda made 34 errors that were corrected by the therapist. Errors included impaired judgment of when food was cooked, becoming distracted, inappropriate sequencing of steps, and impulsivity throughout the task. She took 40 min to prepare the meal and did not attempt to use any compensatory strategies. In subsequent sessions, the number of errors reduced to six errors during the last session (Fig. 30.1). She independently initiated effective strategies, which included marking which steps were completed, pausing prior to completing a step, and using self-talk. Her time use was more efficient, taking 25 min.

Linda completed the AQ and DASS-21 after the intervention (Table 30.1). The closer alignment of Linda's and the therapist's AQ ratings indicated that her intellectual awareness had improved. Postintervention scores on the DASS-21 were within normal limits and similar to baseline.

Linda also completed a follow-up session 8 weeks later which was conducted at her home after discharge. Generally, Linda maintained the gains in online awareness (ten errors) and continued to be efficient in meal preparation, taking 32 min. On the AQ, Linda continued to overestimate her abilities, but to a lesser degree than baseline. DASS-21 scores remained within normal limits (Table 30.1).

When asked about the experience of receiving video feedback, Linda reported that she found it “helpful to revise and review what I had done…. It helped me highlight things that I didn’t do correctly.” When asked what emotions she felt, she reported“I was very pleased with myself, as I had improved so much.” She reported that it was“not intrusive or bothersome to be recorded” to be videotaped and that she enjoyed making food and eating it.

Chapter 31
Metacognitive Strategies for Training of Daily Living Skills in People with Brain Damage: The Self-Regulation and Mental Imagery Program

Karen P.Y. Liu and Chetwyn C.H. Chan

The use of metacognitive strategies has demonstrated the positive effects to improve clients' relearning and performance of simple motor function as well as complicated daily tasks. Generalization of skills learnt is also observed.

Abstract Metacognitive strategies are thought to assist people suffering from brain damage in relearning daily living tasks. The use of self-regulation and mental imagery as metacognitive strategies used in an intervention program is described. The program requires the clients' active participation. The evidence is gathered from two case reports, four randomized clinical trials, and one meta-analysis paper.

Keywords Brain damage · Metacognition · Mental imagery · Occupational performance · Self-regulation

Definition

Occupational performances and *task performances* include all daily activities and are interchangeably used in this chapter.

Strategies are the teaching techniques used by occupational therapists (OTs) to promote clients' active participation and problem solving during their occupational performances. *Metacognitive strategies,* such as self-regulation and mental imagery, refer to the efficient use of self-awareness to self-regulate occupational performances (Shimamura 2000).

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Self-regulation refers to the identification and correction of one's own deficits through self-reflection (Leung and Liu 2011; Liu et al. 2002; Liu and Chan 2014; Ownsworth et al. 2010). Individuals applying the self-regulation strategy are able to govern their own learning by acknowledging the requirement of effort in success, applying appropriate means to utilize their efforts, and regulating their activities. Clients employing self-regulation are able to learn actively to achieve the set goals. Self-regulation is used as a cognitive strategy for (1) helping clients identify problems encountered in doing the tasks after brain damage, (2) seeking appropriate solutions based on their previous experience of the task requirement, and (3) revealing their present understanding of their dysfunction. These strategies help clients to relearn impaired functions.

Mental imagery is a process in which a performance is rehearsed mentally as if the person is actually performing it. It is believed to enhance relearning by involving the client in actively memorizing the information of how the performance is performed (Liu et al. 2004a, b). Evidence has shown that it helps people with stroke to generalize the skills learnt to other daily tasks (Liu 2009; Liu et al. 2009).

Purpose

Clients with brain damage use metacognition, that is, cognitive strategies of self-regulation and mental imagery, for performing daily living tasks to enhance relearning, maintenance, and generalization of occupational performances.

Method

Candidates for the Intervention

Clients who have experienced problems in occupational performance due to brain damage and mainly have poor mobility functioning or a low energy level are the potential candidates for the Self-Regulation and Mental Imagery Program.

In our studies, clients suffering from a brain damage, and who meet the following inclusion criteria, are recruited to participate: (1) diagnosed as having suffered a first unilateral cerebral infarction as confirmed by a computed tomography scan, (2) more than the age of 60 years, (3) independent in carrying out daily activities prior to the brain damage, and (4) able to communicate effectively as screened by the Cognistat assessment (Chan et al. 2002).

Settings

The Self-Regulation and Mental Imagery Program is carried out in a rehabilitation hospital with a major brain damage unit. The intervention program is performed at the occupational therapy department.

The Role of the OT

The OT provides guidance to clients in developing strategies to overcome deficits in occupational performance. Throughout the intervention, the OT acts as a teaching facilitator, who engages the client in the process of the Self-Regulation and Mental Imagery Program.

Results

Clinical Application

The Rationale of the Self-Regulation and Mental Imagery Intervention Program

The rationale underlying the Self-Regulation and Mental Imagery Program is that it enables the clients to (1) evaluate his or her *ability* and (2) *plan* how the actions of a task should be executed before it is performed in reality. This strategy is similar to *stop, think, and act*, which is commonly used by therapists working with children with special needs (Post et al. 2006).

Self-regulation involves clients identifying the steps for a complete performance of a task, occupation, or activity. With these steps, clients identify the perceived problems in the performance when compared with their ability before the brain injury occurred. The client is guided to find the solutions to these problems by looking at the issues arising with each of the steps and then brainstorming the possible solutions.

For example, a client with right hemiplegia identifies *losing balance* as the problem. This problem occurs in the *fold the laundry* task (Table 31.1), that is, when he or she reaches out to take a laundry item from the laundry basket. If the client is unable to identify a solution, the OT guides the client by offering various possible suggestions for the client to try out. Based on the usefulness of these various suggestions, the OT guides the client to identify the most effective solution. After trying different ways, the solution would be effective if the client puts the basket closer to his or her left side or holds the abdominal muscles tight when reaching for the basket. The client then practices using this solution to solve the laundry task and other tasks. Through this process, the client learns to self-regulate the task performances, which enables him to develop a deeper insight in the functioning.

Mental imagery is the platform with which clients rehearse the processes of analyzing the task, identifying problems, generating solutions, and mentally practicing the self-rectified performance on the task. Each of the steps of this process is listed in Table 31.2.

Table 31.1 The daily tasks used for training, assessment, and the evaluation criteria

	Daily tasks for training
Week 1	Put clothes on hanger
	Fold the laundry
	Prepare a cup of tea
	Wash the dishes
	Carry out a money transaction
Week 2	Prepare fruit
	Make the bed
	Take medication
	Use the telephone
	See the doctor
Week 3	Sweep the floor
	Tidy the table after a meal
	Fry vegetables with meat
	Go to a park/outdoors
	Go to the canteen

The Self-Regulation and Mental Imagery Intervention Program

This program focuses on clients' active self-learning for performing daily living tasks that they performed smoothly before the brain damage occurred. The client learns to perform the daily tasks (Table 31.1) by using the strategies of self-regulation and mental imagery. The OT guides the client to develop appropriate strategies to overcome the problems.

The program takes 3 weeks. The clients receive training in five 1-h sessions each week. The client performs the specific daily tasks included in each session. These tasks include, for example, functioning of mobility, balance, and upper limb coordination. The level of difficulty of each set of tasks is organized in a demand-ascending order (Table 31.2). However, among these tasks, the demands are overlapping. The training of the easiest task set (e.g., folding laundry) is practiced in the first week, while the most difficult task set (e.g., shopping and use of transportation) is practiced in the third week. This design aims to enhance generalization of skills learned from one stage to another (Liu 2009; Liu et al. 2009).

The *first* week is used for training of the clients' skills in using *self-regulations*. The client identifies the deficits in performing the various sequential steps of a task (e.g., for tearing the tea bag). Once identified, the client would need to generate the best alternatives to complete the task. Examples of the best alternatives would be stabilizing the tea bag with the weaker arm or using the better hand to manipulate the tea bag while tearing the tea bag. Tasks used in the program are presented in Table 31.1.

Table 31.2 Use of mental imagery in occupational performance training of clients suffering from brain damage

Task analysis enhancement	Tell the participant the task to be trained
	Get the participant to identify the steps in the task through mentally imagining the task
	Present the participant with the computer-generated task steps for verification of self-identified steps
Problem identification	Get the participant to visualize his or her own performance with the help of the steps shown in the computer program on the steps of the task
	Get the participant to identify the problems encountered and solutions in each step by going through the mental process
Task performance	Get the participant to imagine his or her own task performance with the rectified steps
	Get the participant to actually perform the task and videotape the performance
	Get the participant to evaluate the performance on the videotape so as to adjust the problems and solutions
	Repeat the above steps until the participant learns the tasks with the proper method

The second and third weeks are used for training the clients' ability to perform tasks based on mental imagery. Here, the clients mentally rehearse the solutions generated from the self-regulation, as if the task is to be executed with the process. The work process for use of mental imagery is presented in Table 31.1.

Previous studies indicate that mental imagery was composed of sequential mental processes, which include attention, memory, and visualization of images and generalization (Chow et al. 2007).

Evidence-Based Practice

The self-regulation is widely applied (1) in the field of education for behavioral management and problem solving (Post et al. 2006), (2) to enhance self-awareness of impairments (Ownsworth and Clare 2006), and (3) for conducting occupational performance tasks for a client with brain damage (Liu et al. 2002; Liu and Chan 2014). Mental imagery is most often used in training of motor function (moving blocks, reaching for and grasping an object). An audiotape (Page et al. 2005) or occupational performances (Liu 2009; Liu et al. 2004a, b, 2009) were used to guide the imagery process. The results of a recent meta-analysis showed positive effects on recovery of upper extremity motor function after stroke (Kho et al. 2013). Liu and colleagues (Liu 2009; Liu et al. 2004a, b, 2009) showed that using metacognitive strategies had positive effects on improving performance on tasks learned in the program and generalization effects to other occupations apart from those used during the training sessions. This positive effect lasted 1 month after discharge from the program.

Discussion

People with brain damage participate in rehabilitation programs. The role of OTs is to teach clients to relearn occupational performance of daily living tasks. Here, various teaching methods are used.

The most common method is demonstration and then practice. After analyzing the clients' behavioral problems, OTs generate ways of rectifying the problem and demonstrate the rectified behavior for the client, who learns through imitation. The effectiveness of this teaching method is called into question.

Instead, metacognition, using the strategies of the self-regulation and mental imagery, that is, the clients' active awareness of the process of learning, is a critical ingredient in successful learning. This learning approach initiates the clients' ways of solving the problems and planning for the action. The results last over time and even generalize to new tasks.

Mental imagery is more effective if those who practice the technique have a thorough understanding of their own body capacity. This principle is applied when the strategy of the self-regulation is used to help clients to recapture their own capabilities and become familiar with their "new" body functioning.

Mentally rehearsing the performance can serve as a supplement to carry out the task among clients who find performance of tasks too demanding because they have poor mobility functioning or a low energy level.

Conclusion

Previous studies have demonstrated the positive effects of using the metacognitive strategies to improve clients' understanding, relearning of performance, and motor function. This research offers further evidence concerning the role of active cortical control, which can be mediated by self-regulation and mental imagery to enhance the relearning potential of clients with brain damage.

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Clinical Case Study

The Effect of Self-regulation and Mental Imagery Program on Maria's[1] Regain in Function After a Stroke

Keywords: Stroke, Self-regulation, Mental imagery, Functional regain

Introduction

The theme of this case study looked into the effect of Maria's participation in a 3-week self-regulation and mental imagery program aimed to enhance Maria's performance at daily tasks.

The students' task includes:

1. Understanding what self-regulation and mental imagery are
2. Understanding how self-regulation and mental imagery can be used in the activities of daily living training
3. Explaining the effect of mental imagery on one's daily task performance and upper extremity motor function
4. Understanding how self-regulation can be combined with other commonly used treatment strategies (such as constraint-induced movement therapy) to further promote people's regain in function

As a starting point, the students should use the following references to gather information:

Functional Independence Measure (FIM). For example

https://www.google.se/search?q=functional+independence+measure+%28fim%29&source=lnms&tbm=isch&sa=X&ei=G3R7UoniEoXf4QTYhoGYAg&ved=0CAkQ_AUoAQ&biw=960&bih=456. Retrieved 2013/11/07

Kho AY, Liu KPY, Chung RCK (2013) Meta-analysis on the effect of mental imagery on motor recovery of the hemiplegic upper extremity function. Aust Occup Ther J. doi: doi: 10.1111/1440–1630.12084

Leung DPK, Liu KPY (2011) Review of self-awareness and its clinical application in stroke rehabilitation. Int J Rehabil Res 34:187–195

Liu KPY (2009) Use of mental imagery to improve task generalisation after a stroke. Hong Kong Med J 15:37–41

[1] Pseudonym.

Liu KPY, Chan CCH (2014) A Pilot Randomized Controlled Trial of Self-Regulation in Promoting Function in Acute Post-Stroke Patients. Arch Phys Med Rehabil 95:1262–1267
Liu KPY, Chan CCH, Lee TMC, Hui-Chan CWY (2004a) Mental imagery for promoting relearning for people after stroke: a randomized controlled trial. Arch Phys Med Rehabil 85:1403–1408
Liu KPY, Chan CCH, Lee TMC, Hui-Chan CWY (2004b) Mental imagery for relearning of people after brain injury. Brain Inj 18:1163–1172
Liu KPY, Chan CCH, Lee TMC, Li LSW, Hui-Chan CWY (2002) Case reports on self-regulatory learning and generalization for people with brain injury. Brain Inj 16:817–824
Liu KPY, Chan CCH, Wong RSM, Kwan IWL, Yau CSF, Li LSW, Lee TMC (2009) A randomized controlled trial of mental imagery augment generalization of learning in acute poststroke patients. Stroke 40:2222–2225

Overview of the Content

The major goal of the intervention was to teach Maria in utilizing self-regulation and mental imagery effectively so that it could help her to promote the performance at daily tasks.

Learning Objectives

After the work, students will be able to:

- Explain what self-regulation and mental imagery are
- Explain the effect of self-regulation and/or mental imagery on one's daily task function or upper extremity motor function
- Understand how self-regulation and mental imagery could be integrated in the activities of daily living training for people with stroke
- Further explore how self-regulation can be combined with other commonly used treatment strategies (such as constraint-induced movement therapy) to further promote people's regain in function

The Background History of the Clinical Case Study

Personal Data and Occupational Needs

Maria was a 68-year-old lady when she joined the mental imagery program after a stroke. Before the stroke, she was a housewife and performed all of self-care and instrumental daily (IADL) tasks. Her husband Peter and she also looked after their 2-year-old grandson during daytime when their son and daughter-in-law went for work.

Medical Diagnose and Disability Description

Maria had sustained an internal capsule infarction to the right hemisphere of the brain and this resulted in left hemiplegia.

Internal and External Environmental Circumstances

Maria had a supportive husband. Her son and daughter-in-law were also supportive but could only spend the weekend taking care of her. They lived in a single-storey house with easily accessible rooms, bathroom, and kitchen. However, a big step in front of the house entrance created a challenge for Maria in terms of accessibility outside the house.

Reason for Seeking Occupational Therapy

Maria had a stroke and was referred to the occupational therapy department for functional training.

Occupational Performance Issues

Maria was independent in all self-care and instrumental activities of daily living tasks before the stroke. After the stroke, she required maximal level of assistance to perform self-care activities. Her performance at instrumental activities of daily living was also greatly affected.

The mental imagery program commenced 11 days after the onset of the stroke. At the time Maria was admitted to the program, her scores on the Functional Independence Measure (FIM) were 30/91 for the motor subscale and 30/35 for the cognitive subscale. This reflected that Maria relied on the maximal level of assistance to perform self-care activities but was fairly independent in communication and problem solving.

Progress and Outcome

Maria showed improvements in performance on all of the 15 trained tasks. She achieved a two- or three-point improvement in most of the tasks. Her performance at the trained tasks was found to be maintained 1 month after the program. The results of her performance at the five untrained tasks assessed at the end of the third week were also very encouraging. Two of the tasks were performed with minimal assistance and the other three with modified independence. However, for her results in cognitive and motor function, Maria did not show much improvement after the program. In the Color Trails Test (a test of her attention and sequential processing),

the changes in scores were 223 to 145 s for Part 1 and 412 to 190 s for Part 2. In the Fugl–Meyer Assessment (a test of motor function), Maria scored 0/60 and 5/60 on the upper extremity subscale both before and after the training, and 10/28 and 15/28 on the lower extremity subscale before the training and after the training, respectively.

In the first week of the program, Maria needed help from the therapist in identifying the problems with the task performance and generating solutions to enhance the performance. With a relatively low level of motor functioning at the extremities, Maria was able to plan her actions to compensate in the trained tasks. For example, when performing the task *tidy the table after a meal,* she leaned onto the table edge for gaining more balance before she reached forward and got the dishes. Maria practiced the mental imagery very well before she actually performed the task. She found that the technique was useful especially for the less frequently performed tasks such as helping her grandson to get dressed.

This case study suggested that the self-regulation and mental imagery program is able to enhance stroke persons' relearning and generalization of function that promotes their resumption of independent lives.

The Student's Report

The following guiding questions have been identified in developing possible solutions to Maria. These questions are generated from the available literature references and our clinical experiences.

Questions

1. What is self-regulation? How is it applied in a functional training?
2. What is mental imagery? How is it applied in a functional training?
3. What is metacognition and how do self-regulation and mental imagery fit into the concept?
4. Please explain the 3-week program of self-regulation and mental imagery for people with stroke.
5. What area(s) of improvement can be observed using self-regulation and/or mental imagery?
6. What would be the added benefit when self-regulation is combined with constraint-induced movement therapy?

Chapter 32
Teaching/Learning Strategies for Intervention with People with Neurovisual Impairments

Al Copolillo

Abstract This chapter presents teaching/learning strategies that can be used by occupational therapists (OTs) who provide service for people with neurovisual impairments, i.e., vision impairments related to neurological injury and illness. When to consider integrating people with neurovisual impairments into group interventions that primarily include people with adult-onset eye diseases such as macular degeneration and glaucoma is discussed. When it is probably most essential to provide individual intervention is also discussed. There is a focus on self-management and health promotion models to design and plan both group and individual interventions.

Keywords Neurovisual deficit · Self-management

Definition

The term, *neurovisual deficit,* incorporates all vision problems occurring as a result of neurological disorders, such as brain injury or multiple sclerosis. Specifically defined, neurovisual deficits are post-chiasmatic visual field and central field disorders, i.e., disorders of the central nervous system occurring proximal to the optic chiasm (Kerkhoff 2000).

Background

Symptoms of neurovisual deficits can be classified as problems with accommodation, version (synchronous and symmetric eye movement), vergence (synchronous eye movement in asymmetric directions), visual fields, and light absorption and modulation. A number of problems with vision fall into these categories including, problems with fixation, scanning, and reading speed; double vision, shimmering

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vision, and eye strain; spatial awareness; and problems with light sensitivity, contrast sensitivity, and color detection (Kerkhoff 2000). Visual field deficits are frequently seen in people with neurovisual deficits. Other symptoms that are often encountered include severe spatial–perceptual deficits such as depth perception and hemi-inattention or unilateral neglect. Impaired oculomotor control and, in rare cases, visual hallucinations can also be present (Kerkhoff 2000; Rowe et al. 2009).

Complications to the treatment of neurovisual deficits are often in relation to the overall impact of acquired brain injuries including intellectual and motor problems (Whitson et al. 2007). They can limit a person's potential for using assistive technology interventions designed for the larger low-vision population and may require the use of more detailed learning strategies to assure ongoing use. In particular, the presence of any intellectual disability presents a challenge to teaching and learning compensatory strategies for neurovisual deficits; the greater the intellectual challenge, the more time and effort it will take for the client and therapist to develop strategies that compensate for the vision impairment. Within the category of neurovisual deficits, there are symptoms that are not uniquely visual but rather are manifestations of multiple sensory losses, frequently in combination with intellectual and motor problems, hemispatial neglect being a primary example. Neurovisual deficits range from mild to severe, and therefore, can affect occupational performance in a variety of ways (Warren 2011b).

Purpose

People with neurovisual deficits require occupational therapy intervention in the customized use of assistive technologies, adaptation of the environment, and adapted performance of daily activities to assure ongoing performance of occupations. Occupational therapists (OTs) are knowledgeable of neurological illness and disability, as well as vision disorders. They are skilled in the treatment of acquired brain injuries and other neurological disorders, and they are trained to explore the use of assistive technologies, adapt environments, recognize challenges of desired tasks, and explore adjustments to permanent physical changes with clients for whom such intervention will enhance occupational performance. This chapter focuses on the learning strategies that are beneficial for the people with neurovisual deficits.

Method

Candidates for Interventions

All people with neurological illness and disability should be screened and evaluated for vision problems. Problems with vision in this population can be detected through the use of vision assessments such as the Brain Injury Visual Assessment

Battery for Adults (Warren 2013b), the Self-Report Assessment of Functional Visual Performance (SRAFVP; Mennem et al. 2012), and the Melbourne Low Vision ADL Index (MLVAI; Haymes et al. 2001). Most candidates for intervention are people with mild to moderate acquired brain injuries and other neurological disorders who complain of or demonstrate problems specific to the visual system, including inability to recognize objects in visual fields, create meaning from what they see, and take appropriate action to complete a task or solve a problem that would typically be discerned through visual information. People with more severe acquired brain injuries and other neurological diseases are not to be discounted. As recovery occurs, the ability to make use of assistive technologies and other strategies to compensate for vision problems can improve with intervention (Warren 2013a).

Epidemiology

While there are estimates that vision impairment accompanies acquired brain injury in around 30 % of cases (Kerkhoff 2000), neither national nor international statistics on the incidence and prevalence of low vision and blindness due to neurovisual deficits have been determined. One study examining prevalence and cause of vision impairment calculated the frequency of visual field deficits. In this single-site, retrospective study of 220 people with acquired brain injuries (traumatic brain injury and stroke), 46 % were found to have some form of visual field deficit. Among those, approximately one fourth had scattered visual field deficits (Suchoff et al. 2008).

Settings and Services for People with Neurovisual Deficits

Vision rehabilitation services for people with neurovisual deficits are provided in a wide variety of contexts and settings. Initial evaluation to detect vision problems in the hospital where the person is receiving care for the overarching neurological disorder increases the potential for service-specific to the neurovisual deficit. In inpatient rehabilitation settings, referral to ophthalmologists and optometrists, frequently initiated through occupational therapy screening and observation, often leads to valuable intervention for people with neurovisual deficits. If more vision services are needed following inpatient stages of treatment, outpatient care may be necessary.

Low vision services for people with acquired eye disease are typically provided on an outpatient basis in specialized low-vision rehabilitation programs. These are available via departments and ministries of vision and blindness or in private ophthalmology and optometry practices that employ low-vision specialists. Many of the services available from these programs are for blind adults and children with congenital or early-onset blindness and vision impairments, but it is becoming more common in some countries for people with adult-onset eye diseases and neurovisual

deficits to be referred to these programs. In the USA, while state vision and blindness departments make efforts to accommodate individuals with neurovisual deficits, many of these services are provided through hospital-based occupational therapy programs or low-vision rehabilitation programs by a team of specially trained physicians and OTs. In all settings, availability of other needed service, including social work, psychology, nursing, and orientation/mobility is an important part of the context and setting. Collaboration between OTs and other vision rehabilitation professionals assures appropriate care and expands the impact of intervention (Warren 2011a).

Service is provided in both individual and group formats. In most inpatient occupational therapy settings, vision rehabilitation services for a person with an acquired brain injury or other neurological disorder are provided individually as part of an intervention plan that addresses a broader focus on functional retraining following the neurological disorder, for example, stroke or traumatic brain injury. Remediation of vision problems occurs through referral to neuro-ophthalmologists. When the vision problem is more closely related to visual perceptual and visuocognitive issues and when these problems are severe, individual intervention is more likely to be successful. In cases of mild neurovisual symptoms, intervention may proceed via individual or group formats. People with mild neurovisual symptoms may benefit from group interventions with a health promotion or self management perspective. Participants in group programs like these are typically people with low vision from eye diseases like macular degeneration or retinopathy, but they can accommodate people with mild to moderate neurovisual deficits as well.

The Role of the OT

The main challenge to the OT working with people with neurovisual deficits is to determine, through screening and evaluation, the extent to which vision problems directly deplete the functional abilities. In addition, the therapist tries to discern how vision contributes to problems with cognitive processing. Once vision-related issues are identified, the OT must arrange for and follow through with any remedial interventions the client might need to improve function. The OT must also explore compensatory strategies that simplify and accommodate daily function. The OT partners with the client to facilitate problem solving, decision making, and the most appropriate use of low vision resources. Primary areas of focus in the rehabilitation of people with neurovisual deficits are reading and learning to explore the visual field deficit area. Hemianopic dyslexia, a severe reading disorder manifested by slow reading, omission of words, word guessing, and disorganized scanning patterns, can be reduced through guided reading practice and instruction in exploration of the deficit visual field. OTs can provide such training directly and during performance of functional activities like following a menu or preparing a grocery list (Schuett et al. 2012).

Results

Clinical Application

Teaching/Learning Methods for People with Neurovisual Deficits

There are a variety of teaching/learning methods that the therapist can make use of. Frequently used in self management programs are *strategies* such as action planning, providing feedback on progress, modeling self-management behaviors, modeling problem-solving strategies, using group support as social persuasion, sharing stories and life experiences, and providing individualized guidance (Corbin 1998).

Self-management and health promotion programs guide the person toward a solution rather than telling the person what the solution should be. Modeling and persuasion from peers are used, but individual guidance from an OT is also a mechanism for change when the person seeks it. While medical management is frequently emphasized in self-management programs, OTs focus more on quality of life, social, and emotional adjustment to an illness or injury (Warren 2011b; Packer 2013). Improving understanding of the vision deficit itself and educating people with vision impairment about available resources is emphasized. Active learning strategies in which the person with the vision impairment participates in discussions and shares challenging experiences that require creative problem solving are used. The client develops specific behavioral goals that move her/him toward greater independence in managing the symptoms of the neurovisual deficit, often through the use of assistive technology or through a collaborative process of adapting the environment. In group settings, other group members may describe ways in which they addressed similar problems and concerns and the resulting successes they experienced. Such interactions build confidence, reduce negative mood, and can encourage an individual group member to take reasonable risks that lead to improved quality of life. A variety of research studies support the use of self-management and health promotion concepts with clients with low vision (Brody et al. 2005; Eklund et al. 2008; Girdler et al. 2010). While none have specifically targeted people with neurovisual deficits, they are recommended for use.

A self-management or health promotion perspective can be used whether the intervention occurs in groups or individually. Within some health-care settings, intervention sessions are restricted in number and length, making it essential for the OT and the person with the neurovisual deficit to cover a variety of issues in a short amount of time. Identifying community resources that the client can access when needed and exploring assistive technologies become important parts of these brief, individual interventions.

To best accommodate the person with a neurovisual deficit, a combination of verbal and *written instructions* in conjunction with the use of *pictorial guides* and *videotapes*, including *videotaping of the client* her/himself performing a newly acquired skill, can facilitate learning. Repetition of the skill, control of the environment to reduce or enhance sensory input, and attention to both the level of intensity and specific, vision-dependent characteristics of the task are essential to the teaching/learning process (Gentry 2009; Toglia et al. 2012).

Recognizing *stages of learning* and the demands they place on the learner is also an important consideration when working with people with neurovisual deficits. In initial stages of learning, there is greater need for the learner to move slowly to allow time to interpret the visual cues or to begin to rely more on auditory or kinesthetic cues, think about what he/she is doing and analyze the steps of the task. As the person begins to refine and customize the task by choosing the best visual cues and developing individual strategies that work best for her/him, the process can speed up and the OT may choose to offer feedback less frequently during the task or only following completion of the entire task. Finally, as performance of the skill becomes more automatic and mastery of the task is apparent, the client should be praised for the level of autonomy he/she has achieved and encouraged to explore other challenges to which similar learning processes can be applied (Toglia et al. 2012).

Assistive Technology Interventions for People with Neurovisual Deficits

Chapter 32 (Copolillo and Gentry), *Low Vision Intervention: Decision-Making for Acquiring and Integrating Assistive Technology,* identifies a variety of assistive technologies that, while primarily designed for use by people with eye diseases such as macular degeneration, glaucoma, and retinopathy, can be used by people with mild to moderate neurovisual deficits. More specific to neurovisual deficits, issues of light sensitivity can be addressed through exploration of illumination and magnification options. Centralized computer systems can be used to simplify the process of turning lights and other electrical appliances on and off. Computer software programs that offer read aloud options while magnifying and highlighting text can reduce demands on the visual system while also simplifying cognitive processing (Copolillo and Ivanoff 2011).

Other Technological Interventions for Neurovisual Deficits

Prism Rehabilitation Therapy

There is growing evidence that using yoked prisms for prism adaptation therapy improves visual functioning in people with unilateral spatial inattention and spatial dysgraphia. Some researchers have indicated that it reorganizes higher levels of spatial representation in the brain. Improved focus and recognition in extra-personal and peri-personal space has been noted with retention up to 6 months for some programs. Yoked prisms are provided through medical prescription by an ophthalmologist or neuro-ophthalmologist, and trained vision rehabilitation specialists, including OTs, can provide prism adaptation therapy. The prisms *shift the visual space from the unattended area into the intact visual field,* reducing the need to scan into the neglected field. The result is reduced unilateral inattention with improvements in activities of daily life performances, as noted in some cases. While promising, more advanced clinical trials are required on prism adaptation therapy (Jacquin-Courtois et al. 2013; Kapoor and Ciuffreda 2002).

Tinted Lens Use

There is evidence that *yellow tinted lenses enhance contrast* when bright objects are viewed outdoors. Such lenses may be useful to people with neurovisual deficits experiencing problems with light sensitivity and glare. Using colored lenses appears to be somewhat detrimental to color vision, and the level of detriment increases with darkness of the lens. However, the distinctness of an outdoor scene viewed through a variety of colored lenses, i.e., clear, yellow, dark yellow, and orange, does not seem to be affected. Preference for yellow-tinted lenses is likely due to the enhanced contrast they seem to create for the individual. Therefore, it may be beneficial to explore the use of them when contrast sensitivity is an issue. Darker lenses may reduce glare and soothe the discomfort associated with photosensitivity (Wolffsohn et al. 2000).

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Case Study of Kate: Participation in Occupations Following Neurovisual Impairment

Keywords: Self-management, health promotion, vision impairment

Introduction

The theme of this case study is mild to moderate neurovisual deficits that may occur following a stroke, traumatic brain injury, or other neurological illness and the teaching/learning strategies that can be used when planning individual or group interventions.

The Student's Tasks Include

- Reviewing methods of conducting visual screening and evaluation for people with vision impairments.
- Understanding general cognitive teaching/learning strategies that can be applied to intervention for people with low vision.
- Identifying the goals and purpose of chronic disease self-management for people with low vision and reviewing the evidence for using self-management and health promotion with people with neurovisual deficits.

As a starting point, the students should use the following references to gather background information:

Important References Are

- Brody B, Roch-Levecq A, Thomas R, Kaplan RM et al (2005) Self-management of age-related macular degeneration at the 6-month follow-up: a randomized controlled trial. Arch Ophthalmol 123:46–53
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Overview of the Content

Major Goals of the Intervention

The main goals of the intervention are engagement in occupations to enhance participation for people with neurovisual deficits and increased confidence in managing the short-term and chronic symptoms of neurovisual deficits.

Learning Objectives

By the end of this chapter, students will be able to:

1. Distinguish between neurovisual deficits and other low-vision eye diseases,
2. Discuss screening and evaluation of a person with a neurovisual deficit,
3. Identify appropriate teaching/learning strategies to apply to the case, and
4. Apply principles of self-management and health promotion for people with neurovisual deficits.

Background

Personal Information Kate is a 65-year-old woman, recently retired from her position as an office administrative assistant, which she held for 22 years. She lives alone in a mid-sized city in a three-bedroom, one-story house. During the first 10 months following her stroke, Kate's sister came from another city to live with Kate and help her as she recovered. With some community services having been put in place, the sister was compelled to return to her own home a few months ago. Kate's functional abilities immediately began to decline.

Pertinent Medical History As a child, Kate was in a bicycle accident in which she lost complete sight in her left eye. About 1 year ago, Kate experienced a left posterior cerebral artery ischemic stroke with lesions in the occipital lobe affecting vision. Remaining symptoms of the stroke were mild to moderate. Early problems with cognition were relatively resolved 3–6 months following the stroke with only minor attention and short-term memory problems remaining. Scattered visual field loss and contrast sensitivity difficulties persisted too; some sensory loss on the eyelid and surface of the eye have resulted in a drooping eyelid and some visual blurring. Neuro-ophthalmology testing revealed loss of visual acuity of 20/100 best corrected vision. A follow-up visit to her neurologist resulted in referral to occupational therapy for vision rehabilitation.

Occupational Therapy Interventions Occupational therapy evaluation conducted in the OT clinic revealed that Kate is having difficulty reading, managing money,

and finding desired heat levels on stove burners. She reported that she almost fell in her home recently, has trouble recognizing the faces of people who come to her door, and is feeling depressed because she is so isolated and unable to leave her home. Having driven prior to her stroke, Kate stated that she would like to use public transportation but knows little about it and is nervous about going outside by herself. The OT plans a home visit (see Chap. 13) to evaluate environmental conditions (see Chap. 12) and observe Kate in her daily routine. She also enrolls Kate in a group self-management program consisting of 10 weekly sessions. Among other occupations addressed, the program educates Kate about her vision problem, provides opportunities to try assistive technologies that might improve function in the home and community, explores lighting and magnification options, and addresses some home and community mobility issues through collaboration with an orientation & mobility specialist.

The Student's Report

The following questions have been identified in developing possible solutions to Katie. These questions were generated from the references found in the reference list of this chapter:

- What measures might the OT use when conducting a screening of Kate's vision?
- What functional abilities and routines are likely to be affected by Kate's vision loss?
- What client-centered goals would the OT develop to address neurovision concerns in collaboration with Kate?
- How would a group self-management program benefit Kate? If she is unable or unwilling to attend a group, what self-management alternatives might the OT use to explore Kate's issues?

Chapter 33
Delivering Fatigue Management Education by Teleconference to People with Multiple Sclerosis

Marcia Finlayson and Katharine Preissner

> *The program broke things down into simple basic things that I could do to manage my fatigue—things I didn't think about before the course.*
> Participant

Abstract Fatigue is one of the most common and disabling symptoms reported by people with multiple sclerosis (MS). Teaching people with MS how to self-manage their fatigue is an important role for occupational therapists (OTs). Typically, these strategies are taught face to face, either in groups or on a one-to-one basis. For some people with MS, traveling to a location for this education is difficult. Therefore, teleconference delivery can be a viable option.

Keywords Multiple sclerosis · Self-management · Telehealth

Background

Up to 83 % of people with multiple sclerosis (MS) report disabling fatigue (Kluger et al. 2013). People with MS have described fatigue as frustrating, overwhelming, immobilizing, and disabling (Holberg and Finlayson 2007). The Multiple Sclerosis Council (1998) defined fatigue as "a subjective lack of physical and/or mental energy that is perceived by the individual or caregiver to interfere with usual and desired activities" (p. 2).

Several rehabilitative treatment options are available for people with MS who seek to reduce the impact of fatigue on their daily lives (Finlayson et al. 2013a),

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including the use of a set of strategies which has historically been referred to as "energy conservation." Supporting individuals to learn and apply these strategies is one of the major roles of the occupational therapist (OT) on the MS care team. In response to feedback from people with MS who did not like the language of "conservation" because it made them feel like they had to give up important and valued activities, our research team stopped using the term "energy conservation" to describe the contents of our program. Instead, we now refer to *fatigue management* strategies and focus on teaching people with MS to examine their energy use, modify activities, and make active choices so that they can reduce the impact of fatigue on their daily lives. Modifications and choices can occur at the level of the person, the environment, or the activity itself.

Several studies have demonstrated the efficacy and effectiveness of face-to-face, group-based education for reducing fatigue impact and improving quality of life (Kos et al. 2007; Mathiowetz et al. 2005, 2007; Matuska et al. 2007; Sauter et al. 2008). Technology-supported delivery models, such as group-based teleconference and on-line programs, have also been evaluated and show promising results (Finlayson 2005; Finlayson et al. 2011; Ghahari et al. 2010).

Purpose

The primary aims of the teleconference-delivered, fatigue management interventions are to reduce fatigue severity, reduce the impact of fatigue on daily life, and improve the overall quality of life. A secondary aim is to improve self-efficacy for managing fatigue.

Method

Candidates for the Intervention

Candidates for the intervention are adults with MS (International Classification of Diseases (ICD-10) code G35), who experience disabling fatigue. This disease is typically diagnosed in people between the ages of 20 and 50 years, and is more common among women and people of Northern European descent.

Epidemiology

This intervention targets adults with MS who experience moderate to severe fatigue, as measured by an average Fatigue Severity Scale (FSS) score of 4 or more (Krupp et al. 1989). The short version of the Blessed Orientation-Memory-Concentration test (BOMC; Katzman et al. 1983) is used to identify individuals

who have the requisite attention and concentration to participate. Individuals who have difficulty accessing face-to-face education programs are specific targets for the intervention.

Settings

The intervention is advertised through community settings, MS clinics, and MS support groups. Interested individuals volunteer and are screened for eligibility by telephone. Because this is a teleconference intervention, individuals can participate by dialing into the sessions from the location of their choice.

The Role of the OT

The OT functions as an educator, coach, and facilitator by introducing and explaining fatigue management strategies, providing examples of strategy application, promoting discussion and sharing across participants, encouraging and answering questions, and supporting vicarious learning. The OT may also be involved in recruiting and screening participants and organizing program logistics.

Results

Clinical Application

The intervention is a community-based group educational program guided by psychoeducational group theory (Brown 2004) and informed principles of self-management (Lorig and Holman 2003) and self-management support (Lawn and Schoo 2010). The content of the program was heavily influenced by the work of Packer et al. (1995). The intervention is a closed group that includes six sessions held once a week for 6 weeks. Ideal group size is five or six participants.

Each session is 1 h and 10 min in length. Participants are provided with a telephone, a headset, and a program binder, and they dial into a toll-free conference call line at a designated time. The major topics of the six sessions are as follows:

- Impact of fatigue on daily life; fatigue management principles
- Communicating with others about fatigue
- Body mechanics and using tools and technology
- Activity analysis, evaluating priorities, and making active decisions
- Living a balanced life, analyzing, and modifying a day
- Goal setting for long-term use of strategies

Table 33.1 Fatigue management strategies taught in the course. (Finlayson 2005)

Adjust priorities by choosing how to spend available energy
Change the way the body is positioned during an activity
Use adaptive equipment, gadgets, or energy-saving devices
Eliminate part or all of an activity
Stop to take a rest in the middle of a long activity
Plan days to balance work and rest times
Ask for help from family or friends
Evaluate standards and set activity priorities
Change the location of equipment, furniture, or supplies at home or work
Change work heights at home or at work
Simplify activities
Change the time of the day an activity is done
Include rest periods in the day
Delegate part or all of an activity to another person

Across the entire intervention, 14 strategies are taught (Table 33.1; Finlayson 2005).

Delivering an occupational therapy intervention through a group teleconference call is challenging, and requires a high level of knowledge of group dynamics and strong-group facilitation skills (Dunleavy et al. 2013). Participants must be provided with tips for participating in a group teleconference, and therapists must be prepared to deal with technological problems. Pre-intervention introductory calls from the therapist can mitigate participant anxiety, if it exists. Intervention costs include the teleconference line and associated charges, telephones, and headsets for participants, and copying and distribution of the program binders.

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Participants build knowledge of fatigue management strategies and develop confidence in their abilities to apply these strategies through peer support and vicarious learning. Participants learn, refine, and generalize the application of the strategies across a range of activities through discussion, exploration, practice, and reflection.

Evidence-Based Practice

A randomized controlled trial of the intervention was conducted in 2007–2010 on 181 people with MS. On average, participants were 56 years of age and had been living with MS for 20 years (Finlayson et al. 2011). Effectiveness (intent-to-treat) analysis indicated that compared to the waitlist control group, the intervention group experienced significant reductions on all three subscales of the Fatigue Impact Scale

(FIS; Fisk et al. 1994; cognitive: $p = .001$; physical: $p = 0.014$; social: $p = 0.002$) and achieved significant improvement on the role physical scale ($p = 0.0002$) of the SF-36 (Ware and Sherbourne 1992). After the waitlist group received the intervention, all participants were followed for 6 months. Analysis of effect sizes over time for the pooled sample indicated that the average effect size for the FIS subscales was 0.61. The average effect size for the subscales of the SF-36 was 0.30.

Post-hoc analysis uncovered several factors that moderated study outcomes, including age, gender, and level of impairment (Finlayson et al. 2012), and having diabetes or arthritis (Finlayson et al. 2013b). Overall, younger participants experienced greater reductions in fatigue impact and greater improvements in self-efficacy over time than did older participants. Participants with less physical impairment experienced greater mental health gains and were more likely to retain these gains over time than were participants with greater physical impairment. Although women experienced greater fatigue impact benefits, men experienced greater mental health benefits. People with diabetes were slower to show improvement after intervention than people without diabetes. People with arthritis made much more dramatic initial gains compared with people without arthritis but had difficulty maintaining those gains over time.

Discussion

Delivering an educational intervention without the benefit of visual feedback to gauge participant understanding is challenging. As telehealth and distance education technologies continue to advance, this challenge will eventually be remediated. The results of a randomized controlled trial and several follow-up analyses support the feasibility, utility, and effectiveness of teleconference delivery of fatigue management education for people with MS. Future research will need to compare participant outcomes and cost-effectiveness between the teleconference delivery model and a more traditional face-to-face model.

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The Case Study of Karen: Supporting the Use of Fatigue Management Strategies

Keywords: Fatigue, Multiple sclerosis, Self-management

Introduction

The theme of this case study is enabling fatigue self-management through the selection and application of fatigue management strategies.

The Students' Tasks Include Learning About

- MS (e.g., Cameron et al. 2013)
- Fatigue in MS (e.g., Finlayson et al. 2013a)
- Evidence supporting the use of fatigue management education in MS (e.g., Blikman et al. 2013)
- Self-management and self-management principles (e.g., Lorig and Holman 2003)
- Telehealth and the challenges of delivering interventions by telehealth (e.g., Dunleavy 2013)

As a starting point, students should use the following references to gather background information:

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Overview of the Content

Major Goals of the Actual Intervention

The major goals of fatigue management education are: (1) to reduce the impact of fatigue on daily life, (2) to enhance overall quality of life, and (3) to support development of self-management skills and self-efficacy to manage MS.

Learning Objectives

By the end of studying this chapter, the learner will be able to:

1. Appreciate the complexity of MS fatigue and its management
2. Identify when it is appropriate to offer fatigue management education to a person with MS.
3. Describe the overarching self-management skills that are developed through group-based fatigue management education
4. Summarize the evidence regarding fatigue management education for people with MS

The Background History of Karen

Personal Information

Karen is a 47-year-old female with relapsing remitting MS. She was diagnosed 12 years ago. She is married, has a 7-year-old daughter, and works part time as a sales clerk. She and her family live in a three-story town house in a large city.

Medical Information Including Prognosis

Over the past 2 years, Karen's MS has progressed. She has experienced two relapses, both of which left her with residual mobility impairments and extreme fatigue. She tried the medication amantadine for her fatigue, but found it ineffective, so stopped taking it. She prefers not to use a cane because it makes her feel "old." Her doctor has indicated that she is likely transitioning into a secondary progressive form of the disease.

Occupational Therapy Intervention

The initial interview with Karen uncovered that she is struggling to maintain employment because of her fatigue and mobility impairments. In order to cope, she has given up most of her social and leisure activities so that she has enough energy to take care of her home and child and get through her tasks at work. Some of her personal activities of daily living (ADL) habits have also suffered due to fatigue, and she has resorted to prepared meals and fast food because she is having difficulty in grocery shopping and making meals after a day at work. Karen reports that these changes make her feel bad about herself and her ability to be a good role model for her daughter. Karen wants to make adjustments to manage her fatigue more effectively and get back to doing the things that she values.

Karen completed the nine-item Fatigue Severity Scale (Krupp et al. 1989) and received a score of 6.8, which indicates that she is experiencing severe fatigue. Karen also completed the 14-item self-efficacy for Energy Conservation Questionnaire (Liepold and Mathiowetz 2006), which evaluates a person's confidence to use 14 different fatigue management strategies. Overall, Karen's confidence was low, with an average score of 4 out of 10.

The Student's Report

The following guiding questions have been identified:

- What are some of the factors that may be contributing to Karen's fatigue?
- Which of these factors are most likely to be amenable to fatigue management education?
- What are the key self-management skills that the occupational therapist will work to develop during the course of the fatigue management program?
- What is self-efficacy and why it is important for fatigue management?
- Based on Karen's situation and the available literature, which fatigue management strategies would you focus on during your intervention and why?
- What outcome measures would you select to evaluate the effectiveness of a fatigue management education program for Karen and why?
- What are the potential benefits and limitations of a teleconference-delivered fatigue management program for Karen?

Chapter 34
Psychoeducational Groups

Sandra Hale and Jocelyn Cowls

I valued a lot of the exercises. They were all good introductions to the topic and they also got you involved.
Participant

Abstract Clients attending psychoeducational groups report that in addition to skills learned and social benefits, the activities reinforce content, assist in establishing healthy milieus, encourage involvement in the group, and assist with the recollection of the topic discussed (Cowls and Hale, Can J Occup Ther 72(3):176–182, 2005).

Keywords Mental health · Psychoeducational groups · Rehabilitation

Background

The therapeutic value of group work has long been supported by a variety of disciplines, predominantly psychology, psychiatry, social work, nursing, and rehabilitation. Groups in mental health settings aid in promotion of hope, universality ("I am not alone with my problems"), and mutual support (Yalom 1995). Psychoeducational groups often bring together people with similar illness states or health-related concerns. Effective learning can occur in group settings through individuals sharing concerns and strategies used to overcome them. This is much more powerful than didactic relaying of information (Anderson 2001).

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Definition

Psychoeducational groups provide a structured, supportive, and interactive environment in which clients may learn about their illness and effective coping strategies to help manage symptoms and improve functioning (Brown 2011; Pitschel-Walz et.al. (2013). Leaders of the group guide or facilitate learning through offering current and up-to-date information (Brown 2011).

Historical Roots

Psychoeducation has its roots as a family-focused intervention. It is considered an evidence-based approach and a useful adjunct to medication wherever possible in the treatment and prevention of mental health issues (Colom et al. 2003). It is used with mental health clients interested in learning new ways of coping and problem solving. Skills learned can assist people to improve functioning in their personal and work lives. Topics addressed in psychoeducation vary and can include stress management, self-esteem, recognizing and managing symptoms of illness, strategies to stay well, and conflict resolution.

Purpose

Psychoeducational groups can help to prevent relapses with mental health conditions by skill teaching and information they provide. Recent mental health reviews emphasize the importance or recovery principles and self-management to promote recovery (Lloyd and Williams 2010). These groups can assist in maintaining wellness and can remediate recurring problems by improving the knowledge of illness and coping skills and by establishing routines to restore abilities. Clients have stated that they benefit from review and repetition of information (Brown 2011; Cowls and Hale 2005).

Method

Candidates for the Intervention and Epidemiology

Psychoeducational groups are reportedly effective with a variety of Axis I diagnoses in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; 2013), such as schizophrenia, mood disorders, anxiety disorders, eating disorders, and concurrent disorders of mental health and addiction.

The above disorders may begin in adolescence, in the case of eating disorders and anxiety disorders, and range through to adulthood. The diagnosis of schizophre-

nia generally varies in onset from 18 to 25 years of age. Aside from eating disorders, whereas 90% are female, most illnesses mentioned affect the lives of both genders.

Psychoeducational groups have wide applicability within mental health from adolescences to older adulthood. It has often been believed that significant cognitive limitations are exclusion criteria for participation in psychoeducational groups. However, in a recent study by Pitschel-Walz et al. (2013), it was suggested that clients with borderline intellect are capable of integrating in and benefiting from psychoeducational groups, and therefore should not be excluded.

Settings

A review of the literature and clinical experience shows that psychoeducational groups are used in both inpatient and outpatient settings. Although benefits have been identified in both, it can be argued that inpatients may have greater difficulty attending to, understanding, and incorporating information gained in groups into their daily life (Cowls and Hale 2005; Sibitz et al. 2007).

Sibitz et al. (2007) found that clinical stability may be the most important prerequisite for benefiting from psychoeducational groups. One study by Duman et al. (2010) found that when providing short and well-structured psychoeducational groups, inpatients did show significant increases in their knowledge about their illness and discharge readiness.

The Role of the Occupational Therapist in Applying the Intervention

Although a variety of health-care professionals conduct psychoeducational groups, occupational therapists (OTs) bring a unique focus and method of group facilitation. When involved in a group, OTs practice as *facilitators,* empowering the client to direct and carry a large portion of group discussion. However, psychoeducational groups by definition do require structure. The OTs develop the structured content of these groups while incorporating two distinct factors: activity and link to occupational performance (participating in a task for self-care, productivity, or leisure).

Brown (2011) suggests that the psychoeducational group facilitator must possess a deep understanding of the group subject. She says that the facilitator is responsible for creating an environment that fosters hope, new learning, emotional expression, self-awareness, and an opportunity to practice new learning.

Recent literature suggests that OTs need to reconnect with their roots in activities. It has been stated "activity is valuable and should be promoted in order to deliver best practice for occupational therapy in mental health" (Cowls and Hale 2005, p. 178). Within a psychoeducational group, activities may serve many purposes such as an icebreaker, to illustrate a point, enhance self-reflection, increase participation, or to terminate a session (Brown 2011; Cowls and Hale 2005).

Results

Clinical Application

Principles for Practice

Attending a psychoeducational group should not be uniformly recommended for everyone.

An *occupationally based assessment* helps individuals to identify goals they define as central and important in their life. One such standardized assessment is the Canadian Occupational Performance Measure (COPM; Law et al. 1998). Once occupational issues in self-care, productivity (work), or leisure have been established, goals can then be generated in partnership with the client.

The content of psychoeducational groups can be discussed to ensure that they are relevant to the clients and could assist in the recovery of identified occupations. The assessment process is a key to developing rapport and collaborating with the client who attends a group. Setting individual goals and objectives allows each client to have a sense of control which can lead to greater buy in and contribution (Brown 2011). The results of these assessments serve as a guide for recovery and assist the client in integrating the skills from groups to their occupational goals.

If a client is reluctant to attend psychoeducational groups or uncertain of their benefits, a trial offer to try a group should be encouraged before ruling it out. Ultimately, the decision rests with the clients. Nothing will take this process further, however, than creating a collaborative, respectful working partnership. A regular review of goals and adapting them to each client's needs and abilities is central to occupational therapy practice.

Two other important principles in terms of effective group process relate to *group composition* and *readiness to attend to the content of the psychoeducational group*. People attending groups should be at comparable points in their recovery. This promotes optimal group dynamics.

Readiness to attend these groups is often dependent on where clients are in understanding, accepting, and dealing with their illness and life circumstances (Cowls and Hale 2005).

The need for stability for participants of psychoeducational groups has been highlighted in recent qualitative studies and is understood clinically by facilitators who run them. The OTs can assist in adapting the progression from social or activity-based groups to psychoeducational groups. For example, clients may find that attendance in leisure or cooking activities gives them the opportunity to increase their comfort level for groups prior to engaging in a psychoeducational group.

Psychoeducational groups involve the delicate balance between offering content and process. Group content involves offering the education regarding a particular topic, and group process refers to interpersonal and group dynamics (Champe and Rubel 2012). Managing the balance between these two concepts is essential because as Champe and Rubel (2012) imply, "too much focus on group process risks veer-

ing into the territory of therapy groups, while too much focus on content and the conceptual learning risks merely teaching to people sitting in a circle" (p. 72). Furr (2000) indicates that although the information provided within the content of the group is critical, the experiential learning within the process of the group allows a client to apply the learning to real life.

Compared to discussion groups, clients placed higher value on groups that involve activity either as the primary function in the group or when used as a catalyst for discussion (Cowls and Hale 2005). For example, "warm-up" activities help clients to think about topics in a fun way, such as group juggling aimed at stress management, or charades for communication skills. When learning is made enjoyable through experiential learning, clients typically become more involved and have greater motivation. Providing an active learning environment leads to increased comprehension, retention, and integration (Brown 2011). "Learners are more open to accepting knowledge they discover than they are in accepting what others say they should know or learn" (p. 43).

Evidence-Based Practice

Intervention Efficacy The effectiveness of psychoeducational groups has been documented through research focused on outcome measures as well as client feedback (Cowls and Hale 2005; Duman et al. 2010; Goldner-Vukov et al. 2007; Sibitz et al. 2007). Qualitative research outcomes report that clients experience an increase in self-esteem, connection to others, sense of empowerment, and confidence with problem solving (Cowls and Hale 2005; Goldner-Vukov et al. 2007).

When *activity is combined with skills teaching,* this process facilitates an increase in memory for the skills learned (Brown 2011). Of special interest to OTs is that clients often experience an increase in psychosocial functioning in the spheres of self-care, productivity, and leisure (Goldner-Vukov et al. 2007). Through the participation in occupational therapy groups, Sundsteigen et al. (2009) found that clients demonstrated improvements in their daily life through a transfer of their learning from groups. This research revealed that learning in a safe, supportive, and encouraging environment led clients to develop greater confidence to manage their illness and greater willingness to pursue new and challenging situations.

Clients who are *educated about their illness and healthy coping strategies,* gain essential insight and become empowered to make healthy choices in their life. By linking clients' goals to potential benefits of psychoeducational groups, clients demonstrate increased motivation to participate in groups, and implement learned skills into their daily life. For example, with the knowledge of how to manage anger assertively, clients may be more confident, and perform better in the workplace, knowing that they are capable of dealing with a difficult coworker. With knowledge of how to increase self-esteem, clients may take the risk of joining a community book club as a way to combine their love of reading with connecting to others, and thereby increasing their leisure activities.

Effectiveness A study published in 2013 explored changes, in a 5-year period, of the frequency and relevance of psychoeducational groups in psychiatry in Europe. Results indicated that there has been a significant increase in both the number of psychoeducational groups offered and the perceived relevance of these groups (Rummel-Kluge et al. 2013). Research provides evidence that clients often show greater improvement of measured skills when activity groups were offered (Cowls and Hale 2005; Moll and Cook 1997).

Typically, scientific evidence for mental health has focused on biologic therapies, such as pharmacotherapy. A growing body of evidence is emerging of the adjunctive benefit of psychosocial interventions along with pharmacotherapy. A study of 120 individuals diagnosed with bipolar disorder by Colom et al. (2003) demonstrated that the group psychoeducation was an efficacious adjunct to lower the number of illness occurrences, detect symptoms earlier, and reduce the severity of recurrent episodic symptoms.

Qualitative studies are providing the perspective of persons who participate in these types of groups (Cowls and Hale 2005; Goldner-Kukov et al. 2007; Sibitz et al. 2007). These findings assist in guiding practice toward what is meaningful for clients.

Discussion

Groups can be powerful change agents, and they have been used for decades to assist people with mental health illness. Psychoeducational groups bring people together to learn life skills and new ways of solving problems (Anderson 2001). OTs bring a unique style and vision to these groups through the use of activity and through the linking of skills to application in daily life. This is consistent with the philosophical belief that we learn by doing. Recent literature reaffirms that OTs should consider this core belief in the interventions they provide (Brown 2011; Cowls and Hale 2005; Furr 2000; Eaton 2002; Moll and Cook 1997; Sundsteigen et al. 2009).

OTs aim to facilitate client's engagement in meaningful activities of occupation, in a manner that supports their health, and participation in life. Bearing this in mind, the content of psychoeducational groups should fit with clients' stated goals. Skills learned needed to be meaningful and provide a link to the activity they wish to return to in the areas of self-care, productivity (work), and leisure.

A commonly recommended group size of between six and eight people represents a cost-effective treatment modality. It is recommended that OTs continue to conduct research related to the unique contributions of incorporating activity into groups, and how this can facilitate returning to meaningful occupations in clients' lives.

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The Case Study of Natalie: Returning to Work Following a Mental Health Disability Leave

Keywords Anxiety, depression, isolation, return to work

Introduction

The theme of this case study concerns preparing a client for a return to work through developing coping strategies and increasing confidence.

The students' tasks include:

1. Learn about the history of psychoeducational groups
2. Learn the concept of group *facilitation* for psychoeducational groups
3. Identify the benefits of using psychoeducational groups versus individual treatment
4. Identify how to assess a client's readiness to participate in a psychoeducational group

Important references are: Brown N (2011) Psycho-educational groups: process and practice, 3rd edn. Routledge, New York

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Overview of the content: Major goals of the actual intervention are (a) complete an assessment of Natalie's occupational performance issues including barriers and component issues, (b) outline appropriate psychoeducational groups for Natalie to attend that will address her current needs, (c) facilitate a variety of psychoeducational groups that will increase self-esteem and develop coping strategies, such as assertiveness, anxiety management, sleep hygiene, work–life balance, and stress management.

Learning Objectives

By the end of studying this chapter, the student will:

Be able to utilize information from the literature review to apply to the case study
Be able to use information gained through the case study method to guide clinical reasoning in future clinical situations
Understand the skills required to effectively create and facilitate psychoeducational groups for clients with mental health concerns
Create a six-session psychoeducational group on a specific topic, e.g., self-esteem

The Background History of the Clinical Case Study

Personal data: Natalie is a 49-year-old married woman living in an urban setting. She is currently in her second marriage and has three grown children, all of whom have left the family home. Natalie is employed as a Registered Nurse; however, she has not worked for the past 18 months. Long-term disability is her current income replacement.

Medical diagnoses: Natalie has been diagnosed with posttraumatic stress disorder, major depressive disorder, and alcohol dependence (in remission). Natalie has been attending 12-step programs and has remained sober for the past 10 months.

Current circumstances: Natalie has been working as a nurse for the past 12 years with the elderly in a continuing care environment. Following a significant workplace injury, Natalie had to take a leave from work to heal physically. When attempting to return to work gradually, she experienced considerable anxiety dealing with her supervisor and peers. Natalie felt judged and intimidated during her return-to-work process and was unable to stand up for herself. Due to anxiety and persistent physical pain, Natalie had a failed return to work and left for a second time on a sick leave. Following this sick leave, Natalie began to drink wine to numb her difficult feelings and physical pain.

While off on disability, Natalie's anxiety increased; she did not leave her home during the day, she slept excessively, and isolated herself from friends and family. Memories of earlier abuse have resurfaced through nightmares and flashbacks. Despite having past abusive relationships, Natalie currently lives with her husband who is healthy and supportive.

Natalie was admitted to an inpatient addiction program for 8 weeks where she was diagnosed with major depressive disorder and posttraumatic stress disorder. With 10 months of sobriety behind her, Natalie was referred to an inpatient program for clients with anxiety disorders.

Reason for seeking occupational therapy: Natalie was referred to an occupational therapist (OT) on the treatment team as she was worried about her ability to return to work. Natalie loves her job and feels that her work contributes to her sense of meaning. She lacks self-esteem and doubts her ability to cope with conflict and her illness symptoms. Natalie worries about experiencing another failed return to work.

Occupational performance issues: As a caregiver, Natalie focuses constantly on the needs of others before herself. She does not take time for basic self-care, such as healthy sleep or eating three meals a day. Although Natalie used to dance and spend time with her friends, she has spent most of the past 18 months in isolation at home with her husband. Natalie loves her work; however, she is anxious about her ability to perform her duties competently. Barriers for Natalie include poor self-esteem and anxiety. When faced with conflict, Natalie tends to become passive and struggles to find a voice for herself; therefore, she is also worried about her ability to manage the aggressive behavior of her colleagues.

The Student's Report

The following guided questions have been identified in developing solutions for Natalie. These questions are generated from the available literature references and our clinical experiences:

1. What are the major occupational performance issues in this case?
2. Is it appropriate to be addressing return-to-work concerns during an inpatient stay?
3. What types of psychoeducational groups may be appropriate for Natalie?
4. What may be the benefits for Natalie attending group therapy over individual therapy?
5. How may the use of activity in the psychoeducational groups be designed to address Natalie's specific goal of returning to work?

Chapter 35
Illness Management Training: Transforming Relapse and Instilling Prosperity (TRIP) in an Acute Psychiatric Ward: A User's Perspective

Siegfrid Wing-Kin Lee and Sunny Ho-Wan Chan

Transforming relapse and instilling prosperity (TRIP) is a ward-based intervention program that aims to decrease treatment noncompliance and relapse by improving insight and health during the visits to acute psychiatric care of clients with schizophrenia.

Abstract Participation in transforming relapse and instilling prosperity (TRIP), using the strategies learned from illness management including knowledge enhancement, behavioral tailoring, relapse prevention development, cognitive behavioral technique, and related coping skills (Mueser et al., Psychiatr Serv 53:1272–1284, 2002), helps the clients adhere to treatment recommendations and minimize relapses. Moreover, TRIP leads them to identify ways to redesign or reestablish a goal-driven healthy lifestyle. By learning how to manage their illness effectively, participants can be further reinforced to take part in their respective occupations.

Keywords Acutepsychiatry · Healthylifestyle · Illnessmanagement · Psychoeducation · Schizophrenia

Definition

Statements: The Theoretical Framework of the Intervention

Transforming relapse and instilling prosperity (TRIP) connotes the notions of relapse reduction and health promotion within the program (Chan et al. 2007) by using strategies. It is originally a ten-session psychoeducation program which

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provides information on illness and relevant skills for coping with symptoms, and a goal-driven, healthy lifestyle is reestablished or designed with the participants. It implies a positive experience of learning and enrichment during a short journey in the hospital.

Historical Development

Traditionally, during an acute stage of hospitalization, due to unstable mental state and restrictions of the ward environment, clients usually follow structured occupational therapy programs consisting of typical work, rest, and leisure activities which aim at the promotion of purposeful engagement and maintenance of healthy activity to assist them in rebuilding basic daily routines. However, such programs cannot fully help them reintegrate into the community on discharge and prevent their relapse, and therefore TRIP was developed to fill this gap. Since the inception of the first version of TRIP, the awareness of illness management along the pathway of recovery process has alarmed the person in recovery (Davidson 2008) as well as the clinicians (e.g., Salyers et al. 2009; Whitley et al. 2009). In view of the trend in shortening the length of stay in hospital, further intensive and tailored-made treatment is needed. Thus, a new version of TRIP is fabricated accordingly.

Purpose

The purpose of the intervention is to improve insight and health among clients with schizophrenia during acute psychiatric care, so that treatment noncompliance can be reduced and relapse prevented, with the ultimate aim of progressing toward personal healthy goals within clients' respective occupations.

Method

Candidates for the Intervention

Inclusion criteria for TRIP are as follows:

- Age within 18–65
- Diagnosed schizophrenia or schizoaffective disorder
- Admitted to an acute psychiatric unit
- Stabilized mental condition after admission
- Attained primary education level or higher
- Participating voluntarily

The exclusion criteria are clients with co-morbid diagnosis of substance abuse, organic brain syndrome, or mental retardation

Settings

The TRIP program is commonly carried out in a confined area in a psychiatric admission ward or therapy room in occupational therapy department, equipped with audiovisual equipment. Chairs may be arranged in a circle to facilitate discussion as well.

Role of Occupational Therapist in Applying the Intervention

As emphasized by Eaton (2002), an occupational therapist (OT) can play a major role in delivering psychoeducational group interventions in acute mental health settings. The TRIP program is then implemented by the OT under this empirical background. Playing the roles of teacher and facilitator in the group, the OT not only teaches the clients adaptive life skills and knowledge of illness but also promotes the sharing of experiences among themselves.

The OT works with the clients to develop strategies or cues by incorporating the learning content (e.g., recovery goal setting, illness management techniques) into their daily routines, to connect to their respective occupation. It is also important that the OT promotes the importance of a healthy and balanced lifestyle within the program. This includes articulating personalized goals and exploring how illness management (e.g., symptom and medication management) may be useful in achieving these goals. Addressing the personalized goals among clients meaningfully is crucial to engagement and motivating participation. Varieties of techniques are employed to optimize learning and retention. They include interactive teaching, specially designed activities and exercises, emphasizing sharing among group members and assignments after group, and so on. The OT in the group focuses on helping clients to become aware of their own power by gaining life skills that give them a greater sense of personal control (Blair and Hume 2002).

Results

A Brief Guide to Clinical Application

The new version of TRIP program is a four-session activity-based illness management program. Each session lasts for about 90 min. The topics include:

- Introduction to mental illness and treatment
- Understanding sign and symptoms
- Relapse prevention
- Healthy lifestyle and recovery goal development

An operational manual has been written as reference for OTs working in different hospitals in Hong Kong to streamline the group implementation. Various activities have also been designed purposefully in each session to facilitate teaching of the main theme and consolidation of knowledge. OTs can run the topics making use of interactive sharing and activities. Warm-up or socialization games are introduced at the beginning of each session with homework assignments developed collaboratively with the client at the end of each session. During each session, the learning materials are well presented like classroom teaching to draw their attention. Each participant will receive educational handouts or cue cards about the strategies reviewed in every session. Visual aids used in the group can further facilitate their learning and sharing among the group.

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

A core focus of TRIP is teaching clients how to manage their illness collaboratively with treatment providers, so as ultimately to achieve their life goals. Mueser et al. (2002) reviewed ample evidence to support the effectiveness of the strategies used in the illness management program. Using those strategies, TRIP can further facilitate clients' participation in their personal occupation by underscoring goal achievement. By realizing good mental health, grasping stress management techniques, or pursuing meaningful personal goals of healthy lifestyle building, an eventual goal of recovery with a full life beyond the illness can be achieved (Mueser et al. 2006).

Evidence from Practice

The TRIP program has positive effects on insight and health during acute psychiatric care (Chan et al. 2007). Kavanagh et al. (2003) emphasized the application of psychoeducation as an early intervention in acute setting. Rebolledo and Lobato (1998) also stated that the psychoeducational approach could further foster the adoption of a safer lifestyle when facing vulnerability. Health-oriented illness management can benefit patients' experiences of illness. The knowledge gained and the direct sharing of personal difficulties in various group sessions may increase patients' insight into mental health and influence their perspectives on their own well-being. Mueser

et al. (2002), in a literature review, demonstrated that psychoeducation, relapse prevention, coping skills training, or a cognitive behavioral approach are effective in preventing relapse in clients with psychotic symptoms. Walling and Marsh (2000) suggested that as long as clients have learned from stress management, healthy lifestyle building, or coping skills enhancement, they can be encouraged to engage in activities to reduce the risk of relapse and improve the quality of life. In fact, a large-scale multicentre double-blind randomized controlled clinical trial of the new TRIP program has just been completed and significant improvements in knowledge of mental illness as well as relapse prevention are found in participants immediately after the program, 3- and 12-month follow-up (Chao 2013). The results are encouraging for the recovery of people with mental illness.

Discussion

TRIP as applied in acute psychiatric settings is useful in empowering the clients in their illness management by influencing the pertinent relapse prevention plan. The TRIP program can provide a platform for enhancing the clients' holistic view of their illness, treatment, and recovery as a whole. They can also make sense of their recovery or have mutual learning in the program. The participation or involvement of service users is very vital in the recovery process (Tse et al. 2012). TRIP becomes a good start for them to enlighten the awareness of their needs, abilities, and hope instillations for future life during their stay in a psychiatric setting. The involvement of consumers as mentors in implementing the program will be considered the next transformative step of the program.

Participants join the TRIP program on voluntary basis, implying that they may get better insight to their illness or they may have good rapport with OTs. For those clients who are unwilling to attend may represent a larger group with "poorer insight," "repeated hospitalizations," or "inadequate readiness" to work with OTs. Hence, the OT should make use of their creativities to develop other means of interventions to engage and address their needs.

The TRIP program is conducted within the hospital setting during the phase of acute psychiatric care with the aim of reducing rehospitalization; yet the effectiveness of retaining the clients in the community still awaits further systematic research. As suggested by Hornung et al. (1996) and Zygmunt et al. (2002), supportive services such as booster sessions can be an effective means of reinforcing and consolidating the knowledge taught to clients with psychiatric illness. Thus, some kinds of postdischarge support programs in outpatient clinics or ambulatory centers can further be explored as a continuum of care to enhance the application of strategies taught in TRIP.

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The Case Study of David

Keywords TRIP program, insight, illness management

Introduction

The theme of this case study concerns the illness management for a person with mental illness.

The students' task includes:

1. Strategies and research in illness management (Mueser et al. 2002, 2006)
2. The TRIP program (Chan et al. 2007; Chao 2013)
3. Relapse prevention in serious mental illness (Walling and Marsh 2000)

As a starting point, the students should use the following references to gather background information.

Important references are:

Chan SHW, Lee SWK, Chan IWM (2007) TRIP: a psychoeducational program in Hong Kong for people with schizophrenia. Occup Ther Int 14:86–98

Chao JYW (2013) The impact of teaching illness management to psychiatric in-patients: a one-year follow-up. Paper presented in Hong Kong Hospital Authority Convention 2013, 15 May 2013. https://gateway.ha.org.hk/f5-w-687474703a2f2f7777772e68612e6f72672e686b$$/haconvention/hac2013/proceedings/en_oral.html

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Overview of the Content

The major goals of the TRIP program are to:

1. Improve insight and health among clients with schizophrenia during acute psychiatric care;

2. Reduce the treatment noncompliance;
3. Prevent relapse; and
4. Build up personal healthy goals within clients' respective occupations.

Learning Objectives

By the end of studying this chapter, the learner will:

- Be familiar with the content and the process of the TRIP program
- Be able to teach the strategies in illness management to clients with mental illness
- Be able to focus on the topics of mental illness and related signs and symptoms as well as treatment
- Be able to focus on the topics of relapse prevention and healthy lifestyle

The Background History of Clinical Case Study

Personal data: David is a 37-year-old gentleman. He lives with his parents and his younger brother in a public housing estate. He studied up to university level. He worked as a sales representative in a department store.

Psychiatric diagnoses and prognoses: David was diagnosed with schizophrenia when he was 25 years old. He had a history of psychiatric hospitalization twice in the past. This is his third hospitalization due to poor drug compliance. The relapse of his symptoms included auditory hallucination and persecutory delusions of being harmed by his colleagues.

Occupational therapy interventions: After David's mental state was stabilized after 3 days of hospitalization, he was introduced to occupational therapy program. He was invited to join the TRIP program which was the first time he got in touch with this kind of intervention. In the first two sessions, David revisited the knowledge of his illness and related signs and symptoms. He got a new insight about his recovery pathway during the group discussion with other participants. He started to notice poor sleep was his key early warning sign. He then developed his own relapse prevention plan and established personalized recovery goals to facilitate redesign of his lifestyle in the subsequent two sessions.

Finally, he was discharged after 2 weeks of hospitalization. He revealed a different experience in this admission: insight gained, illness management learned, and action plan developed. He understood regular drug compliance is important for his successful community integration and accepted it as an essential element for him to strive for personal life goals. He was found to pay effort to maintain his action plan active during 3-month and 1-year follow-up.

The Student's Report

The following guiding questions have been identified in developing possible solutions to David. These questions are generated from the available literature references and our clinical experiences:

Questions

1. What are the major definitions and concepts used in this case?
2. What are the important issues and goals when implementing the TRIP program for David?
3. What would be the strategies used in the illness management and relapse prevention?
4. What would be the short- and long-term goals for David?
5. What is the role of the occupational OT in the above process?
6. How did the concepts of illness management incorporate well with the recovery process among people with mental illness?
7. What is the research-based evidence for illness management program (e.g., TRIP program)?

Chapter 36
Psychosocial Intervention in Schizophrenia

Adriana D. B. Vizzotto, Patricia C. Buchain, Jorge Henna Netto and Hélio Elkis

Occupational therapy intervention combined with appropriate medication is associated with improvement in clients' condition. (Buchain et al. 2003)

Abstract The occupational therapy psychosocial intervention (OTPI) approach based on cognitive rehabilitation among clients with schizophrenia is discussed in this chapter. Schizophrenia clients have cognitive impairments in executive functions (Morrice and Delahunty, Schizophr Bull 22:125–137, 1996). This deficit is defined as the "negative syndrome" (Crow 1980) and, in treatment-resistant schizophrenia, the syndrome exhibits a great intensity that influences daily life. For these clients, it is demonstrated that psychopharmacologic treatment combined with psychosocial interventions is more effective than the sole use of psychopharmacologic treatment. This strategy improves cognitive aspects and social functioning and consequently counteracts the deterioration caused by the illness (Huxley et al., J Nerv Ment Dis 188:187–201, 2000). Thus, occupational therapy enables these clients' improvement in executive functions.

Keywords Cognitive rehabilitation · Psychosocial intervention · Schizophrenia

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Background and Definitions

Disease and Symptoms

Schizophrenia is a chronic and incapacitating illness, with cognitive and interpersonal deficits (ICD-10 (International Classification of Diseases) 1992). It is characterized by *positive and negative symptoms*, the latter being the most critical determinant of psychosocial functioning (Pratt et al. 2005). The positive or *productive symptoms* are characterized by delusions, hallucinations, and disorganized thought, and the *negative symptoms* include deficits of normal emotional responses or of other thought processes, blunting affective (lack of emotional reactivity), poor discourse, inability to experience pleasure, lack of desire to form any kind of relationship, and lack of motivation (Crow 1980). Schizophrenia sufferers describe their problems as difficulties to *concentrate on simple tasks* and *executive functioning deficits* (decreased cognitive flexibility, working memory, and planning), affecting every aspect of life (Wykes et al. 1999).

Impairments

The *cognitive impairments* and thought disorder that characterize schizophrenia may interfere with the development and influence of *self-efficacy beliefs*. For example, Brekke et al. (2007) reported that cognitive functioning moderates the relationship between subjective well-being and psychosocial functioning.

Cognitive executive functioning (Baddeley and Della Sala 1996) is closely related to good social and occupational functioning (Green et al. 2000), describing the way information is controlled and processed. These processes are essential in many different situations, such as planning the execution of tasks, making decisions, correcting errors, and responding to new information (Wykes et al. 1999). Clients with schizophrenia do poorly on neuropsychological tests reputed to tap these skills: working memory, cognitive flexibility, and planning (Wykes et al. 2002).

Purpose

The main aim is to assist clients in maximizing their occupational performance within their localized and unique social and cultural environments. The therapy is focused on the continual assessment of each individual's occupational performance and goal negotiation, and on the selection, grading, and adaptation of activities related to self-care, leisure, and productivity (Cook and Howe 2003).

The occupational therapy psychosocial intervention (OTPI) approach is aimed to provide clients with *strategies* that facilitate planning, problem solving, and self-correction when occupations, activities, and work are performed. Successful use of these strategies may be helpful for clients to manage their functional performance and to *facilitate their social involvement* (Katz and Keren 2011).

Method

Candidates for the Intervention

Clients, of either gender, who fulfill the diagnostic criteria for schizophrenia according to the ICD-10 and are between the ages of 18 and 60 years are candidates for OTPI. Inclusion criteria are (a) impairments in cognitive functions, (b) having executive function deficits, (c) social functioning disabilities, and (d) impairment in performances in activities of daily living (ADL).

Epidemiology

In the World Health Organization (WHO) on the global impact of the disease, a prevalence of schizophrenia of 0.92% for men and to 0.9% for women (Murray and Lopez 1996) has been reported. Higher prevalence rates (close to 1%) have also been reported in studies conducted in Latin America and Brazil (Almeida et al. 1992; Vicente et al. 1994). The epidemiologic studies in Brazil estimate that the incidence and prevalence are consistent with those seen in other countries. Studies estimate that approximately 80% of clients with schizophrenia have significant cognitive deficits compared to healthy people, and these deficits may affect up to 98% of the cases considering the premorbid functioning (Fioravanti et al. 2005).

Settings

The OTPI takes place in the occupational therapy department within the Schizophrenia Program and Proerta Treatment Resistant Schizophrenia (PROJESQ) at the Institute of Psychiatry of the Hospital das Clínicas (HCFMUSP), School of Medicine-University of São Paulo (FMUSP), São Paulo, Brazil.

The Role of the Occupational Therapist

Occupational therapists (OTs) have an important role to *teach* individual clients about how to handle and improve ADL. OTs use a wide variety of person-centered deliberate *strategies* that stimulate clients' development or use of interpersonal resources that is directed to desirable occupational performances (Katz and Keren 2011).

OTs are responsible to create a triadic productive relationship, the *therapist–client–activities*, i.e., an environment in which clients experience learning and the possibility of applying their resources, in which a pathologic condition can be transformed into one of creative and structured development, thus enabling clients to deal differently with their limitations and to improve their social interaction (Villares 1998).

The OT's role during the group intervention activities is to facilitate the interpersonal relationship and social interactions between the participating clients.

Results

The OTPI psychosocial intervention includes the following measures applied by a rehabilitation team:

Psychopharmacologic Treatment Combined with Complementary Therapy. Psychopharmacologic treatment reduces psychotic symptoms and prevents relapses. However, it does not have the same convincing effect on cognitive or functional impairments (Penadés et al. 2006). Therefore, psychopharmacologic treatment should be combined with *psychosocial interventions, complementary therapy,* and *occupational therapy* to be considered effective (Buchain et al. 2003; Cook and Howe 2003; Dickerson and Lehman 2006).

Complementary therapy includes:

- *Social skill training* that is a range of techniques founded on operant or social learning theory to enhance social performance, such as instructions, modeling, role-play, reinforcement, corrective feedback, and in vivo exercise using homework assignments (Pfammatter et al. 2006).
- *Psychoeducational teaching with families* includes ensuring that knowledge of the disease meets the expectations of family members and clients so that they may deploy their resources in combating the disease and promoting better family interaction (Anderson et al. 1996).
- *Vocational orientation* is useful in helping clients to develop vocational skills that can exploit their abilities in a supervised, accepting environment. To be useful for independent living, this learning must be generalized to the workplace (Gunatilake et al. 2004).
- *Cognitive behavior therapy* is an empathic and nonthreatening technique, in which clients elaborate their experience of schizophrenia. Specific symptoms are identified as problematic by the client and become targeted for special attention. This work may include, for example, belief modification, focusing/reattribution, and normalizing of psychotic experience (Dickerson and Lehman 2006).

Occupational Therapy

Occupational therapy, as a part of the psychosocial intervention, focuses on *metacognitive training* of *cognitive executive functions* aimed to ameliorate clients' negative symptoms and thus improve clients' psychosocial functioning (Pratt et al. 2005). Overall metacognitive occupational therapy comprises (Cook and Howe 2003):

- Continual assessment of function, skills, and environment
- Collaborative goal setting, treatment planning, and review

- Selection, grading, adaptation, and sequencing of activities
- Adaptation of the social and physical environments, including educational interventions and support for relatives and people at work
- Training and development of skills, education, and rehabilitation

Thus, the occupational goal intervention model (OGI; Katz and Keren 2011) is used for teaching the client how to perform tasks. It originates from the goal management training (GMT; Levine et al. 2000). The OGI focuses on teaching clients strategies of how to execute activities and daily-living tasks efficiently. The execution of each task contains five stages including the following steps: (1) *Stop and think!*, i.e., meaning that the OT orients the task performances to the client and an initial discussion starts about how the client wants to work; (2) *Define the task,* i.e., the client and the OT together make the choice and definition, and set goal(s) for the task performances; (3) *List a goal into sub-goals,* i.e., the steps to achieve the goal is set. The process, steps, and required material is recorded. Reasonable time for the performances is estimated. (4) *Learn steps*. Beforehand, the client explains the steps and how he or she plans to process the performances of the task and then performs it. (5) *Monitor*. The client and OT together check and evaluate the outcome and the process. They compare the outcome with the defined goal. The client responds to: "What kind of problems and difficulties did you meet?" (Katz and Hartman-Maeir 2005; Katz and Keren 2011). All activities that involve them in occupations performed in the social contextual environment are used. Here, clients are involved in social participation through use of daily routines, as an organizing axis (Benetton 1994; Table 36.1). Clients are encouraged to perform daily tasks, to develop constructive tasks (e.g., handcraft), to have contact with each other, and to share performances of various tasks.

This occupational participation gives clients the opportunity to plan, organize, create strategies, increase personal development, experience motivation, and learn how to solve problems (Grieve 1993). The therapeutic use of activities and worktasks involves clients, individually or in a group, in participation in various social roles, performed in contexts such as at home or in the community (Roley et al. 2008). This intervention approach enables clients to engage in meaningful occupations and to cope better with required ADL (Finlay 2004).

Clients' participation in group activities include communication, training in how to behave in a socially desirable way, social interaction among group members, and cognitive training (Finlay 1993).

Evidence-Based Practice

Evidence for the OTPI occupational therapy approaches among clients with schizophrenia-resistant executive functions was proved in a pilot study regarding outcome in ADL. Moreover, the clients participating in goal-directed activities were able to encourage correcting themselves, make decisions, use judgment, and make appropriate choices (Vizzotto 2013). These results have earlier been demonstrated

Table 36.1 Occupational therapy sessions exemplified

Occupational therapy session planning nr____		
Performance of activity	Daily activities	Client-chosen handcraft activity
Performance of tasks	Example is cooking	Example is working with mosaic stones
Analyses of the performance components	Decide the recipe	Learn the task's sequence order
	Organize the ingredients Prepare the food	Organize the physical space and material for task execution
	Organize the table Organize and clean the room	Plan the individual mosaic project (object, color draw, etc.)
Purposes and expected outcome	The client takes: initiative plans and organize the activity relates to other clients social interaction occurs	Organize materials the client takes: initiative plans and organize the activity relates to other clients demonstrates mental flexibility and problem-solving social interaction occurs

in terms of increased occupational performance and interpersonal relationships (Buchain et al. 2003).

There are studies proving the effectiveness for both OGI and GMT. Katz and Keren (2011) showed in a small pilot study (three groups: the OGI, the Frontal Executive Program, and a control group; 18 participants) initial support for the OGI's effectiveness.

For GMT, a study by Krasny-Pacini, Chevignard and Evans (2013) showed greater effectiveness when a combination between GMT and other interventions occurred, such as problem-solving therapy, personal goal setting, and external cueing or prompting in performance of ecological and daily-life training activities.

Discussion

Clinically, there is agreement among mental health professionals about the effects of occupational therapy interventions among schizophrenia clients with executive dysfunction. More evidence-based studies are needed to investigate detailed cognitive areas amenable to modification with such interventions. These studies would be relevant in mental health services once they improve the prospects of rehabilitation for schizophrenia sufferers and can lead to improvement in health costs.

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The Case Study of José

Keywords Instrumental activities of daily life (IADL), rehabilitation, schizophrenia

Introduction

The theme of this case study concerns improvement in IADL, autonomy to restructure his daily life, and being able to engage in new daily activities.

The students' tasks include:

- Finding information about occupational therapist (OT) treatment in schizophrenia
- Definition of cognitive deficits and executive functions
- Cognitive rehabilitation

Overview of the Content

Major goals of the actual intervention are:

1. Improvement of performance in activates of daily life
2. Maximization of independent functioning
3. Maximization of the efficient independent living
4. Improvement of interpersonal relationships

Learning Objectives

By the end of this section, the student should be able to:

- Use a literature review to solve the case study based on cognitive rehabilitation
- Be able to apply clinical reasoning based on the occupational goal intervention (OGI) method in a specific case study and similar clinical situations
- Write a scientific report on a case of cognitive rehabilitation

The Background History of Clinical Case Study

Personal Information José is 50 years old. José is married and lives with his wife and a daughter of 22 years. José has been retired since he became ill. He used to work for many years as an electrician for the telephone company. Currently, he does not perform housework or professional activities and has difficulty getting out of his house.

Medical Information Including Prognoses When José was 24 years old, he was diagnosed with schizophrenia. At that time, he had many positive symptoms (auditory hallucinations and persecutory delusions). Throughout the years, despite drug treatment, he remained with social isolation and gradually abandoned many daily activities as a result of his illness. He was hospitalized three times over the years and has been submitted to cognitive behavioral therapy and social skills training, but no palpable improvement in function or social participation was noted. At present, he maintains medication treatment. He was referred to occupational therapy because his daughter will leave home and he will need to be responsible for tasks at home.

Occupational Therapy Interventions

The cognitive–functional rehabilitation program used with José was based on the "occupational goal intervention" (OGI) developed by Katz and Keren (2011). The improvement of the cognitive aspects, specifically executive functions in order to enable him to occupational performance was the main goal of treatment of José. The proposed tasks were accomplished through the use of the proposed method of OGI stages. José had as objectives in his treatment planning been able to take to himself the responsibilities: do the supermarket to the house, prepare the afternoon snack, and clean his laundry (washing, ironing, and save). The sessions took place respecting the stages of OGI. For example, in relation to tasks related to shopping and snack preparation:

Task 1: Describe your eating routine.
Task 2: Preparation of a food described in the previous step.
Task 3: Preparation of a list of grocery shopping. Grocery shopping. Choose the products (quality and quantity) and perform the payment at the supermarket checkout. Store all products in place.
Task 4: Preparation of the afternoon snack including the organization of the place and preparation of the food with the products purchased on the market.

The Student's Report

The following guiding questions have been identified in developing possible solutions to José:

What are the major concepts and their definitions used in the case?
What cognitive functions are involved in the performance of tasks exemplified?
What are the important issues and goals of the treatment program to choose from José's history and needs?
What is the research-based evidence for the selection of the method that will be used?
Which assessments can contribute to develop the occupational therapy program?

Chapter 37
Intervention in Panic and Anxiety Disorders Through Lifestyle Modification

Rodney A. Lambert

> *… if there are altered sensitivities within body systems … recognition of such sensitivity by both patient and therapist enables remediation through specific lifestyle changes…*
> (Lambert et al. 2008, p. 22)

Abstract Unhealthy habitual lifestyle behaviors add to the burden of local, national, and global health. At least six body systems are known to have altered sensitivity, and are affected by habitual behaviors such as diet, fluid intake, exercise, and habitual lifestyle drug use (e.g., caffeine, nicotine, and alcohol).

Occupational therapists (OTs) work with everyday occupational behaviors that include habitual lifestyle factors. The lifestyle modification intervention (LMI) administered by OTs discussed here centers on occupational form, performance, and synthesis related to supporting patients in modifying habitual lifestyle behaviors that can therefore affect the development, experience, severity, and duration of anxiety symptoms.

Keywords Anxiety · Complexity science · Lifestyle · Occupation · Neuroses panic attacks · Randomized controlled trial · Therapy

Background and Definitions

Introduction For at least the past 40 years, global and national health policies have promoted the health gains achievable through modification of habitual lifestyle behaviors, including increased exercise, smoking cessation, and improved diet, benefit health (Dalle et al. 2013). Unhealthy habitual lifestyle behaviors add to the local, national, and global burden of ill health, and have led to an action plan being put into place by the World Health Organization (WHO Regional Office for Europe

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2012). This is supplemented by evidence of the economic burden from unhealthy lifestyle behaviors in the UK (Scarborough et al. 2011). Smoking, for example, has been characterized as "the world's leading preventable cause of death" (Samet 2013, p. 91), and obesity is considered a global epidemic (Hilton et al. 2012).

Panic attacks are a specific and severe form of anxiety disorder, typified by the sudden onset of overwhelming anxiety that presents with a variety of physical symptoms such as palpitations, shortness of breath, dizziness, and nausea, and may involve fears of "going crazy" or of impending doom or death (American Psychiatric Association 2000).

Clients living with a panic disorder have been shown to have an altered sensitivity in cardiovascular, respiratory, audio-vestibular, musculoskeletal, autoimmune, and gastrointestinal body systems (Lambert and Brown 2007). Although the majority of evidence shows increased sensitivity in these body systems, the mechanisms are still being investigated, and some reduced sensitivities are also possible. Altered sensitivity in these body systems influences responsivity and thereby symptomatic reactions. Examples are increased sensitivity to the anxiogenic effects of caffeine (Vilarim et al. 2011) and immune system sensitivity to environmental exposures (Cooper et al. 2007). A lifestyle review conducted as part of the lifestyle modification intervention (LMI) identifies potential individual sensitivities, which can then be modified through negotiated and monitored behavior and symptomatic change.

The LMI program provided by occupational therapists (OTs) (Lambert et al. 2007, 2010) focuses on (a) *occupational form of habitual lifestyle activities* such as dietary habits, exercise, and sleep behavior, (b) *occupational performance of the habitual lifestyle behaviors,* including clients' choice of either health-enhancing behaviors such as regular exercise or health-damaging behaviors, such as smoking, drinking insufficient fluids, or overconsumption of alcohol or caffeine, and (c) outcome demonstrated in *occupational synthesis,* for example the client's awareness of his/her altered sensitivity affecting his/her mood and sleep quality.

The theoretical frameworks that underpin the LMI are the *Model of Human Occupation* (Kielhofner 2008) and the tripartite structure of *Occupational Form, Performance, and Synthesis* (Nelson 1997).

Purpose

The *purpose* of the LMI is to assist clients experiencing symptoms of suffering from anxiety/panic disorders to identify their specific body system sensitivities, and to encourage modification of potentially detrimental habitual lifestyle behaviors. Through the intervention, they regain control over symptoms, thereby improving their everyday occupational behaviors. The LMI includes assessment, education, and intervention methods for clients to prevent, improve, and regain control over their panic and anxiety symptoms. This approach provides an occupational synthesis through which to improve understanding about the interrelationship between neu-

rophysiological effects and cognitive interpretations related to routine habitual lifestyle behaviors.

Method

Candidates for LMI

The LMI program is intended for adults (16–65 years of age) who have experienced anxiety or panic attacks/disorder at either initial or ongoing stages.

Settings

The LMI has been used so far with individual clients in primary care environments.

Epidemiology

The prevalence of all anxiety disorders in the UK primary care services was estimated at 7.2% (Martin-Merino et al. 2010), and it has been estimated in a systematic sample of 7936 adult primary care patients, that across cultures, the prevalence of anxiety within primary care may be as high as 25.6% (Roca et al. 2009).

The Role of the OT in Applying the LMI

The OT's role in applying the LM intervention is generally (but not exclusively) as a member of a community mental health team, with a specific remit to focus on daily living skills including habitual lifestyle behaviors. The specific focus of the LMI therefore is to:

- Introduce the client to a *lifestyle review* of habitual behaviors through which to identify potential influences on symptoms of anxiety/panic. This is achieved through the use of client diary data.
- Introduce a staged modification of lifestyle behaviors identified as potential risks to anxiety/panic symptoms. The potential risk behaviors are identified through correlating lifestyle behaviors with anxiety/panic symptom severity derived from diary data.
- Monitor and review the effects of the lifestyle modification and its effect on anxiety/panic symptoms. The effects are observed through diary data showing the impact on anxiety/panic symptoms correlated to the lifestyle modification.

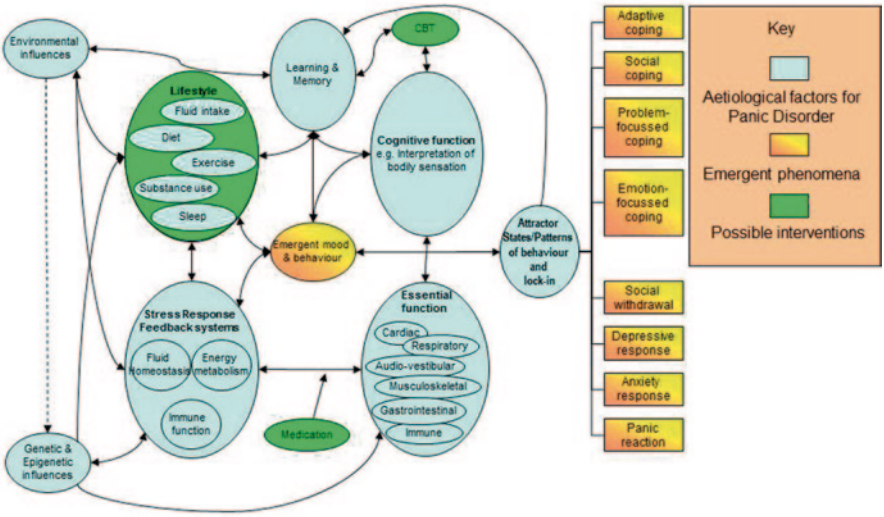

Fig. 37.1 Complex interaction and panic disorder: emergent phenomena and therapeutic implication. (Adapted from Lambert R (2007) Complexity, panic and primary care. In: Bogg J, Geyer R (eds) Complexity science and society. Radcliffe, Oxford, with permission of the copyright holder)

- Establish together with the client, strategies to regain control over their own symptoms through lifestyle modification.

Results

A Brief Guide to Clinical Application

The LMI focuses on improving client's recognition of elements of their habitual lifestyle behavior that potentially increase the risk of adverse anxiety/panic reactions. It then identifies strategies for modifying behavior through which patients regain control over these reactions. The LMI reviews responses in five areas of habitual lifestyle behavior: (a) diet, (b) fluid intake, (c) exercise, (d) habitual lifestyle drug use (caffeine, alcohol, and nicotine), and (e) sleep.

The LMI is based on the observation that likely causes of panic and anxiety are diverse, from genetic predisposition to altered sensitivity in neurotransmitter/receptor density and function and body-system function, and include cognitive and environmental factors.

As suggested by the Medical Research Council (MRC 2008), this diversity of potential interaction between etiologic factors has been used to model the resulting complex system within which patterns of mood and behavior emerge (see Fig. 37.1). This model identifies at which point in the system an intervention can be attempted. For example, medication focuses on the physiologic functions of the body, while

CBT focuses on cognitive interpretation, learning, and memory. The LMI focuses on a different and already internal part of the system, in terms of habitual lifestyle behaviors that influence emergent mood and behavior through the stress-response feedback mechanisms, physiologic function, and cognitive interpretation.

Another point of entry may be through environmental influences such as work or other occupational behaviors. Therefore, through applying the LMI, the OT increases client awareness of individual sensitivities within their physiological system, and considers possible remedial action to regain control over associated symptomatic responses. Lifestyle review increases understanding of how habitual lifestyle behaviors may affect symptoms of anxiety and panic. Through modifying lifestyle behavior and learning how to monitor the outcome of change, clients can learn what actions assist them in regaining control over symptoms and to regain control over their routine occupational behaviors. This places them in a better position to fulfill desired occupational roles and achieve an improved occupational balance.

The LMI provides up to ten intervention sessions over a 16-week period (three 1-h appointments at weekly intervals, three half-hour appointments at weekly intervals, three half-hour appointments at two-weekly intervals, and one 1-h appointment at a monthly interval). The intervention should be delivered in four distinct but largely concurrent stages:

- Lifestyle review using self-report "lifestyle" and "mood and sleep" diaries. The lifestyle diary provides detail of (a) fluid intake including water, caffeinated/decaffeinated, soft, and alcoholic drinks, (b) diet content and pattern, (c) exercise, and (d) smoking. Behaviors are rated by volume at three daily time points (am, pm, and evening). Weekly totals are used to correlate with results from the mood diary. The mood and sleep diary also provides a daily record at the same three time points, for sleep quality, and anxiety ratings based on the potential symptoms of a panic attack, along with a record of situational influences. Correlations between evidence from both diaries are used to identify potential lifestyle behaviors that appear to influence anxiety reactions. It is the *correlations that focus discussion,* rather than firm cut-off values. The diary sheets are given to clients during the first session and they are asked to complete them daily, and these are reviewed in the second and subsequent sessions.
- Education to increase client awareness of the potential negative health effects of some lifestyle behaviors (such as smoking and poor diet) and the health benefits of other lifestyle behaviors (such as sufficient exercise and sufficient fluid intake). The level and amount of information needs to be tailored to each individual client, but it is vitally important that the therapists themselves are familiar with, and regularly update, their own evidence base.
- Specific lifestyle changes (in diet, fluid intake, exercise, habitual lifestyle drug use, or sleep) should be negotiated between the client and the OT. The focus of attention should be guided by the lifestyle review, and changes in the behaviors that appear to represent the highest risk behaviors should be targeted at the earliest stages if possible. The approach should be motivational and positive, discussing how to overcome practicalities and recognizing the fluctuating nature of any lifestyle change program.

- Monitoring and review between therapist and client of the agreed lifestyle changes and any subsequent symptom change. It is vitally important that positive feedback is provided during each session, to recognize not only the impact on symptoms of any changes made but also the effort required to effect and maintain those changes. If lifestyle change in one area has limited impact, then move to the next.
- A final review session is needed after a longer period (of around a month) at the end of the intervention. This reviews progress made during the series of sessions, in both lifestyle behavior change and symptom experience. This also provides an opportunity to consider future changes in areas that have been identified as potential risks, but have not been attempted during the intervention. This again focuses attention onto the patient regaining control.

Evidence-Based Practice

It is important that OTs are familiar with the literature relating to habitual lifestyle behaviors and health. Key works are those associated with *diet* (Benton and Nabb 2003), *fluid intake* (Wilson and Morley 2003), *exercise* (Broman-Fulks et al. 2004), and *habitual lifestyle drug use*, including alcohol (Marquenie et al. 2007), *nicotine* (McLeish et al. 2009), and *caffeine* (Masdrakis et al. 2007). These behaviors should not be considered in isolation; however, as evidence suggests high levels of interaction among these habitual lifestyle behaviors (Poitras and Pyke 2013).

Results from a randomized controlled trial have been published in which the lifestyle intervention was compared with routine general practitioner (GP) care (Lambert et al. 2007). This showed a significant short-term benefit using the Beck Anxiety Inventory (BAI) as the primary outcome measure, assessed at 20 weeks. However, between-group differences were not significant at the 10-month follow-up. The conclusion was that the lifestyle intervention was at least as cost-effective as routine GP care (Lambert et al. 2010). It also produced improved results when compared with a broad range of prescribed medications, including benzodiazepines and selective serotonin reuptake inhibitors or serotonin-specific reuptake inhibitor (SSRI; Lambert 2012). The LMI was equivalent in efficacy to the use of cognitive behavioral therapy (Lambert et al. 2007). This trial has shown that when symptom profiles are similar at baseline, lifestyle review provides a rational explanation for experienced symptoms, along with a strategy for regaining control, that the fear of the previously misinterpreted symptoms reduces dramatically (Lambert et al. 2008).

Discussion

Many interventions in mental health are focused either on a purely neurobiological approach through the use of medication or on mainly cognitive approaches through the use of differing forms of cognitive behavioral therapy, either alone or in com-

bination. The proposed LMI provides the patient with increased awareness of their own specific neurobiological sensitivities and also their physical and cognitive responses. It also provides positive strategies through which the patient can regain control over these. The evidence base is increasingly in support of this focus of intervention. The LMI provides a specific, patient-focused, occupational therapy intervention based on occupational behavior. It has been shown to provide both a clinically effective and cost-effective intervention with evidence of longer-term benefits. There is an ongoing need to evaluate its use with different patient groups (such as psychosis and depression), and in different settings (such as inpatient care) and formats (such as group work). The author would be very happy to work with anyone wishing to develop the work further.

Acknowledgment The main trial results from the wider study were presented at the 33rd North American Primary Care Research Group meeting held in Quebec City on October 15–18, 2005. This research was supported by a National Health Service (NHS) Research and Development (R&D) National Primary Care Researcher Development Award Fellowship (grant RDA99/062) and by a NHS R&D Eastern Region Health Services and Public Health Research Scheme Grant (HSR/0500/1).

I am indebted to the grant-awarding bodies whose financial support made the research possible. The long-term support of the patients, the GP practices, and occupational therapists who participated in the research enabled completion of the research.

Clinical trial registration details: Controlled-trials.com—ISRCTN51562655 http://www.controlled-trials.com/isrctn/search.asp

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The Case Study of Mister C: Change of Lifestyle Influence on Panic Attacks and Outcome

Keywords: Dizziness, lifestyle, panic attacks

Introduction

The theme of this case study concerns the use of the lifestyle modification intervention (LMI) to treat Mr. C's panic disorder/panic attacks.

The students' tasks include: Finding information about:

1. Panic disorder and panic attacks, and to review the evidence and procedure related to the LMI.
2. Information and evidence should be identified that relates to lifestyle behaviors presented by Mr. C, and their potential impact on his mental and physical health.
3. Consider the clinical reasoning for the use of the LMI in the treatment of Mr. C, and also evidence for how to treat his remaining vertigo (see: Tecer et al. 2004).

As a starting point, students should use the following references to gather background information. Important references are:

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Overview of the Content

Major Goals of the Actual Intervention

Learning Objectives

By the end of studying this chapter, the learner will have gained:

- Knowledge of the major symptoms of anxiety and panic attacks/disorder
- Knowledge of the practical use of patient-recorded diary data in clinical reasoning
- An understanding of the role that lifestyle behaviors play in mental health, and specifically in the case of Mr. C
- An appreciation of the relevance of using lifestyle as an intervention which can reduce the risk of misinterpretation of bodily sensations and increase the strategies available to patients to regain control over their own symptoms

The Background History of Clinical Case Study

Personal Information

Mr. C is a 35-year-old male, who is happily married with one child aged 10 years. He is physically active and regularly participates in competitive sport. He runs his own successful company.

Medical Information

Mr. C has panic disorder and has had panic attacks several times a week, and often daily, for more than 3–4 years. He has been taking the selective serotonin reuptake inhibitors or serotonin-specific reuptake inhibitor (SSRI) medication: fluoxetine for 6 months in an attempt to control his anxiety, and has also tried a number of other medications over the previous 3–4 years and also had attended courses of cognitive behavioral therapy (CBT) on two previous occasions.

Occupational Therapy Interventions

Mr. C has high expectations of himself both at work and in his social and home life. He had been described by his GP as a “typical type A personality”. Mr. C participated in a review of his situation, which identified a high caffeine intake (often

including two 2-litre bottles of Coca Cola per day in addition to coffee and tea), moderate alcohol intake, and a diet often high in salt. He identified that particularly his caffeine and alcohol intake tended to increase at times of stress. Mr. C agreed that he should consider reducing his caffeine and alcohol intake, improving his diet, increasing his general fluid intake and reviewing his expectations of himself. Over 3–4 months, he made significant and sustained positive changes in his lifestyle behaviors as agreed. However, while he reported that the panic attacks had stopped, he still had disturbing periods of dizziness and nausea, which had been a feature of his presentation from the start. In discussion with his general practitioner (GP), and in consideration of evidence that "dizziness between panic-attacks may warrant audio-vestibular testing" (Tecer et al. 2004), he was referred to the ear, nose, and throat (ENT) department at the local hospital for investigations. He was found to have vertigo, which was subsequently treated with carbamazepine (Strupp et al. 2013).

If the anxiety symptoms had not been eliminated through the lifestyle changes, it is highly likely that the vertigo would not have been diagnosed and treated.

The Student's Report

The following guiding questions have been identified in developing possible solutions to Mr. C. These questions were generated from the references found in the literature search:

1. What are the main symptoms of panic disorder and panic attacks?
2. What are the main recommended treatments for panic disorder? (See NICE (2007) "Anxiety (amended): Management of anxiety (panic disorder, with or without agoraphobia, and generalised anxiety disorder) in adults in primary, secondary and community care." National Institute for Health and Clinical Excellence, No. NICE Clinical Guideline 22 (amended), London)
3. What is Lifestyle behavior? How do we distinguish between routine lifestyle behaviors that may be open to change and environmental influences that are less likely to change?
4. What evidence is there that lifestyle behaviors may impact on mental health?
5. In what ways can lifestyle behavior be viewed as occupational behavior?
6. How can potential risk behaviors be identified?
7. If risk behaviors are identified, what strategies can be applied to help the patient address them?

Chapter 38
Redesigning Daily Occupations (ReDO™): Facilitating Return to Work Among Women with Stress-Related Disorders

Mona Eklund and Lena-Karin Erlandsson

You got help to formulate goals in private life, as well as for working life. Because they are connected with each other. When I went to X, I felt it was strange just to talk about work. The rest of my life seemed not to exist. In my case, I think it was so much more than just work.[…] You need to get all pieces of the puzzle to fall into place. So, I'm very satisfied. (B)

Abstract There is a scarcity of rehabilitation methods for people with stress-related disorders that are effective in terms of return to work and reducing sick leave. This chapter describes the Redesigning Daily Occupations (ReDO™) program for women with stress-related disorders, the development, its main principles, and primary and secondary outcomes. The ReDO™ program, which addresses people's whole repertoire of everyday occupations, was effective in the primary healthcare context, compared to traditional rehabilitation provided by the Social Insurance Offices. Further research is needed, however, to establish a firm evidence base for the ReDO™ intervention.

Keywords Return to work · Self-esteem · Stress · Women

Background

Work-related stress and its consequences in terms of sick leave and economic losses for the individual and society are of major concern in many western countries (European Foundation for the Improvement of Living and Working Conditions 2007; Lander et al. 2009; Uegaki et al. 2010; Vaez et al. 2007). Absence from work due to stress-related disorders is more common among women, and it has been shown that difficulties in combining domestic duties, care of children, and paid work increase

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the risk for sick leave (Jansen et al. 2006; Sandmark 2009). This means that women's whole life situation, not only their paid work, needs to be considered in work rehabilitation and makes interventions tailored for women an urgent issue.

Definitions and Previous Interventions

Stress is a multifaceted phenomenon, which refers to a variety of states of unpleasantness (Lyon 2000). Since women's stress tends to include the whole life situation (Asberg et al. 2009), general stress was of concern in the Redesigning Daily Occupations (ReDO™) intervention. In line with Cohen et al. (Cohen et al. 1983; Cohen and Williamson 1988), stress was defined as the degree to which a person perceives his/her life as unpredictable, uncontrollable, and overloaded.

A stress-related disorder is generally seen as a minor mental disorder, a vaguely defined but often used diagnosis that also includes mild depression and generalized anxiety (Brouwers et al. 2009). These minor mental disorders are more common among women, and in both western and eastern cultures, female gender tends to be the strongest risk factor (Bener et al. 2012; Lejtzen et al. 2014).

Very few interventions for people with stress-related disorders have shown to be effective with respect to return to work. Cognitive behavioral therapy (CBT) tends to result in positive outcomes such as reduced levels of psychological complaints and work-related stress (van der Klink et al. 2001), but CBT does not seem to have any effects on return to work (de Vente et al. 2008; Stenlund et al. 2009). However, there are a few studies where activity-based interventions have been compared with care as usual or CBT, showing that the activity-based alternatives were more effective (Blonk et al. 2006; Schene et al. 2007; van der Klink et al. 2003). Furthermore, an intervention based on job–person match through patient–supervisor communication was shown to be effective regarding return to work (Karlson et al. 2010).

Purpose

The purpose of the ReDO™ intervention may be expressed on several levels. It aims at facilitating return to work, which is the primary end goal. To accomplish that, a number of individual short-term goals need to be addressed. These are about realizing one's assets and limitations, on a personal as well as environmental level, as well as reaching a better balance between everyday occupations and (re-)entering valuable occupations on the repertoire. By accomplishing such short-term goals, secondary outcomes such as better self-esteem, more satisfying and valued everyday occupations, and a better occupational balance may be reached. Another purpose is that those who have participated in the intervention will be able to analyze their own situations in terms of occupational balance and patterns of everyday occupations, find strategies for how to resolve problematic issues in that respect, and thereby prevent relapse into occupational imbalance.

Method

The ReDO™ intervention is based on occupational therapy and occupational science theory and uses the restoring and therapeutic mechanisms that may be found among everyday occupations. It is a 16-week group-based lifestyle intervention, partly inspired by Lifestyle Redesign® (Jackson et al. 1998) regarding the general outline of the intervention. It focuses on the women's whole repertoire and pattern of everyday occupations, and a crucial initial part of the intervention is to analyze the occupational situation. The current pattern of occupations is scrutinized, as is the woman's history of everyday occupations. Have I lost any of my valuable occupations? How is the balance today between work, relaxation, family duties, social life, etc.? What hassles me and what are my uplifts? What changes would be needed to accomplish a more satisfying and balanced everyday life? What can be done about it? These questions are discussed during the group sessions, which also include exercises to illustrate the women's situation. An example of such an exercise is to draw a rag mat where each stripe signifies a new occupation. A typical "stress mat" would be narrow-striped. Sometimes there are exercises that aim at providing new experiences and an opportunity for the women to enjoy themselves. Other ingredients in the group sessions are lectures about stress and occupational balance. This more detailed content in the ReDO™ intervention, developed by Erlandsson (2013), is inspired by her previous research on the complexity of women's everyday life (Erlandsson and Eklund 2003a, b; Erlandsson et al. 2004).

Participating in the ReDO™ program means repeating a loop of identifying problems and imbalance when in the group, setting personal goals for what one wants to achieve, finding strategies for how to reach the goals, testing the new strategies in real life, evaluating the outcome when in the group again, analyzing what worked well and what needs to be revised, setting new goals, and so on. The group meets twice a week, and during the first 5 weeks, the focus is on everyday life as a whole. The next 5 weeks have a stronger emphasis on work. The last 6 weeks of the program are work practice. The woman's ordinary workplace is the prioritized site for the work practice, but if that is not feasible, another workplace can be arranged. During the 6 weeks of work practice, two booster sessions are held, the last one to also complete the ReDO™ program.

Candidates for the Intervention

People with, or at risk of, stress-related disorders are the target group for the ReDO™ intervention. The focus in this chapter is on women on sick leave for such disorders, and so far, the intervention has been evaluated for outcomes in that group only. However, in clinical practice, it is also used with men. Another lifestyle intervention, also inspired by Lifestyle Redesign® but where the detailed intervention content is based on research on everyday life and occupational needs among people with psychiatric disorders, is currently being implemented for people with severe

mental illness. The principles of lifestyle interventions may be applied and adjusted to fit various target groups who have problems related to occupational balance, and there lies an enormous potential in this.

Epidemiology

Minor mental disorders, which thus include stress-related disorders, are more common among women. A recent Swedish study found an overall 12-month prevalence of 3.2% among women as compared with 1.5% among men (Lejtzen et al. 2014). This is possibly because of women's multiple life roles as being mothers, homemakers, and gainfully employed (Gjerdingen et al. 2000; Nordenmark 2002), but biological causes have been proposed as well, and researchers have identified specific biochemical markers in women at risk of illness because of prolonged psychosocial stress (Asberg et al. 2009).

Settings

The principal current arena for the ReDO™ intervention is the primary health care. The initial idea behind what finally became the ReDO™ intervention was to develop a lifestyle intervention for implementation within occupational health services, however, and it is well suited for that arena as well. There are also plans on using the ReDO™, in adjusted form, for preventive purposes in workplaces. The intended target group will in this case be people at risk of ill health because of the stress.

The Role of the Occupational Therapist

The occupational therapist's (OT) role as a leader of the group intervention program is distinct and important. Preferably, a group of six to eight participants are led by two group leaders in order to ensure that all participants are paid the same amount of attention. OTs applying the ReDO™ intervention work as coaches for self-occupation analysis and for learning about occupations (Erlandsson 2012). The ability to understand one's life situation and its impact on one's health is a prerequisite for being able to take the initiative to make alterations in everyday life. Thus, instead of having the role of an expert in a traditional way, by, for example, giving recommendations for healthy daily occupations, the OTs conducting the ReDO™-group intervention provide participants with tools to explore the complexity in their own patterns of everyday occupations. The OTs are responsible for holding short seminars, arranging practical exercises, providing homework tasks, and leading the subsequent group discussions. The ReDO™ program is described in detail in a manual and the OTs who want to apply the program are requested to

take a short course to achieve the ReDO™ specific theory base before receiving the course material.

Evidence-Based Practice

The ReDO™ intervention has been evaluated in a matched-control study. Forty-two women who participated in the ReDO™ intervention and 42 who received standard rehabilitation via the Social Insurance Offices were assessed before and after a 16-week period of rehabilitation and at two follow-ups, which occurred 6 and 12 months after completed rehabilitation. The evaluation concentrated on the 12-month follow-up and showed that the ReDO™ group had returned to work to a greater extent and had a lower sick-leave rate (Eklund and Erlandsson 2011). They had also improved their self-esteem more and were more satisfied with the rehabilitation received than those who received traditional rehabilitation (Erlandsson and Eklund 2013a, b). Moreover, the women's symptoms of anxiety and depression decreased more in the ReDO™ group (Eklund 2014). Part of the evaluation focused specifically on the time points before and after the intervention period. The ReDO™ group improved more than the comparison group on satisfaction with daily occupations (Eklund and Erlandsson 2014) and on mastery (Eklund and Erlandsson 2014) during that period. A qualitative study of a subgroup of the ReDO™ group indicated that the intervention worked through positive experiences while in the ReDO™ program, in the group, as well as when trying to alter things in their everyday situations. Those experiences triggered an inner process and the women told they went through personal changes and reevaluated their priorities in life. Return to work was facilitated both by the ReDO™ intervention directly and through the inner process and changes the women went through (Wastberg et al. 2013).

Discussion and Conclusion

The ReDO™ program is a fairly new intervention and more research needs to be undertaken before one can say it is an evidence-based intervention. However, the major intervention outline builds upon a lifestyle intervention concept that has previously shown to be effective for improving the quality of life and health among elderly people (Clark et al. 1997), preventing juvenile delinquency (Snyder et al. 1998), and improving the time-use patterns among people with severe mental illness (Edgelow and Krupa 2011). This strengthens the relevance of an intervention such as the ReDO™ program and renders trustworthiness to the positive outcomes obtained so far. Lifestyle interventions may be an avenue for occupational therapy interventions in a variety of contexts and may be used for preventive as well as rehabilitation purposes.

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The Case of Betty: To Become Aware of a Concealed Work Place Problem

Keywords Stress, hassles, control, self-analysis

Introduction

The theme of this case is analyzing the daily occupations of a client diagnosed with severe stress-related disorder. It aims at illustrating how minor routines and habits at a work place may gradually impact negatively on an employee's health and work ability. The case also aims at elucidating strategies that may be used by an occupational therapist (OT) to identify the client's situation and develop an intervention plan focusing on support toward increased health and regained work ability.

The Student Tasks

Exploring possible origins for stress in women's patterns of daily occupations (Erlandsson and Håkansson 2009)
Finding information about an instrument for assessing hassles and uplifts in patterns of daily occupations (Erlandsson and Eklund 2003a, b)
Suggesting individual as well as group-based occupational therapy interventions (Erlandsson 2012, 2013)
Synthesizing the information into a report

Important References As a starting point, students should use the following references to gather background information:

Erlandsson L-K (2012) Coaching for learning—supporting health through self-occupation analysis and revision of daily occupations. WFOT Bull 65:52–56
Erlandsson L-K (2013) The redesigning daily occupations (ReDO™) program: supporting women with stress-related disorders to return to work—knowledge base, structure, and content. Occup Ther Ment Health 29(1):85–101
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Overview of the Content

Major goals of the actual intervention are: (1) identification of origins of hassles as well as uplifts in Betty's life before she developed ill-health, (2) prevention/minimization of experienced hassles at work, (3) increased experiences of uplifting occupations in daily life, and (4) a plan for gradual return to the workplace.

Learning Objectives

By the end of studying this chapter, the learner will:

- Have insights into how to assess hassles and uplifts among everyday occupations
- Be able to identify such hassles that may be targeted in an occupational therapy intervention
- Have ideas about how to use uplifting experience-loaded occupations for intervention
- Write a scientific report that addresses stress management based on coaching and self-analysis, in group or individually.

Background

Personal Information

Betty is the mother of two grown-up sons and she and her husband still live in the house where the boys grew up. The house is now too large for the two of them, but they keep it to have room when the sons with families come to visit. Betty loves their garden and spends a lot of free time there. Since 7 years, Betty has been working as the MD secretary at an engineering company. She works full time and she is much appreciated by her colleagues. She has gradually become the one everyone turns to when needing help—with anything. Just before she turned ill, she worked from 9 am to 6 pm, but she also went to work during the weekends in order to finish the tasks that should have been completed the preceding week. This was due to her never being able to finish her tasks during working hours.

Medical Information

She started to experience various symptoms such as sleeping problems that caused general fatigue and impacted on all her body functions. She had troubles remembering things at work and she had even started to have hard times managing routine tasks at home. One morning, she had a panic attack when she tried to drive to work

and had to go back home. The doctor diagnosed her with stress-related symptoms and minor depression, and put her on the sick list.

Occupational Therapy Intervention

After 3 months, when Betty started to feel better, she was referred to an OT for assessment and intervention aimed at regaining work ability and returning to work. The OT viewed Betty's case as multifaceted, considering her complex pattern of daily occupations, but after listening to Betty's story, she concluded that the therapy should focus on the work situation. The situation that had developed at Betty's work place was most certainly related to her ill-health.

The Student's Report

Questions to be responded to by the students (student's report):

- What makes the OT assume that the main problem is located to Betty's work place?
- What aspects of the work situation are most likely to have caused Betty's gradually increasing feelings of stress?
- What occupational therapy strategies and methods may be used to evaluate the work situation?
- What instruments may be used to explore stress-generating factors at the work place?
- What other aspects may be useful to explore? Please motivate.
- What would be the focus for an occupational therapy intervention?
- What are the pros and cons with an individual versus group intervention in this case?

Chapter 39
Trunk Restraint: Physical Intervention for Improvement of Upper-Limb Motor Impairment and Function

Mindy F. Levin

The physical intervention discussed here is task-related training combined with trunk restraint to limit motor compensation during reaching-and-grasping training.

Abstract Children and adults with hemiparesis use excessive trunk movement to compensate for limitations in arm movement during reaching activities. Reaching and grasping with physical limitation (trunk restraint) of or feedback about excessive trunk movements leads to improvements in the quality of arm motor patterns (shoulder and elbow range, endpoint trajectory), reduction of excessive trunk movement, and decreased upper-limb impairment. In children, the intervention consists of task-oriented upper-limb therapy performed while movements of the trunk are limited by strapping the trunk to the back of a chair. The trunk restraint limits forward and lateral trunk displacement and rotation but allows scapular movement.

Keywords Cerebral palsy · Exercise movement techniques · Rehabilitation · Recovery · Stroke

Background

The Theoretical Framework of the Intervention

Task-related training (Carr and Shepherd 2000) delivered at the same time as trunk restraint (Michaelsen and Levin 2004; Michaelsen et al. 2001, 2006; Schneiberg et al. 2010; Thielman et al. 2008; Wu et al. 2012a, b) combines physical restraint of trunk movement (flexion and rotation) with repetitive meaningful unimanual and

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bimanual reaching and grasping tasks using objects of different sizes, weights, and shapes (task-related training).

Definitions and Historical Development

Functional gains may be accompanied by increased compensatory movements of the trunk (anterior/lateral displacement and rotation) to compensate for arm motor impairments (Levin et al. 2002). Practice of a movement without restriction of trunk motor compensations or feedback of motor performance may lead to increased motor compensation (Cirstea and Levin 2000; Michaelsen et al. 2006). When motor compensation occurs during movement production, the central nervous system receives nonoptimal sensory information from the trunk and limb (Adkins et al. 2006). This could interfere with the recovery of premorbid movement patterns, as has been suggested for the control of posture (Nashner et al. 1983) and precision grasping (Eliasson et al. 1992, 1995; Gordon and Duff 1999). Restraint of trunk movement during performance of upper-limb activities combined with task-specific upper-limb training in adults (Michaelsen and Levin 2004; Michaelsen et al. 2006) and in children (Schneiberg et al. 2010) or constraint-induced therapy in adults (Wu et al. 2012a; b) improves functional outcomes more than unrestrained upper-limb training (for review see Wee et al. 2014). By restraining the excessive movements of the trunk during reaching and grasping training, more relevant somatosensory input from the arm joints can be provided and used to modulate the reaching pattern. This can be achieved by increasing the intensity of the afferent input (Hadders-Algra et al. 1999) or by increasing the frequency of exposure to task-appropriate somatosensory information.

Purpose

The purpose of the application of trunk restraint during the practice of upper-limb tasks is to improve arm motor function by providing more appropriate, afferent information to the central nervous system from the affected arm to facilitate the reappearance of more efficient trunk and arm movement patterns.

Method

Candidates for the Intervention

Trunk-restraint therapy is intended to remediate upper-limb motor control dysfunctions including body structures (World Health Organization 2007).

The technique is indicated for adults or children with moderate-to-severe hemiparesis who use excessive compensatory trunk movement when attempting to reach and grasp objects. Diagnoses include cerebral palsy, hemiplegia, quadriplegia, and stroke.

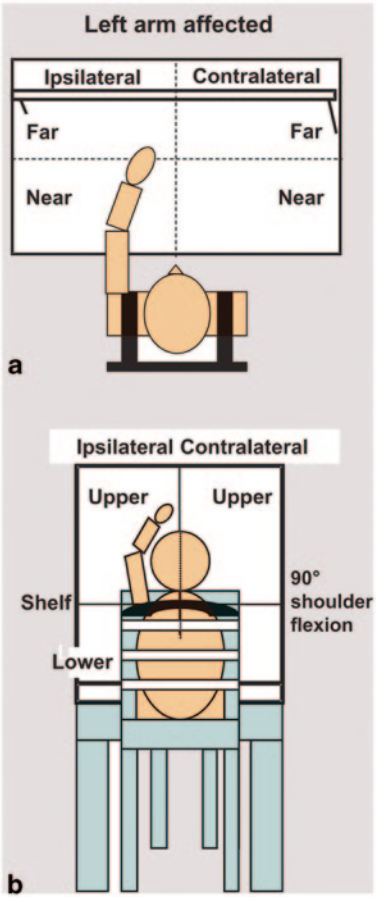

Fig. 39.1 Illustration of how the arm workspace can be divided into quadrants so that activities of the left upper limb can be practiced. The objective of trunk-restraint therapy is to "force" the child to extend their elbow and shoulder far from the body by performing activities in the far (**a**) and upper (**b**) ipsilateral and contralateral arm workspace, while restricting the compensatory movement of the trunk with a harness or strap

Settings

The technique may be used in rehabilitation healthcare settings or in home-exercise programs.

The Role of the Occupational Therapist in Applying the Intervention

The occupational therapist (OT) develops a training program consisting of unimanual and bimanual upper-limb and hand activities in the workspace of the arm. The workspace is defined by the length of the arm and is divided into four basic quadrants (Fig. 39.1): ipsilateral, contralateral, near field (proximal half of arm's length), and far field (distal half of arm's length). The length of the arm is defined as the distance between the medial border of the axilla and the fingertips of the

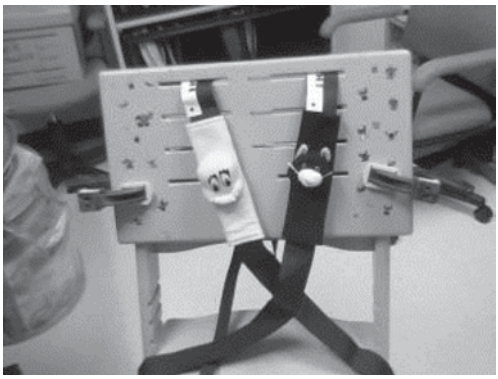

Fig. 39.2 Example of a trunk-restraint system used for children with cerebral palsy. Child-friendly straps are attached diagonally across the shoulder and hip bilaterally to the back of the chair

outstretched hand for pointing activities, or the distance between the medial border of the axilla and the wrist crease for activities involving grasping. However, since trunk compensation is most likely to be greater when objects to be manipulated are placed further from the body, most of the activities should be done in the far workspace. The range of the activities should be varied and should include different combinations of wrist, elbow, and shoulder-joint movements. The number of repetitions should be high and the activities should be challenging to drive plastic changes in the nervous system (Kleim and Jones 2008; Kwakkel 2006; Shepherd 2001).

Results

Clinical Application

Fundamental Principles for Clinical Use

When motor compensations occur during movement production, the central nervous system receives nonoptimal sensory information from the trunk and limb (Adkins et al. 2006) which could interfere with the recovery of premorbid movement patterns.

A Brief Guide to Clinical Practice

The technique is most effective in clients with moderate-to-severe hemiparesis who use more trunk compensation than those who have mild hemiparesis (Michaelsen et al. 2006; Thielman et al. 2004). Trunk anterior displacement and rotation are restricted by a harness (de Oliveira et al. 2007) or two 3–4-inch-wide straps diagonally across the trunk from the right shoulder to the left hip and from the left shoulder to the right hip (Michaelsen and Levin 2004; Michaelsen et al. 2006; Fig. 39.2). Straps

can be secured around the body to a high-backed chair with buckles or Velcro closures. For adults, the straps should be applied so that no more than 2 cm of trunk anterior displacement in the sagittal plane and no more than 5° of trunk rotation are permitted while shoulder girdle movement is relatively unrestricted. If trunk restraint is used in children with cerebral palsy, up to 5 cm of trunk movement should be permitted depending on the age of the child (Schneiberg et al. 2002, 2010).

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Permitting the use of motor compensations could lead to a pattern of learned nonuse (Alaverdashvili and Whishaw 2010, 2013; Allred et al. 2005; Taub et al. 1993), limiting the capacity for subsequent gains in motor function of the paretic arm. Interventions that include the restriction of trunk motor compensations by physical trunk restraint may encourage the nervous system to find new motor solutions to task accomplishment and to overcome learned nonuse. These motor solutions may be more effective in improving upper-limb function through the emergence of new motor patterns. Improvement in upper-limb function will decrease activity limitations and social participation restrictions.

Evidence-Based Practice

Trunk-restraint therapy is beneficial for motor recovery in adults (16–80 years of age) with chronic acquired brain damage (stroke) leading to disrupted motor control of the trunk and arms. Beneficial effects have also been demonstrated in children with cerebral palsy for both improvement in motor function (Schneiberg et al. 2010) and motor learning (Robert et al. 2013). The principles should be equally applicable to individuals with other types of acquired brain damage such as traumatic brain injury, and to children with other developmental motor disorders.

Trunk restraint combined with task-related training improved arm motor function in adults with stroke in six high-quality randomized control studies (Michaelsen and Levin 2004; Michaelsen et al. 2006; Woodbury et al. 2009; Thielman 2010; Wu et al. 2012a, b), in one pre- and postdesign study (de Oliveira et al. 2007) and in one high-quality randomized control trial in children with cerebral palsy (Schneiberg et al. 2010). Michaelsen et al. (2006) compared arm motor impairment and function in clients with stroke practicing task-related training with ($n=15$) or without trunk restraint ($n=15$). Clients in the trunk-restraint group made greater improvements in motor function than those in the control group. Improvements were accompanied by increased active joint range and were greater in clients with greater initial severity of hemiparesis. In these clients, task-related training with trunk restraint led to less trunk movement and increased elbow extension during reaching, while clients in the control group increased compensatory trunk movement. In addition, changes in arm functions were correlated with changes in arm and trunk kinematics in the

trunk-restraint group. Schneiberg et al. (2010) compared task-oriented training with and without trunk restraint in 12 children with cerebral palsy in a prospective single-subject randomized control trial. Each group received a total of 15 h of training. Some children in each group improved arm trajectory smoothness and elbow extension range. However, more children in the trunk-restraint group reduced their excessive trunk displacement after training and retained the improvements longer.

Discussion

Further research is needed to identify the effectiveness of trunk restraint during task-related training of the upper limb in larger groups of children with cerebral palsy and in children with different motor control deficits. The effectiveness of combining the approach with other approaches or as an element in shaping arm movement during constraint-induced therapy has not yet been evaluated in children.

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Clinical Case Study of Jason: Quality of Unimanual Arm Function in Child with Cerebral Palsy

Keywords: Grasping, motor compensations, reaching, recovery, training, upper limb

Introduction

The theme of this case study concerns the development of a treatment approach to improve arm and hand function in child with hemiplegic cerebral palsy.

The student's task includes:

1. To recommend an occupational therapy intervention and provide a rationale for its use
2. To summarize the evidence for the effectiveness of the intervention

As a starting point, students should use the following references to gather background information.

For a description of the Content and Clinical Application of the Intervention

- Michaelsen SM, Dannenbaum R, Levin MF (2006) Task-specific training with trunk restraint on arm recovery in stroke: randomized control trial. Stroke 37:186–192
- Schneiberg S, McKinley P, Sviestrup H, Gisel E, Mayo NE, Levin MF (2010) The effectiveness of task-oriented intervention and trunk restraint on upper limb movement quality in children with cerebral palsy. Dev Med Child Neurol 52:e245–e253

For Fundamental Concepts on Which the Intervention Is Based

- Cirstea MC, Levin MF (2000) Compensatory strategies for reaching in stroke. Brain 123:940–953
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Overview of the Content

Aim: To choose an occupational therapy (OT) intervention that will facilitate the learning and reinforcement of optimal movement patterns of the upper limb for unimanual reaching and grasping tasks.

Background History of Clinical Case Study

Personal Data Jason is a boy, aged 5 years 6 months. He is attending a specialized school because of his mobility impairment but his academic performance is equivalent to typically developing children of his age. He enjoys music and playing with friends.

Medical Diagnosis and Function Jason was born from a normal pregnancy. At 2.2 months, his parents noticed that he used his left hand less than his right hand and by 10 months of age, a diagnosis of left-sided hemiparesis due to antenatal stroke was confirmed with CT scan. The specific diagnosis is a left hemispheric atrophy with parietal encephalomalacia suggesting a left middle cerebral artery stroke. He has moderate spasticity in the flexor muscles in the left upper limb and the arm tends to adopt a flexor synergy with the hand closed and the thumb adducted at rest or on exertion. Active elbow and shoulder joint ranges are moderately reduced as is the range of active finger flexion with the wrist extended. When he tries to reach his left arm forward, he leans the trunk forward. However, when his left arm is supported by the therapist, it is possible for him to actively extend his elbow and flex his shoulder over a greater range than that which he can produce himself when reaching unassisted. Functionally, he can eat independently using his fingers or a spoon placed in the right hand and can drink from a glass using both hands. He can use his left hand to manipulate objects if required but movements are not coordinated and he has difficulty grasping and releasing objects.

The reason of seeking occupational therapy consultation was to improve the use of the left arm during play and activities of daily living.

Occupational Therapy Intervention

Practice of upper-limb movements in different parts of the arm workspace while wearing a trunk-restraint system should be offered during play activities and during therapy sessions. It is recommended to practice for 1–2 h per day in therapeutic/play situations. Play situations can include interaction with video games that encourage full arm movements such as IREX, Sony Eye-Toy, Wii, Nintendo, etc. For therapist-supervised activities, movements of the arm should be encouraged in which the arm is extended far from the body, into the ipsilateral and contralateral workspace, both below and above shoulder level (see Figs. 39.1 and 39.2). Bimanual activities should also be included.

Questions for Students

1. Which occupational therapy intervention is recommended and why?
2. What is the evidence for the effectiveness of the intervention in this population and age group?
3. What alternative occupational therapy interventions are available?
4. What is the role of the occupational versus the physical therapist for this intervention?

Chapter 40
Constraint-Induced Movement Therapy for Restoration of Upper-Limb Function: Introduction

Mary H. Bowman, Victor W. Mark and Edward Taub

Before starting Constraint-Induced Movement Therapy, it was hard to remember to use my weaker hand for everyday things, but now I just use it without having to think about it.
Client

Abstract Constraint-induced movement therapy (CIMT) is a research-originated, behavioral approach to neurorehabilitation of limb function after neurologic damage. The intervention utilizes a combination of motor training elements and psychological concepts to facilitate increased use of the affected limb as well as improved movement quality and control. Importantly, CIMT is designed to achieve real-world improvements by behavioral methods, which facilitate the incorporation of regained abilities into the person's spontaneous behavior. CIMT is composed of four primary elements: (1) repetitive, unilateral training procedures; (2) training by the behavioral technique termed shaping; (3) a set of behavioral techniques, termed the "transfer package," that promote transfer of therapeutic gains to the life situation; and (4) constraining use of the more-affected hand by one of several techniques including restraint of the less-affected hand, discouragement for exclusive reliance on the less-affected hand for unimanual and bimanual tasks, and purposeful design of the CIMT treatment activities to encourage use of the more-affected hand. Evidence shows that CIMT improves the functional use and occupational

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performance of the more-affected upper extremity by reversing learned nonuse and facilitating use-dependent brain plasticity.

Keywords Motor skills · Neuronal plasticity · Rehabilitation · Stroke

Definition and Background

Constraint-induced movement therapy (CIMT; Taub et al. 1993) improves the functional use of the more-affected arm after neurological injury by overcoming learned nonuse and facilitating use-dependent cortical reorganization. It is an intervention based on a behavioral neurorehabilitation model employed with individuals following central nervous system damage (e.g., stroke, traumatic brain injury; TBI). Basic neuroscience studies with monkeys (Taub 1977, 1980) preceded studies with humans for CIMT, and laid the foundation both for discovering the existence of *learned nonuse* as a mechanism contributing importantly to the deficit in monkeys with single deafferented forelimbs, and for providing methods to overcome it (Taub et al. 2006a). This phenomenon is found in humans as well after neurologic insult, so that the individual has reduced use of the limb despite motor capability for occupational performance (Taub et al. 1993, 1999). The efficacy of CIMT is considered to be based on two independent but linked mechanisms (Taub et al. 2006a): (1) practice-based counterconditioning of learned nonuse and (2) use-dependent plastic brain reorganization.

Purpose

CIMT has been shown to enhance a client's occupational performance through improved motor ability and remediation of symptoms of learned nonuse. Used both in rehabilitation and habilitation of the more-affected arm, CIMT has been shown to significantly change not only the more-affected arm use and motor ability but also brain function and structure, as demonstrated by neuroimaging (Gauthier et al. 2008, 2009; Liepert et al. 2000; Rickards et al. 2012, 2013; Sterling et al. 2013).

Method

Candidates for the Intervention

Because the clinical practice of CIMT is derived from a research foundation that continues to expand, the principles and procedures of CIMT will likely continue to be revised and refined. The amount of impairment of candidates has been classified in CIMT research by using active range of motion (AROM) of the upper extremity

Table 40.1 UAB CIMT research group classification of severity of upper extremity impairment based on active range of motion for adults with hemiparesis

Classification	Shoulder	Elbow	Wrist	Fingers	Thumb
Grade 2 (mild to moderate limitation) MAL < 2.5 for AS and HW scale	Flexion and abduction ≥ 45°	Extension ≥ 20° from a 90° flexed starting position	Extension ≥ 20° from a flexed starting position	Extension of all MCP and IP (either PIP or DIP) joints ≥ 10° from a flexed starting position; may be assessed by attempting to pick up and drop the tennis ball	Extension or abduction of thumb ≥ 10° from a flexed starting position
Grade 3 (*moderate limitation*) MAL < 2.5 for AS and HW scale	Flexion and abduction ≥ 45°	Extension ≥ 20° from a 90° flexed starting position	Extension ≥ 10° from a flexed starting position	Extension of MCP and IP (either PIP or DIP) joints of *at least* two fingers ≥ 10° from a flexed starting position; may be assessed by attempting to pick up and drop a washcloth	Extension or abduction of thumb ≥ 10° from a flexed starting position
Grade 4 (*moderately severe limitation*) G4/5 MAL < 2.5 for AS and HW scale	Flexion and Abduction ≥ 45°	Extension ≥ 20° from a 90° flexed starting position	Extension ≥ 10° from a flexed starting position	Extension of at least two fingers > 0° and < 10° from a flexed starting position; may be assessed by attempting to pick up and drop a washcloth	Extension or abduction of thumb ≥ 10° from a flexed starting position
Grade 5 (*severe limitation*) G4/5 MAL < 2.5 for AS and HW scale					
Subclass A					
	Flexion, abduction, or scaption ≥ 30°	Initiation of extension and flexion at the elbow	Must be able to either initiate extension of the wrist or initiate extension of any digit		
Subclass B					
	Flexion, abduction, or scaption ≥ 30°	Extension ≥ 20° from a 90° flexed starting position	No active movement required for the wrist, fingers, or thumb		

For classification in this system, individuals with hemiparesis are assessed by the therapist to determine the amount of AROM at each joint of the more-affected UE. Each joint movement must meet minimal AROM requirements and be performed three times in a minute in order to meet the criteria for a specific grade. Classification of UE movement of an individual also depends on deficit of use of the more-affected UE as determined by the MAL or G4/5 MAL mean score. Individuals that meet the criteria for grade 2 movement, but score higher than a 2.5 mean on the MAL, would be determined to have grade 1 UE movement. Individuals who are unable to meet the minimal movement requirements for either subclass of grade 5 movement would be classified as grade 6

(UE) as a primary criterion (Bowman et al. 2006; Taub et al. 1993, 1999). Early CIMT research had recruited participants with only mild-to-moderate (grade 2; see Table 40.1) stroke deficits (Taub et al. 1993, 1999, 2006b). The research then progressed to treating clients with moderate or moderately severe (grade 3 and 4) UE impairment (Taub et al. 1999). More recently, work has been carried out with stroke clients with plegic or nearly plegic hands (grade 5) using an expanded version of CIMT (eCIMT) that combines selected neurorehabilitation procedures with all of the components of CIMT (Bowman et al. 2006; Taub et al. 2012).

The original CIMT protocol has also been modified and extended to individuals with TBI (Shaw et al. 2005); multiple sclerosis (Mark et al. 2008); focal hand dystonia (Candia et al. 1999); lower extremity paresis following stroke, spinal cord injury, and multiple sclerosis (Taub et al. 1999; Mark et al. 2013); aphasia (CIAT and CIAT II; Johnson et al. 2013; Pulvermüller et al. 2001; Taub 2002); or cerebral palsy (pediatric CIMT;Taub et al. 2004, 2007, 2011).

In addition to the UE AROM criteria, selection of research participants has taken into consideration postural balance, cognitive integrity, presence of pain that might interfere with administration of the therapy, and illness chronicity, to ensure homogeneous populations. However, in clinical practice, greater flexibility may be appropriate to treat clients with learned nonuse (Mark and Taub 2004).

Stroke chronicity of>1 year was used for most research studies, but preliminary evidence suggests that clients in the acute to subacute phases may also benefit (Nij-land et al. 2011; Wolf et al. 2006)

The use of the AROM criteria assists the therapist with selecting the appropriate CIMT protocol. Clients with mild or moderate UE paresis are usually treated for 3.5 h/day for 10 consecutive weekdays, while clients with more severe UEs paresis are usually treated 3.5 h/day for 15 consecutive weekdays (Mark and Taub 2004).

Epidemiology

The prevalence of stroke-associated disability in the general population has been reported to range from 173 to 200 per 100,000 (SASPI Project Team 2004), while the estimated proportion of stroke survivors who are dependent in their activities of daily living (ADL) ranges from 30 to 50% (Carroll 1962; Gresham et al. 1975).

Seventy percent of chronic stroke survivors are estimated to have motor deficit (Anderson et al. 2004). Studies have not yet determined what proportion of adult stroke clients with an acute hemiparesis in a subacute or chronic stage will meet inclusion criteria for CIMT.

In a prospective study, 41 out of 87 people suffering from a stroke had moderate-to-severe hemiparesis in the acute phase of recovery (Prabhakaran et al. 2008). The great majority of these 41 clients (83%) recovered to at least 70% of the maximum motor gain possible by 3 months after stroke onset. Another longitudinal study found that of stroke patients presenting with acute hand impairment, 65% remained impaired by 18 months poststroke onset, including 43% with at least mild–moderate

difficulty (Welmer et al. 2008). Together, these findings suggest that an appreciable number of acutely hemiparetic stroke clients eventually regain substantial movement ability that would appear adequate for training tasks. However, further research is needed to determine what proportion of stroke patients in the subacute or chronic stage have persistent learned nonuse and motor deficits of the paretic UE, and therefore would be recommended to undergo CIMT.

Individuals with diagnoses other than stroke, such as TBI, cerebral palsy, and multiple sclerosis, who meet the AROM criteria, may also be appropriate for CIMT.

Settings

Research, to date, indicates that CIMT is well suited for implementation among outpatient and in-home health settings. Studies have suggested that CIMT in an acute inpatient rehabilitation setting may be efficacious (Nijland et al. 2011).

The Role of the Occupational Therapist

CIMT may be conducted by an occupational therapist (OT) or a physiotherapist (PT). The role of the therapist in CIMT is to ensure the integrity of the standard intervention while focusing on the unique needs and goals of each client. The OT may be required to adopt a variety of roles, including evaluator, tester, trainer, coach, problem solver, and encourager. Therapists must employ therapeutic skills in observation, listening, problem solving, behavioral management, task analysis, strategy development, safety awareness, and risk assessment, especially with regard to appropriate mitt use. Splinting, adaptive equipment selection, adaptive strategy development, and other interventions are also employed with clients during CIMT.

In the clinical application of CIMT for clients with different grades of motor deficit severity, it is imperative to replicate the procedures that were used in the research protocols for that grade of motor deficit. Employing a treatment protocol, designed for a patient with grade 2 or mild–moderate deficit, with a client who does not meet the minimal movement requirements for the grade 2 protocol, may lead to poor results as well as frustration on the part of both the therapist and the clients. Therapists also need to recognize the importance of close adherence to all four of the components of the CIMT protocols in order to achieve the best results with clients as measured by the Motor Activity Log (MAL; Uswatte et al. 2006b). If the MAL is not selected by the treating therapist, as at least one of their outcome measures for CIMT, then the therapist must realize that the central construct addressed in CIMT consisting of real-world use of the more-affected UE is not being determined. CIMT protocols always need to have a measure of real-world use, as an outcome measure like the MAL; otherwise, measurement of the outcome of this behavioral approach to rehabilitation of the more-affected arm will not assess the most important aspect of its treatment effect.

Fig. 40.1 An example of administering two of the four components of CIMT known as shaping with a client who had suffered from a stroke. The mitt on the less-affected hand reminds the client to use only the more-affected hand for each task and greatly reduces the ability to use that extremity

It should be noted that many procedures in CIMT are not typically employed in conventional rehabilitation. In our experience, therapists have often voiced their unfamiliarity with the types of procedures utilized in CIMT, particularly with the techniques of the transfer package. It is important that therapists who plan to implement CIMT should first be adequately trained.

At the University of Alabama at Birmingham, CIMT training consists of a semi-annual 5-day continuing education course that includes 2 days of a hands-on lab practicum accompanied by a feedback on performance of procedures to ensure proper administration of the CIMT treatment.

Results

Clinical Application

CIMT consists of four main components:

- Repetitive, functionally relevant, and task-oriented training of the more-impaired limb.
- Training by the behavioral technique termed shaping.
- Employment of a set of behavioral techniques known as the *transfer package* that are designed to facilitate carryover of gains made in the research laboratory or clinic to the generalized life situation.
- Procedures to constrain use of the more-affected extremity, including physical restraint of the less-affected arm (Taub et al. 1993; Uswatte et al. 2006a, Fig. 40.1).

Shaping (Taub et al. 1993, 1994), one of the primary training technique employed, is a systematic behavioral procedure whereby progress is achieved in small steps by successive approximations throughout multiple trials that use frequent detailed

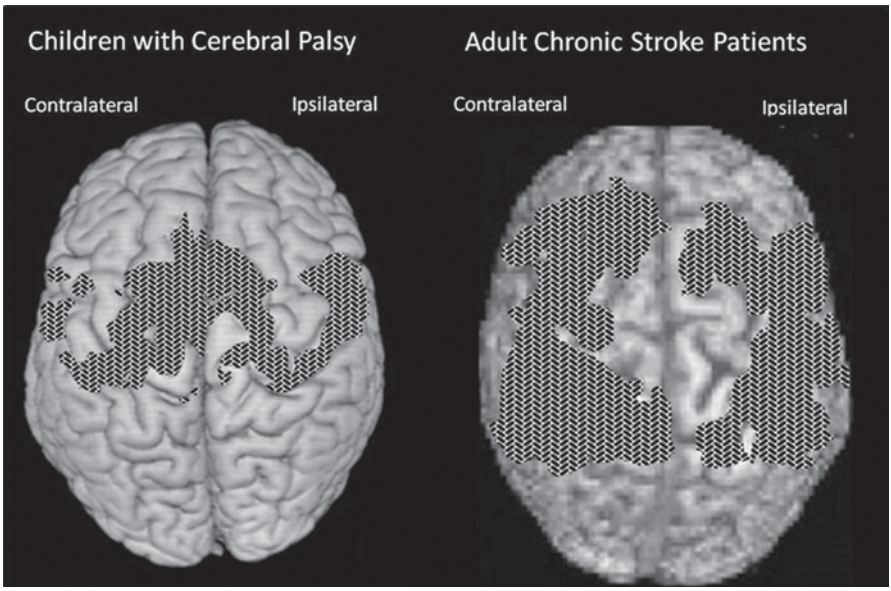

Fig. 40.2 Cortical surface-rendered image showing an increase in grey matter after CIMT using voxel-based morphometry (VBM)

feedback and encouragement. With adults, the shaping process is usually broken up into blocks of ten trials each, and the repetitions of the task are timed or the number of repetitions completed in a set timed period (e.g., 30 s). The data from each trial are recorded and reported immediately to the client. Progression of the shaping task requires consistent improvement in the previous performance.

The *transfer package* (Taub et al. 2006a, 2013) utilizes selected behavioral techniques: home diary, behavioral contract, home skill assignment, daily administration of the MAL (Uswatte et al. 2006b), problem solving, and maintenance of a daily schedule. In the transfer package, protocol adherence is bolstered by maximizing client accountability, engaging the client in problem solving, and prompting the client to use the more-affected limb during occupational performance. The transfer package makes compliance with the CIMT protocol the responsibility of the client; therefore, the functional achievements are his own.

A signature feature of CIMT protocols is the use of a padded safety mitt on the less-affected hand as a physical restraint. The mitt is worn for a target of 90% of waking hours during the therapy period and is removed during personal hygiene and where safety might be compromised through its use. Mitt use is only one way of constraining the adult client's behavior to increase the use of the more-affected UE and is not the most important feature (Uswatte et al. 2006a).

Recent research findings in this laboratory indicate that in randomized controlled trials, the more significant component in adult CIMT is the use of *the transfer package*. (Gauthier et al. 2008; Taub et al. 2013) The largest gains in use of the more-affected UE in the life situation and in structural brain change were found when participants received all of the components of the CIMT including the transfer pack-

age (Fig. 40.2). Images are groups of (a) children with hemiparetic cerebral palsy and (b) adults with chronic stroke. Grey matter increases are displayed on a standard brain. Surface rendering was performed with a depth of 20 mm. Cross-hatched areas indicatestatistics ranging from 2.0 to 6.7. Corrected for family-wise error. (Reprinted with permission from Neurologie & Rehabilitation 2013; 19: 161–175)

Two outcome measures with established reliability and validity have been consistently used with CIMT research:

- The MAL (Taub et al. 1993; Uswatte et al. 2006b), a structured, scripted interview that measures the amount and quality of spontaneous arm use during ADL in the real world. The MAL is a necessary outcome measure for providing CIMT.
- The Wolf Motor Function Test (WMFT; Morris et al. 2001; Wolf et al. 2001, 2005), which is a standard laboratory test of motor ability. The WMFT is not required when providing CIMT in clinical practice (Mark and Taub 2004).

How the Intervention Addresses Impairments, Activity Limitations, and Participation Restrictions

After CIMT, motor impairments of the more-affected UE show positive changes, in a large majority of cases, and the client is better able to engage the limb in occupational performance both inside and outside of the clinical setting. In addition to the motor and functional use gains, evidence has shown that clients report quality of life improvements that are sustained for at least 2 years after undergoing CIMT (Wolf et al. 2008).

Evidence-Based Practice

CIMT is an evidence-based approach that is grounded in a strong empirical foundation that has been evolving over the last two-and-a-half decades. Randomized controlled trials (RCTs) have been published with positive results (Shaw et al. 2005; Taub et al. 1993, 1999, 2004, 2006b, 2007). The Extremity Constraint Induced Therapy Evaluation (EXCITE) trial (Wolf et al. 2006, 2008), a large, multisite RCT of CIMT for the UE after stroke, was the first of its kind for rehabilitation of the UE in the USA. Additional evidence continues to emerge from around the world, with over 450 studies published that have examined CIMT; all but two yielding to our knowledge successful findings.

Discussion

The CIMT model brings with it engaging concepts and challenging principles that offer new perspectives and opportunities for rehabilitation. As this model has been disseminated, criticisms of CIMT have been voiced, including concerns with safety, questions about the distinctiveness of the intervention, concerns for the acceptability of CIMT to clients, and reimbursement issues. Mark and Taub (2004) discuss these issues in detail.

As health-care costs rise in today's society, rehabilitation treatments will likely continue to be scrutinized and studied to determine optimal practices that yield the best functional outcomes while maximizing cost-effectiveness. As described above, CIMT is a rehabilitation approach that is founded on empirical data with proven outcomes and evidence that continues to mount. Refinement of CIMT protocols has reduced the cost of therapy delivery by the reduction of the number of hours per weekday required for implementation of the treatment with no compromise of functional outcomes (i.e., 6 h/weekday were once required but now 3.5 h yield the similar result). Automated forms of CIMT have also been successfully studied to reduce the cost of administration of shaping by a therapist, which may allow the therapist to work with more than one client at a time (Taub et al. 2005). Further research has been carried out using a tele-rehabilitation approach to CIMT where a device is placed in a client's home and treatment is carried out remotely by a therapist. In this delivery of treatment, ongoing biometric parameters are monitored by the therapist as the client performs shaping tasks. Also, the therapist has the ability to have constant interaction by an audio–visual link as needed with a client and is able to interface with the client to perform the transfer package components of the intervention. (Brennan et al. 2011; Taub et al. 2005)

Future studies should more closely examine the factors responsible for the therapeutic effect of CIMT, as well as attempt continued extension of CIMT to new populations of clients who display learned nonuse of the affected arm. Studies that combine pharmacological and brain stimulation modalities and traditional neurorehabilitative interventions with CIMT to maximize gains for lower-functioning clients are also needed.

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The Case Study of Mrs. W

Keywords Motor skills, neuronal plasticity, rehabilitation, stroke

Introduction The theme of this case study is the use of constraint-induced movement therapy (CIMT) for upper extremity (UE) rehabilitation of an adult following stroke.

To better understand this case study we recommend review of the following key references:

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Overview of Content

The major goal of UE CIMT is to enable patients to make substantial gains in real-world spontaneous use of the more-affected arm and hand. This is achieved primarily by overcoming learned nonuse of the more-affected UE, but improvements in quality of movement also occur.

Background of the Clinical Case Study

Personal Information Mrs. W is a 53-year-old African-American right-hand dominant woman. She is a high-school graduate and worked as a housekeeper prior to her stroke. She is divorced and lives in her own home where she is independent with her activities of daily living (ADLs).

Medical and Disability Status She is status post right cerebral infarction sustained 1 year prior to her OT evaluation resulting in left-sided hemiparesis. Her past medical history includes hypertension, anemia, depression, and seasonal allergies.

Intervention An assessment with Mrs. W determined that she had mild-to-moderate UE AROM (grade 2) of her left UE and that she demonstrated a deficit in

use of the more-affected UE as measured by the MAL. Since she met the AROM criteria and appeared to display learned nonuse of her left UE, it was determined that it would be appropriate for her to participate in a grade-2 CIMT offered in an outpatient setting.

After pretreatment testing, she underwent a CIMT Protocol lasting 3.5 h, 5 days a week for 2 weeks. Treatment consisted of all four components of CIMT: intensive UE training, use of the training technique known as *shaping* that focused on improving motor ability of left UE, implementation of the *adherence-enhancing transfer package* that promoted gains in the clinical setting to be realized in her real-world environment, and *techniques to constrain use of her more-affected UE*, which included using a padded mitt which restrained use of the less affected UE. After treatment, Mrs. W was retested to determine changes in the functional use and motor ability of her left UE. She showed substantial improvement on the MAL, going from scores on the Amount Scale (AS) of 0.3 and How Well (HW) Scale of 0.7 pretreatment to scores on AS of 3.6 and HW of 3.7 at posttreatment; treatment changes of 3.3 and 3.0, respectively. Prior to CIMT, she used her arm for 10/29 items on the MAL and by the end of treatment she used it for 26/29 items. Her left UE motor ability also improved as measured by the Wolf Motor Function Test (WMFT); her median performance time decreased from 4.4 to 1.2 s and her mean functional ability score improved from 3.2 to 4.2. At 2 years following her treatment, she was found to have kept the gains that she made in CIMT in UE function and motor ability. She reports that she is using her hand for *just about everything* and that she is enjoying time with her grandchildren.

The Student's Report

The following questions prompt the student to consider why CIMT was appropriate for Mrs. W. The listed references are resources for answering these questions.

- What is CIMT?
- What are the four components of CIMT?
- What is learned nonuse?
- What assessments are used for measuring changes in UE function after CIMT?
- Can a 2-week therapeutic rehabilitation intervention like CIMT result in structural changes in the brain?

Chapter 41
Functional Electrical Stimulation Therapy: Enabling Function Through Reaching and Grasping

B. Cathy Craven, Stephanie C. Hadi and Milos R. Popovic

In the early stages of rehabilitation, functional electrical stimulation therapy should be used as an adjunct therapy along with conventional occupational therapy to maximize neurological recovery and augment voluntary reaching and grasping.

Abstract Individuals with stroke and spinal cord injury (SCI) experience permanent disability resulting from total or partial upper extremity (UE) paralysis, sensory and autonomic impairments which limit their independence in self-care and instrumental activities of daily living. UE paralysis is typically unilateral for individuals following stroke and bilateral following tetraplegia. Reaching, grasping, and manipulation are vital components of UE function that allow individuals to use the sensorimotor integrity of their arm and hand, to perform activities that meet their personal needs, and meaningfully participate in their external environment. This chapter provides a detailed discussion of the role of functional electrical stimulation therapy (FEST) in augmenting UE reaching and grasping in these two client groups.

Keywords Functional electrical stimulation therapy · Grasping · Neuroprosthesis · Reaching · Spinal cord injury · Stroke · Upper extremity function · Voluntary function

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Definitions

1. *Grasping* refers to the ability to hold and manipulate an object. Examples of different types of grasp include:
   a. *Palmar grasp* refers to opposition of the thumb and palm followed by simultaneous flexion of the thumb and fingers (e.g., grasp used to hold a water bottle).
   b. *Lateral prehension* is generated by flexing the fingers first to provide opposition between the lateral index and flexed thumb (e.g., grasp used to hold small, light objects, like a key or paper clip).
   c. *Precision grip* (or *pulp to pulp pinch)* is generated by first forming opposition between the thumb and the palm, followed by flexion of the index finger and thumb (e.g., grasp used to hold smaller objects, like dice or popcorn).
2. *Active-assisted reaching and grasping* refers to performing these tasks with the help of a therapist, attendant, or device.
3. *Functional electrical stimulation* (FES) refers to a technique that uses surface or implanted electrodes to apply short low-energy pulses to a group of muscles to stimulate a sequence of coordinated muscle contractions and produce functional movements, that are not otherwise possible, in the absence of the device or neuroprosthesis.
4. *Functional electrical stimulation therapy* (FEST; or functional electrical therapy) is a therapeutic approach in which a neuroprosthesis is used intermittently for short periods of time to elicit or retrain voluntary motor function, such as reaching, and grasping.

Purpose

FEST is a short-term therapeutic tool used by occupational therapists to elicit or augment reaching and grasping among clients with persisting weak or paretic upper extremity (UE) function following stroke or cervical SCI (tetraplegia).

Epidemiology

Eighty-five percent of individuals living with stroke have severe UE paralysis, while 45 % of individuals with tetraplegia have persisting motor deficits more than 1 year after onset. Small gains in reaching and grasping abilities have a high functional yield, often increasing the participant's independence in self-care, functional, and vocational activities.

FEST: The Occupational Therapist's Role

The occupational therapist (OT) is responsible for identifying appropriate FEST candidates, advocating for FEST resources in their practice environment, and both implementing and evaluating FEST. The OT identifies the type of grasp to be trained, the appropriate FEST protocol, including dose and frequency, and incorporates meaningful activities to ensure ongoing client engagement. The OT is responsible for applying electrodes, operating and maintaining the FEST device, and providing active assisted reaching and grasping to ensure the elicited movements are painless, and follow efficient (normal) movement patterns.

These processes are best implemented when adhering to the Canadian Practice Process Framework (Polatajko et al. 2007) during FEST implementation:

1. *Outline* the client's objectives and plan for FEST
2. *Initiate* the therapeutic process, screening for therapy contraindications, and obtaining informed consent
3. *Assess and evaluate* the client's occupational performance using the Canadian Occupational Performance Measure (Law et al. 1990)
4. *Set the stage* for the clients' FEST by identifying occupational performance issues, prioritizing occupational goals, and clarifying expectations and assumptions about the practice process
5. *Implement* the FEST intervention plan
6. *Monitor and modify* the FEST plan
7. *Evaluate the outcome* (Goal Attainment Scaling; Kiresuk and Sherman 1968)
8. *Conclude* the therapeutic process upon achievement of occupational goals post-FEST or plateau of function

Methods

Identifying FEST Candidates

Individuals with acute or chronic stroke or tetraplegia that are unable to voluntarily grasp or reach objects are potential FEST candidates. FEST has promising implications for facilitating voluntary movement in those with no residual UE motor function and for augmenting functional recovery, including the ability to grasp and reach in individuals with spastic and flaccid UEs.

Absolute FEST contraindications include: cardiac pacemaker, implanted defibrillator, diaphragmatic pacer, ventricular arrhythmia, uncontrolled hypertension or autonomic dysreflexia, and pressure sores or skin lesions at potential desired electrode sites.

Relative contraindications include: allodynia, complex regional pain syndrome, nerve root avulsion, and lower motor neuron injury with chronic muscle denervation.

Electrical Stimulation Devices (Apparatus)

FES devices produce muscle contractions or sequences of muscle contractions generated by a microprocessor-controlled electric stimulator to produce stimulated functional activities (i.e., grasping or releasing a cup). FES is customized for the individual client, and can be delivered using surface (transcutaneous), percutaneous, or implanted electrodes. Implanted FES systems have conventionally been used in clients with acute tetraplegia. Surface FES systems have been used in the past as an orthotic system prescribed for lifelong daytime substitution for inadequate or absent UE motor function in clients with paresis (Popovic and Thrasher 2004).

Currently, the Ness H200® (Bioness Inc., USA) is the only commercially available surface FES system to deliver FEST for retraining grasping (Alon et al. 2007). A Canadian competitor, specifically developed to deliver surface FEST, the MyndMove system (MyndTec Inc., Canada) will be available in Canada starting October 2014. The MyndMove system offers software prescriptions for 17 different reaching and grasping therapeutic protocols for stroke patients, and 13 different grasping therapeutic protocols for SCI patients (M.R. Popovic, personal communication, September 2014). There are three additional surface FES systems used to deliver FEST in clinical trials. These devices include:

1. The prototype version of the ActiGrip CS® electronic stimulator (Neurodan A/S, Aalborg, DK; Popovic et al. 2002, 2004a)
2. The workstation and FES stimulator (Gritsenko and Prochazka 2004; Kowalczewski et al. 2007) aimed for restoring hand function
3. The Compex Motion stimulator (Compex SA, Switzerland; Popovic and Keller 2005).

Regardless of device choice, FEST is applied intermittently for 2–6 months to elicit and/or augment voluntary UE motor function.

Electrode Choice

FEST is customized for the individual client, and most often, delivered using surface electrodes. Electrical stimulation applied during FEST is optimally delivered using short balanced biphasic electrical pulses, preferably current regulated, that generate a sequence of action potentials of adequate amplitude in the peripheral nerves, to elicit visible or palpable muscle contractions. In rare cases, percutaneous (Chae and Hart 2003) and implanted (Turk et al. 2008) electrodes have been used in FEST. Implanted and percutaneous electrodes may cause local infection; thus, noninvasive surface electrodes may be preferable.

a. Surface electrodes are inexpensive and easy to apply to the skin, but are ineffective when stimulating certain peripheral nerves (i.e., those innervating the proximal shoulder muscles). The typical locations of FEST electrode placement used for grasping and reaching for clients with stroke are shown in Fig. 41.1.

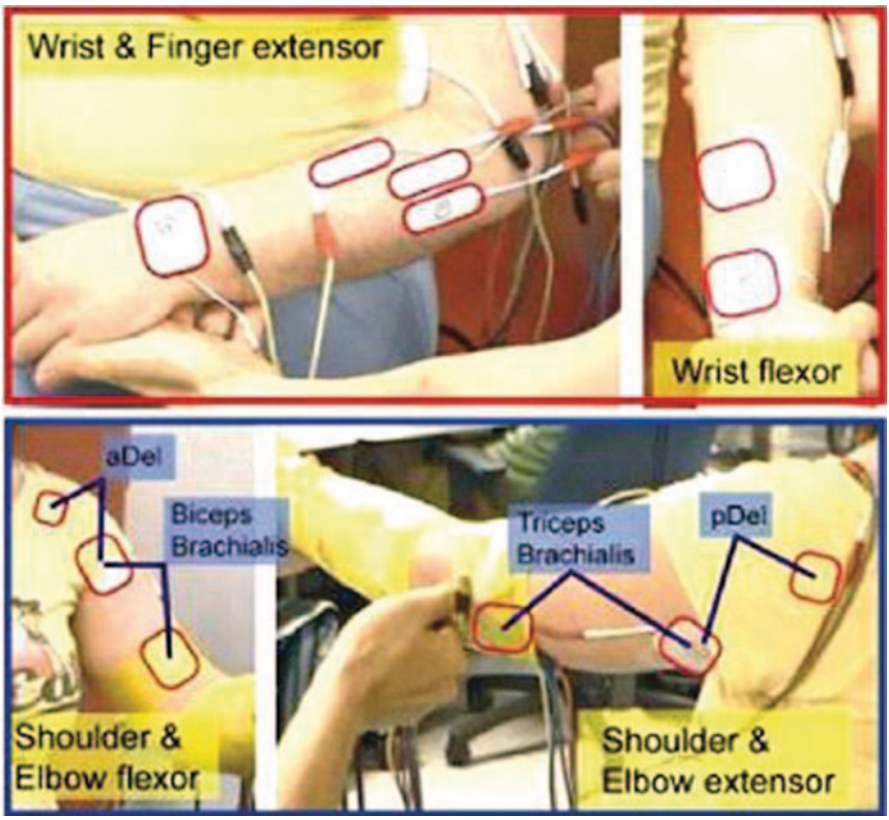

Fig. 41.1 Typical locations of surface stimulation electrodes used to retrain reaching and grasping functions in clients with severe stroke using the Compex Motion (Compex SA, Switzerland)

b. *Percutaneous electrodes* consist of thin wires that are inserted through the skin into the underlying muscle tissue where they remain in place for a maximum of 30 days (Chae and Hart 2003).
c. *Implanted electrodes* are permanently implanted into the muscle or around a peripheral nerve. BION™ microstimulators (Advanced Bionics Corporation, USA) are implanted via a hypodermic needle (Loeb 2002); are cylindrical in shape (2-mm diameter and 16-mm length), and are powered and controlled via radio waves from an external controller carried by the client. Implanted electrodes, with the exception of the BION™ microstimulators, require lengthy surgical procedures to implant.

Until recently, implanted and percutaneous electrodes were considered to have the ability to deliver higher stimulation selectivity with less electrical charge applied, as compared to surface stimulation electrodes. The MyndMove stimulator and electrode system is purported to deliver highly specific muscle contractions using only a fraction of the charge that implanted systems require to produce equivalent muscle contractions.

The OT's recommendation for use of FES versus FEST should be based on clients' goals, tolerance for invasive procedures, prognosis, and resources.

FEST Intervention

FEST is typically applied using surface electrodes three to five times per week for 8–16 weeks, with each session ranging from 45 to 60 min in duration.

FEST consists of preprogrammed electrical stimulation and manual support of joint motion by the OT, which together enables the client to achieve functional motion.

Outcome Measures

OTs implementing evidence-based practice perform standardized assessments to characterize the client's impairment and disability, identify subgroups suitable for specialized care, and determine treatment effectiveness. The reader is encouraged to routinely use the assessments described herein for clients with stroke and tetraplegia.

The choice of the assessment tool is dictated by the intent of the assessment. The Chedoke McMaster Stroke Assessment (CMSA; Gowland et al. 1993) is an example of a valid measure with sound psychometric properties used to describe UE function and determine the prognosis after stroke. Less than 10% of stroke clients with Chedoke McMaster Stages of Motor Recovery (CMSMR) stages 1 or 2 recover their ability to reach and grasp (Rand et al. 1999).

There is currently a paucity of psychometrically robust UE functional assessments for individuals with tetraplegia. Many UE function assessments are not sufficiently sensitive enough to detect changes in UE function and hand function. The routinely used Functional Independence Measure (FIM; Dodds et al. 1993) and Spinal Cord Independence Measure (SCIM; Catz et al. 1997) are insufficient to characterize UE functional recovery following tetraplegia.

We propose two standardized assessments for assessing UE function and hand function pre- and post-FEST intervention:

1. *GRASSP*—The Graded Redefined Assessment of Strength, Sensibility, and Prehension is a standardized UE function impairment measure for individuals with complete or incomplete tetraplegia. The GRASSP has good inter-rater reliability (0.84–0.96), test retest reliability (0.86–0.98), construct validity (sensation and strength testing is more sensitive than ISNCSCI sensory and motor testing), and concurrent validity with SCIM, SCIM self-care subscores, and the Capabilities of Upper Extremity Questionnaire (0.57–0.83; Kalsi-Ryan et al. 2012).
2. *TRI-HFT*—The Toronto Rehabilitation Institute Hand Function Test evaluates gross motor function of unilateral grasp and focuses on lateral pinch, pulp to pulp pinch, palmar grasp, and strength of both power and lateral grasps (Popovic et al.

2005). The TRI-HFT has good inter-rater reliability (0.98), concurrent validity with the FIM self-care subscores (0.56–0.73) and is highly sensitive in detecting changes in voluntary UE function pre- and postintervention (Kapadia et al. 2012; Popovic and Thrasher 2004).

Either one of these outcome assessments should be paired with an impairment-specific functional abilities evaluation (i.e., SCIM for individuals with tetraplegia and the CMSMR for individuals with stroke). The recent paradigm shift from using FES as an orthotic system to using it as a therapy to augment UE strength and motor function has resulted in improved voluntary reaching and grasping. There is substantial level I evidence of the therapeutic efficacy of FEST.

Results

Evidence-Based Practice

A) Surface FEST for Stroke Clients

Authors journal year design sample size	Subjects intervention outcomes	Results/conclusions
Popovic et al. (2002) Pre–Post *N* = 16	*Subjects*: 16 stroke subjects allocated to a higher functioning group (HFG; 4 FEST, 4 controls) and a lower functioning group (LFG) (4 FEST, 4 controls) based on the ability to extend their affected wrist, metacarpophalangeal (MCP) and interphalangeal (IP) joints *Intervention*: 3-week FEST applied 30 min/day. Controls received conventional therapy *Outcomes*: UEFT	Improvements for both HFG and LFG post-FEST. As the HFG had greater benefits, it was recommended that HFG was best suited for FEST Results of these three studies suggest that both acute and chronic stroke subjects benefited from FEST
Popovic et al. (2003) RCT *N* = 28	*Subjects*: 28 acute stroke subjects allocated to HFG (8 FEST, 8 controls) and LFG (6 FEST, 6 controls) *Intervention*: 3-week FEST applied 30 min/day. Controls received conventional therapy *Outcomes*: UEFT, DT, MAS, RUE/MAL	
Popovic et al. (2004b) Pre–Post *N* = 16	*Subjects*: 16 chronic (>1 year) post-stroke subjects (8 HFG, 8 LFG) *Intervention*: 3-week FEST, 30 min/day *Outcomes*: UEFT, DT, MAS	

Authors journal year design sample size	Subjects intervention outcomes	Results/conclusions
Gritsenko and Prochazka (2004) Pre–Post *N*=6	*Subjects*: 6 subjects, >12 months post-stroke, reasonable shoulder and elbow active ROM, but unable to grasp/release objects *Intervention*: FEST with instrumented workstation applied for 12 consecutive workdays, 1 h/day *Outcomes*: FMA, WMFT and kinematics	Kinematics and WMFT showed improvement during treatment and on discharge, but were lower at follow-up FMA scores did not improve FEST was associated with improvements in hand function
Popovic et al. (2005) RCT *N*=13	*Subjects*: 13 acute stroke subjects (5 FEST, 8 controls), CMSMR score=1 or 2 *Intervention*: 12–16-week FEST, 3–5 sessions/week, 45 min/session. Controls received conventional therapy *Outcomes*: FIM, BI, CMSMR, FMA, and TRI-HFT	Statistically significant results achieved on all tests, except FIM in favor of FEST FIM was not sufficiently responsive to capture improvements in arm/hand function
Thrasher et al. (2008) RCT, *N*=21 Pre–Post, *N*=7	*Subjects*: RCT of 21 acute stroke subjects (10 FEST, 11 controls), CMSMR stages 1 or 2, and a 2–7-week duration between stroke and the start of intervention Pilot study using FEST with 7 chronic stroke subjects, CMSMR score=2 or 3 *Intervention*: RCT: 12–16-week intervention, 5 days/week, 45 min/session Pilot Study: 12–16-week FEST, 3 days/week, 45 min/session *Outcomes*: TRI-HFT, FIM, BI, FMA, and CMSMR arm and hand scores	RCT: Both FEST and control groups improved in all outcome measures. FEST group had significant improvements compared to the control group on the BI, FMA, and CMSMR ($p<.05$) with no significant differences in the FIM Pilot Study: Scores on all outcomes were higher, but did not reach statistical significance due to small sample size
Mangold et al. (2009) RCT *N*=23	*Subjects*: 23 subjects (12 FEST, 11 controls), acute or subacute stroke, severe hemiparesis to complete hemiplegia of the arm and/or hand (maximum CMSMR=3) *Intervention*: 4-week training program, 3–5 sessions/week for UE function training, 45 min/session. In the intervention group, 3 sessions were FEST *Outcomes*: EBI subscore, CMSMR arm and hand	Significant improvements in all outcome measures in the FEST group Gains from pre- and post-treatment were not significantly different between either group

BI Barthel Index, *EBI* Extended BI, *DT* Drawing Test, *FMA* Fugl–Meyer Assessment, *MAS* Modified Ashworth Scale, *RUE/MAL* Reduced Upper Extremity Motor Activity Log, *UEFT* Upper Extremity Function Test, *WMFT* Wolf Motor Function Test

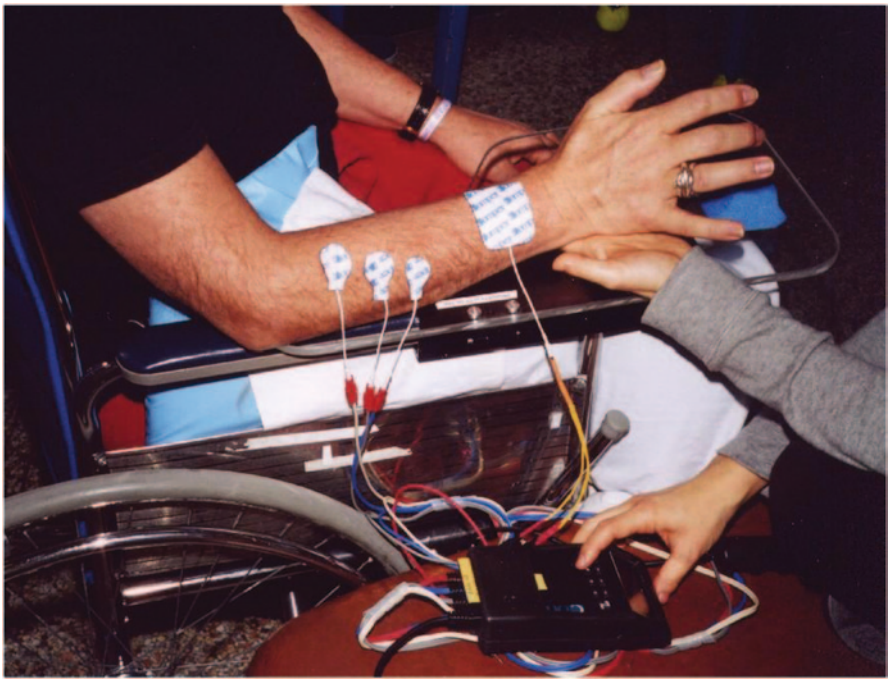

Fig. 41.2 FEST of a client with stroke learning to voluntarily open his hand

B) FEST Protocol Example for Clients with Stroke

Based on the literature evaluating the efficacy of FEST in individuals with severe chronic stroke (Popovic et al. 2005; Thrasher et al. 2008), the following stimulation protocol, therapy dose, and frequency have demonstrated good clinical outcomes:

1. One-hour FEST 3–5 times/week for 16–20 weeks
2. Balanced, biphasic, current regulated electrical pulses
3. Pulse amplitude from 10 to 50 mA
4. Pulse width from 100 to 250 μs
5. Pulse frequency of 40 Hz

Since neuromuscular recovery in stroke clients occurs from proximal to distal, FEST should be separated into two phases: (1) focus on proximal functions, such as reaching forward to grab an object, or touching one's face (i.e., shoulder and elbow flexion/extension, forearm supination/pronation), followed by (2) focus on distal functions, such as grasping and manipulating objects (i.e., wrist flexion/extension and finger movements). An example of an individual with stroke learning to voluntarily open his hand (Fig. 41.2). The case study provides more details of a specific FEST protocol.

Table 41.1 Table summarizing level 1 and 2 evidence of FEST trials for individuals with tetraplegia

Authors Journal year Design Sample size	Subjects Intervention Outcomes	Results/conclusions
Popovic et al. (2006) RCT *N*=21	*Subjects*: 10 subjects with complete SCI (6 FEST, 4 controls) and 11 subjects (6 FEST, 5 controls) with incomplete SCI *Intervention*: surface FEST *Outcome*: FIM, SCIM and TRI-HFT	Although this study was not powered to determine treatment efficacy, these results suggested that short-term use of FEST for grasping had the potential to improve grasping in clients with motor complete or incomplete SCI
Kapadia et al. (2011) RCT *N*=22	*Subjects*: 22 subjects (10 FEST, 12 controls) with incomplete subacute (< 6 months) C4-C7 SCI *Intervention*: 8-week intervention, 5 days/week (40 sessions). Controls received 2-h OT sessions, FEST group received 1-h OT and 1-h FEST sessions *Outcome*: FIM, SCIM, and TRI-HFT	At completion, both FEST and control groups improved, however, FEST group showed significant improvements over controls in FIM and SCIM self-care subscores, TRI-HFT instrumented cylinder scores, and TRI-HFT credit card scores
Popovic et al. (2011) RCT *N*=21	*Subjects*: 21 subjects (9 FEST, 12 controls) with incomplete subacute (< 6 months) C3-C7 SCI. *Intervention*: 8-week intervention, 5 days/week (40 sessions). Controls received 2-h OT sessions, FEST group received 1-h OT and 1-h FEST sessions *Outcome*: FIM, SCIM, and TRI-HFT	No significant differences in TRI-HFT total score FEST group improved or maintained gains at 6-month follow-up in voluntary hand function as assessed using the FIM and SCIM self-care subscore
Kapadia et al. (2013) RCT *N*=8	*Subjects*: 8 subjects (5 FEST, 3 controls) with incomplete chronic (≥24 months) C4-C7 SCI *Intervention*: 13–16 weeks intervention (39 sessions). Controls received 1-h OT sessions, FEST group received 1-h FEST sessions *Outcome*: TRI-HFT, GRASSP, FIM and SCIM self-care subscore	Pilot data results suggest that FEST has the potential to improve voluntary grasping function in persons with chronic tetraplegia

C) Surface FEST for Clients with Tetraplegia

There is level 1a evidence (Popovic et al. 2006, 2011) and level 2 evidence (Kapadia et al. 2011) of the efficacy of FEST for improving hand function, maintaining functional gains at long-term follow-up, increased independence, and quality of life (Kapadia et al. 2011; Popovic et al. 2006, 2011) among clients with subacute tetraplegia (Table 41.1). Subacute tetraplegic subjects who received OT with FEST showed significantly greater functional abilities on the FIM self-care, SCIM upper extremity, and TRI-HFT scores for manipulation of objects when compared to the conventional OT control group. Four subjects available at 6-month follow-up continued to either improve or maintain their gains in voluntary hand function,

Fig. 41.3 FEST applied to a client with tetraplegia using lateral grip when stacking wooden blocks

as assessed using FIM self-care subscores and SCIM self-care subscores (Kapadia et al. 2011; Fig. 41.3).

Discussion

Individuals with tetraplegia and stroke rank improvement and maintenance of UE function as a critical priority necessary for improving quality of life (Snoek et al. 2004). FEST has the potential to improve reaching and grasping in clients with stroke and tetraplegia, thereby restoring function, dignity, and independence in ADLs (Verrier et al. 2012).

Key factors to ensure FEST success include: (a) early application after the onset of clients with paresis; (b) use of FEST in conjunction with conventional OT; (c) incorporation of programmable FES systems and customized electrical stimulation protocols; (d) diversity of meaningful tasks and functional activities combined with high repetition (application of motor learning principles); (e) client engagement in the therapy process and attentiveness to performed tasks; and (f) FEST administration for at least 40 1-h sessions (essential dose to improve both reaching and grasping in clients with paresis).

Benefits for utilizing surface FEST include, (a) noninvasive procedures; (b) adaptability for individual client requirements; (c) early introduction in rehabilita-

tion; (d) facilitation of task-specific training even in individuals with minimal to no voluntary function; (e) short-term therapy versus life-long use; (f) undemanding training requirements for OTs (the authors suggest at least 1–2 days of training); and (g) ease of applying surface-based FEST.

This chapter summarizes the published benefits and discusses the limitation of FEST among clients with paresis. The functional gains anticipated with FEST are greatest in clients with acute paresis and some voluntary movement, but are also evident in clients with chronic paresis. Generalization of these findings are limited by small sample sizes, individualized treatment and outcome assessment protocols, diverse inclusion criteria, and the availability of FEST equipment and OT expertise in clinical settings.

The OT and resource requirements associated with FEST, although significant, have the potential to improve tetraplegic and stroke clients' functional abilities and reduce the burden of care over their lifetime. Once a client plateaus in function, adaptive aids (i.e., universal cuff, thumb spica splint, handwriting splint) or invasive procedures may be considered (i.e., implanted neuroprostheses).

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The Case Study of William: Applying Functional Electrical Stimulation Therapy to an Individual with Chronic Stroke

Keywords Chronic stroke, functional electrical stimulation therapy, hand function, upper extremity function

Introduction

The theme of this case study is the application of functional electrical stimulation therapy (FEST) to enhance the client's grasping and reaching, several years post hemorrhagic stroke.

The students' tasks include:

- Identifying the prognosis and recovery of upper extremity (UE) and hand function for individuals with hemorrhagic stroke (Gillen 2013)
- Clinical reasoning for utilizing functional electrical stimulation therapy in this patient population (Popovic et al. 2005; Thrasher et al. 2008)
- Identifying the appropriate placements of electrodes to facilitate UE reaching, palmar grasping, and lateral prehension (Popovic et al. 2005; Thrasher et al. 2008)
- Outlining the appropriate FES equipment and FEST protocol to implement (Popovic et al. 2005; Thrasher et al. 2008)
- Utilizing the Canadian Practice Process Framework (Polatajko et al. 2007) to guide the therapeutic process to facilitate client-centred, evidence-based, and reflective practice
- Synthesizing the information into a report.

As a starting point, students should use the following references to gather background information:

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Overview of the Content

Goals of the Intervention

The major goals of utilizing functional electrical stimulation therapy are:

1. Maximization of recovery to the UEs and hands
2. Enhance ability to voluntary contract muscles
3. Reduce cocontraction of antagonist and proximal muscles, and reduce involuntary muscle contractions in the region of interest
4. Increase active or active-assisted ROM of all joints

Learning Objectives

After studying this chapter, the learner will:

1. Write a scientific report on utilizing FEST with an individual with chronic stroke or tetraplegia
2. Understand the therapeutic justification and ethical considerations related to applying FEST to an individual with paresis

The Background History of Clinical Case Study

Personal Information

William is 60 years old. He lives with his daughter's family in a one-storey bungalow in Scarborough. After an initial consultation with Laura, his outpatient OT, William identified the following occupational goals related to leisure and self-care: (1) "I want to enjoy a cola on my own," (2) "I want to play cards with my friends," and (3) "I want to shave by myself." From William's identified goals and Laura's analysis, together they modified these goals to: (1) independence with picking up, drinking, and putting a cola can back on the table, (2) independence with playing poker (i.e., holding playing cards, picking up and releasing poker chips), and (3) independence with grooming activities (i.e., shaving).

Medical Information Included Prognoses

William experienced a hemorrhagic stroke in the right frontal parietal area at the age of 58. When William began inpatient rehabilitation, his motor recovery status, scored by CMSMR, was as follows: arm = 1, hand = 2, leg = 2, and foot = 2. William spent 5 days in acute care, and was then transferred to an inpatient rehabilitation

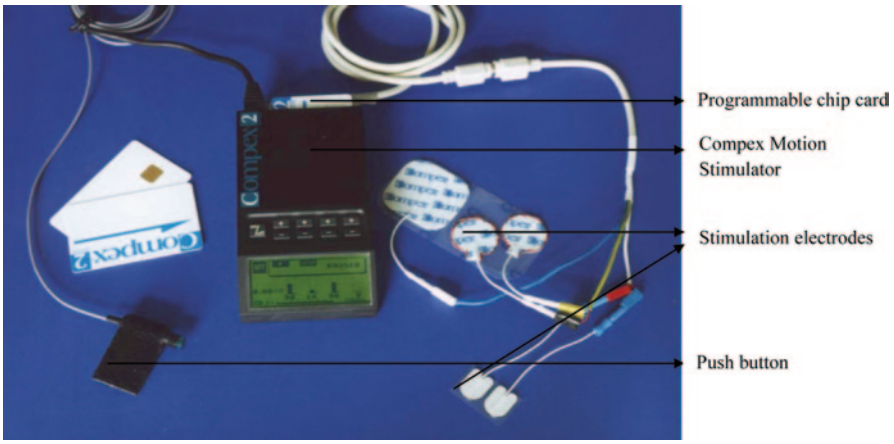

Fig. 41.4 Complex motion stimulation hardware

facility where he made some recovery and was discharged to his daughter's home. After 4 months of rehabilitation, his CMSMR scores were arm = 2, hand = 2, leg = 4, and foot = 2.

While his left leg showed good recovery, his left arm was not functional and had high muscle tone. William has shoulder pain and limited shoulder flexion. Movement of his UE function was characterized with flexor synergy pattern. He had increased resistance to passive stretching in the distal flexor musculature. Using the two-point discrimination test, it was confirmed that his tactile sensation was not severely impaired: He was able to discriminate two-point touch with his palm when points were about 3.5 cm apart. William also had allodynia in his right forearm.

Occupational Therapy Intervention

At the beginning of FEST, William was walking independently in his ADLs with the help of a cane and ankle-foot orthosis, but rarely used his paretic arm in functional activities.

Laura used the Canadian Practice Process Framework to guide the therapeutic process. She informed William that she would utilize FEST to increase his left paretic arm function. She informed him that they would meet for 1-h sessions, twice daily for 12 weeks. She used the Compex Motion Stimulator (Compex SA, Switzerland; Fig. 41.4) to deliver the FEST (Popovic and Keller 2005). Laura aimed to stimulate William's targeted muscles using the following FET parameters: symmetrical biphasic current pulses, pulse duration of 250 μs and ramp-up and ramp-down times of 2 s, and a constant stimulation frequency of 40 Hz.

As Laura knew the principles of neuromotor recovery, she separated her protocol into two phases. In the first phase, she focused on proximal functions, and focused on distal functions in the second phase.

Goal #1: "I want to enjoy a cola on my own."

Laura asked William to execute seven arm motions: (1) reaching for the cola can placed in front of him, (2) grasping the can, (3) bringing the can to his mouth, (4) tipping the can, (5) reaching out and placing the can back in front of him, (6) releasing the can, and (7) bringing his arm back to his side.

Typical Stimulation Protocol

- Prior to a movement, William was asked to imagine himself reaching for a cola can placed in front of him. He was asked to strain both mentally and physically (maximal effort) for 10–20 s to execute the forward reaching movement.
- Laura would only activate the FEST when William demonstrated signs of maximal effort (e.g., facial expression showed a visible strain), and had insufficient power or excessive muscle co-contraction.
- When William demonstrated maximal effort, Laura used a hand switch to trigger the stimulation to produce the first component of the desired forward reaching arm movement that William could not execute himself. *Anterior deltoid m*. and *triceps m.* were stimulated simultaneously to produce this movement.
- Once William's arm was in the forward-reaching posture and in front of the can, Laura asked William to open his fingers and place them around the can. When William demonstrated maximal effort in activating the hand-opening sequence, Laura activated the hand switch (third switch activation) to stimulate the *extensor digitorum m.* and *lumbricals I-IV m.*
- Now that William's arm was in the forward reaching posture with an open hand and fingers in contact with the can, Laura asked William to close his fingers and grab the can. When William produced maximal effort, Laura activated the hand switch to stimulate finger flexion produced by flexing *thenar m.*, *flexordigitorum superficialis m.* and *flexor digitorum profundus m* (Fig. 41.5). As the fingers flexed, the *extensor digitorum m.* (Fig. 41.6) and *lumbricals I-IV m.* relaxed.
- Laura then asked William to bring the can to his mouth. When William produced maximal effort, Laura activated the hand switch to trigger the *biceps m.* stimulation. As *biceps m.* was stimulated, *anterior deltoid m.*,*thenar m.*,*flexordigitorum superficialis m.,* and *flexor digitorum profundus m*. remained flexed.
- Subsequent to William bringing the can to his mouth, Laura asked William to place the can back on the table. After William produced maximal effort, Laura activated the hand switch to trigger *triceps m.* stimulation. As *triceps m.* was stimulated, *biceps m.* relaxed.
- When William placed the can on the table surface, Laura asked him to release the can. Again, after William produced maximal effort, Laura activated the hand switch to trigger the next phase of stimulation, namely relaxation of *thenar*

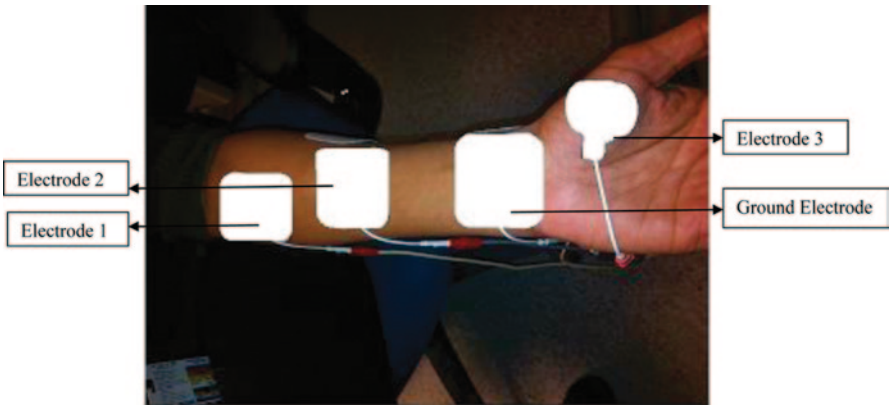

Fig. 41.5 Electrode placement for hand closing. Channels 1 and 2 are used to produce finger flexion. Channel 3 is used to generate thumb flexion

m.,flexordigitorum superficialis m., and *flexor digitorum profundus m.,* simultaneously with contraction of *extensor digitorum m.* and *lumbricals I-IV m.* to open his hand and release the object.

- In the final phase of the protocol, Laura asked William to bring his arm next to his body and to relax it. Again, when William produced maximal effort, Laura activated the hand switch to trigger the final phase of stimulation. In this phase, *posterior deltoid m.* and *biceps m.* were stimulated together, then *biceps m.* was relaxed, followed by *triceps m.* activation, and then complete relaxation of both *triceps m.* and *posterior deltoid m.* This final stimulation step produced arm extension and placed William's arm in a relaxed position next to his body.

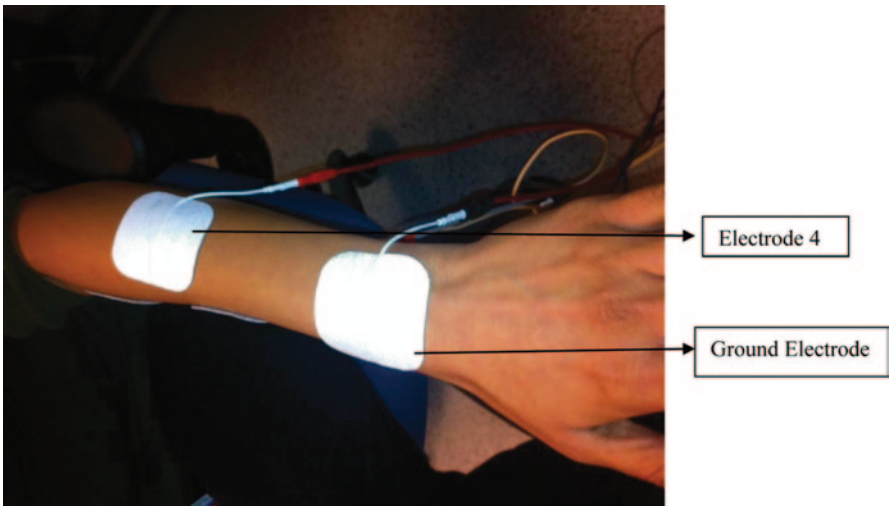

Fig. 41.6 Electrode placement for hand opening. Channel 4 is used to produce finger extension

- Once Laura was able to properly complete this task with William, she asked William to repeat the same arm and hand movements 10–20 times during a single treatment session. The number of repetitions was determined by William's endurance and tolerance.
- While William executed these motor tasks, Laura guided his arm and fingers and assisted the neuroprosthesis in performing the desired task (e.g., providing assistance with carrying the weight of his arm and tapping the muscle belly to cue activation). Laura also ensured that William executed normal movement patterns for all motor tasks (i.e., cueing his right shoulder to relax when William displayed shoulder hiking).
- As William's function improved, Laura modified the FEST prescription accordingly. She reduced her assistance to the necessary minimum and then reduced the FES assistance to a necessary minimum.

The specific parameters used in the above stimulation protocol were: (1) pulse duration = 250 μs, (2) max amplitude on all channels < 30 mA, (3) ramp up = 1 s and ramp down = 0.5 s, and (4) pulse frequency = 40 Hz.

Please note that the above stimulation protocol represents one of 24 reaching and/or grasping protocols that have been developed for treating individuals with stroke and tetraplegia.

By the end of the 12-week FEST intervention, William was able to independently reach for a cold can of cola in the fridge to enjoy with his friends.

As Laura used the Canadian Practice Process Framework to guide the therapeutic process, she continued to monitor William at his 6-month follow-up to assess whether William sustained functional gains post FEST and to determine whether another intervention would need to be implemented.

The Student's Report

The following guiding questions have been identified in developing possible solutions for William. These questions were generated from references found in the literature search:

1. What motor tasks are needed to achieve William's other two occupational goals? Which muscles need to be stimulated?
2. What are the absolute/relative contraindications to using FEST? How can the OT address these (if any)?
3. What are William's week-1 and week-8 goals?
4. What changes in function might we expect?
5. How will we know FEST has been successful?
6. At what juncture should one stop FEST?
7. Is there a role for compensatory aids in helping William achieve his goals?
8. How does the FEST interface with other OT services?

Chapter 42
Joint Protection: Enabling Change in Musculoskeletal Conditions

Alison Hammond

The problem is changing habits of a lifetime. Joint protection principles are easy to learn; the difficulty is changing habits sufficiently to make a difference.

Abstract Joint protection includes applying ergonomic principles in daily life, altering working methods, using assistive devices, and modifying environments. It is taught to people with musculoskeletal conditions, such as rheumatoid arthritis (RA), osteoarthritis (OA), and soft tissue rheumatisms. Common principles are to: distribute load over several joints, reduce effort using assistive devices, pace activities, use orthoses, and exercise regularly. Cognitive-behavioral, self-efficacy, and motor-learning approaches are employed. Clinical trials demonstrate that using these approaches is significantly more effective than advice and demonstration alone in changing joint protection behavior, improving self-efficacy, function, and reducing pain in both early and established RA and hand OA. There is still conflicting evidence for its effectiveness in soft tissue rheumatisms.

Keywords Arthritis diseases · Assistive devices · Energy conservation · Ergonomics · Joint protection · Musculoskeletal conditions

Definition and Background

Joint protection is a core component of occupational therapy interventions for musculoskeletal conditions. Joint protection is an active coping (or self-management) strategy to improve clients' perceived control of their condition, psychological and

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health status, daily activities, role performance, and social participation (Hammond 2004).

Joint protection intervention includes educating in (1) altering working methods, (2) use of proper joint and body mechanics through applying ergonomic principles, (3) use of assistive devices, and (4) modifying occupational performance and environments. It is often integrated with fatigue management, working splints and flexibility and strength hand exercises.

Joint protection was first developed in the 1960s, based on increased understanding of pathophysiologic changes in rheumatoid arthritis (RA) and on biomechanics. Principles were extended to other inflammatory arthropathies, osteoarthritis (OA), and soft tissue rheumatisms (Brattstrom 1987; Chamberlain et al. 1984; Cordery 1965; Melvin 1989; Sheon 1985). At that time, clients were encouraged to regularly practice joint protection in the expectation that they would apply this to their personal situation (Chamberlain et al. 1984; Cordery 1965). The focus was on improving body structures and function, and maintaining the ability to perform daily activities.

Research in the past 15 years has used structured self-management education and skills training to promote attitudinal, cognitive, and behavioral changes for improving protection of the joints. These cognitive-behavioral approaches further affect personal factors (e.g., increased self-efficacy, perceived control of the condition, problem-solving abilities, and reduced frustration). Additionally, they aim to enable clients to change habits and routines in their daily activities, work, and leisure.

Purpose

Joint protection is an active self-management strategy aiming to *maintain or improve* (1) occupational performance in daily life, (2) role performance and participation in social life, (3) perceptions of control, and (4) psychological and health status (Hammond 2013).

The aims of joint protection are as follows:

1. *For people with RA, reduce* (a) load and effort during daily activity performance, thus reducing strain on joint structures weakened by the disease process; (b) pain; (c) irritation of the synovial membrane; (d) local inflammation; and (e) fatigue.
2. *For people with OA*, (a) reduce loading on articular cartilage and subchondral bone, (b) strengthen muscle support, and (c) improve shock-absorbing capabilities of joints (Cordery and Rocchi 1998).
3. *For people with soft tissue disorders* (e.g., de Quervain's disease, carpal tunnel syndrome), reduce (a) pain, (b) inflammation, and (c) strain on soft tissues.

Method

Candidates for the Intervention

Joint protection is provided to clients with the following:

- *Inflammatory polyarthropathies,* such as RA and seronegative and psoriatic arthritis. These diseases affect three times more women than men, most commonly in the 40–60-year age range, but they may start at any age. RA affects on average 1 % of people globally (Kvien 2004).
- OA affects the hand, hip, knee, or several joints of the body simultaneously (i.e., generalized OA). Nearly twice as many (1.8:1) women as men live with OA, and 10 % of people over the age of 60 years are symptomatically affected (Dennison and Cooper 2003).
- *Upper-limb soft tissue disorders:* (1) *de Quervain's disease* is more common in women than in men, with peak onset between 30 and 50 years of age. (2) *Carpal tunnel syndrome* occurs in 5.8 % of women and 0.6 % of men, with peak onset between 45 and 54 years of age (Fam 2003).

Epidemiology

The numbers of people potentially benefiting from joint protection can be estimated from percentages of those with activity limitations. Among people living with RA, about 60 % have activity limitations, particularly related to hand function (Young et al. 2000). There is a high prevalence of people with hand impairments, pain, and muscle weakness in RA over 2 years duration (Horsten et al. 2010). A community survey by Jordan et al. (2000) found that 43 % of people over 65 years of age with arthritis (mainly OA) experienced difficulty with household activities. The number of people living with *soft tissue disorders* who could benefit from joint protection interventions is unknown. These figures suggest many people with musculoskeletal conditions could benefit from joint protection advice.

Settings

Joint protection is most often provided in rheumatology and occupational therapy departments, to both in- and outpatients, as well as in community settings.

The Role of the Occupational Therapist

In providing joint protection, occupational therapists (OTs) have both *facilitatory and teaching roles*. The OT has knowledge of (1) pathophysiology of musculoskeletal

conditions, (2) ergonomic and biomechanical principles for protecting joints, and (3) cognitive-behavioral methods. This knowledge constitutes the theoretical base for joint protection interventions, which are clinically applied using educational and facilitatory strategies.

Result

Clinical Application

The commonest principles taught to clients are the following:

- *Joint protection:* Respect pain; distribute load over several joints; use the strongest, largest joint to perform an activity; avoid working in positions of potential deformity; reduce effort by using assistive devices and avoiding lifting and carrying; and avoid prolonged periods of working in the same position.
- *Energy conservation:* Pace by balancing rest and work and alternate heavy and light activities; use work simplification; use correct working positions and postures.
- *Orthoses:* Use working orthoses appropriately to reduce pain and improve grip function.
- *Exercise:* Exercise regularly to maintain range of motion and muscle strength.

Beasley (2012) provides an extensive list of principles.

The educational and facilitatory strategies used include motivational, cognitive-behavioral, self-efficacy, and motor learning approaches. These enable clients to overcome barriers to changing behavior and to maximize performance of joint protection so that therapeutic aims are achieved.

These strategies include the following:

- *Discuss* health beliefs and attitudes to the disease. Additionally, clients may have developed misconceptions of joint protection, that means using joints as little as possible, only during certain activities, or only when pain is present (Niedermann et al. 2010).
- *Identify* clients' expectations, worries, or concerns, and their valued activities and life goals.
- *Teach cognitive-behavioral strategies,* such as self-monitoring, goal setting, and how to develop action plans for practicing techniques at home. A regular review of such home programs with clients is essential.
- *Teach* using effective educational techniques to enhance recall of joint protection principles and methods, such as simplification, use of advance organizers, and explicit categorization.
- *Teach* joint protection techniques using effective skills training methods (e.g., practicing simple and then more complex activities using joint protection, feedback, and mental rehearsal).

- *Enable modeling,* that is, teaching in small groups, encouraging members to observe each other. Seeing others perform successfully increases self-efficacy and problem-solving ability (Hammond 2010; Hammond and Niedermann 2010).

Joint protection can be taught using individual or group education, supported by self-help booklets.

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Joint protection reduces pain and the likelihood of deformities, and maintains activity and participation (Hammond and Freeman 2001, 2004)

Evidence-Based Practice

A *survey* of the UK practice found that joint protection education typically lasts for 1.5 h over two treatment sessions and does not use behavioral approaches. The usual content is (1) education about RA, (2) how joints are affected, (3) joint protection principles, (4) demonstrations with short (e.g., 15–30 min) practice of hand joint protection methods commonly used in cooking and housework activities (e.g., making a cup of tea), and (5) discussion of solutions to specific problems, supported by a self-help booklet (Hammond 1997). This is still the typical practice.

Clinical Trials Investigating Joint Protection Education

A randomized controlled trial ($n=55$; 6-month follow-up) of 1 h of individual education, similar to the typical content described above, but not compared to an intervention, improved clients' knowledge of joint protection methods (Barry et al. 1994). Similarly, a pretest, posttest clinical trial of a group program ($n=21$; 3-month follow-up) providing this typical intervention for 2.5 h as part of an 8-h arthritis education program also found improved knowledge of joint protection, but no significant changes in joint protection behavior occurred. Barriers to changing behavior were identified through interview as (1) being unable to recall methods sufficiently during daily activity performance; (2) considering these as not applicable, as "my hands are not that bad yet" or using techniques on bad days only; (3) difficulty getting used to the different actions; and (4) difficulty changing the habits of a lifetime (Hammond and Lincoln 1999).

Many early trials had small sample sizes but indicated that, in established RA, structured group programs emphasizing active learning, problem solving, behavioral approaches, frequent practice, and home programs gave significant improvements:

balance of rest and activity (nonrandomized trial, $n=25$; Furst et al. 1987); use of assistive devices (pretest, posttest trial, $n=53$; Nordenskiold 1994); and functional ability (pretest, posttest trial, $n=21$; Nordenskiold et al. 1998).

More recent trials have been larger and methodologically sounder. A randomized trial with people with early RA (average 18-month disease duration, average age 50 years, $n=127$) compared a behavioral joint protection program with a standard arthritis education program (including 2.5 h of typical joint protection education). At 12 months, those in the behavioral group had significantly improved use of joint protection, less hand and general pain, improved functional ability (e.g., less early morning stiffness), and fewer flare-ups in comparison to the standard education group (Hammond and Freeman 2001). At 4-year follow-up, the behavioral group continued to have significantly greater use of joint protection, less early morning stiffness, better activities of daily living (ADL) scores, and fewer hand deformities than the standard education group, that had continued to deteriorate (Hammond and Freeman 2004).

The joint protection program was also tested in people with very early RA (average 4.5-month disease duration; average age 51 years; $n=54$) with little pain or functional difficulty. At 6-month follow-up, no significant differences between groups or over time occurred (Freeman and Hammond 2002).

The same program has been tested in patients with OA in hands ($n=257$), compared to written advice only, in a factorial randomized trial. At 6-month follow-up, significantly more people in the joint protection group reported globally higher scores on the AUSCAN (hand pain and function) scale (Dziedzic et al. 2013).

Clinical Trials Investigating the Effects of Joint Protection Combined with Exercise

A randomized controlled trial with clients with moderate–severe RA (average 15-year disease duration, average age 53 years; $n=85$) receiving a behavioral joint protection, energy conservation, and exercise program also identified significant improvements at 8-month follow-up in pain and functional and physical ability in comparison to those receiving usual care (Masiero et al. 2007). Both groups were receiving antitumor necrosis factor-alpha (TNF-α) drugs (e.g., infliximab, etanercept). A randomized controlled trial with people with ankylosing spondylitis (AS) on anti-TNF-α receiving self-management education, including joint protection, energy conservation and range of movement exercise, also demonstrated improvements in pain and function (Spadaro et al. 2008). This indicates that benefits from joint protection can be gained over and above such biologic drugs.

A randomized controlled trial in clients with hand OA (average age 60 years, $n=40$) identified significant improvements at 3 months in grip strength and self-perceived hand function, although not in pain control or functional ability, in comparison to a control group receiving education about OA (Stamm et al. 2002). A further trial combining educational–behavioral joint protection education, splinting

and hand exercises ($n=40$) demonstrated significant improvements in pain and stiffness compared to joint protection alone (Boustedt et al. 2009). This latter trial emphasizes the importance of providing joint protection as part of a package of hand management, alongside exercise, fatigue management and, if applicable, orthoses.

There is conflicting evidence for the effectiveness of ergonomic interventions in soft tissue rheumatisms (Verhagen et al. 2006).

Understanding the Value of Participating in Joint Protection Education

People with RA report joint protection education results in improved: (1) physical well-being, less pain, and better function; (2) improved psychological well-being, a more positive outlook, and feeling less stressed; (3) personal control, confidence, and independence; and (4) self-acceptance (Niedermann et al. 2010).

Discussion

These studies highlight three issues: (1) How the joint protection education is provided makes a significant difference to whether patients gain benefits. The use of educational, cognitive, and behavioral approaches is significantly more effective than traditional joint protection education. (2) Providing only joint protection information does not seem to help clients with the tools to make changes when the need arises, as the standard intervention group provided with typical joint protection advice continued to deteriorate without making changes longer term in response. (3) People need to perceive the relevance of using joint protection; it may be too early to use it, if clients have few or no problems.

Conclusion

Joint protection intervention is effective if it is taught effectively. To date, research has focused on developing effective group joint protection programs for RA and hand OA clients. However, individual education is more often provided, and thus individual behavioral programs need to be developed and evaluated. Research with patients with hand OA demonstrates joint protection is effective and outcomes are enhanced by combining it with hand exercises. It is also beneficial in AS. Joint protection in lower-limb RA and OA has been little evaluated. In soft tissue rheumatism, randomized trials are needed using clearly defined conditions and interventions. The cost-effectiveness of joint protection has not been evaluated.

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The Case Study: Assisting Helen to Use Joint Protection, Energy Conservation, and Exercise at Work, Home, and in Leisure

Keywords Arthritis, energy conservation, ergonomics, joint protection

Introduction

The theme of this case study is the application of educational and behavioral approaches to enable adoption of ergonomic solutions at home, work, and in leisure.

The students' tasks include:

1. Finding out about the common symptoms, activity limitations, and participation restrictions of people with rheumatoid arthritis
2. Identifying the key joint protection and energy conservation principles which should be taught
3. Identifying key evidence for what are effective educational, cognitive-behavioral approaches to facilitate concordance with adopting ergonomic techniques sufficiently to be effective
4. Locating, selecting, and analyzing the research literature related to the effectiveness of joint protection
5. Synthesizing the information into a report

As a starting point, the students should use the following references to gather background information. Selected references are listed here and others are at the end of the chapter.

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Overview of the Content

The major goal of the interventions is to reduce pain and fatigue, improve activity ability, participation, and self-efficacy.

Learning Objective

Understand how to design and deliver an intervention with a person with rheumatoid arthritis to enable concordance with use of ergonomic approaches in daily life.

The Background History of the Clinical Case Study

Personal Data

Helen is 44 years old. She is a health visitor (i.e., visits new babies, and also young children with difficulties, and their mothers at home) and is based in a large open-plan office in a primary health-care center. She is married and has a daughter (aged 11 years). Together they live in a two-bedroom terraced house 6 km from work.

Medical Diagnoses and Prognoses

Helen has had RA for 4 years and takes the medications of methotrexate, sulfasalazine, and co-codamol. Although her disease activity is reasonably controlled, she still experiences pain (5.4/10 on a 10-point pain scale), hand pain (5.8/10), and fatigue (6.7/10). Her shoulders, wrists, hands, and feet are bilaterally affected. Balancing work and home life is difficult.

Reason for Seeking Occupational Therapy

Helen enjoys her work but is concerned she may have to give it up. Therefore, her physician referred her to an OT.

Current Circumstances

At the initial interview, the OT identifies that Helen works 4 days a week, taking a break on Wednesdays to "recover." Her manager knows she has arthritis and is keen to retain Helen who is an experienced employee.

Occupational Performance Issues

Helen drives to work and uses her own car to visit clients. However, she has to park about 100 m away from the center and often a similar distance from clients' homes, because of parking restrictions. She conducts home visits mornings and afternoons, needing to carry a heavy bag of casenotes and assessment equipment. When in the office, she has to fetch and return casenotes from stacks (manually opened), telephone clients, and type up reports. Helen usually comes home from work tired, with neck, shoulder, and hand pain. To allow time with family at weekends, she rushes round on Wednesdays doing the housework and shopping. She has given up some leisure activities (going out with friends, her Tai Chi class, and cross-stitch embroidery) as she is too tired and lacks time to do these.

The Student's Report

The following guiding questions have been identified in developing possible solutions for Helen. These questions are generated from the available literature references and our clinical experiences:

Questions

1. What reliable, valid assessments would you use to identify Helen's work, home, and leisure difficulties?
2. What activity limitations and participation restrictions do you think Helen could have, based on your knowledge of RA and her impairments?
3. What are the short- and long-term goals for your treatment plan for Helen?
4. What theoretical models are most appropriate to apply when designing an intervention for Helen?
5. What education do you consider Helen needs to enable her to understand her condition and self-manage her arthritis effectively?
6. How can Helen practically be enabled to adopt ergonomic strategies in her daily life to reduce pain, fatigue, and improve function?
7. What solutions can you suggest for Helen's key activity limitations and participation restrictions?

Chapter 43
Cognitive Priming for Movement Initiation via Self-Speech in People Living with Parkinson's Disease

Kinsuk Maitra, Lynne F. Richard and Hae Yean Park

> *I can turn and not shuffle when I say three times "Turn-Turn-Turn"; this is wonderful.*
> Client

Abstract This chapter describes the RehabSelfPrime-Speech intervention technique used among patients with moderate disability caused by Parkinson's diseases. The aim of the intervention is to promote functional independence. It addresses how clients living with Parkinson's disease learn to use self-priming to initiate movement-related actions (Maitra and Dasgupta, Occup Ther Int 12(4):218–233, 2005; Maitra, Clin Rehab 21(5):418–424, 2007). The client reads action words, which are semantically related to occupational performance of daily living tasks (e.g., get up from a chair, reach for tools or food, or grasp a pen and a paper). The RehabSelfPrime-Speech intervention technique is based on Pulvermüller et al.'s (Eur J Neurosci 21(3):793–797, 2005) language–perception–action theory, well-established repetition priming paradigm (Fleischman, Cortex 43:889–897, 2007) and empirical data on movement disorder related to Parkinson's disease and stroke (Maitra et al., Am J Occup Ther 60(2):146–154, 2006; Maitra, Clin Rehabil 21(5):418–424, 2007).

Keywords Activities of daily living · Attention · Bradykinesia · Priming · Self-speech

Definitions

The terms defined below contain the cornerstones of the intervention *cognitive priming for movement initiation.*

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Priming	Priming for movement initiation can be defined as "temporal or spatial stimuli associated with the initiation and ongoing facilitation of motor activity or movement" (Lim et al. 2005; Nieuwboer et al. 2007).
Repetition priming	It is the facilitation in cognitive processing measured by increased speed and/or accuracy as a result of repeated exposure of a stimulus or event (Crundall and Underwood 2001). Repetition priming is considered as the nonconscious and indirect manifestation of implicit memory (Fleischman 2007).
Visuoperceptual priming	It is one type of repetition priming where the first stimulus (often called prime) is exactly repeated as the second stimulus in format (often called probe; Lyttle et al. 2010). Visuoperceptual priming is strongly driven by sensory processing and is measured by fast visual identification of tasks.
Conceptual priming	It is an another type of repetition priming where the second stimulus (probe) is conceptual in nature in relation to the prime (Lyttle et al. 2010). Conceptual priming is strongly driven by meaning-based processing and is measured by category-exemplar tasks, where subject needs to quickly generate a list of examples in a given category spontaneously that comes to mind.
Self-priming	It is defined as "priming the individual self" (Sandry et al. 2011, p. 531).
Semantic memory	It is defined as "an individual's score of knowledge about the world" (Binder and Desai 2011).
Implicit or nonconscious memory	It is defined as "information that is expressed automatically with no conscious recollection of events" (Cumming et al. 2006).

Background

Parkinson's disease (PD) is a common neurodegenerative disease, estimated to affect 10 million people worldwide, and is characterized by tremor, rigidity, slowness of movement (bradykinesia), and postural instability (Murphy and Tickle-Degnen

2001; Parkinson's Disease Foundation 2014). Progressive difficulty in movement initiation and bradykinesia affect sequential arm movements necessary for optimally performing many common occupations involving the upper extremity, including cooking, eating, dressing, or grooming (for a review, see Murphy and Tickle-Degnen 2001). PD is caused by a degenerative lesion in the substantia nigra, a basal ganglia component in the brain. The dopamine-producing ability of the substantia nigra progressively declines, resulting in typical symptoms of PD (Steece-Collier et al. 2002). The predominant pharmacologic intervention is levodopa (or dopamine replenishment) therapy, and the majority of the parkinsonian symptoms are highly responsive to this therapy. However, following long-term use, both effectiveness (quality of life) and longevity (the duration of the effect) of levodopa diminish, and the risk of developing drug-induced dyskinesia increases (Marsden and Parkes 1977). Although there is an immediate and significant improvement of quality of life following pharmacologic intervention, difficulties in performing activities of daily living (ADL), including gait and balance problems, still persist. For example, spatial characteristics (e.g., stride length), but not temporal characteristics (e.g., stride cadence) of gait improve with drug therapy (Nieuwboer et al. 2007). Therefore, there is a consistent need for physical and occupational therapy in PD patients to address issues of ADL and instrumental activities of daily living (IADL). With the increased understanding of pathophysiology of PD, a range of efforts is being pursued to develop effective rehabilitative programs that work in conjunction with dopaminergic therapy. Now it is widely recognized that clients with PD exhibit cognitive impairment as a central feature of the disease even in the early stage (Mindham and Hughes 2000). It is estimated that over 80 % of people with PD will develop dementia (Hely et al. 2008). A number of cognitive difficulties that include attention, working memory, learning, visual perception, and visuospatial and executive skills have been described to be connected to the disease (Mindham and Hughes 2000). Recent imaging studies in humans suggest that effective movement requires integration of sensory, motor, and cognitive information at various levels for planning and execution of movement (Halsband and Lange 2006; Lehéricy et al. 2006). Therefore, cognitive impairments are also linked to the difficulties in ADL and IADL performance. For example, executive skills, specifically sequencing ability, were found to be a significant predictor of IADLs; and simple motor functioning was found to be a significant predictor of physical ADLs (Cahn et al. 1998). In summary, PD is a chronic and progressive neurologic disease resulting in significant motor and cognitive disability. PD is associated with progressive loss of independence and increasing financial burden. Although mortality and morbidity of PD are delayed with modern pharmacologic intervention, a high rate of decline in motor ability and an increase in disability make the disease a public health concern (Nieuwboer et al. 2007). Non-pharmacologic interventions such as occupational, physical, and speech therapy are therefore sought to promote independence and functionality in PD (Johnson and Almeida 2007).

The Theoretical Basis of Priming in Movement Initiation

A fundamental feature of a cognitive function is to get a beneficial effect from repeated exposure of an event that may play a critical role in meaningful and purposeful movement (Fleischman et al. 2009a, b). This benefit is called *repetition priming* and is a form of implicit or nonconscious memory. Repetition priming is assessed indirectly by measuring facilitation of performance in terms of increased speed of processing or accuracy of a response due to previous exposure to identical (*visuospatial priming*) or related (*conceptual priming*) information (Lyttle et al. 2010; Squire 2004). *Visuospatial priming* is a sensory-based priming, whereas conceptual priming is a meaning-based priming. The beneficial effect of repetition priming is preserved in healthy aging (Fleischman et al. 2009a). Early studies indicate that repetition priming might be preserved in PD (Bondi and Kaszniak 1991; Heindel et al. 1989; Koivisto et al. 1996). However, more recent studies indicate that sensory-based visuospatial priming may be compromised in PD (Arroyo-Anllo et al. 2004; Fleischman et al. 2009b). Therefore, it might be possible to use a conceptual priming paradigm to internally generate purposeful movement in patients with PD. It is also plausible to *self-prime* an action by repeating meaningful information to influence a related upcoming movement. For example, when patients with PD self-prime themselves by uttering the action word "reach" three times before performing a reaching task, the reaching velocity was increased compared to no self-prime condition (Maitra 2007). The RehabSelfPrime-Speech intervention technique, as presented below, is based on the above presented concepts of *priming movement initiation* by self-priming via semantically related words.

Purpose

Clients with PD have difficulty performing many ADLs, despite medication, due to cognitive impairments and impairments in movement initiation and performance. The purpose of the RehabSelfPrime-Speech intervention technique is to utilize the client's vocabulary memory to facilitate everyday motor performance necessary for completing ADLs and IADLs.

Method

Candidates for the Intervention

The RehabSelfPrime-Speech intervention technique is aimed for people who are in the mild to moderate stages of PD; stage 3 on the Hoehn and Yahr scale (Hoehn and

Yahr 1967), meaning that the disease is at the mild to moderate stage, with balance impairment, but the patient can still perform some ADL and IADL tasks.

Epidemiology

PD occurs worldwide in all ethnic groups and socioeconomic classes. The incidence and occurrence of PD increases with age and is about 1 % in people over the age of 65 years around the world. PD and other neurodegenerative diseases (e.g., Alzheimer's disease) combined could surpass cancer as the second most common cause of mortality by 2040 (Singhal et al. 2003). Despite extensive and focused research, causes of PD remain unresolved, although genetic and environmental factors such as exposure to pesticides have been strongly suspected (Steece-Collier et al. 2002).

Settings

RehabSelfPrime-Speech intervention technique does not require any equipment or specific environment. Thus, the client can practice the technique in any setting in groups or individually—at home, in the clinic, or in the community—to initiate and maintain a motor performance.

The initial RehabSelfPrime-Speech intervention technique is used in clinical settings to facilitate upper extremity and lower extremity dressing, and simple meal preparation.

The Role of the Occupational Therapist

The role of occupational therapist (OT) is to organize the context in which the client practices the RehabSelfPrime-Speech intervention technique. Following client-centered practice principles, the OT collaborates with the client to choose the tasks that the client is interested in performing. For example, if the client chooses to perform tasks of simple meal preparation, the OT helps the client select action words the client needs to read aloud during the activity to facilitate the performance.

Results

A Brief Guide to Clinical Application

Individual training sessions are conducted three times a week for 15–30 min each time. Three weeks of interventions are suggested for this protocol to be internalized.

Fig. 43.1 A representative subject is swaying by reading aloud the word *SWAY* three times in preparation to rise from the toilet seat

RehabSelfPrime-Speech intervention techniques can be applied to facilitate ADL, work, or leisure activities. The principle of the technique derives from the repetition prime process. The client needs to read aloud semantically related action words three to four times before the client attempts to perform the action following a command. For example, if the goal of an intervention is to increase range of motion of the upper extremity for a reaching action, therapist advises the patient to read aloud the word "REACH" multiple times. After that, the therapist can provide a "go" signal for the patient to attempt to reach for an object in front of him or her. This process of action self-priming may continue for multiple times for the session or can be intermingled by other actions and performances. Several of these self-priming sessions will establish a routine procedural learning in the patient. Hopefully, then the self-priming will be integrated in the patient's behavior. Once the priming procedure is established, the patient then can be instructed to "read silently" instead of "reading aloud" in a skill transfer process.

Clients read aloud different action words three times and then perform the action with three repetitions. Following is an example of how the practice of RehabSelf-Prime-Speech intervention technique for a client with PD can be implemented.

To get up from a chair, the action word is *SWAY* and then *RISE*. The OT shows a card with the word *SWAY* on it. The client reads the word aloud three times, and then does a swaying motion while sitting on a chair. This action is repeated three times. After three sways, the OT shows the client other cards with the words *SWAY* and then *RISE*. The client reads the words aloud three times and tries to rise from the chair following the sway. The client does three attempts to perform this action (Fig. 43.1). Using this strategy of priming movement initiation, the action can be primed with words and can be applied to any daily tasks, such as dressing, self-care, or preparing a light meal.

Evidence-Based Practice

Primes are contextually or spatially relevant stimuli that, through experience, are associated with expected behavior. External and contextually relevant primes have

been theorized to guide internally the cognitive functions necessary for ADL and IADL performances (Gage and Storey 2004; Praamstra et al. 1998). Neurologic and motor control research has shown that the brain goes through cognitive programming or ideation before making any action or movement. Priming of this cognitive programming is possible through *external priming* via semantically related language (Gentilucci et al. 2000; Gentilucci and Volta 2008; Maitra and Telage 2004; Maitra et al. 2003; Maitra and Dasgupta 2005; Maitra 2007). For example, participants performed reaching and grasping tasks with a wooden block while they silently read the words *near, far, small,* and *large* written on the block. Results of this study showed that the participants reached faster when they reach for a block with the word *far* written on it compared to reaching for a block with word *near* written on it. Similarly, the grasping aperture was larger when the participant grasped a block with the word *large* written on it than when the word *small* was written on it. The conclusion was that the participants automatically associated the meaning of the word with the planning of the action (Gentilucci et al. 2000).

Studying clients with PD and stroke (Maitra et al. 2006), researchers showed that pre-reading of a word that is semantically related to the expected motor performance, positively influenced the performance. Speed and smoothness of the reaching or grasping task ($n=24$) were significantly facilitated when the words *REACH* or *GRASP* were pre-read (Grossi et al. 2007). The word-based contextual primes have to be in congruency with the movement performances. For example, a reaching performance is not influenced by an unrelated action word such as *RETURN* or nonsense word such as *GA* (Miller et al. 2005).

Pulvermüller et al. (2005) explained the mechanism by which action words can prime and facilitate a motor performance. He proposed that words are represented in the brain by a neuronal network (or cell assemblies). The network is formed by neurons that represent a word's meaning (sensory perception) as well as the neurons that represent the word's content (motor action). Thus, for example, visually seeing the word *REACH* (perception), or saying the word *REACH,* may stimulate the neural network governing the reach action, a phenomenon which can be investigated by functional magnetic resonance imaging (fMRI) data of the brain. For example, when the subjects read the words *lick, pick,* and kick, the brain showed activation in the sensory association areas of the mouth (for *lick*), hand (for *pick*), and leg (for *kick*) for interpretation of the meaning of the word. The fMRI also showed simultaneous activation of the motor areas of the mouth, hand, and leg responsible for licking, picking, and kicking actions (Pulvermüller et al. 2005). These studies provide a strong rationale for the present protocol.

Discussion

RehabSelfPrime-Speech intervention technique with semantically related action words to action is a simple but evidence-based interventions that can be implemented and incorporated into a regular neuromuscular intervention plan. Additionally, these

interventions can be implemented and practiced in multiple settings, including home. There is evidence that adherence to a program is greater when implemented in the home (Ashworth et al. 2005). Because PD is a progressive degenerative disease, it is unrealistic to expect that therapeutic interventions can be sustained over long periods of time. The priming method can be continued by the patient; empowering them to self-manage their symptoms as much as possible (Allen et al. 2012).

Conclusion

The evidence for the RehabSelfPrime-Speech intervention is supported by studies with people suffering from stroke (Maitra et al. 2006) or PD (Maitra 2007), and several empirical studies with older adults provided sufficient rationale to use the protocol in practice (Grossi et al. 2007; Maitra and Telage 2004; Maitra et al. 2003).

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The Case Study of Mr. W—The Use of Priming to Improve Function

Keywords Activities of daily living, Parkinson's disease, priming movement initiation

Introduction

The theme of this case study is based on the RehabSelfPrime-Speech intervention technique.

The students' tasks include:

1. Demonstrate an understanding of Parkinson's disease (PD).
2. Determine how symptoms of PD interferes with occupational performance.
3. Understand how semantic priming can be used to facilitate movement initiation.
4. Apply this understanding to a case example, creating a priming intervention.
5. Evaluate possible outcomes and revise the intervention, if necessary.

As a starting point, students should use the following references to gather background information. Links to the article and/or abstract are provided.

- Allen NE, Sherrington C, Suriyarachchi GD, Paul SS, Song J, Canning CG (2012) Exercise and motor training in people with Parkinson's disease: a systematic review of participant characteristics, intervention delivery, retention rates, adherence, and adverse events in clinical trials. Parkinson's Disease, 1–15. http://www.hindawi.com/journals/pd/2012/854328/

This article is a summary of evidence from 53 relevant randomized controlled trials (RCT) and 90 interventions on the use of exercise and motor training with patients with PD.

- Grossi JA, Maitra KK, and Rice MS (2007) Semantic priming of motor task performance in young adults: implications for occupational therapy. Amer J Occup Ther 61(3):311–320. http://ajot.aotapress.net/content/61/3/311.full.pdf

This study investigated the use of priming, using performance-related words and its impact on motor performance in young adults ($N=24$).

- Lim I, Van Wegen E, De Goede C, Deutekom M, Nieuwboer A, Willems A, Kwakkel G et al (2005) Effects of external rhythmical cueing on gait in patients with Parkinson's disease: a systematic review. Clin Rehabil 19(7):695–713. http://cre.sagepub.com/content/19/7/695.long

A review of 24 studies (two were RCT) focusing on the effects of external rhythmical cueing.

- Maitra KK (2007) Enhancement of reaching performance via self-speech in people with Parkinson's disease. Clin Rehabil 21(5):418–424. http://cre.sagepub.com/content/21/5/418.long

Participants with PD took significantly shorter time when using self-speech to complete a movement task (reaching for, grasping, and placing a water bottle) than in the control or other conditions.

Major Goal: The major goal of the priming motor initiation intervention is to enable the patient with PD to identify action words associated with completing an activity of daily living (ADL) or instrumental activity of daily living (IADL) that they identify as important and use those words to facilitate initiation (priming) in order to improve functional performance.

Learning Objectives: Using the case study, the student will be able to:

1. Identify motor control problems and risks for this patient with PD
2. Develop client-centered treatment goals to address motor performance
3. Create an intervention using a semantic priming example
4. Choose an activity and give examples of the semantic primes that could be used to help initiate movement
5. Evaluate the efficacy of the treatment intervention based on current available research evidence

The Case

Medical Diagnoses and Prognoses: Mr. W. is a 63-year-old male, diagnosed 15 years ago with early-onset Parkinson's disease. He has experienced periods of slow decline in motor performance, but has recently changed medications that have helped decrease involuntary muscle movement and improved his quality of movement. The patient's wife reports some cognitive decline—forgetfulness and a decreased attention span. Mr. W. hopes to continue to be as independent as possible, but also knows that the progression of the disease will make participation in everyday activities more difficult in the future.

Personal Data: He is a retired chiropractor who lives with his wife in a single-story house (five steps to enter the house) in a rural community. He takes some responsibility for household chores—especially outside mowing the yard. Mr. W. has volunteered for the local Parkinson's organization and has spoken to groups about the disease. He is also a member of a church band that plays together once a week. Mr. W. loves music and has been playing drums from an early age. He stopped playing the drums a year ago due to worsening Parkinson's symptoms; however, he has been able to play with the band once last month.

Reason for Seeking Occupational Therapy: Mr. W. is currently in an outpatient program after a fall at home and general decline of function. He is being seen by an occupational therapist (OT) and a physical therapist (PT). He identified his rehabilitation goals as improved movement for functional mobility in the house and community and improved quality of movement for performance of ADLs, IADL, and participation in volunteer activities. He particularly wants to be able to continue to mow the yard around the house.

Current Circumstances and Occupational Performance Issues: On evaluation, Mr. W. needs occasional minimal assistance to initiate movements such as coming from sit to stand and initiating locomotion. He walks without an assistive device, but uses external supports (rails, a table) about 25 % of the time and reports one fall in the past month. He needs some verbal cues to plan and complete his morning ADLs, and his wife reports that he can get "stuck" in a posture and needs physical assistance to get "unstuck" in order to complete a task like upper body dressing. At present, he needs minimal assistance to supervision for basic self-care tasks. He is a very social person and likes to talk with others in the clinic—both staff and other patients; however, he can be difficult to understand due to loss of volume in his vocalizations. He can be impulsive in his actions and requires some redirection to maintain a focus on safety and attention to a task.

Student Report: The following guiding questions have been identified in developing possible solutions to assist Mr. W. in treatment using a priming intervention. These questions are generated from the available literature references and clinical experiences.

1. What strengths and limitations do Mr. W. exhibit?
2. What specific motor control problems or risks do you think are a priority to address?
3. Focusing on the quality of movement, think of Mr. W.'s roles and tasks and
   - Choose two or three tasks that require functional mobility at home.
   - How could you incorporate semantic priming as a way to help him improve performance of those tasks?
   - Create a plan of treatment (goals and activities) that incorporates semantic priming.
   - Choose an activity. Create semantic primes that could be used to initiate movement and help Mr. W. complete the activity.
   - Write a description of how treatment intervention would be implemented.
4. Summarize your findings about what the research evidence suggests about the efficacy of the use of priming with Mr. W.?
5. In what ways does he fit/not fit the characteristics that would make semantic priming a viable treatment tool?
6. Based on research evidence, what functional improvement might you expect?
7. How would you evaluate the use of this treatment intervention with patients with PD?

Chapter 44
Ayres Sensory Integration® Intervention

Teresa A. May-Benson and Roseann Schaaf

After ASI, Max's mother reported. Max started to play trucks and cars with the other kids at school and can focus long enough to play a board game with the family. He will give verbal encouragement to another child who is upset. He is better able to participate in dressing and his sleeping has improved…he is now able to transition to bed with more ease, which was a welcome improvement.

Abstract Ayres (1972, p. 11) defined sensory integration as "the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment." The sensory integration process reflects a dynamic, self-organizing interaction between the child and the physical and social environment. This process is believed to be the natural result of a child's typical sensorimotor development. Sensory integration allows the child to engage in and participate in a wide range of meaningful and purposeful activities.

Keywords Sensory integration · Sensory processing · Sensation · Praxis

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Background

History

The sensory integration frame of reference was developed by A. Jean Ayres (1972, 1989, 2011), an occupational therapist (OT), with postdoctoral training in educational psychology and neuroscience. The theory of sensory integration was developed to explain behaviors in children with learning problems that were not adequately explained by existing perceptual motor theories.

Sensory Integration Theory

Ayres (1972, 1989, 2011) combined concepts from neuroscience, psychology, human development, and occupational therapy into a theory of sensory integration that provides a holistic framework for understanding behavior and learning. Although this theory has been updated and expanded, the premise that adequate processing and integration of sensory information provides a building block for skills, such as postural control, bilateral integration, praxis, visual motor skills, and self-esteem.

The theoretical postulates that form the foundation for the sensory integration frame of reference are:

1. Sensory integration is a developmental process.
2. Successful integration and organization of sensory information results in and is further developed by adaptive responses.
3. The "just right challenge" provides the milieu for sensory integration to occur.
4. Children have an innate drive to seek meaningful experiences from their environment.
5. Due to neuroplasticity, enriched experiences effect change in the nervous system.
6. Sensory integration is a foundation for physical and social engagement and participation in daily life activities and routines.

Sensory Integration Dysfunction

Ayres's (1989) factor and cluster analyses, and later contributions by colleagues (Davies and Tucker 2010; Mailloux et al. 2011; May-Benson and Cermak 2007; Mulligan 2002), identified patterns of dysfunction in sensory integration which assist in interpretation of assessment data and guide intervention. These patterns include:

1. *Somatodyspraxia*: Poor ability to plan and execute motor actions associated with signs of poor discrimination of touch and poor body scheme/body awareness (Ayres 1972, 1989, 2011).

2. *Bilateral integration and sequencing deficit*: Poor ability to coordinate both sides of the body and poor postural and ocular mechanisms associated with signs of inefficient processing and perception of movement and body position (Ayres 1972, 1989, 2011).
3. *Ideational dyspraxia*: Decreased ability to generate ideas for motor actions (May-Benson and Cermak 2007).
4. *Somatosensory processing deficit*: Poor discrimination of tactile and proprioceptive information (Ayres 1972; Mailloux et al. 2011).
5. *Vestibular processing deficit*: Poor awareness and tolerance of gravity and movement through space (Ayres 1972, 1989).
6. *Sensory modulation dysfunction*: Over- or under-responsiveness to sensory experiences or situations, particularly those that impact regulation of arousal level (Mailloux et al. 2011; Miller et al. 2007).
7. *Visuo-dyspraxia*: Poor visual perception and visual motor has also been identified although this pattern may not respond best to intervention using sensory integration (Ayres 1989; Mailloux et al. 2011).
8. *Postural–ocular movement disorder*: Deficits in postural control, muscle tone, and oculo-motor control with signs of decreased vestibular and/or proprioceptive processing and thought to be a foundation of bilateral integration and sequencing problems (Ayres 2011).

Definitions and Interventions

Definitions

Sensory Integration refers to "the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment" (Ayres 1972, p. 11). Sensory integration includes perception, modulation, and integration of sensory information as a foundation for participation in activities across social, physical, learning, and daily living tasks (Ayres 1972).

Sensory Processing Disorder is a term to identify children with problems processing sensation (Miller et al. 2007). Miller and colleagues propose a taxonomy of sensory processing disorder; however, this terminology is not universally accepted as many therapists prefer to describe children as having difficulty processing and integrating sensation.

Sensory Modulation refers to over or under-responsiveness to typical levels of sensation. In recent years, other terms have been used including hyper- and hypo-responsivity to sensation, sensory over- or under-responsivity, and, most recently, hyper- and hypo-reactivity (American Psychiatric Association 2013). Sensory modulation also refers to the neurological process of assessing sensory inputs for relevance, and adjusting the nervous system's response to those inputs.

Sensory Discrimination refers to the nervous system's ability to identify salient qualities and features, especially temporal and spatial characteristics, of sensations and to ultimately use this information for skill use.

Praxis is the ability to conceive of, organize, and carry out a sequence of unfamiliar, goal-directed actions (Ayres 2011).

Adaptive Response is the ability to respond appropriately and effectively to an environmental, sensory, or task demand (Ayres 1972).

Developmental Coordination Disorder (DCD) is a diagnosis consisting of poor motor coordination in the absence of frank neurological damage which results in deficits in functional performance. Many OTs view dyspraxia as a subtype of DCD and utilize this diagnosis with children with sensory integration-based praxis problems (Cermak and Larkin 2002).

Intervention

Sensory integration intervention, now referred to as Ayres Sensory Integration® (ASI) intervention, is based on the premise that foundational sensory motor skills are improved through active participation in meaningful individually-tailored sensory and motor experiences, which increase the ability to respond appropriately to, and make adaptive responses to environmental demands, allowing the child to better engage in functional activities. To encourage and promote the ability to demonstrate increasingly more adaptive responses to environmental and task demands, the OT guides and facilitates the selection of therapeutic activities based on the child's wants and needs. Intervention is often provided in an environment that affords opportunities for participation in active sensorimotor activities that provide levels of sensation that are greater than afforded in usual play environments. This approach often includes the use of specialized equipment, such as suspended swings that can be utilized in multiple ways, that allow for varying levels of linear and rotary movement; that provide opportunities for climbing, rolling, and sitting upon; and that provide opportunities for moving the body in a variety of ways.

Purpose

ASI is utilized when sensorimotor factors are determined to be affecting participation in daily life activities. This approach identifies sensorimotor factors that may be impacting participation, and then designs active, individually-tailored, sensorimotor activities to address these.

Method

Candidates for the Intervention

ASI is appropriate for any individual who has difficulties processing and integrating sensory information that impacts their ability to participate in chosen activities. This includes children with learning problems, nonverbal learning disability (NVLD), attention deficit disorder, autism spectrum disorder, Tourette's syndrome, and, in some cases, intellectual disabilities. Individuals with mental health concerns, such as anxiety, depression, obsessive–compulsive disorder, and schizophrenia may also benefit if they demonstrate sensory and/or motor difficulties. It is appropriate for individuals throughout the life span, from infants through adults. ASI is most often associated with children aged 4–8 years.

Epidemiology

The etiology of sensory integration problems is not well understood. Recent studies suggest a genetic component with sensory over-responsivity to touch and auditory information (Keuler et al. 2011). May-Benson et al. (2009) found that children with sensory processing problems and children with autism demonstrated high incidences of prenatal maternal stress, assisted delivery, cord wrap, breech position, high birth weight, jaundice, chronic ear infections, and delayed crawling.

Studies using the Sensory Profile (Dunn 1999) as a measure of sensory integration estimate a prevalence of 5–16.5% (Ahn et al. 2004; Ben-Sasson et al. 2009). This is consistent with the prevalence of DCD which is reported to be between 6 and 22% (American Psychiatric Association 2013). The incidence of sensory processing problems in children with autism is even higher with estimates of 45–90% (Ben-Sasson et al. 2007).

Prognosis and long-term follow up of individuals with sensory integration problems has not been examined; however, several studies have found that sensory and motor problems persist into adulthood. Motor difficulties are found to persist well into adolescence (Cermak et al. 1991) and adults with sensory integration problems report higher amounts of depression, anxiety, social isolation, and reduced quality of life (Kinnealey et al. 2011).

Settings

ASI may be provided in an outpatient clinic setting or within the school or hospital setting. The ideal setting for ASI is a treatment space that is well equipped with specialized equipment, has an adequate suspension system, and provides the opportunity for a one-to-one therapeutic relationship between child and OT practitioner.

Children with mild problems, or those nearing the end of services, may do well in a small group to work on social interaction skills as well as sensory and motor performance. OT practitioners may also provide consultation that includes specific recommendations for environmental modifications or sensorimotor activities performed within the child's daily routines (sometimes referred to a sensory diet).

The Role of the OT

OTs have expertise in working with children, families, and individuals to develop and monitor interventions designed to facilitate full participation in desired activities. Therapists utilizing ASI follow a data-driven decision-making process, as explicated by Schaaf and Blanche (2012). The steps of this process are as follows:

1. *Goal setting* which identifies participation challenges and sets goals with the parents, child, or individual. Goals are based on observations, history taking, discussion with parents/teachers, and other stakeholders and focus on participation in daily life activities.
2. *Systematic assessment* utilizing assessments which evaluate sensory processing factors that may underlie participation challenges. Strengths and barriers to participation/goal achievement are identified and include environmental (social, physical, cultural) strengths that support participation and environmental barriers which hinder participation.
3. *Generating hypothesis* using assessment findings regarding factors affecting successful participation.
4. *Designing intervention* through identification, development, and utilization of specific sensorimotor activities/strategies.
5. *Identifying proximal and distal outcomes* to monitor progress that are directly related to hypothesized factors affecting participation and include individual and environmental strengths and barriers. *Proximal outcomes* are factors affecting participation (e.g., poor praxis, decreased cognition or motivation, poverty of movement, spasticity, difficulty processing and integrating sensation, etc.), while *distal outcomes* are skills, abilities, and behaviors.
6. *Conducting the intervention* involves child–therapist interactions as described below, and includes collection of data on outcomes.
7. *Analyzing and displaying data* for analysis of outcomes with a chart, bar graph, line graph, or table.
8. *Modifying thehypothesis* based on reevaluation if outcomes are not met.

Assessment

A formal sensory integration assessment will occur across multiple levels of functioning. The International Classification of Function (ICF; World Health Organiza-

tion 2010) guides assessment, at the impairment, activity, and social participation levels and includes the ability to process and integrate sensory information, praxis, postural control and motor skills, and performance in daily life activities. Assessment tools are based on referral problems, purpose of the assessment (such as whether it is a school-based vs. clinic-based assessment) and abilities of the child.

Optimal sensory integration evaluation includes formal, objective, and standardized assessments combined with systematic clinical observations and parent/proxy report. The most commonly used standardized assessment for sensory integrative functioning is the Sensory Integration and Praxis Test (*SIPT*-Ayres; Ayres 1989) which provides diagnostic and descriptive information related to sensory integrative and praxis functions in children aged 4–8. The *SIPT* consists of 17 tests which assess areas of tactile, vestibular, and proprioceptive sensory processing; form and space perception; visuomotor coordination; motor planning ability; and bilateral integration and sequencing. Structured clinical observations of postural and motor skills provide additional qualitative information about children's performance and skills which aid in interpretation of standardized test results (Ayres 1972; Blanche 2010; Blanche et al. 2012). Parent/proxy report measures (e.g., Dunn 1999 and Parham et al. 2007) supplement standardized assessment information and provide information on the child's performance and responses to sensory information in the home and school environments.

Intervention

ASI is an art and science that involves understanding neurological foundations of sensory integration theory and its application to behavior. As an art, ASI involves a therapeutic relationship and skillful interplay between the child and the therapist. It is unique from other sensorimotor therapies in its focus on the improvement of sensory factors impacting behavior and eliciting of adaptive responses during treatment activities, usually contextualized within play, which require active participation of the child. The basic elements of ASI, are specified by Parham et al. (2011) and May-Benson et al. (2014). The ASI intervention Fidelity Measure© specifies structural and process components of the intervention. Structural components include the physical plant, assessment process, and training needed to fully implement the intervention. Process components reflect behaviors and interactions performed by the therapist. In ASI, as appropriate to the child's needs, the therapist will:

1. Ensure the child's physical safety
2. Present at least two sensory opportunities from tactile, vestibular, or proprioceptive inputs
3. Help maintain appropriate level of alertness
4. Challenge postural, ocular, oral, and/or bilateral motor control
5. Challenge praxis and organization of behavior
6. Collaborate in activity choice
7. Tailor activity to present just-right challenge

8. Ensure activities are successful
9. Support the child's intrinsic motivation to play
10. Establish a therapeutic alliance

Evidence-Based Practice

Evidence for ASI has grown with areas of evidence which include (a) etiology, (b) clinical manifestation, (c) diagnosis, (d) assessment, (e) prognosis, (f) intervention, (g) prevention, and (h) patient experience and meaning. Information on most of these areas has already been presented. May-Benson and Koomar (2010) conducted a systematic review of 27 studies examining the effectiveness of ASI with children who had problems processing and integrating sensation. Thirteen of the 27 studies were randomized controlled trials. May-Benson and Koomar found that ASI may result in positive outcomes in sensorimotor skills and motor planning, attention, socialization, behavioral regulation, reading-related skills, participation in active play, and achievement of individualized goals. Further, gross motor skills, self-esteem, and reading gains were found to sustain from 3 months to 2 years. Since this review, two additional randomized controlled trials with children who had autism found significant positive gains on goal attainment scales (individualized goals), in socialization, reduction of caregiver assistance in self-care, and reduction of autistic mannerisms (Pfeiffer et al. 2011; Schaaf et al. 2014).

Discussion

Sensory integration is a theory that describes how processing and integration of sensory information provides an important foundation for functional skills and participation in activities. Intervention using the sensory integration approach is guided by the theory of sensory integration (Ayres 1972, 1989) and has been operationalized into key principles (Parham et al. 2011). This approach may be an appropriate choice when the challenges participating in activities are related to poor processing and integration of sensation. This intervention is frequently carried out by OTs following a systematic reasoning process designed to assess and treat sensory factors that may affect the participation challenges and goals. Intervention is playful, includes active participation of the child, tailored sensorimotor activities and the use of specialized equipment and settings. Efficacy evidence is emerging for children with learning difficulties, autism, and other developmental delays. (For more information, see references in The Case Study of: Caroline, a child with problems processing and integrating sensory information.)

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The Case Study of: Caroline, a Child with Problems Processing and Integrating Sensory Information

Keywords Integration, intervention, praxis, sensory, sensory defensiveness

Introduction

The theme of this case study concerns provision of Ayres Sensory Integration® (ASI) intervention for a child with problems processing and integrating sensory information.

The students' tasks include:

1. Finding information about the sensory integration frame of reference.
2. Synthesizing assessment results to identify patterns of sensory integration dysfunction.
3. Determining possible outcome measures, goals, and objectives for intervention.
4. Identifying possible sensory integration activities to address major areas of concern.
5. Synthesizing the case information into a report.

As a starting point, the students should use the following references in addition to the references cited in the text to gather background information:

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Overview of the Content

The major goals of ASI intervention are to:

1. Facilitate participation in activities
2. Support self-regulation of behavior as a basis for participation in daily activities
3. Facilitate the development of praxis as a building block for participation in activities

Learning Objectives

By the end of this chapter, the learner will:

- Be able to understand the theoretical postulates of the sensory integrative approach
- Apply common terminology in the OT–SI approach
- Understand the unique features of this approach
- Outline the process for assessment, intervention and documentation of outcomes in the SI approach
- Understand the application of the OT–SI approach through a case example

The Background History of the Clinical Case Study

Personal Data

Caroline is an 8-year and 1-month-old female in second grade of school.

Medical Diagnoses and Prognoses

Caroline was born at 25 weeks' gestation by emergency C-section weighing 1.25 lbs. She was hospitalized in the neonatal intensive care unit for 3 months. Early developmental milestones were within normal limits. She is left-hand dominant. She has diagnoses of learning disability, attention deficit disorder, and language processing problems.

Reason for Seeking Occupational Therapy

Caroline's parents were concerned about her high state of arousal and over-responsivity to sensations provided by daily activities, such as bathing and hair brushing,

which often resulted in extreme emotionality and frequent behavioral outbursts. They expressed that Caroline lacked independence in dressing, self-care, and hygiene and that they were afraid that her social interactions and acceptance by her peers were affected by her poor hygiene and sloppy dress. They believed her poor fine motor skills and handwriting adversely impacted her ability to complete her school work. They wanted Caroline to be less frustrated and more successful in school with an overall better self-esteem. They also wanted home life to be easier and less stressful for the all family members.

Current Circumstances

Caroline was evaluated using the Sensory Integration and Praxis Tests (SIPT), informal clinical observations of posture, motor skills and balance, and a parent-completed developmental/sensory history. Her assessment indicated that Caroline was very defensive to touch and had sensitivities to visual and auditory sensory inputs. She sought proprioceptive input through jumping on beds and chewing on her clothing and other objects as a means of regulating and organizing her behavior. Caroline demonstrated decreased tactile, proprioceptive, and vestibular discrimination which contributed to problems in postural control and praxis. These difficulties resulted in difficulty carrying out motor-based activities, such as dressing and active play on a playground with peers. In the area of praxis, she demonstrated good ideation skills but had difficulties with motor planning, sequencing skills, and bilateral coordination.

Occupational Performance Issues

Caroline had difficulty with many daily living skills and difficulties in social participation. She had problems sleeping alone (often sleeping with her parents), falling asleep, and sleeping through the night. Being sensitive to certain clothing textures, tags in shirts, and socks, she was very particular about her clothing which interfered with her independence in dressing as well as completing her morning routines. She preferred to wear stretch pants and t-shirts because of difficulties dressing herself and managing fasteners. Caroline strongly resisted haircutting and hair brushing, and, with her clothing, often looked unkempt. She was a messy eater, had difficulties handling utensils, often knocked over glasses, and spilled or broke things. She had poor balance which made it hard to learn to ride a bicycle. At school, she often stood at the table instead of sitting, sat on the edge of her seat, and frequently fell out of her chair. Lastly, Caroline had problems organizing herself to clean up her room, do homework, or complete household chores.

The Student's Report

The following questions are generated from the available literature, references, and our clinical experiences and will guide the student in developing an assessment and intervention plan for Caroline:

Questions

1. What assessments are appropriate to identify sensory integration problems for this child?
2. What patterns of sensory integration dysfunction does this child demonstrate?
3. What outcomes would you expect to change?
4. What short- and long-term goals would you set for this child?
5. What are the steps in the clinical reasoning process you would use to assess and treat this child?
6. What type of intervention setting and activities would be useful for this child?
7. What other intervention approaches may be useful to use with this child?
8. What is the research evidence for occupational therapy using a sensory integration approach?

Chapter 45
Upper-Limb Therapy in Children Following Injection of Botulinum Neurotoxin A

Brian Hoare and Remo N. Russo

After injection and intensive therapy, the client was really happy to be able to catch and throw a ball with his school friends.

Abstract Botulinum neurotoxin A (BoNT-A) is a useful medication for the reduction of muscle overactivity in the upper limb(s) of children with cerebral palsy. The method for BoNT-A delivery, dose, and muscle localization criteria are established. Children who are being treated require appropriate assessment at the impairment and activity levels of functioning. Once injected, children require specific therapy delivered by an occupational therapist according to the specified goals that are set out prior to injection, by the child, family, and health-care workers. BoNT-A injection offers the child with cerebral palsy a period of reduced muscle overactivity and is a useful adjunct to evidence-based upper-limb therapy.

Keywords Botulinum neurotoxin · Cerebral palsy · Child · Upper limb

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Definition and Background

Cerebral palsy is described as "a group of disorders of the development of movement and posture, causing activity limitation that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain" (Bax et al. 2005). Children with cerebral palsy can experience varying degrees of positive (e.g., muscle overactivity) and negative (e.g., sensory impairment) features of the disorder, and each can have an impact on function (Graham 2000). The predominant disorders of muscle overactivity in cerebral palsy are spasticity and dystonia (Jethwa et al. 2010). The topography of involvement can affect the upper limb(s) in all forms of cerebral palsy, and impact on the performance of daily tasks.

Both spasticity and dystonia can be influenced by botulinum neurotoxin A (BoNT-A) injection (Brin 1997).

BoNT-A is a protein product of *Clostridium botulinum,* an anaerobic bacterium (Jankovic and Brin 1997). Its action is to block the release of acetylcholine from the motor nerve terminal to the muscle cell, causing a chemical denervation (Brin 1997). The pharmacologic effect of BoNT-A lasts up to 12 weeks (Graham 2000); however, as an adjunct to upper-limb therapy functional benefits lasting much longer can be experienced (Hoare et al. 2010; Russo et al. 2007).

BoNT-A is injected directly into the overactive muscles, which are targeted according to clinical evaluation and desired functional goals. In the upper limb, these muscles may include the shoulder internal rotators and adductors, elbow flexors, forearm pronators, wrist flexors, long finger flexors, and thumb adductors and flexors (Hoare et al. 2010). Dosing regimes and dilution volumes for BoNT-A are established (Russman et al. 1997). The child usually has some form of analgesia for the procedure (Forrester et al. 2011), and the muscles to be injected are identified using a method of localization such as electrical stimulation, electromyography, or ultrasound to ensure correct needle placement (Chin et al. 2005).

Purpose

BoNT-A injected directly into the overactive muscle results in relaxation of the muscle and improved posture, providing a useful adjunct to evidence-based upper-limb therapy. To improve function, injection of BoNT-A must always be considered as an adjunct to preplanned, evidence-based, and goal-directed intervention (Hoare et al. 2010, Fehlings et al. 2010). It should never be used in isolation for functional improvement.

Method

Candidates for the Intervention

The primary goal for upper-limb injection of BoNT-A in children is to reduce muscle overactivity thereby reducing the risk for development of increased muscle stiffness and permanent shortening.

For children with cerebral palsy with *more severe upper-limb impairment* (i.e., Manual Ability Classification System (MACS) level IV and V; Eliasson et al. 2006), BoNT-A may also be injected to increase passive and active range of motion, improve tolerance to splinting and casting, maintain hygiene and skin integrity, improve cosmesis, manage pain, or prevent long-term deformity. Injection of BoNT-A may also be used to decrease caregiver burden during tasks such as dressing and bathing.

For children with *less severe upper-limb impairment* (i.e., MACS level I–III; Eliasson et al. 2006), hand skill development, improved occupational performance, and functional goal attainment are often the goals for the use of BoNT-A as an adjunct to upper-limb therapy.

Epidemiology

Cerebral palsy occurs with an incidence of approximately 2 per 1000 live births (ACPR 2013). It is the most common form of childhood physical disability and there is no cure. Upon careful and thorough clinical assessment, it is estimated that up to 50 % of the population of children with cerebral palsy will benefit from upper-limb injection of BONT-A.

The Role of the Occupational Therapist in Applying the Intervention

The role of the occupational therapist is integral in the identification of appropriate children for BoNT-A injection, the selection of muscles for injection, pre- and postinjection assessment, goal setting, and the provision of preplanned, evidence-based, and goal-directed intervention following injection.

Results

Clinical Application

Assessment of the Upper Limb before Injection of BoNT-A

Assessment at the *impairment level* must be undertaken prior to receiving BoNT-A injection. These measures assist in (1) identifying muscles with significant overactivity interfering with function, (2) selecting and prioritizing the muscle(s) for injection, (3) determining the dosage, and (4) choosing the type and amount of postinjection therapy.

Clinical range of motion is measured together with spasticity using the modified Tardieu Scale (Boyd and Graham 1999). This measure of spasticity is obtained when a joint is moved as fast as possible through its range of movement (V3 velocity) and the angle of "catch" elicited is measured using a goniometer. The difference between the angle of "catch" (R1) and the full passive range of movement (R2) reflects the potential range available in the joint if spasticity is eliminated. The modified Ashworth Scale may also be used to grade resistance to slow passive stretch to establish the level of muscle stiffness (Bohannon and Smith 1987).

Prior to considering BoNT-A injection for children MACS level I–III, careful *activity level* assessment to examine the influence of abnormal posturing on active use of the hand during task performance is essential. Videotaped assessments such as the Modified Melbourne Assessment (MMA; Randall et al. 2012), the Assisting Hand Assessment (Krumlinde-Sundholm et al. 2007), Box and Blocks (Jongbloed-Pereboom et al. 2013), or the Shriners Hospital Upper Extremity Evaluation (SHUEE; Davids et al. 2006) provide valuable information on a child's typical movement abilities. These observations are critical for (1) guiding muscle selection, (2) directing postinjection therapy, and (3) providing objective data measuring the change following BoNT-A and therapy.

Goal Setting

The Canadian Occupational Performance Measure (COPM; Law et al. 1994) is designed to detect change in a person's occupational performance. The COPM is an extremely useful tool for identifying and prioritizing goals pre- and postinjection of BoNT-A. The COPM responses can be transferred and scaled using the Goal Attainment Scaling (Kiresuk et al. 1994). This complementary approach enables goal identification, articulation, and measurement (Wallen et al. 2007).

Intervention Postinjection of BoNT-A

Impairment Level: Stretching and Splinting

With or without BoNT-A, there is a paucity of evidence supporting the use of upper-limb impairment-based therapy interventions (Novak et al. 2013). This includes splinting, casting, and upper-limb resistance training.

Splinting. A Cochrane systematic review demonstrated little benefit for stretching of muscles to prevent or reduce contractures, concluding that the use of splints be ceased (Katalinic et al. 2009). The application of these findings to children with cerebral palsy however, is extremely limited. The current state of evidence for upper-limb stretch in children is due to a lack of research as opposed to evidence suggesting these interventions are not effective (Jackman et al. 2013; Katalinic et al. 2009; Novak et al. 2013). In the only study directly evaluating the effects of upper-limb static *night splinting* following BoNT-A injection in children with cerebral palsy, splinting was found to demonstrate a favorable treatment effect in reducing spasticity and improving function (Kanellopoulos et al. 2008).

Until evidence proves otherwise, it is considered the potential benefits of sustained stretch overnight when a child is not using the limb(s) far outweigh the negligible risks and low cost of this intervention. The general clinical recommendation for *static splint use* is for a minimum of 6 h per night. This is based on evidence that contractures did not occur in children with cerebral palsy when lower-limb muscles were stretched for more than 6 h (Tardieu et al. 1988). The optimal splint design or position is currently unknown. *Day splinting* using neoprene and lycra garments *is not recommended* following injection of BoNT-A, with limited evidence for efficacy (Jackman et al. 2013) and the potential to reduce agonist and antagonist muscle movement, creating further weakness.

Casting is clinically indicated when fixed contracture (loss of passive range of motion) is present. Casting provides a low-load prolonged duration muscle stretch. Typically, a serial program is implemented whereby a cast is reapplied every 3–7 days, gradually increasing the passive range of movement until the desired range is achieved. Three to four serial casts will usually be adequate to achieve the desired range of movement, and static splinting following the casting program is essential to maintain gains.

Upper-limb resistance training. Children with cerebral palsy are weak (Mockford and Caulton 2010). Considering the denervation effect of BoNT-A, structured upper-limb resistance training following BoNT-A should be considered (Elvrum et al. 2012). It is important to recognize that in children muscle strength can occur in the absence of muscle hypertrophy following resistance training programs (Stackhouse et al. 2005). This suggests that gains in strength appear to have more to do with neural factors or increases in motor unit recruitment and firing rate. Clinicians should adhere to the guidelines by National Strength and Conditioning Association for youth resistance training (Faigenbaum et al. 2009).

Activity Level: Occupational Therapy

It is generally recommended that occupational therapy should commence 2–4 weeks following injection, with research supporting intensive bursts of movement-based training provided once or twice weekly for 2–3 months following injection (Hoare et al. 2013).

Clinicians need to consider important transitions during childhood. Children preparing for school need independence in skills such as dressing, cutting, and opening a lunch box. In this instance, specific task practice using a *goal-directed training program* is more appropriate than a broad-based motor program (Hoare and Imms 2009, Mastos et al. 2007). Goal-directed training is an activity-based approach to therapy aiming to improve a person's ability to engage in meaningful activities (Mastos et al. 2007). Programs are implemented using principles of motor learning (Muratori et al. 2012) and are based on four components: (1) selection of a meaningful goal, (2) analysis of baseline performance, (3) intervention/practice regime, and (4) evaluation of outcome (Mastos et al. 2007). Prior to injection of BoNT-A, the COPM (Law et al. 1994) and Goal Attainment Scaling (Kiresuk et al. 1994) can be used to identify a meaningful goal for a child. The therapist should observe the child's baseline performance of the task to identify the specific areas of limitation. This process facilitates treatment planning and may also assist in determining appropriate muscles to be targeted for injection with BoNT-A. Following injection, the occupational therapy intervention focuses on *specific and repetitive practice* of the chosen task. The role of the therapist is to adapt the task or environment, and create a learning situation to develop active problem solving, exploration of alternative strategies, and opportunity for repetitive task practice.

For younger children with unilateral cerebral palsy, both *constraint-induced movement therapy* (CIMT) and *bimanual therapy* have proven to be effective with or without the use of BoNT-A (Hoare et al. 2013; Hoare et al. 2007). Clinicians should consider the specific goals for intervention and choose the most developmentally appropriate, family-friendly, and convenient of these approaches following BoNT-A injection.

Traditional upper-limb occupational therapy practice involves a bimanual approach to training that is underpinned by several theoretical models (Chapparo and Ranka 1997; Kielhofner 1995; Law et al. 1997). Occupational therapists target the treatment of hand skills with specific task practice using a motor skill acquisition frame of reference (Kaplan and Bedell 1999). This approach is well supported by recent advances in knowledge in the areas of neuroscience, basic mechanisms of hand function, and, more specifically, motor control and motor learning theories (Eliasson 2005; Hoare et al. 2010).

CIMT; Taub et al. 1999; see Chapters?) combined with BoNT-A injection can be effective in providing intensive practice to young children with unilateral upper-limb involvement who do not spontaneously use their affected upper limb or have a significant developmental disregard. As the evidence is as supportive of modified CIMT as it is of CIMT (Eliasson et al. 2014), a modified protocol using a mitt and 2 h of daily practice for 2 months is suggested. A bimanual training program should follow shortly after.

Evidence-Based Practice

There is very strong evidence supporting the use of activity-based upper-limb interventions to improve motor activities, function, and self-care in children with cerebral palsy (Novak et al. 2013). This includes bimanual therapy, CIMT, goal-directed training, and context-focused therapy. There is also strong evidence for home programs that support the implementation of these interventions in a child's natural environment (Novak et al. 2013, Novak et al. 2009).

All these treatment models are time-limited, *top-down or goal-directed, intensive blocks of skills training* (Hoare et al. 2013) and apply principles of motor learning and motor control (Muratori et al. 2012). *Bottom-up approaching models* (Mandich et al. 2000), based on hierarchical theories that assume functional gains will be achieved by remediating delayed, deficient, or missing foundational motor skills, *should not* be used in children with cerebral palsy (Novak et al. 2009). These models include sensory integration, process-oriented treatment, perceptual motor training, or a combination of these.

Discussion

The primary goal for upper-limb injection of BoNT-A in children is to reduce muscle overactivity thereby reducing the risk for development of increased muscle stiffness and permanent shortening. As an adjunct to evidence-based upper-limb therapy, careful and considered injection of BoNT-A offers a window of reduced muscle overactivity to maximize the effect of activity-based therapy that aims to improve upper-limb function. Effective, evidence-based therapy following upper-limb injection of BoNT-A may include *bimanual therapy, CIMT, goal-directed training, or context-focused therapy*. All children should also be provided with *a home program*.

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The Case Study of Anna: Activity-based Therapy Following Upper-Limb Injections of Botulinum Neurotoxin A

Keywords Botulinum neurotoxin A, cerebral palsy, upper-limb rehabilitation

Introduction

The theme of this case study is to improve the functional use of the more affected upper limb in a young child with unilateral cerebral palsy.

The student's tasks include:

- Understanding the etiology, definition, types, and symptoms of cerebral palsy (Bax et al. 2005)
- Reasons for using botulinum neurotoxin A in the upper limb in children with cerebral palsy (Hoare et al. 2010; Hoare et al. 2013)
- Understanding the types and evidence for upper-limb occupational therapy intervention in children with cerebral palsy (Valvano 2004; Novak et al. 2013; Eliasson et al. 2014)
- Synthesizing the information into a report

As a starting point, students should use the following references to gather background information.

Important references include:

Bax M, Goldstein M, Rosenbaum P, Leviton A, Paneth N, Dan B et al (2005) Proposed definition and classification of cerebral palsy, April 2005. Dev Med Child Neurol 47(8):571–576

Eliasson A-C, Krumlinde-Sundholm L, Gordon A, Feys H, Klingels K, Aarts P, Rameckers E, Autti-Rämö I, Hoare B (2013) Guidelines for future research in Constraint-induced movement therapy for children with unilateral cerebral palsy: An expert consensus. Dev Med Child Neurol (in Press)

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Overview of the Content

Major Goals of the Actual Intervention

The major goal for injection of botulinum neurotoxin A is to reduce muscle overactivity thereby reducing the risk for development of increased muscle stiffness and permanent muscle shortening. As an adjunct to upper-limb activity-based intervention, injection of BoNT-A also offers a window of reduced muscle overactivity and improved posture to maximize the effect of activity-based therapy that aims to improve upper-limb function and occupational performance.

Learning Objectives

By the end of studying this chapter, the learner will:

- Be able to use a literature review to solve the case based on the Case Study Method (CM)
- Be able to apply the CM in clinical reasoning to the specific case study and similar clinical situations.
- Understand the justification and ethical considerations related to using botulinum neurotoxin A in children with cerebral palsy.
- Write a scientific report on using botulinum neurotoxin A as an adjunct to upper-limb therapy in children with cerebral palsy.

The background history of the clinical case study:

Personal Information

Anna is an 18-month-old girl who lives with her parents, James and Kate. James works full time and Kate works 3 days a week. While her parents are working, Anna attends child-care for 2 days a week and is cared for by her maternal grandparents on the other day.

Medical Information Including Prognoses

Anna was born at term via an uncomplicated pregnancy. At 4 months of age, Kate noticed that Anna's right hand was fisted with her thumb tucked into the palm. Anna

also had a strong left-hand preference during play and avoided use of her right hand. At 7 months of age, Anna was assessed by a pediatric neurologist who suspected a diagnosis of right unilateral cerebral palsy. This was confirmed by an MRI at 8 months of age. Anna now sits independently and uses a commando crawl to move around on the floor. She does not crawl. She has recently started to pull to stand and is able to take steps while holding onto furniture. She has started to use single words and responds well to verbal cues.

Occupational Therapy Interventions

Following her diagnosis, Anna was referred to the physical rehabilitation clinic at a local hospital. She was assessed by the multidisciplinary team and goals discussed with her parents. James and Kate were very concerned about Anna's lack of spontaneous use of her right upper limb and their primary goal was for Anna to play with toys using two hands. As a result, Anna received an 8-week block of modified constraint-induced movement therapy (mCIMT) with her occupational therapist. She was also provided with a static overnight stretching splint with a supination strap. Anna made significant improvements following mCIMT. She now spontaneously initiates the use of her right hand to touch and hold objects. She is able to grasp, hold, transport, and release smaller objects but has difficulty with larger objects. She also has difficulty stabilizing objects on the table and pulling objects apart. Anna has full passive range of motion in all joints and no catch is present on high-velocity passive stretch. During her post-intervention assessment, Anna's occupational therapist was concerned with increasing abnormal posture in her right shoulder, forearm, and thumb. During active use of the right upper limb, Anna's shoulder appeared to internally rotate, the forearm hyper-pronated, and thumb adducted across her palm. This made the effective grasp of objects difficult. The occupational therapist felt an injection of botulinum neurotoxin A would assist in improving posture during active use of the limb and an appointment was made for consultation with the rehabilitation specialist at the physical rehabilitation clinic.

The Student's Report

The following guiding questions have been identified in developing possible solutions for Anna. These questions were generated from the references found in the literature search:

- What are the major definitions and concepts used in this case?
- What is the aim of the static night splint with supination strap?
- Is Anna an appropriate candidate for upper-limb botulinum neurotoxin A? What valid and reliable assessments could be used to help determine the need of an upper-limb injection?

- What muscles would be considered for injection of botulinum neurotoxin A?
- What type of activity level intervention would be appropriate for Anna following injection of BoNT-A? What intensity and how long should this intervention be provided for? What is the evidence for this intervention?
- What are some examples of age-appropriate and challenging activities to use in therapy sessions?
- What are some considerations for the treatment environment to ensure Anna achieves the level of practice required to improve her hand skills?
- What are some of the personal and environmental barriers to implementing a home program for Anna?

Chapter 46
The Role of Occupational Therapists in the Rehabilitation Team

Anne M. Baker and Carolyn A. Unsworth

Abstract The purpose of this chapter is to define the scope and role of the occupational therapist (occupational therapy) within a rehabilitation team. This chapter defines the different types of teams that exist, and presents information across all types. Frequently cited advantages and barriers to teamwork are also discussed. To provide context for the reader, the concepts that are discussed within this chapter are applied to teams working with clients who have experienced a stroke. The principles that are used by occupational therapists working on stroke teams are also applicable to many other clinical populations. Finally, the evidence base for teamwork is discussed, with respect to published studies.

Keywords Multi/inter/trans-disciplinary team · Teamwork

Definitions

Definitions are adapted from Janis 1982; Myers 1975; 1982 Paul and Peterson 2001; Unsworth et al. 1987; Weiland et al. 1996.

- *Multidisciplinary teams*: Involve clinicians working each within their particular scope of practice, and interacting formally to independently contribute to the diagnostic/evaluation and intervention decisions about a client (for example, family meeting discussions, in which clinicians present to the client under their allocated specialty, e.g. occupational therapy/physiotherapy/speech pathology/dietetics/nursing/medical staff).
- *Interdisciplinary teams*: Involve overlap of professional clinical roles, formal and informal communication, and shared clinical reasoning between all team members (for example, allied-health clinicians who work together in emergency departments as "allied-health professionals", rather than under their discipline specific roles).

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- *Transdisciplinary teams*: Involve blending of professional clinical roles, where one clinician might take on multiple roles for the team and for the client (for example, case managers).
- *Groupthink*: Occurs when members of the team do not present alternative ideas, critique a decision, or raise an unpopular opinion about the diagnostic/evaluation and intervention decisions about a client (for example, rehabilitation teams who continue to use the same type of pressure-relieving cushion that has been traditionally used in their setting, even if emerging evidence exists to support the use of an alternative cushion). This usually occurs in order to maintain the cohesion of the team, while sacrificing what could be the best solution for the client.
- *Decision polarisation*: Occurs when members of the team take on more extreme views than they usually would for decisions about a client. For example, in a team meeting, a clinician might participate in the discussion about the client and then support the view that the client is safe to be discharged home. However, this clinician may have come to the team meeting with the view that the client needed more time to recover independent living skills. This polarisation, or extreme shift of the decision, may be due to pressure from other members of the team to align with a more dominant view, or a willingness to take a more extreme view as there is shared responsibility for the decision, and therefore the clinician is not individually bearing the consequences. Early literature dubbed decision polarisation 'risky shift', as it appeared that team decisions polarised in the direction of taking more risks. However, research quickly showed that decisions polarised toward both more risky and more conservative views.

Purpose

Over the past 50 years, relatively little research has been undertaken, or publications produced by occupational therapists about the role of this profession in teamwork. Notable exceptions, as presented in this chapter include papers by: Unsworth (1996, 2001), and the work of Atwal (2002, 2005) and Drinka and Clark (2000). There is, however, a wealth of general textbook material (see, for example, Mosser and Begun 2013), and some research (as cited within this chapter) supporting teamwork as the most desirable approach for delivery of health-care services. In fact, this method has proved so effective and popular in daily practice that a team approach to the delivery of most health-care services has been the expected norm for decades (Weiland et al. 1996). In the area of stroke rehabilitation, used as an illustrative example throughout this chapter, the team approach has been widely accepted as superior to uncoordinated service provision since the 1970s (Pendarvis and Grinnell 1981; Slade and Nathanson 1976; Wood-Dauphinee et al. 1984).

There are three styles of teamwork that are most commonly referenced in the literature: multidisciplinary, interdisciplinary, and transdisciplinary teams (Paul and Peterson 2001). Although each of these styles of teamwork differs with respect to the leadership, culture, and type of participation that is expected, working within a

team (regardless of the type) is felt to be advantageous (Atwal 2002). Frequently cited advantages of teamwork include: producing more effective services, providing a responsive and client-focused service, reducing duplication and improving planning, and creating more satisfying roles for clinicians (Sheehan et al. 2007). However, there are a range of barriers that must be overcome in order to ensure that teams are able to function effectively. These factors may include: professional assumptions about other disciplines, blurring of role boundaries, and communication and decision-making difficulties including decision polarisation and groupthink (Sheehan et al. 2007; Unsworth 1996).

Method

- *Candidates (population groups) for teamwork* are diverse and frequently cited throughout the literature. A select example of population groups that are conducive to a teamwork approach include: cancer care (Fleissig et al. 2006), paediatrics (Watter et al. 2008), mental health (Simpson et al. 2005), and stroke (Unsworth et al. 1997).
- *Setting for teamwork* are once again diverse and frequently cited throughout the literature. A select example of settings suitable for teamwork include: acute care (Robertson and Finlay 2007), inpatient rehabilitation (Armstrong 2008), and community health (Enemark-Larsen and Carlsson 2012[1]).
- The remainder of this chapter explores the role of occupational therapists in the rehabilitation team (including both inpatient and outpatient rehabilitation), with a stroke population.

The Role of the Occupational Therapy

Standard rehabilitation teams often include medical staff, occupational therapist(s), physiotherapist(s), speech-language pathologist, neuropsychologist, dietician, social worker and nurses, as well as the client and his or her support network. Within this make-up, the role of occupational therapy is to promote health and well-being through the use of occupation (Unsworth 1995; Unsworth 1996). Clinicians may choose to select a conceptual model of practice that focuses on the concepts of volition, habituation, performance capacity, and environmental context in order to help facilitate occupational performance (Kielhofner 2008) or alternatively clinicians may focus on the reciprocal interaction that exists between a person, their environ-

[1] Editor: A newly published report concern the teamwork aimed to decrease community inhabitants' financial maintenance support. Paulson, H (2014) Report 15:2014. (In Swedish) http://www.linkoping.se/Global/St%C3%B6d%20och%20omsorg/Kvalitet%20och%20utveckling/FoU/FoU-rapporter%202014/FoUa_15_2014_Team_Utreda_web.pdf. Assessed 2014/10/23

ment, and occupation (Melton et al. 2009). Regardless of the model that is chosen, clinicians apply the concept of "occupation" within the rehabilitation setting to their clients' everyday activities such as personal activities of daily living (PADL—eating, toileting, showering, dressing, grooming), domestic activities of daily living (DADL—cooking, cleaning, laundry), and community activities of daily living (CADL—shopping, employment, driving). Because of their specialist knowledge about the interaction between the environment and occupation, occupational therapists also play a key role in enabling their clients to make a safe transition between rehabilitation and home/or an alternative discharge destination (Unsworth 1995). To provide an example of this, Unsworth et al. (1995) conducted a study in order to determine how rehabilitation teams determine the most appropriate housing for stroke survivors upon discharge from a hospital in the state of Victoria, Australia. This study was underpinned by a Social judgment theory approach, which explored how decision makers (in this instance, teams of clinicians) weighed and combined information in reaching decisions in complex environments. Thirteen rehabilitation teams (total clinicians: $n = 74$) from metropolitan and rural regions were asked to document the accommodation recommendations and policies for 50 hypothetical stroke clients. The clinician sample consisted of 13 occupational therapists, 13 rehabilitation consultants/ physiatrists, 13 registered nurses, 13 physiotherapists, 10 social workers or welfare officers, and 12 speech pathologists. Each clinician was issued with a 'casebook', which was completed individually. Clinicians were then brought together in their teams, and asked to make a decision together about where each client should be discharged to. Each client was described in terms of eight attributes: mobility status, ability to manage their own affairs, client's choice of housing, PADL skills, D/CADL skills, general health status, social situation, and premorbid living arrangements. Theses attributed had been previously researched as central to housing discharge decisions (Unsworth and Thomas 1993). Team recommendations were recorded on a response scale. The findings showed considerable, yet reliably consistent, differences among team members about the recommendations that were made, and all 13 teams agreed in only 6 of the 50 cases. Although medical practitioners (in this instance rehabilitation consultants) are often dominant in guiding team decisions (Sheehan et al. 2007), the research showed that occupational therapists (and to a lesser extent, social workers) were just as important as the rehabilitation consultants in making and promoting decisions around discharge in each of the cases (Unsworth et al. 1997). This suggests that occupational therapists play a critical role within rehabilitation teams around facilitating discharge planning, in-line with a client's functional status.

Results

Clinical Application of Teamwork

Teams can and do vary in their composition and the way in which they function in a clinical environment. Geddes and Chamberlain (2001), for example, conducted

a prospective quantitative study in order to describe and compare six services providing multidisciplinary rehabilitation to stroke survivors. Based in England and Northern Ireland, data were collected from 1997 to 1999 on 1076 clients, who received community-based rehabilitation. Sites were selected in order to highlight the different ways of supporting and treating stroke clients in the community. No site had a policy of providing/restricting services on the basis of age, and all teams saw clients with a range of stroke severity. Four different ways of working as a "multidisciplinary team" were identified across the six sites: (1) early-supported discharge rehabilitation (this type of team aimed to reduce the length of the acute hospital stay); (2) post-discharge rehabilitation (this type of team provided rehabilitation in the transition from the acute or rehabilitation hospital to the community); (3) general practitioner (GP)-oriented rehabilitation (this team provided home-based rehabilitation, to avoid an acute hospital admission); and (4) late community rehabilitation (this team provided autonomous rehabilitation, unconnected with an acute hospital or GP referral). In this study, clinicians were required to modify the assessments and the interventions that they provided in order to suit the type of team in which they were employed. This suggests that occupational therapists need to be creative in their therapeutic approach, and need to keep on top of the best evidence when working within different types of teams. This also suggests that barriers to teamwork (professional assumptions about other disciplines, blurring of role boundaries, and communication difficulties) must be openly addressed in order to promote effective clinical practice in the ever-evolving world of teamwork.

Evidence-Based Practice of Teamwork

The Centre for Evidence-Based Medicine (2009) has developed guidelines that can be used to grade the different types of evidence that is available to answer a clinical question about the effectiveness of an intervention. Using this system, Level 1a is considered to offer the highest level of evidence, and is obtained from a systematic review of randomised controlled trials (RCTs). At the time of writing, no systematic reviews were available to directly inform the effectiveness of the occupational therapist as a rehabilitation team member. However, other reviews have been completed which indirectly inform our understanding in this area. Steultjens et al. (2003), for example, conducted a systematic review in order to ascertain whether occupational therapy interventions improved outcomes for stroke clients. A search of the databases MEDLINE, CINAHL, EMBASE, AMED, and SCISEARCH retrieved 4183 citations. Thirty-two of these studies met the inclusion criteria and were included in the review, of which 18 were RCTs. For comprehensive occupational therapy intervention, the pooled standardised mean difference favoured the treatment group with respect to: primary ADLs (0.46; confidence interval (CI), 0.04–0.88), extended ADLs (0.32; CI, 0.00–0.64), and social participation (0.33; CI, 0.03–0.62). The authors concluded that the positive results for comprehensive occupational therapy on these outcome measures supported the importance of occupational therapy as part of the rehabilitation of stroke survivors.

Promoting Effective Teamwork

Effective communication is a cornerstone for effective teamwork. Therefore, activities that promote communication will also enhance teamwork. When working in stroke rehabilitation, or other teams, the following ideas can help promote and strengthen teamwork (Mosser and Begun 2013; Unsworth 1995):

- Ensure all team members (including the client and his/her caregivers) have an adequate opportunity to present information to the team
- Time is always at a premium, so ensure written and verbal reports are concise
- Allocate specific time each year for team building, as well as social activities that help to foster good working relationships
- Host in-service sessions to discuss known barriers to and facilitators of teamwork, as well as continuing education sessions on team-identified topics of interest

Discussion and Conclusion

Teamwork has been largely accepted as offering the best mode of care provision in most of the practice areas where occupational therapists work. This brief chapter has provided an example that shows how occupational therapists play a key part in the rehabilitation of stroke survivors, as members of a team that includes other health-care professionals, the client, and his or her caregivers. Functional impairment associated with advancing age, medical conditions (including stroke), or injury frequently has devastating consequences for clients and their families. It is anticipated that we will continue to witness increasing demand for rehabilitation that is delivered as part of a cohesive team. Occupational therapists have pivotal skills in promoting health, well-being, and occupational performance. As a profession, we need to continue to advocate for our clients and to use our skills to deliver occupation-focused evaluations and interventions within the context of a team environment.

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Chapter 47
Pain Management: The Multidisciplinary Roessingh Back-School Rehabilitation Program and E-Health Interventions for Chronic Pain Sufferers

Miriam M. R. Vollenbroek-Hutten, Hermine J. Hermens and Daniel Wever

After a couple of sessions the client became aware of his inadequate thoughts concerning pain and his inadequate behavior as a consequence.

Abstract Multidisciplinary team interventions aiming at breaking the vicious circle of impaired functioning are effective for clients with chronic pain. However, because of the growing number of people with such complaints, these interventions cannot be provided totally on a face-to-face basis. Therefore, the possibilities of intervention in the client's daily environment professionally supervised through distance learning, i.e., telemedicine, need to be considered.

Keywords Chronic pain · Feedback · Monitoring · Multidisciplinary rehabilitation programs · Telemedicine

Introduction

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (IASP 2014). *Chronic pain* is a condition that has lasted longer than 6 or up to 12 months (Debono et al. 2013). It is a complex disorder, the development and maintenance of which is influenced by biopsychosocial factors (Gatchel et al. 2007; Gatchel 2013; Miles 2012[1]).

[1] References published after 2008 are added by the editor.

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Epidemiology

Musculoskeletal disorders constitute a major problem in the European Union. The overall prevalence of muscular pain affected by work is 17%. The reported 12-month prevalence of problems in the neck and upper limbs is in the range of 30.5–39.7% in people living in the Netherlands. Absence from work of 2 weeks or more caused by musculoskeletal disorders is about 53%. The costs for musculoskeletal disorders are estimated in the European Union member states to be 0.5 and 2% of the gross national product. Moreover, pain complaints not related to work are a major and rapidly growing problem in Western industrialized countries. About 75 million Europeans (19%) complain of *chronic pain* (Breivik et al. 2006). These figures have increased during the past 6 years according to Leadley et al. (2012), who established that "general adult population reported an average chronic pain prevalence of 27% among European people."

Results

Varieties of multidisciplinary team interventions are available (see, for example, Michael et al. 2012). Among these, the interventions presented in this chapter are (1) the *Multidisciplinary Roessingh Back-school Rehabilitation Program* (*RRP*; Vollenbroek-Hutten et al. 2004) and (2) *the Myofeedback-based Tele-treatment service (MYOTEL*; e.g., Kosterink et al. 2010).

Roessingh Back-School Rehabilitation Program

Purpose

The RRP focuses on improving clients' health status by reducing their level of pain and disabilities and increasing functional capacity.

Method

Candidates for Intervention

The RRP is aimed at clients with specific chronic pain, especially low back pain, who experience occupational performance deficits in their activities of daily living (ADL) and work performances. These clients have developed a decreased-ability condition, that is, a vicious circle of back pain, inactivity due to back pain and fear, restricted performance of physical activities, and decreased physical capacity (Mayer et al. 1985).

Inclusion criteria for the RRP are (1) ability to participate in daily activities for at least 3 days per week, (2) sufficient motivation, (3) ability to cooperate, and (4) trainability. Referral to the RRP follows a decision tree (van der Hulst et al. 2005; Vollenbroek-Hutten et al. 2004).

Setting

Clients with chronic low back pain are referred to the RRP program at a physical medicine and rehabilitation clinic by a general practitioner or specialist.

The Role of the Occupational Therapist

The occupational therapist (OT) is a member of the multidisciplinary rehabilitation team, which additionally consists of specialists in physical medicine and rehabilitation.

Rehabilitation team members perform assessments to screen clients suitable for RRP, goal setting, and evaluation. The OT and the physiotherapist conduct the interventions following the standard protocol on a weekly basis.

Clinical Application

The RRP

The program concerns interventions performed in client groups and focuses on the client's *self-management*. Clients need to learn to take responsibility for their situation and act on this when needed. Key elements in the intervention are *exercise, training, and education*.

The RRP is based on the Swedish back-school (Zachrisson-Forsell 1980) and multidimensional pain programs (Fordyce et al. 1985). These interventions assume that clients with chronic low back pain develop a deconditioning syndrome. The aim of the RRP intervention is to influence client's health and perceived disabilities positively in the following ways. The RRP interventions focus on teaching clients (1) to change behavior, especially thoughts that inhibit occupational performance; (2) self-management, such as taking responsibility for their own situation and acting on this in healthy ways; (3) ergonomically correct performance of physical activities, sports, and work; and (4) increasing and maintaining physical condition to facilitate performance.

Clients aspire to:

- Enhance clients' physical condition
- Learn how to obtain temporal adaptation balance their activity level with their capacity

- Get insight into the mechanism important for the development and maintenance of back pain
- Learn how to deal with pain and to take responsibility for their condition
- Get stimulus and advice on ADL independence
- Integrate to go back to and sustain in work
- Integrate in sports and leisure activities.

Clients are treated in groups of up to eight participants each week for 7 weeks. The intervention includes the following features:

- Two hours of conditioning training, the purpose of which is to break through the vicious circle of deconditioning and focus on:
- Strength training of leg, back, and abdomen muscles using fitness apparatus. The training starts with two series of ten movements at 60% of maximum force, and is built up to three series of 20 movements at 70% of maximum force.
- Cardiovascular (endurance) training on bicycle, rowing, or running ergometers. This training starts with 10 min at 65–80% of VO_2 max, depending on the client's baseline condition, and is built up gradually by 2 min per week to 20 min at the end of the program. Each session of conditional training consists of warming up, training, and cooling down. Clients also learn how to improve their condition in their own time, and are encouraged to do so.
- Half an hour of sports. During these sessions, attention is paid to:
  - Basic principles and elementary forms of sports aimed at teaching clients how to perform these sports activities ergonomically correctly.
  - Enhancing clients' experience that sports activity is a pleasant way to maintain condition.
- Half an hour of swimming. Swimming is considered to have a positive effect on health, on the premise that people need various forms of movement. Besides, as muscle tone decreases, many clients experience a decrease in pain during swimming, permitting an increase in condition.
- One-and-a-half hours of *occupational therapy* to create awareness of clients' level of physical functioning and their physical capacity, with the aim of bringing these two into balance. For this purpose, activities focus on giving *insight into ergonomic principles,* and practicing these principles in activities such as wrapping and unwrapping a bookcase and wallpapering, with feedback on how these are being done, with the aim of *teaching clients to set their own effort limits*.
- Four hours of physiotherapy to build up the client's activity level; improve muscle function; acquire awareness of posture while standing, sitting, and walking; and train while running, jumping, pushing, pulling, carrying, and cycling, as well as in sports and game activities.

During the sessions, clients act, experience, and get feedback on appropriate ways of performing the program for further application at home.

Following this program, clients with work-related deficits due to back pain may be offered *individual occupational rehabilitation*.

Evidence-Based Practice

The effects of multidisciplinary back-school rehabilitation programs based on several systematic reviews and meta-analyses (van der Hulst et al. 2005) are good in some studies, but other studies report only moderate evidence of beneficial effects. For example, in a clinical trial, 30–50 % of clients showed an improvement in disability level. This result was nonsignificant when comparing the back-school participants with the "ordinary" rehabilitation participates (Vollenbroek-Hutten et al. 2004). On the other hand, a recent published study certifies the positive efficacy of back schools. For example, the study by Sadeghi-Abdollahi et al. (2012) on factory workers ($n=26$) showed significant improved pain relief after a 3-month period when estimated with the visual analogue scale (VAS) scale. However, the overall methodological quality of the studies reviewed is often poor. Thus, the efficacy of multidisciplinary interventions aimed for clients with chronic low back pain, based on back schools, is not yet clearly proven (van der Hulst et al. 2005).

The Myofeedback-Based Tele-Treatment Service

Purpose

The MYOTEL focuses on improving clients' health status by reducing levels of pain and disability, increasing functional capacity, and improving work capacity.

Method

Candidates for the Intervention

The MYOTEL is intended for (1) clients with neck and shoulder disorders causing pain that restricts daily activities but still permits work and (2) nonworking clients with chronic neck–shoulder complaints who want to reduce their disabilities. *Exclusion criteria* are general pain syndromes such as fibromyalgia, excessive overweight (body mass index > 30), tumors, or severe deformities.

Setting

Referral to the MYOTEL program may be made by health professionals (general practitioner, neurologist, OT, physiotherapist, rehabilitation physician) or by clients themselves. The MYOTEL program is conducted in the client's home or workplace environment.

The Role of the OT

The OT explains the aim and content of the intervention to clients in a face-to-face visit and teaches them how to relax taut muscles. Thereafter, the OT has a weekly consultative role to discuss progress, goal setting, and evaluation, which is performed by connection via the Internet.

Results

Clinical Application

The provision of intervention in the client's home and work environment using ambulatory systems to monitor and provides feedback on inadequate behavior during everyday activities is exemplified by the MYOTEL services for feedback on muscle relaxation levels.

Theoretical Assumption

The MYOTEL is based on the assumption that clients with chronic pain have altered muscle activation patterns compared to asymptomatic controls (e.g., Nederhand et al. 2000). This is reflected especially in prolonged activation of muscles, that is, a decreased ability to relax after performing low dynamic, static, or mental tasks. The Cinderella hypothesis (Hägg 1991) states that low levels of taut muscle may contribute seriously to the development and maintenance of chronic pain. Based on these findings, the MYOTEL focuses on creating awareness of this absence of sufficient muscle rest.

Technical Application

The ReTra equipment (Fig. 47.1) is used to measure raw electromyography (EMG) data from the trapezius muscle. These data are converted into percentages of relaxation time. The clients get auditory and vibratory feedback when relaxation time is insufficient (Hermens and Hutten 2002).

The ReTra consists of (1) a harness with four incorporated surface electrodes that continuously measure surface electromyography (sEMG) from the trapezius muscle, (2) a portable unit that stores signals and processes functionality, and (3) a personal digital assistant (PDA) to provide continuous feedback to the client on the level of the taut muscle in the form of the EMG signals.

Client data are sent from the PDA (e.g., via GPRS) to a secure server. This is accessible to authorized health-care professionals via a web portal, and is thus available all the time regardless of where the OT is. The system enables the OT to interpret the data both in real time and historically, permitting e-consultation.

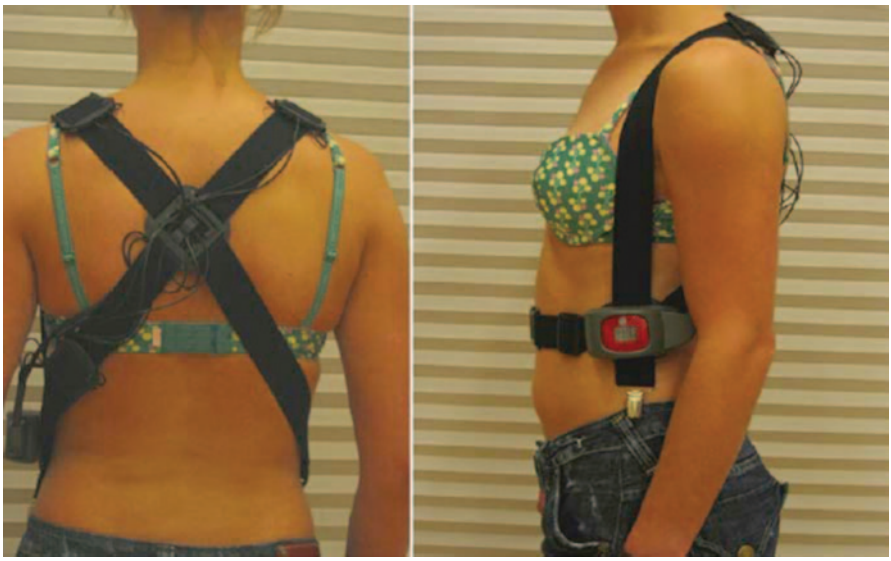

Fig. 47.1 The ReTra system worn by clients receiving the MYOTEL intervention. *Left*: Harness with incorporated dry surface electrodes. *Right*: Signal processing, storage, and vibration unit

The MYOTEL Intervention Program

As well as providing bio-data, clients keep a daily diary of their performed activities and the pain they experienced. At least once a week, but more often if needed, the OT and the client consult, face to face or by telephone.

Material for this consultation is the OT's study of the EMG data and the client's diary. The OT identifies the problems seen in muscle patterns (relaxation and activation). Based on these data, together with the diary activities, events when the client experiences low levels of relative rest times (RRT) are identified.

Subsequently, the OT and client together seek solutions, and the client is taught appropriate skills and techniques to develop better functioning.

The week's progress is discussed: how clients learn to identify aspects relevant to their pain, plus the very important aspect of learning self-management. The consultation ends with new tasks and an appointment for the next week.

Intervention normally ends after 4 weeks with a face-to-face visit. The MYOTEL program is presented in Fig. 47.2.

Evidence-Based Practice

Clients wear the harness with the surface electrodes (Fig. 47.1) during their performance of daily activities for 4 weeks. This gives very intensive and continuous *feedback* from tasks performed in their environment (Voerman et al. 2007a).

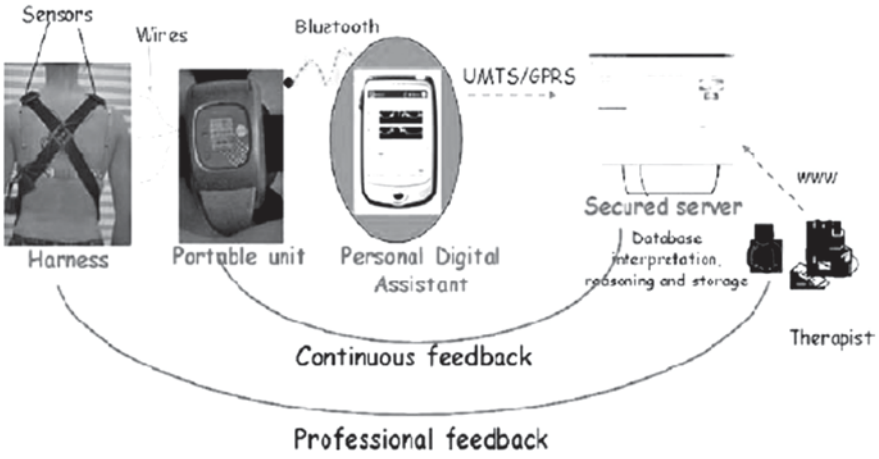

Fig. 47.2 Components, data transmission, and ways of feedback provision in the MYOTEL intervention. (http://www.utwente.nl/ewi/bss/research/research_themes/macro/myotel_project/)

The program enables quick adaptation of the client's behavior and shows the long-term effects of the intervention.

Hermens and Hutten (2002) investigated the processes underlying the feedback mechanisms andfound that changes in the discomfort factor were especially associated with changes in catastrophic thoughts; reduction in disabilities was related to decreased catastrophic thoughts about fear and avoidance of working. However, the percentage of explained variance was no more than 30–40%.

The myofeedback intervention has been evaluated in a number of studies (Hermens and Hutten 2002; Huis in't Veld et al. 2008; Voerman et al. 2006, 2007b). The studies show that over the 4 weeks of the intervention, the clients wore the equipment for at least 4 h a day, 5 days per week. The results of a prognostic cohort study in 21 clients with work-related pain show that about 60% improved their pain/discomfort scores directly after myofeedback, and these were practically unaltered at 4-week follow-up. A remarkable finding is that 35–40% of the clients show a further improvement on pain/discomfort when the myofeedback had already ended (Hermens and Hutten 2002). A prognostic cohort study in 14 clients with chronic whiplash disorders showed significant effects on pain and disabilities: 55% of the clients showed a clinically relevant reduction of pain and 36% of disabilities (Voerman et al. 2006). In a randomized clinical trial comparing myofeedback ($n=41$) with ergonomic consultation ($n=38$) for clients with work-related neck–shoulder pain in the Netherlands and Sweden, 50% of the clients experienced a clinically relevant reduction in pain and disability, which persisted at a 6-month follow-up (Voerman et al. 2007b). Myofeedback with remote data gathering and e-consultation is being tested in a cross-sectional study in 15 clients and 17 professionals to obtain insight into end users' attitudes and self-efficacy regarding remote myofeedback intervention. Results showed that both clients and professionals expect the remote myofeedback intervention to be feasible. Attitudes were positive in 66% of the clients and 46% of the professionals. In addition, the majority of clients and profes-

sionals considered their self-efficacy sufficient for remote myofeedback intervention, and they expected at least the same effects as from the traditional intervention (Huis in't Veld et al. 2007). A subsequent prognostic cohort study in ten women with work-related pain showed that RRP is technically feasible. Eighty percent of clients report;ed a reduction in pain intensity and disability directly after RRP (Huis in't Veld et al. 2008). The Swedish part of the European MYOTEL project (www.myotel.eu) was evaluated among 65 women with neck and shoulder pain. During three mounts, 33 women took part in the muscle relaxation training during their work performances. Evaluation showed no significant improvement in pain status among the "MYOTEL" women compared to those who participated in conventional care, however, with favors for comfort and time saving (Sandsjö et al. 2010[2]).

Discussion

The most common interventions aimed at chronic pain disorders are the multidisciplinary team approach, of which the RRP program as outlined as above is one. However, even with an indication tree for the decision on whether to intervene, the RRP is not effective for all clients. One explanation may be that not every client is inactive due to back pain and fear, and lowered physical capacity with, consequently, overloading. In Hasenbring et al. (2001), model and in clinical practice, some clients lack fear but ignore the pain. These clients are probably much more helped by learning how to balance their activity patterns during the day than by physical reconditioning. Here, the present intervention including goal setting may probably be more effective. Another explanation why the intervention does not suit all clients might be that the skills learned in the rehabilitation program are too specific, occasioning problems with their generalization to daily life. This led to the notion that providing intervention in the client's daily environment by using ambulant monitoring and feedback systems could be effective. The telemedicine concept manifested in the MYOTEL service seems to be a good example. Results of the first evaluations indicate that this service is at least as effective as traditional interventions. In clients with chronic back pain, such an intervention should focus on activity levels. An intervention with focus on temporal adaptation, in which the feedback is directed toward normalization of the disturbed activity pattern, might be effective.

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Chapter 48
Pain Management: Functional Restoration for Chronic Low-Back-Pain Clients

Laura Stana, Anne Bouchez, Serge Fanello and Isabelle Richard

Movement is not that dangerous, I can make it!
Client

Abstract Functional restoration is a concept for intervention of low back pain that has been developed by Mayer et al. (Spine 10:765–772, 1985). It relies on the concept that disability and participation restriction among clients with low back pain is the result of complex interactions among pain, physical deconditioning induced by inactivity, and psychosocial issues. The social cost, mainly indirect costs, induced by sick leave payments for chronic low back pain is high, and this has led to the development of multidisciplinary programs that include occupational therapy interventions.

Keywords Coping behavior · Ergonomics · Low back pain · Sick leave · Weight lifting

Definitions

Chronic low back pain	is pain of the lumbar region lasting for more than 3 months.
Functional restoration	is the intervention program for nonspecific low back pain (i.e., infectious and tumor diseases are excluded) and other musculoskeletal diseases. The program is not

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aimed at reducing the level of pain, but rather focuses on physical reconditioning and coping strategies (Schonstein et al. 2003).

Background

Low back pain is a biopsychosocial issue. Treatments exclusively aimed at the biomedical aspects of low back pain, such as prescription of analgesic medicine, surgery, and corsets, are effective in the acute phase.

Multidisciplinary functional restoration programs have been used in the chronic phase of low back pain since the 1980s. Although differences among the various programs exist, they share a common framework, including (1) physical reconditioning, which is achieved by the clients' participation in intensive physical activities; (2) psychological counseling aimed at the development of coping mechanisms; and (3) modifications of the work environment (Poireaudeau et al. 2007; Schonstein et al. 2003).

Purpose

The objective of the functional restoration programs is that the clients return to work and resume social and leisure activities.

Method

Candidates for the Intervention

Functional restoration is indicated for clients suffering from chronic low back pain of nonspecific origin. Some programs are embedded in public policies aimed at reducing sick leave and enrolling only clients with work contracts (Loisel et al. 2003).

Epidemiology

The incidence of chronic low back pain in developed countries ranges between 60 and 90 %. The prevalence is estimated at 5 %. In the majority of cases (85–95 %), pain and disability disappear within 3 months (Müllersdorf and Soderback 2000).

Settings

The functional restoration programs are conducted by multidisciplinary teams and provided in rehabilitation outpatient facilities. They usually last for 3–5 weeks, and clients participate full time or part time.

Results

The Role of the Occupational Therapist

Occupational therapists (OTs) are responsible for the following:

- Assessments of activity limitations and participation restrictions using various available assessment instruments (e.g., Dallas pain questionnaire, Lawlis et al. 1989; Oswestry Low Back Pain Questionnaire, Fairbanks et al. 1980; or Capability to Perform Daily Occupations, an assessment adapted to occupational performances, Schult 2002).
- Evaluation and retraining of activities directly related to work tasks, such as weight-lifting tasks. A client's ability to lift weights is measured using the progressive isoinertial lifting evaluation (PILE; Mayer et al. 1988). The clients are required to lift blocks from the floor and place them on shelves at the level of the person's shoulder. The lifting capacity is measured by increasing the weight, starting with 5 kg (men) and 2.5 kg (women) and stepping up by 5-kg (men) and 2.5-kg (women) increments. The score is represented by the maximum weight that can be lifted.
- Investigation of the work tasks that are required by the clients to be performed during a workday. Based on the information, a training program is designed in which the client performs the work tasks in a simulated or real-life environment.
- Information on the benefits of physical activities. Clients often believe that reduction of performances of activities is necessary to treat their pain. The level of this restricting behavior is assessed by using the Fear-Avoidance Beliefs Questionnaire (FABQ; Wadell et al. 1993).
- Thereafter, OTs and team members provide coherent information and demonstrate attitudes that promote the clients' active coping, aimed at decreasing clients' fear and avoidance of movements and increasing performances of daily activities and participation in social life.
- Counseling in which the client, relatives, coworkers, and managers participate to decide on possible modifications of the work environment. These interventions are individually performed at the workplace. They are directed to (1) physical aspects of the work environment, such as limiting weight lifting and the possible use of weight-lifting devices; and (2) management aspects of the work organization, such as possible cooperation between coworkers and supervisors' attitude to the worker.

Clinical Application

Occupational Therapy Within a Multidisciplinary Pain Management Function Restoration Program

The programs are usually organized as intensive outpatient programs lasting 5 weeks with a full-time schedule. The interventions are performed in the rehabilitative setting, conducted in groups of 5–12 clients, or by individual counseling at the workplace.

The duration of the programs varies from 10 to more than 200 h (Poireaudeau 2007). The OT sessions account for approximately one third of all activities during the program.

The content of a functional restoration program includes the following:

- *Physiotherapy*: training of muscle flexibility, trunk muscle strengthening, and aerobic exercise for 1–3 h per day
- *Sports activities*: for 1–6 h per week
- *Occupational therapy*: Clients perform weight-lifting tasks, or simulation of work tasks using, for example, gardening or bricklaying, for 1–2 h per day
- *Psychological counseling*: performed in individual sessions or during group activities
- *Counseling*: during workplace visits

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Functional restoration programs allow clients to "work in spite of pain" and thus resume performance of activities that help clients return to work.

Evidence-Based Practice

The functional restoration program has proved effective for (1) the main outcome measure of increasing participation of low-back-pain clients in returning to work and (2) decreasing the number of days on sick leave (Jousset et al. 2004; Kaapa et al. 2006; Kool et al. 2007; Poireaudeau et al. 2007: Schonstein et al. 2003) and increasing the muscle endurance (Roche et al. 2007). These results are strongly dependent on the social security system of the country in which the program is conducted (Poireaudeau et al. 2007).

Discussion

The precise design of the functional restoration programs vary among rehabilitation clinics around the world. At present, there is restricted evidence for which intervention parts (Schonstein et al. 2003) or intensity (Roche et al. 2007) is required of the program to bring about a positive effect. Moreover, the cost-effectiveness of these programs also warrants further studies.

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Chapter 49
The Principles and Practice of Work and Ergonomics

Barbara A. Larson and Melanie T. Ellexson

The worker was experiencing wrist and hand pain. Once the tool was changed to an inline grip, his symptoms began to decrease.

Abstract Occupational rehabilitation programs address worker safety and productivity, using the organizing construct of participation, as defined by the International Classification of Functioning, Disability, and Health (WHO 2014), as well as selected frames of reference that facilitate participation in work. Demographic and logistical factors of work-related musculoskeletal disorders, gender and age of onset, and epidemiology are identified. Clinical application and the role of the occupational therapist (OT) are examined in relation to the expected outcomes of an occupational rehabilitation program. Work as a performance area of occupation is discussed with an emphasis on worker function. Evidence related to work and ergonomics is presented from the standpoint of duration and cost, and worker quality of life.

Keywords Ergonomics · Human engineering · Occupational health · Task performance and analysis · Work

Definitions

Work	Productive or purposeful activities.
Task performance and analysis	The detailed examination of observable activity or behavior associated with the execution or completion of a required function or unit of work.

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Occupational health	The promotion and maintenance of physical and mental health in the work environment.
Human engineering (ergonomics)	The science of designing, building, or equipping mechanical devices or artificial environments for the anthropometric, physiologic, or psychological requirements of the people who will use them.

Background

An occupational rehabilitation program addresses the needs of workers, while focusing on their ability to work safely and productively. Understanding and applying ergonomic principles in the return to work process addresses the match of the work to the worker, as well as the development of strategies to prevent injuries from occurring in the future (Adam et al. 2010; Larson and Wick 2012; Salisbury 2013). The occupational therapist (OT) works in collaboration with the worker and other team members including case managers, employers, or selected agencies (American Occupational Therapy Association, AOTA 2008).

The organizing construct, according to the International Classification of Functioning, Disability, and Health (ICF), as stated in Hemmingsson and Jonsson (2005) is that a therapist uses participation in the intervention processes, here participation in work. This process is facilitated by the frameworks of the biomechanical approach (James 2003; Pettersson et al. 2012), the occupational therapy practice framework (AOTA 2008; Schultz-Krohn and Pendelton 2006), the person–environment–occupation model and the ICF (Law et al. 1996; Pettersson et al. 2012). The psychosocial and integrative model of the ICF emphasizes the importance of teamwork and communication, thus providing a context for understanding "the impact of health conditions on work functioning" (Anner 2012; Escorpizo et al. 2011; Pettersson et al. 2012; Steffan and Tosi 2012).

In the late 1970s and early 1980s, US industry began to recognize its responsibility for active management and prevention of injury in the workplace (Ellexson 1997; Jacobs and Baker 2000; Adam et al. 2010). *Occupational rehabilitation* emerged as the umbrella term to describe programs that evolved to serve this worker population. Occupational rehabilitation encompasses *work hardening, work conditioning, work rehabilitation, return to work, functional restoration,* and other programs that rehabilitate the injured worker (Adam et al. 2010; Commission on Accreditation of Rehabilitation Facilities 2008; Jacobs and Baker 2000; King 1998).

Purpose

The OT strives to enhance occupational performance, allowing the individual to engage in task completion, with the *goal of full participation in work* (American Occupational Therapy Association 2008; Larson and Reineke Lyth 2011; Pettersson et al. 2012; Salisbury 2013).

Prevention strategies include ergonomic evaluation and design of the workplace, employee selection and screening, proactive injury management, and education and training of the work force (Adam et al. 2010; AOTA 2011; Larson and Ellexson 2000; Stein et al. 2006).

Determining *intervention strategies* requires (a) analysis of the physical job demands, (b) identification of the psychosocial, (c) environmental and cultural aspects of a workplace, as well as (d) assessing worker function (AOTA 2011; Larson and Reineke Lyth 2011; Minna and Mika 2012).

Job modifications, or reasonable accommodations, are considered if the worker is unable to perform essential job functions (Americans with Disabilities Act 1990; ADA 2008; Keilhofner 2004). *Modifying the workplace, and the tools and equipment* used in the course of work activity, may aid an individual in compensating for the way tasks are completed.

Method

Demographics and Logistical Factors

Candidates for Occupational Rehabilitation

Diagnosis or disease categories include diseases of the nervous system, International Classification of Diseases (ICD) codes G00–G09, and diseases of the musculoskeletal system and connective tissue, M00–M99 (ICD-10 2010).

Gender and Common Age of Onset

According to the US Bureau of Labor Statistics (BLS) 2013 data, the rate of nonfatal occupational injury and illness cases requiring days away from work was 112 per 10,000 full-time workers, and of these men accounted for 61% of injuries and illnesses. Moreover, among all workplace injuries and illness cases, 34% resulted in musculoskeletal disorders (MSD) that require time away from work (BLS 2013).

Epidemiology

The US Department of Labor (BLS 2013) defines an MSD as an injury or disorder of the muscles, nerves, tendons, joints, cartilage, or spinal disks. The overall rate for all MSD cases was 39 per 10,000 workers in 2006 (BLS 2013). It should also be noted that mental health conditions are common in industry and the costs associated with long- and short-term disability are higher with this population due a more frequent absence from work (Pomaki et al. 2012).

Settings

An occupational rehabilitation program may be provided in a hospital-based program, a freestanding program, a private or group practice, or in a work environment. Individuals are referred to these programs by physicians, insurance companies, workers' compensation agencies, case managers, employee health officers, or other health-care providers dependent on local and national law (AOTA 2008; Salisbury 2013; Larson and Reineke Lyth 2011).

The Role of the Occupational Therapist in Applying the Intervention

The primary role of the OT is to provide services to individuals or populations with deficits, problems, or impairments in work performance (AOTA 2011; Rice and Luster 2002; Minna and Mika 2012). The OT addresses factors that influence the participation in/and performance of actual job tasks, including the (a) worker's abilities, skills, neurobehavioral factors, physical health and fitness, cognition, and psychological and emotional well-being, and (b) the environment in which the job exists (AOTA 2011; Larson and Wick 2012, Pettersson et al. 2012; Law 2002). The OT may also have roles in *case management, ergonomics, and the design and implementation of transitional return-to-work programs* (Salisbury 2013).

Results

Outcomes of Occupational Rehabilitation

Clinical Application

Intervention planning for deficits or problems in the performance area of work is a multifaceted, complex process. The physical capacity of the worker as well as knowledge of

the work tasks and routines, ergonomic stressors, tools and equipment, environmental considerations and other factors affecting the individual's ability to return to work must be identified (Adam et al. 2010; AOTA 2011; Haruko et al. 2006; Larson and Wick 2012; Larson and Reineke Lyth 2011; Pettersson et al. 2012; Stein et al. 2006).

A return-to-work program is interdisciplinary in nature, and often uses conditioning, work simulation, strengthening, and education to improve biomechanical, neuromuscular, cardiovascular, and psychosocial functions (CARF 2008; Adam et al. 2010). Program effectiveness requires motivation and active participation by the worker with clearly stated goals, communicated to all team members (Adam et al. 2010).

Intervention That Directs the Worker to Function

Work is a performance area of occupation; it has specific activity demands and requires certain performance skills (AOTA 2008). Deficits in body structure or body function limit the worker's ability to meet the activity demands of a given job (AOTA 2008; Steffan and Tosi 2012; World Health Organization, WHO 2014). Changes in the worker's physical, psychological, or sociocultural status affect engagement in the occupation of work (Pomaki et al. 2012; Rice and Luster 2002). The work capacity of the person is optimized through prevention, rehabilitation, education, and ergonomics (Adam et al. 2010; AOTA 2011; Larson and Ellexson 2000). Future risk to the worker is minimized, while the individual's health and well-being are maximized through participation in work (Adam et al. 2010; AOTA 2011; Law 2002).

Evidence-Based Practice

Workplace-based return-to-work interventions have been shown to have a positive impact on duration and costs of work disability, with weaker evidence supporting an increased quality of life for the workers (Franche et al. 2005; MacEachen et al. 2006). Return to work was found to be more complex than managing physical function and included individual's beliefs, roles, and the perceptions of others involved in the process (Law 2002; MacEachen et al. 2006; Pomaki et al. 2012). Social and communication barriers were identified as negatively affecting return to work, while goodwill and trust were noted to play an important role in successful transition to work (MacEachen et al. 2006; Pomaki et al. 2012). Ergonomic benefits, to be sustained, should be based on a participative approach and a strategy that brings value to the quality, productivity, and efficiency of a company (Larson and Wick 2012; Querelle et al. 2012).

Discussion

While there is a need for stronger evidence in this area of practice, the resources available for occupational therapists are expanding. The Institute for Work and Health (2014) an independent, nonprofit Canadian research organization (www.iwh.on.ca), provides evidenced-based information on interventions that enhance work performance, address injury and disability prevention, and facilitate successful return to work (Scheer 2007).

Reimbursement for occupational rehabilitation services depends on the setting in which the service is provided. Payment sources include direct reimbursement, state or federal programs, or community agencies.

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The Case Study of Mr. MJ

Keywords Interdisciplinary plan, collaboration, physical demands, psychosocial demands

Introduction

The theme of this case study is team planning and intervention for timely and effective return to full duty in a desired work position.

The students' task include:

1. Review of the literature
2. Developing an interdisciplinary plan for effective efficient treatment
3. Determining the physical and psychosocial demands of the job
4. Collaboratively developing a plan of assessment and evaluation
5. Assessing future risk
6. Recommending job accommodation and/or job safety equipment

As a starting point, the students should use the following references to gather background information:

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Overview of the Content

The major goal of the interventions offered is that Mr. MJ return to full duty at his former position as a postal carrier.

Learning objectives: After review of the references and reflection on this case, the student will be able to:

1. Determine a collaborative plan of evaluation and intervention
2. Identify when referral for functional training (work hardening) is most appropriate
3. Develop a plan for the type of activities necessary for an effective functional program

4. Explain the importance of motivation and self-confidence in the recovery of the injured worker
5. Describe the return to work process for this worker
6. Identify job accommodation and/or safety equipment that may be appropriate for this worker

1. **Background Information** Mr. MJ is a 52-year-old African American male with two adult children. He is currently separated and works approximately 10–12 miles from his employment. He has been employed at the US Postal Services for over 25 years as a mail carrier. Mr. MJ has a history of high cholesterol, arthritis, and diabetes. He does not use any illicit drugs and he is a social drinker. Mr. MJ enjoys his position and believes he will retire working for the post office within the next 5 years.

2. **Description of the Presenting Problem** On May 31, 2011, Mr. MJ was performing his normal work duties as a mail carrier. After working approximately for 4 h, Mr. MJ tripped on an uneven sidewalk between two homes he was delivering mail and rolled over his left ankle. He immediately heard a loud pop and he fell to the ground. Mr. MJ attempted to continue his route; however, he was unable to bear weight through his left ankle. After limping back to his truck he drove back to his postal station and informed his supervisor of the incident. His supervisor informed Mr. MJ to complete an incident report and he finished his day. Mr. MJ went home and the next morning he was still unable to bear weight on his left foot. Mr. MJ observed that he had severe edema in his left foot and was unable to put on his shoe. He went to work and attempted to do his job but was unable to. Mr. MJ was referred to the hospital and underwent magnetic resonance imaging (MRI) and X-ray. Later that day, he was informed that he suffered an Achilles tendon rupture. He was provided crutches and was informed to make an appointment to see his primary care physician (PCP). Mr. MJ was instructed to also follow up with the Department of Labor (DOL) to assure his worker's compensation claim was submitted to provide further intervention services. Within 2–3 days, he was evaluated by his PCP and was referred to see an orthopedic specialist. After consultation, Mr. MJ was authorized for surgery to repair the left Achilles tendon. Mr. MJ's surgery was followed by participation in physical therapy (PT) for 6 months to improve strength and active range of motion (AROM). Mr. MJ reports the PT also assisted with improving his balance in addition to decreasing stiffness and pain. He reported after PT he continued to be concerned about being able to walk long distances. He states the PT benefited his overall improvement but believes he is only at 70 % of performing his job demands. Mr. MJ was referred to an occupational therapy work hardening program to improve his functional status in order to perform his day to day job demands as a postal worker.

3. **Intervention** Mr. MJ participated in work conditioning Monday through Friday from 8 a.m. to 12 p.m. The intervention consisted of *aerobic training, strengthening, and stretching within the 4 h of care*. Upon initial *functional*

capacity evaluation (*FCE*), Mr. MJ demonstrated the ability to perform only 58% of his job demands. Mr. MJ's *job-specific activities* at this time consisted of prolonged walking, carrying a mail bag weighing 20 lbs gradually adding weight and distance each week. Mr. MJ also participated with stair-climbing activities with gradual increase of time and distance with stairs (e.g., 32–64 steps each week). The required weight to be carried by the US Postal Services is 70 lbs. Mr. MJ performed material handling consisting of squat lifts (6 in. from ground), power lifts (12 in. from the ground), two handed carrying, pushing and pulling of material, increasing weight each week by 5–10 lbs in order to meet the job demand of 70 lbs. During *work hardening program,* there were monthly reassessments performed to monitor functional improvement. Upon completing his last assessment, Mr. MJ demonstrated the ability to perform 100% of his job demands. Reports were provided to the referring doctor and the case manager assigned by the DOL. Mr. MJ was seen for work hardening daily for 3 months and returned back to work full duty without restrictions.

The Student's Report

The following guiding questions have been identified in developing possible solutions to the long length of time away from work. These questions are generated from the available literature references and our clinical experiences:

Questions

1. What should have been done to increase function effectively and efficiently for this worker?
2. How might the therapist determine the physical demands of this worker's job?
3. What would be the best way to simulate some of the functions of a job?
4. What are the benefits of a job-specific (FCE) vs. a standardized FCE?
5. What are the traits of a well-designed FCE?
6. What are some of the patterns and attributes preferred by older workers?
7. What are some of the age-related changes that may have an impact on this worker?
8. What preventive steps or equipments might be recommended to avoid injuries of this type?

Chapter 50
Reintegrating People Suffering from Depression into the Workplace

Gabe de Vries and Aart H. Schene

Occupational Therapy increases the chances of returning to work in good health, for people suffering from depressive disorder

Abstract Employees suffering from depression have a high risk of becoming unemployed. A combination of treatment focused on depression and on work rehabilitation is effective. Occupational therapy and the Program for Mood Disorders at the Department of Psychiatry of the Academic Medical Centre in Amsterdam, the Netherlands, have developed two modules focused on work reintegration for patients suffering from depression. The modules have been investigated in a randomised controlled trial and seem to be effective in work reintegration.

Keywords Depression · Occupational rehabilitation · Work

Definitions

According to the *Diagnostic and Statistical Manual of Mental Disorders,* 4th edn. (American Psychiatric Association 2000), *major depressive disorder* is characterised by the symptoms depressed mood (such as feelings of sadness or emptiness) or reduced interest in activities that used to be enjoyed, followed by four of the following symptoms: significant weight loss, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness or excessive or inappropriate guilt, diminished ability to think and concentrate or indecisiveness, and recurrent thoughts of death.

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Work is a paid daily activity (Jacobs 1991). *Return to work* means that employees start working after a period of absenteeism caused by a depressive disorder.

Background

Depression

Major depressive disorder (MDD) is a highly prevalent condition among the working population, estimated to affect 11–21% of individuals at some time in their life (Bromet et al. 2011; Kessler et al. 2005). Depressive episodes vary widely in their duration with a mean duration of 3 months (Spijker et al. 2002) and 20% do not recover within 1 year. Recurrence of depression is high: in specialised mental health-care settings 85% within 15 years and in general population 35% (Brodaty et al. 2001; Koopmans et al. 2011; Hardeveld et al. 2010). The aetiology of MDD is complex; contributing factors are both biomedical and environmental, which in turn may influence each other (Langlieb and DePaulo 2008).

Absenteeism from work is in about 30% of the cases related to mental health problems. Of these, about one third is caused by depression (Mathers and Loncar 2006). Of employees suffering from depression, about 50% call in sick (Rytsälä et al. 2005). Once on sickness absence due to depression, it was found to be related to long absence from work (Koopmans 2008; Nieuwenhuijsen et al. 2006), varying between a mean of 100 and more than 200 days (Koopmans 2008; Hensing et al. 2000), and the depressive symptoms had an estimated rate of chronicity (1 year of sickness absence) of about 24% (Brenninkmeijer et al. 2008; Koopmans et al. 2008).

Functioning at Work

Work and depression have a complex relationship. On the one hand, work-related problems may precipitate MDD, in particular increased (psychological) work stress, low control, low social support, and work–family conflicts (Wang et al. 2010; Bonde 2008; Netterstrøm et al. 2008; Wang 2006). On the other hand, MDD causes absenteeism from work but, even more important, *presenteeism,* that is, loss of productivity while the employee is still at work but impaired by his or her mental health symptoms. Presenteeism may provoke problems at work caused by the following:

- *Cognitive limitations,* characterised by problems in concentrating on the work tasks, planning the performance of the work tasks, and limited capability to cope with complex stimuli.

- *Emotional restrictions,* caused by feelings of inferiority and guilt, and loss of interest and initiative. These symptoms create problems in executing daily activities at work, for example, accepting too much work while having difficulties in solving problems.
- *Social restrictions,* difficulties in dealing with colleagues, which are caused by a lower mood, introverted behaviour, or social anxiety.

In addition, the economic burden of depression is high, calculated in the USA for US $ 348 per eligible employee per year (based on US $ 23.15/h wage estimate; Goetzel et al. 2004) including medical costs (US $ 54), absenteeism (US $ 48), and presenteeism (US $ 246).

Purpose

Two occupational therapy interventions were designed to support patients suffering from depression in their return to work (RTW) and to enable them to function with more satisfaction. In addition, work resumption may promote a more favourable course of reduction in depressive symptoms (Brenninkmeijer et al. 2008; Huijs et al. 2012).

Method

Candidates for the Intervention

The intervention is aimed at adult patients, on sick leave for at least 10–12 weeks, due to depressive disorder. Patients with a psychotic depression or those who abuse alcohol or drugs are excluded.

Settings

The intervention is developed as an addition to psychiatric treatment. It can also be used in a work setting or in a work-training centre, but additional psychiatric depression treatment is recommended. The main condition is the ability of the patient to work in his or her former work setting.

Professionals Involved in the Process of RTW

Most important is the *patient's* responsibility for restarting his work, reintegration at work, and performance of work tasks. Apart from health-care services, other

services are involved in the RTW process. This rehabilitation approach combines care and work. The *employer* is responsible for reintegration at the work setting. The *occupational physician* of the company is responsible to ascertain whether the patient is able to RTW. The *general practitioner* is responsible for some aspects of health care and prevention. The *psychiatrist* or *social worker* is responsible for mental health. The *occupational therapist* recommends one of the interventions focused on RTW. The initial role of the occupational therapist is to coordinate the professionals involved, liaise with occupational physician and workplace, and to administer the rehabilitation programme.

A reintegration process will be most successful if the professionals involved have a common goal. Therefore, it is important to communicate and to understand the responsibility of each professional. All professionals involved should agree on the patient's reintegration plan.

Results

Clinical Application

Two types of interventions (occupational therapy (OT) and new occupational therapy (nOT)) will be presented. The first OT intervention was developed and trialled in 1999/2000 (Schene et al. 2007). Results and experiences of this study and the trend of minimising therapy sessions in mental health challenged us to develop and examine an improved occupational therapy intervention (nOT, Hees et al. 2013).

Analysis

Both interventions start by analysing the problems in the work environment that may cause the employee's absenteeism. It focuses on investigating the patient's behaviour in stress situations and determines which work tasks or situations cause problems. The intervention consists of five individual sessions over a 4-week period and includes the following:

The *register and intake session* gives the patient the opportunity to express his or her attitudes about work and willingness to restart working. The occupational therapist explains the content, options, and goals of the occupational therapy intervention.

The *work anamnesis intervention* is a consultation with the patient in which the OT systematically analyses the patient's education and work history. The patient's ability to cope with stressful situations is especially noted.

The *video observation* entails recording the patient's performance of work tasks in a simulated work situation. These recordings are discussed with the patient in relation to his or her experiences of the current workload, relationships with the colleagues, and the appropriateness of the work. The main goals are to analyse the

problems in the present work situation, and to ascertain if there is an ineffective pattern to the way the patient copes with stressful situations.

Contact with the occupational physician and psychiatrist is required to gain additional information from the workplace and to discuss the RTW process.

Occupational Therapy Intervention

This intervention focuses on personal patterns that cause stress in the working situation and is directed at relieving the stress and giving the patient an opportunity to take control over his or her working situation. This part takes about 6 months and consists of 20 group sessions, one each week; ten individual sessions, one every second week; and three follow-up sessions over the course of half a year. In the first 2 months, the focus is on being active in the home situation, in the second 2 months, the focus is on RTW, and in the third 2 months, the focus is on improving coping ability with stressful situations at work.

In the *group sessions,* the occupational therapist presents themes such as work stress*,* capacities and incapacities, perfectionism, prevention, and conflicts at work. The patients are given homework to do. Every group or individual session addresses (1) the work performance, (2) the patterns of coping behaviour, (3) the home situation, and (4) the reintegration at work. Work performance is related to all aspects of functioning at work. Coping patterns are determined for each stressful situation. A work reintegration plan is created.

The *individual sessions* focus on the progress of the intervention in the patient's personal and work situation.

nOT Intervention

This new module of occupational therapy provided fewer interventions (eight group sessions, four individual sessions, and one follow-up session) and focused mainly on coping and behavioural change in the workplace. The intervention emphasised the patients' ability to resume work through *adjustments of the work environment,* such as physical and psychological demands, decision latitude, and the social support from the co-workers and the employer. The adjustments are made on the basis of the patient's experience at work and the effect of the depressive symptoms on his capacity to work

This intervention also emphasises an early return to the workplace, even before the recovery of symptoms; assuming that the remission of psychiatric symptoms will occur after restarting work. In addition, it reflects a shift from the traditional 'train-and-place' model to the more recent 'place-and-train' model. When starting intervention, patients were required to (start) work at least 2 h per week. In this way, the patients were able to directly practise experiences of therapy sessions (e.g. new coping strategies). In addition, by resuming work earlier, they maintained contact

with the work environment, which enhanced understanding. Finally, by having so-called work visits, the communication regarding the RTW process between employer and employee is promoted at an early stage.

For this intervention, a 'work model' was developed; a screening instrument that enables clients to analyse their actual work situation and helps to identify priorities for their reintegration.

Evidence-Based Practice

The OT intervention was tested in an RCT study. Sixty-two adults with major depression, with a mean absenteeism of 242 days, were randomised to treatment as usual (TAU; outpatient psychiatric treatment) or TAU + OT. The main outcome measures were symptoms of depression, work resumption, work stress, and costs. Assessments were conducted at baseline and at 3, 6, 12 and 42 months. Depression improved significantly ($p < 0.001$) in both conditions between baseline and 12 months, and with a trend ($p = 0.080$) between 12 and 42 months. Although TAU and TAU + OT did not differ ($p = 0.950$) in terms of depression symptoms during the first 12 months, they did so during the next 30 months ($p = 0.032$) in favour of OT. In addition, TAU + OT patients worked significantly more hours than TAU patients ($p = 0.035$) over the first 18 months, but not over the later period (months 19–42). Furthermore, we found that patients receiving OT returned to work earlier (TAU + OT = 207 days; TAU = 299 days, $p = 0.010$), without having more work stress.

nOT intervention was also tested in an RCT study. Assessments were conducted at baseline and at 6, 12 and 18 months. One hundred and seventeen highly impaired patients (more than 60 % were absent for more than 3 months and more than two third were depressed for more than 6 months) were randomised to receive either TAU + nOT ($n = 78$) or TAU ($n = 39$). TAU + nOT showed greater improvement in depression severity ($p = 0.03$) and an increased probability of long-term symptom remission when compared to participants in TAU (OR = 1.8, $p = 0.05$). In addition, the percentage of patients who attained sustainable remission (defined as ≥ 6 months) was higher in TAU + nOT (91.6 %) than in TAU (69.0 %; $p = 0.04$). However, in contrast with our previous study, we did not find that nOT resulted in earlier RTW or an increased reduction in the hours of absenteeism when compared to TAU. Nevertheless, OT did increase the probability of long-term RTW in good health (i.e. full RTW while being remitted from depression, and with better work and role functioning; OR = 1.9; $p = 0.02$). Finally, patients in nOT needed fewer sessions with a psychiatrist and had fewer days of hospitalisation than those in TAU only.

Discussion

The main results of the first study show a faster RTW and the second a greater improvement in symptom recovery. These differences can be attributed to several factors. First, several legislative changes (i.e. the new disability act and an improved version of the Gatekeeper's Act) had been implemented in the Netherlands, stipulating more (financial) incentives for both the employer and employee to achieve a fast RTW. Second, guidelines from occupational physicians and mental health professionals have increasingly emphasised the importance of an early RTW before the recovery of symptoms. Third, work and work ability have become more involved in psychiatric health care in particular in our environment because OT interventions were conducted in our health-care setting. This may have led to a reduced contrast between TAU and TAU + nOT in the second study. However, in light of these societal changes which increasingly emphasised an early RTW before the recovery of symptoms (OECD 2012), the provision of extra therapeutic support during the RTW process may be needed in order to support employees in early RTW and also to achieve RTW in good health.

Although the severity of depression influences the success of RTW (Lagerveld et al. 2010; Hees et al. 2012), interventions focusing on symptom reduction will not lead to better RTW outcomes per se (Nieuwenhuijsen et al. 2008). There are some indications that work-directed interventions in combination with a multimodal approach (including cognitive-behavioural therapy and care coordination) are most effective (Lagerveld et al. 2012; Lerner et al. 2012; de Vries et al. 2012). For employees absent with musculoskeletal disorders (including low back pain) such multimodal approaches have also been proven to promote RTW (Anema et al. 2007). These findings support the value of the addition of OT intervention.

Besides a multimodal approach, the expectations of RTW should be a part of psychological education. Perceived health (Audhoe et al. 2012), optimism (Kronström et al. 2011), intention for RTW (van Oostrom 2010), self-efficacy (Nieuwenhuijsen et al. 2013), and positive RTW expectations (Nielsen et al. 2012; Nieuwenhuijsen et al. 2006) are predictors for RTW. These perceptions might be influenced by early RTW. Early (partial) RTW is believed to facilitate both symptom and functional recovery as it allows patients to practise coping skills in the workplace (e.g. learn to manage their symptoms at work), and to benefit from the positive aspects of work such as social contact, structure, meaningful daily activity, and a sense of accomplishment (Huijs et al. 2012; Lagerveld et al. 2012; OECD 2012). Besides partial RTW, expectations can also be influenced by the surroundings such as partners, family, and colleagues who are important in this perception.

Several established interventions embrace similar ideas. For example, the individual placement and support (IPS) is the most effective RTW method for severe mental health disorders (Latimer et al. 2006; Bond et al. 2008). Key elements of IPS are shifting the focus from the severity of symptoms, to improve the employee's ability to cope with the limitations in the work environment and to gain support from the social and professional networks, following a 'first place then train' principle.

In conclusion, early RTW with respect for symptom severity, supported by a multi-model professional approach and social network, may be the best instruments for a successful RTW.

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Case Study, Return to Work After Sick Leave due to Depression

Introduction

Different occupational therapy strategies can be supportive for recovery from depression and can guide employees in their return to work. This authentic case study considers the possibility of occupational therapy interventions.

The student's aim is to guide this employee in return to work in good health.

As a starting point for this case study, the following references are recommended:

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Overview of the Content

The major goal of the actual intervention is to guide the client back to and to sustain at work as well as improving activity level during leisure times.

Background History

Personal Information Mr Baker, 50 years old, works in the financial service sector. He obtained a diploma, and has always worked after his studies. Currently, Mr. Baker works as the head of an important department. He is married and has three children (9, 13, and 15 years old). Despite his age, Mr. Baker still plays football and is a referee too. In short, an active man with a successful career. Unfortunately, his wife became seriously sick a year and a half ago. Since then, he takes care of her and their children.

Work Status In the past years, Mr. Baker could not function properly at work. His firm faced financial pressure; there was some uncertainty whether his department would move at this time. Recently, a colleague, who does not share Mr. Baker's vision, has been recruited in a leading position. Seven months ago, Mr. Baker became absent due to depressive symptoms. In spite of his efforts, he could not resume his work. Therefore, his occupational physician referred him to the psychiatry department of the Academic Medical Centre, where he participated in an occupational therapy programme.

An analysis of his work history showed that Mr. Baker is used to pleasing his colleagues. He is a team player and works very hard to fulfil other people's expectations. This aspect of his personality contributed to his success, but is now working against him. Facing pressure from his colleague and having to cope with his daughter's puberty, he became very insecure about his ability to function properly at his present work. He does not see himself going back to work.

Summary and Outcome of the Intervention

The occupational therapy programme Mr. Baker participated in included eight individual sessions, eight group sessions, and one workplace visit and resulted in that he returned to work. The programme gave him enough confidence to come closer to his feelings and discuss his own needs. He became aware that he is a pleaser and says 'yes' too easily. He also learned he can attach conditions when he says 'yes', for instance, by asking for support or by adapting his schedule to his possibilities. Mr. Baker is now the manager of another department, where his vision and working methods are better appreciated.

Intervention also helped him structuring leisure time; he started to participate in sport activities again and secured quality time for himself. He also found a new way with his wife to share domestic tasks, and they regular discuss how to cope best with the challenges of bringing up teenage children.

Occupational Therapy Intervention: Student's Report

We asked ourselves what kind of intervention can support Mr. Baker in his return to work. To do so, we asked ourselves several questions:

1. What additional information about the work situation is needed and how can we gather this information?
2. In what way does Mr. Baker's private situation (leisure time and work–home balance) contribute to the depressive episode and sick leave?
3. In what way do Mr. Baker's personality and patterns coping with stressful situations contribute to the depressive episode and sick leave?

For the return to work strategy, we also asked ourselves several questions:

4. Does Mr. Baker have enough resources (mentally and physically) to resume work?
5. How can Mr. Baker gain support from his supervisor aimed at solving the problems he experiences and achieve a direct return to work?
6. In what way we can incorporate an activating strategy (an activating approach supports recovery from depressive symptoms)?
7. What will be more supportive for Mr Baker: group sessions or individual sessions?
8. How can we achieve the goal of the work situation becoming a learning situation instead of a stress-situation?
9. How can Mr. Baker become aware of his coping strategies and learn to handle feelings connected to his and his colleagues' requirement?
10. What does Mr. Baker need to cope with his private situation and what is needed to restore an optimal work–home balance?

Chapter 51
Supported Employment for Individuals with Severe Mental Illness

Cynthia Z. Burton, Lea Vella, Elizabeth M. Littlefield and Elizabeth W. Twamley

> *Far and away the best prize that life offers is the chance to work hard at work worth doing.*
> Theodore Roosevelt, 1903.

Abstract Occupational dysfunction is one of the most devastating and disabling consequences of severe mental illness. Supported employment (SE) is an evidence-based practice for assisting clients with severe mental illness to find and keep competitive jobs in the community. The key elements of SE include rapid, individualized job searching, job-based assessment, benefits counseling, time-unlimited job support, and integration of vocational and mental health services. Further, any client who wants to participate is eligible for SE services, and all services are based on the client's individual preferences.

Keywords Psychosis · Psychosocial intervention · Schizophrenia · Vocational rehabilitation

Definition and Background

Supported employment is a form of work rehabilitation that helps clients obtain competitive work (i.e., jobs that pay minimum wage or higher, that are available to any individual, regardless of disability status, and where disabled and nondisabled coworkers work together). The manualized form of supported employment, individual placement and support (IPS), was developed by Becker and Drake (2003).

Unlike conventional vocational approaches that emphasize prevocational training and extensive preparation, supported employment programs provide clients with rapid, individualized job searching and placement in competitive work.

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Placement is followed by on-the-job training as needed and ongoing, time-unlimited support from the employment specialist. Support can consist of any counseling, training, or coaching the client needs to keep the job; assessment of the client's performance and preferences is continuous. Supported employment programs are integrated within mental health care, such that the employment specialist is part of a multidisciplinary treatment team. As this is a community-based intervention, the employment specialist often conducts meetings in the client's setting of choice (e.g., library, career center, coffee shop, home) to focus on client strengths and rehabilitation rather than "patienthood." Work rehabilitation and employment can result in greater income, community integration, and improvement in symptom severity, increased self-esteem, and quality of life (Bond et al. 2001).

Supported employment is an evidence-based practice in psychiatric rehabilitation, with multiple randomized controlled trials and meta-analyses demonstrating its effectiveness over conventional vocational rehabilitation (Bond et al. 2001, Bond 2004, 2007, 2008; Cook et al. 2005; Twamley et al. 2003).

Purpose

Supported employment helps clients obtain and maintain competitive employment.

Method

Candidates for the Intervention

Clients with psychiatric disabilities who want to return to work are good candidates for supported employment. Supported employment programs do not exclude clients for reasons of "work readiness," diagnosis, substance use history, legal history, or level of disability (Bond 2004). Indeed, existing evidence strongly indicates that job searches should not be delayed in favor of skills training or other extended preparation (Bond et al. 2012a).

Epidemiology

Although most individuals with psychiatric illness want to work, employment rates are only 10–25% (Latimer et al. 2004). With the assistance of supported employment, up to two thirds of clients who want to work can obtain jobs (Bond et al. 2008; Bond and Kukla 2011a; Cook et al. 2005; Twamley et al. 2003).

Settings

Supported employment is most commonly used in outpatient psychiatric settings. Any client with a stated goal of working should be offered supported employment.

The Role of the Occupational Therapist (OT)

The OT, referred to in supported employment as the employment specialist, is responsible for delivering all vocational services. The employment specialist typically has a bachelor's or master's degree and provides services to a caseload of 20–25 clients. In addition to the activities described above, the employment specialist may also provide transportation to interviews and attend interviews with the client, depending on the client's preference for disclosure. Better employment outcomes have been linked to increased IPS service intensity and characteristics of the employment specialist (e.g., percentage of time in the community, frequency of contact with clients; Bond and Kukla 2011b; McGuire et al. 2011; Taylor and Bond 2012).

Results

Clinical Application

Supported employment programs consist of the following phases: (1) initial assessment: discussion of the client's job skills, past employment experience, current employment goals and preferences, and benefits counseling; (2) job searching: collaborative effort to create a résumé, complete applications, and prepare for interviews; and (3) time-unlimited follow-up support: the employment specialist provides ongoing support as needed, and checks in regarding stressors, symptoms, or any problems at work.

How the Intervention Eases Impairments, Activity Restrictions, and Participation Restrictions

Severe mental illness is associated not only with psychiatric symptoms but also with cognitive impairment, including difficulty with attention, learning and memory, and problem solving. Employment specialists assist clients by helping them find jobs that are a good match for their energy level, their ability to cope with various job stressors, and their cognitive strengths. Once the client

obtains a job, the employment specialist can help the client troubleshoot symptom exacerbations and cognitive problems on the job. For example, the employment specialist might help a client who hears voices learn to ignore the voices in order to maintain attention on job tasks. The integrated nature of supported employment allows the employment specialist to work closely with other providers to help the client navigate medication adjustments or participate in other psychosocial treatment.

Evidence-Based Practice

The effectiveness of supported employment has been well established in the literature. A 2003 meta-analysis of 11 randomized controlled trials of vocational rehabilitation in schizophrenia and other psychotic disorders showed that 51% of supported employment participants obtained competitive work, compared to only 18% of conventional vocational rehabilitation clients (Twamley et al. 2003); a 2008 updated review demonstrated similar findings (61% vs. 23%; Bond et al. 2008). Further, a recent meta-analysis including 14 randomized controlled trials and a total of 2265 people concluded that supported employment significantly increased rates of any employment over 1 year, and increased job tenure of competitive employment compared to other vocational approaches (Kinoshita et al. 2013). Follow-up studies ranging from 8 to 12 years have demonstrated that between 33 and 71% of supported employment clients worked at least half of the follow-up years (Becker et al. 2007; Salyers et al. 2004).

In sum, IPS has consistently outperformed other vocational programs in job acquisition and a variety of other employment outcomes (Bond et al. 2012a); it has been adopted internationally (e.g., Bond et al. 2012b; Heffernan and Pilkington 2011; Heslin et al. 2011; Hoffman et al. 2012; Kin Wong et al. 2008; Rinaldi et al. 2010), and has demonstrated efficacy for middle-aged and older adults (Twamley et al. 2012) and young people with first-episode psychosis (Rinaldi et al. 2010). With this abundance of empirical support in North America and worldwide, IPS is now identified as the single preferred evidence-based practice for helping individuals with severe mental illness achieve employment.

Discussion

Possible Criticism/Limitations

Consistent with the supported employment value of "zero exclusion," there is evidence that supported employment is superior to other vocational programs regardless of clients' demographic, clinical, and employment characteristics; there appear to be no clearly contraindicated subgroups (Campbell et al. 2011). Despite

these encouraging findings, up to half of clients with severe mental illness still do not work. Common obstacles may include comorbid medical illness, psychiatric symptom exacerbation, lack of motivation, cognitive problems that interfere with job hunting, or fear of losing disability benefits. Indeed, one US study showed that receiving disability benefits was associated with fewer weeks worked, adding to substantial evidence that fear of losing disability income and associated health-care entitlements is a significant disincentive to sustained employment (Campbell et al. 2010). Among those who do work, job tenure can be brief and unsatisfactory job endings are common (e.g., quitting or being fired without being hired elsewhere) (McGurk et al. 2005). Unskilled job placements are also common in supported employment programs, which may contribute to short tenure and job attrition.

Cost-Effectiveness

The annual cost of supported employment is US $ 2000–$ 4000 per client, which is similar to that of conventional vocational rehabilitation (Bond et al. 2001). A recent analysis of social cost impacts regarded the evidence as "strong" for expanding access to supported employment services by substituting them for traditional vocational services (Salkever 2013). In addition, a possible cost offset includes lower utilization of mental health services, such as day treatment among clients participating in supported employment (Bond et al. 2001).

Recommendations for Further Research

To improve the efficacy of supported employment programs, researchers are examining modifiable targets to enhance services. Current research efforts are aimed at augmenting supported employment with cognitive interventions to compensate for neuropsychological deficits commonly seen in severe mental illness (McGurk et al. 2007; Vauth et al. 2005; Wexler and Bell 2005), social skills training to decrease workplace interpersonal conflicts (Tsang et al. 2010), and supported education for young people with first-episode psychosis (Rinaldi et al. 2010). Razzano et al. (2005) examined clinical factors that may affect employment among individuals with severe mental illness, and found that poor self-rated functioning, negative psychiatric symptoms, and recent hospitalization were associated with failure to obtain competitive work. These findings suggest that amelioration of negative symptom severity may increase the likelihood of job placement. Investigations are also underway examining peers as providers of supported employment services (Kern et al. 2013). These novel treatment approaches will continue to be examined as interventions to improve vocational outcomes in individuals with severe mental illness.

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Case Study

Introduction

The theme of this case study concerns supported employment for a person with a severe mental illness.

The students' tasks include:

1. Finding information about supported employment principles (e.g., Becker and Drake 2003).
2. Finding information about how supported employment principles are implemented (e.g., Bond GR et al. (2001). Implementing supported employment as an evidence-based practice. (Psychiatr Serv 52(3):313–321)
3. Synthesizing the information into a report on how the key principles of supported employment are reflected in this case.

As a starting point, students should use the following references to gather background information. Important references are:

1. Becker DR, Drake RE (2003) A working life for people with severe mental illness. Oxford University Press, New York
2. Bond GR, Becker DR, Drake RE et al (2001). Implementing supported employment as an evidence-based practice. (Psychiatr Serv 52(3):313–321)

Overview of the Content

Major goals of the actual intervention The major goals of supported employment are: (1) preparing the client for work and assisting with job searching, (2) competitive job attainment in the community, and (3) job maintenance over time.

Learning Objectives

By the end of studying this chapter the learner will:

1. Be able to identify the key activities in supported employment
2. Be able to apply knowledge of supported employment principles to a client

The Background History of the Clinical Case

Personal Information

JM is a 25-year-old, African American female with a certificate of high school equivalency, who lives with her parents in an apartment.

Medical Information

JM has a diagnosis of schizoaffective disorder and experiences hallucinations, paranoia, and mood liability and irritability. She was referred to supported employment for assistance with returning to work after having been laid off at the end of a seasonal retail job, and being unsuccessful in her independent job search. She had participated in several interviews, but had not been offered a job. JM's psychiatrist initially advised her not to seek work due to concerns that the increased stress of work would exacerbate her psychiatric symptoms.

Occupational Therapy Interventions

JM was accepted as a supported employment client based on her stated goal of returning to work. She and the employment specialist discussed the effect of seeking work on a pending disability claim and following this benefits counseling, JM decided that she would prefer to pursue work rather than disability benefits. During their first one to two meetings, JM and her employment specialist discussed JM's previous work experiences (likes and dislikes) and her preferences for future work. JM expressed interest in applying for both hospitality and security positions. The employment specialist communicated with her employer contacts in the security field to determine where to focus the job search. By the second meeting, JM and the employment specialist began searching for job leads and applying for positions. JM's employment specialist had regular contact with JM's psychiatrist and therapist through a shared electronic medical record, telephone calls, emails, and face-to-face contact at treatment team meetings. The employment specialist was able to collaborate with the other clinicians to ensure that the client attended her appointments and refilled her medications on time. All of JM's clinicians supported her job search and goal of returning to work.

One month after her first appointment with the employment specialist, JM interviewed for and was offered full-time competitive employment with a security firm. She began working and continued to meet with her employment specialist for follow-along support, which included assistance obtaining a uniform, setting up a bank account and direct deposit, and setting up a meal and medication schedule.

One of JM's security assignments involved guarding a bank. The bank manager complained to the security company that JM was listening to music on headphones and dancing on the job. She was sent home for the day and contacted the employment specialist to discuss the situation. They discussed her options, including going to the hospital, quitting her job, and meeting with her supervisor to try to keep the job. JM requested that the employment specialist accompany her to meet with her supervisor; following the meeting, the client was able to keep her job.

The employment specialist continues to provide vocational support to JM, including supporting life skills and decision making relevant to work, and budgeting her income. JM was considering looking for another full-time job to make more money. Support will continue for JM as long as she needs it.

The Student's Report

The following guiding questions are intended to help clarify how supported employment principles are implemented:

1. How did benefits counseling affect the intervention?
2. What are the important issues to attend to when deciding what types of jobs would be a good fit for the client?
3. How did the employment specialist involve other clinicians in supported employment, and what was the outcome of the team approach?
4. How should the employment specialist respond to the client's request to look for an additional full-time job?

Chapter 52
School-to-Work Transition Support for Youth with Disabilities

Leonora Nel and Colette van der Westhuyzen

> *I'm so happy! I didn't believe this was ever possible. She earns a salary like any other person. Thank God. This is all because of this program.*
> Client's parent

Abstract Transition support strategies are a range of interventions and procedures aimed at preparing youth with disabilities for entry into the labor market (employment), community activities, and independent living as adults. It is an individualized process, where occupational therapy interventions are carefully selected to enhance educational and other program outcomes. The transition process moves from school-based prevocational preparation to job placement. This chapter outlines the valuable role of the occupational therapist (OT) in providing training, coaching, and support and is significant in settings where transition support or vocational rehabilitation services are not available.

Keywords Prevocational skills · Supported employment · Transition · Youth with disabilities

Background and Definition

The quotation at the beginning of this chapter was from an interview with the mother of 20-year-old Johanna, who lives with severe spastic quadriplegic cerebral palsy. Johanna underwent occupational therapy-based prevocational training and transition support and consequently gained part-time employment as a kitchen assistant in a school hostel.

Youth with disabilities have the same ambitions and hopes for their future, as their peers living without disabilities (Burchardt 2004). However, they face a range of significant challenges which impacts on their ability to participate optimally in adult life roles, including work (Stewart et al. 2013). Therefore, they require

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specialized support to achieve successful transition to become adult workers (Burgstahler 2003; Smart 2004; Van Niekerk 2007). Access to equal work opportunities has become a major focus for youth services worldwide (U.K. Cabinet Office Strategy 2007; U.S. National Council on Disability 2000).

Transition support uses habilitative and compensatory approaches to facilitate optimal participation and integration as the individual with special needs undergoes the role metamorphosis from child to adult. It covers the period around ages 16–25 and focuses on the life domains of work, social integration, and independent living (U.S. Federal Government 2004; Liu et al. 2007).

It is an individualized process that starts in school, where longitudinal programming includes and emphasizes (1) work readiness, through prevocational preparation (2) training social and life skills required for successful community integration, progressing to (3) ongoing supported in-service training and employment, through which the individual gains access to meaningful work, and then more importantly, is able to maintain it.

The outcome of transition support programs (Halpern 1985) relies on collaboration among all stakeholders, with the youth at the centre (Stewart et al. 2013; Wehman et al. 1985). Occupational therapists (OTs) have a comprehensive knowledge base (King and Olson 2014) and unique skill profile (Du Toit 1991; Kielhofner 2004) which enables them to make a valuable contribution within the support team, and to play a central role in transition support. Ultimately, the outcome of a transition support program is dependent on a number of key factors which include community infrastructure, economic and business activity of the area, as well as client factors such as the severity of functional impairment, the youth's internal motivation and level of self-determination (Wehmeyer and Schwartz 1997; Wehmeyer and Palmer 2003).

Purpose

Transition support interventions for youth with disabilities are aimed at optimally developing the capacity to participate in work, community independence, and social settings when they assume adult roles. Interventions may be health related, educational, social–emotional, or work related, depending on consumer needs and existing supports.

Method

Candidates for the Intervention

Youth with disabilities who experience barriers to integration are candidates for school-to-work transition support.

Epidemiology: Global Statistics on Youth with Disabilities

UNESCO defines "youth" as individuals in the transition of roles from child to adult, and assigns an age range of approximately 15–35 years. It estimates that out of 216 million youth living with disabilities globally, at least 80 % live in developing countries, where support services are likely to be limited if at all present. OT intervention may serve to bridge to bridge the gap for this particular population.

Settings

Referral for transition support usually occurs from (a) school-based support services that serve learners with special needs or (b) health settings providing habilitation/rehabilitation and medical follow-up services. Transition support may occur in a number of settings: school based, community based, and the workplace.

The Role of the OT

In the process of transition support, OTs act mainly as facilitators and providers of prevocational preparation, vocational training, and job placement. The OT's roles may include team co-coordinator, programming consultant, leader of group or individual therapy, skills facilitator, employment specialist, and job coach.

Results

Clinical Application

Transition support entails a client-centered process where goal setting and intervention strategies are individualized. It is the product of thorough and ongoing assessment and problem solving, which informs realistic goals and strategies. Work is the primary focus, although all life domains are addressed in an integrated manner, to achieve the purpose of the intervention.

Figure 52.1 provides a schematic outline of the transition process.

Prevocational Preparation During this initial phase of the transition process, the OT strategies and recommendations focus on work readiness and work-related behaviors, but all life domains are systematically addressed to ensure optimal readiness for assuming adult roles. Education programs are enhanced by the OT providing support and accommodations required by the youth to optimally participate in curriculum activities. OT may also include prevocational preparation in the form of (i)

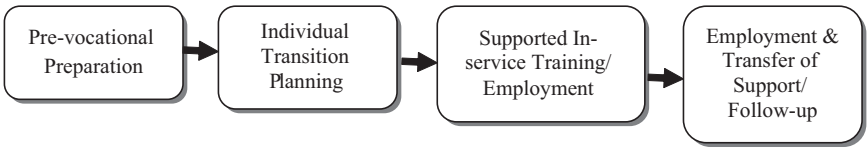

Fig. 52.1 Transition support process

task-centered and socio-emotional therapeutic groups, (ii) marketable skills groups, and (iii) natural community and workplace experiences with a specific focus on training prevocational skills (Jacobs 1991). The Youth Transition Program Model (Benz et al. 1999) provides an outline of how such a program should be constituted, with emphasis on the development of a good work ethic. It has been applied by Little People's School (Jacobs 1991) and Pretoria School (Nel et al. 2007), which are examples of how the occupational therapy service complements the curriculum to achieve successful prevocational preparation.

Assessment A full functional capacity assessment which demonstrates the level of participation and identifies barriers and opportunities in all life domains is essential, and should include aptitude and interest investigations, as well as prevocational readiness assessment through the use of work samples and work simulations (Jacobs 1991).

Transition Planning Based on a critical analysis of the information gained during assessment, the OT provides guidelines and recommendations to stakeholders regarding programming that would benefit the youth's transition. Self-determination and caregiver capacity building are central in the planning of individual transition programs. Goal-setting and progressive implementation of skills development and support can commence from the age of 16.

In-service Training/Supported Employment The principles of supported employment have been found to be valuable in providing in-service training and work experience to youth in school-to-work transition. While the focus is on achieving work readiness, the process ensures (i) time and supports which allow the youth to mature in their emotional capacity, particularly self-esteem, and establishment of personal values and goals, (ii) opportunity to develop and refine prevocational skills which are foundational to work performance, including social and communication skills, time management, work quality etc., in a supported real-work position where intervention is immediately available, and (iii) job exploration and rotation as a means of building a solid base of generic work skills and work experience, increasing "marketability" prior to job searching for permanent employment.

An outline of the elements of supported employment (Wehman et al. 1992) applied to the OT's "work"-related interventions, is provided in Table 52.1.

Support is gradually faded and readiness for permanent employment is determined within the transition team.

Table 52.1 Supported employment elements applied in occupational therapy transition strategies

Support element	Occupational therapy strategies
Consumer assessment (function, skills, interest)	Holistic assessment and analysis of all life domains, components, and contexts
Job development (job analysis and job matching, environmental adaptation and job modification)	Identify, generate, and negotiate appropriate in-service training positions. Apply principles of activity analysis, work simplification, and ergonomics to plan and implement structural or task adaptations, provide assistive technology, and ensure that both client and employer benefit
Job placement	Therapeutic group work is used to train work-seeking behavior. Support (coworking, training, and adaptive strategies) is given to achieve appropriate level of integration and performance when inducted into a new job. Coworkers and employers are given support and training in strategies to effectively monitor and manage the client's work performance and integration. Regular on-site visits are performed to evaluate actual performance status
Employer liaison, and jobsite interventions (training, behavior management) with use of job retention strategies	Build professional relationships with employers, have regular feedback sessions, and offer therapeutic intervention to address or prevent problem areas identified by client, employer, job coach, or coworkers
Individualized support	Coordinate and facilitate service delivered to address needs in all performance areas: health management, work, household management and independent living, transport and mobility, social integration, and leisure pursuits

Employment During this final phase of transition support, support is transferred to appropriate persons or services. Often, the caregiver or family will be in a position to assume this role, having been included in the transition process and empowered through interventions and capacity building. In the absence of long-term support services, the transition support provider may continue support through consultation services and follow-up.

How the Intervention Eases Impairments, Activity Limitations, and Participation Restrictions

Transition strategies redefine disabled youth's perspective on the future, moving them from the role of disabled person to empowered worker, thus being able to (i) engage in a variety of relationships, (ii) contribute through service to the society, and (iii) develop personal strengths and skills (Inman et al. 2007; Seyfarth et al. 1987; U.S. Federal Government 2004).

Evidence-Based Practice

The success of transition strategies may be measured according to several parameters, such as, work, income, residential independence, social and community life participation, personal satisfaction, and parent/caregiver satisfaction (Blackorby and Wagner 1996). According to literature review by Stewart et al. (2013), evidence points to the following aspects as best practice approaches for transition support services:

1. Interactional, life-course approach which
2. Recognizes the complexity and interaction between life domains of education, employment, living and socialization
3. Utilizes self-determination models of training and support
4. Includes functional curriculum and school-supervised real-life work experiences

OT as major contributor in vocational services and supported employment is well demonstrated and documented internationally (Davis and Rinaldi 2004; Liu et al. 2007; Oka et al. 2004; Priest and Bones 2010). However, very little evidence of OT-based prevocational training, vocational preparation, and transition support is available so far. The growing interest in this field of practice among school-based OTs, especially in developing countries, is indicative of the need for this service. New programs should be developed based on the successes of existing models, allowing for adaptations relevant to the context (Mithaug 1994).

Discussion

The literature reflects lower than desired levels of success for persons who underwent transition support. Although there is growing evidence for best practice models for transition support in general, OT as provider remains undescribed and thus unsupported. “There is a need (for Occupational Therapists) to expand the focus in preparing learners for transition from school to the vocational environment” (Uys 2008). Such research (a) may contribute to changing the perception prevalent in support systems of developing countries, that vocational preparation and transition services are nonessential labor-intensive luxuries, (b) may contribute to policy development and implementation within government departments and support services, in line with international conventions (Article 26 & 27, U.N. Convention on the Rights of Persons with Disabilities 2006) so readily agreed to, in providing youth with disabilities access to work and community integration through effective and appropriate preparation and support, (c) leading to greater long-term economic and social independence and self-actualization for these individuals.

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Case Study of KM

Keywords Environmental adaptations, job match, prevocational preparation, therapeutic group work, supported in-service training (SIST), transition planning

Introduction

The theme of this case study is occupational therapy management and client-centered programming and interventions to provide appropriate support during the transition of KM, a young adult with disabilities, from school to adult life, and particularly work.

The students' tasks include:

- Understanding the prevocational preparation process, which includes the training of critical prevocational skills through therapeutic group work
- Reviewing the process and principles of individual transition support
- Knowledge of the principles of supported employment, job analysis and matching, environmental analysis and adaptations through work study and ergonomics based on as environmental and accessibility guidelines as indicated for specific disabilities
- Understanding therapeutic approaches and techniques used to address physical, psychological, and social performance components which impact on the person's ability to integrate in social and work settings
- Compiling a report on how the student views the role of occupational therapy in providing transition support where support services are not available

The following references may provide useful background information:

- Nel L, van der Westhuyzen C, Uys K (2007) Introducing a school-to-work transition model for youth with disabilities in South Africa. Work 29(1):13–18
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Overview of the Content

Major Goals of the Intervention

The major goals of transition support are: (1) achievement of prevocational readiness and self-determination; (2) developing emotional capacity, independence,

social and work skills required for employment and adult role integration; (3) implementing environmental adaptations and supports to ensure optimal participation; and (4) capacity building of family and/or support systems to ensure long-term integration and participation in adult roles.

Learning Objectives

At the conclusion of studying this chapter, the student will:

1. Be able to interpret the case study using information in the literature review, and apply clinical reasoning in similar contexts
2. Have insight into the justification of and ethical considerations relating to transition support
3. Write a scientific report on transition support as an OT service

Background History of the Clinical Case Study: KM

Personal Information

KM lives in a developing country, where government and nonprofit organizations provide education to learners with special needs, and basic health services to support disability-related needs, but no formal vocational or housing support programs. KM attended specialized schooling since the age of 8 years. He is a wheelchair user, and is able to transfer independently and propel himself over fairly uneven surfaces. He has average mental capacity and completed general education and training (grade 9), with no further access to formal higher education and training. At the time of commencement of transition planning, he was hoping to to gain employment to enable him to support his elderly parents and himself financially, as well as to develop his personal capacity. He was computer literate and was interested in advertising work as career choice. KM lived in a simple brick house with his parents and extended family, in a township area adjacent to a major city. His father was a self-employed motor mechanic who contracted with schools to transport learners, and thus also provided transport for KM.

Medical Background and Physical Capacity

KM was diagnosed with osteogenesis imperfecta at a young age, consequent to several nontraumatic fractures. Throughout his childhood, he suffered many fractures to all long bones, often requiring surgery for fixation. As a result, his lower limbs had poor structural support and muscle wasting. He was unable to de-

velop a functional walking pattern. Vertebro-costal development was also affected, resulting in abnormal postural alignment and impairment of lung capacity. As he matured, bone integrity seemed to improve, and fractures no longer occurred. Upper limb function

Occupational Therapy Interventions: School-to-Work Transition Support

Prevocational Preparation KM participated in therapeutic group work from age 14, as part of his scholastic programming. This included: (a) one weekly group session focusing on development of level of activity participation, social skills, self-knowledge, self-determination, and emotional skills in age-appropriate group activities including group games, role-play, functional task performance, and community visits. From age 16, in addition to the above, group work included work orientation and awareness, training in work-seeking skills, as well as (b) two weekly small group sessions which trained generic work skills in simulated work tasks. KM participated in the office administration group.

Assessment In the final quarter of the school year, at age 18, information regarding KM's physical, cognitive, emotional, and social functioning was gathered through personal interview, formal and observational assessments, group observation results, discussions with team members and collateral information from family members. His greatest challenges were identified as:

- Poor self-esteem with lack of self-confidence, resulting in poor self-determination and initiation of actions to assume new roles
- Poor knowledge of transition options, fears of being unable to work or ending up in a sheltered employment setting doing routine work
- Accessibility barriers with respect to existing in-service training work sites and transport

Career choice tests indicated above-average aptitude in visual–spatial reasoning, above-average interests in art, science, writing, business and small group settings, personality preferences for social interaction, and sensitivity to others, and he was found to be responsible, conscientious, and morally conscious.

Transition Planning The OT and educator met with KM and his father, to clarify their needs and expectations and review assessment findings. Based on this, transition options were discussed, and possible career development paths considered. In follow-up individual sessions, KM compiled a written transition plan outlining long-term goals and short-term objectives required to reach those goals. He had decided on learning graphic design and office skills in order to have his own small advertising agency in future. Strategies for implementing action plans were discussed and rehearsed in role-play, where necessary. Access was provided to resources required for the planning process.

Supported In-service Training (SIST) and Employment In order to address the need for developing office skills, and overcome transport and accessibility barriers, the OT placed KM as part-time office assistant to the OT department at the school he attended, building on skills already acquired during skills groups. He developed headache, back pain, and general discomfort during this time, resulting in tiredness and decrease in work quality. Problem analysis identified visual strain and postural discomfort. He was referred for vision screening, and given prescription spectacles which alleviated headaches. His office setup was restructured to optimize for joint and back preservation and energy conservation. His wheelchair was adjusted and inserts added to provide appropriate spinal support. Following this, his work quality improved and he was able to maintain a high level of performance. He was exposed to graded problem solving and organizational and communication challenges. Regular feedback and problem solving with the OT addressed internal and external factors affecting personal growth and work performance. KM gradually gained confidence and grew in his self-esteem through experiencing success and positive results from his work efforts. The OT sought in-service training opportunities in graphic design by visiting local businesses which offer such services and doing environmental and job analyses, while building relationships with managers/owners and introducing the concept of SIST, until a suitable training employer was identified. The employer's premises had accessibility barriers, and the OT negotiated for these to be rectified by providing sketches and floor plans, as well as cost estimations for environmental adaptations to be made. The employer immediately implemented these. The employer did not have a vacant workstation. Together with KM, the OT procured sponsorship for a complete workstation, which would become KM's property, enabling him to start up his own small enterprise once he had completed his training. Three months after the commencement of SIST, KM started training part-time as a graphic designer, in the afternoons. Through shadowing, mock projects, and finally client projects, he was able to master the basic skills sufficiently to apply for permanent employment after 9 months of in-service training. KM's family was approached regarding provision of transport and support for long-term needs with respect to planning for a home-based business. Additions were made to the house and KM was able to give input regarding accessibility and layout based on his experience and interactions with the OT. Periodic individual sessions were valuable in reviewing transition goals and updating action plans, with minimal interventions required, as KM had attained a level of activity participation where he was self-directed and actively initiated and completed tasks on a competitive level. His interpersonal skills had matured and he was experienced as friendly, confident, well mannered, disciplined, and responsible.

Employment and Follow-up KM was offered a full-time position by the training employer, based on his progress and excellent quality of work. He required no ongoing support for work-related aspects. KM worked in this position for 2 years, and another year at a similar business. During this time, he started doing small projects from home, and was able to build up a client base so that after 3 years of employment, he was able to have his own enterprise from home full time. At

present, he is the main breadwinner of the family, and is creating job opportunities for two youth within his business. The final step in KM's transition plan is to purchase a motorcar so that he can be independently mobile. The OT will assist with assessment and recommendation for steering adaptation and driver training.

KM's response during a long-term follow-up interview illustrates the value that OT-based transition support had for him, brilliantly. When asked what his greatest challenges were when he first completed school, he responded: "I had very poor self-image…. I felt my future ends here." To a later question: "How do you see yourself in your community now?" he laughingly replied, "I help the community so much, I should be mayor!"

The Student's Report

Based on your review of the suggested literature and the case described above, summarize in your report how you would conduct transition support for KM according to the following guidelines:

1. Give a summary or schematic representation of his prevocational readiness, highlighting strengths and barriers to transition and integration.
2. Briefly describe possible career development options and pathways, based on his skill level, interests, aptitudes, and functional capacity at the time of exit from school.
3. Which interventions are required by the OT as sole transition service provider? Prioritize and provide time frames to set goals for your OT intervention. Also, briefly note specific approaches and strategies to address each of these.
4. Which interventions require referral to other support services?
5. Identify factors which, in your view, contributed to the successful transition outcomes achieved by KM. These include personal traits and capacities, support provided, and environmental factors.
6. List specific skills or knowledge you would like to expand in order to be equipped to provide transition support.

Part IV
Interventions: The Occupational Therapist Enables for the Client's Recovery

Fig. 1 Participants are enabled into various leisure activities of their interest (visiting parks; http://www.enkoping.se/swwwing/app/cm/Browse.jsp?PAGE=38695; fishing, senior club party; and wheelchair dancing) (The photos are unrelated to occupational therapy.) Photo: Ingrid Söderback, 2013

Chapter 53
Interventions: The Occupational Therapist Enables for Recovery

Recovery Interventions: Overview

Ingrid Söderback

Abstract This part of the handbook surveys the occupational therapy interventions (OTIs) in which the occupational therapist (OT) enables the clients' activity/occupations, with the aim of resuming engagement in occupations. The OT's role is clarified. The interaction between the client and the activity is illustrated by four cases. Commonly used therapeutic media, such as arts and crafts, complementary therapy with animals, gardening, the Internet technology, leisure and recreational activities, music, playing games, progressive relaxation and work-related activities are discussed. Marie-Louise Huss's case illustrates how engagement in occupations brought meaning to the client's life and facilitated her recovery.

Keywords Dementia · Elderly people · Enabling occupation · End of life · Gardening · Horticultural therapy · Life satisfaction · Meaningful occupations · Mental health disorders · Music · Recreational activities · Therapeutic media

Introduction

'Recovery Interventions' focus is on the therapeutic use of activities/occupations. It is these activities that intermediate the therapeutic process. 'Occupational therapy consists of three intertwined components; the client, the therapist and the performances of occupations, of which the latter is the therapeutic active pills' (Sven Hartmann, Professor Emeritus, Centre for Teaching and Learning in the Humanities, Stockholm University. Personal communication in the late 1970s). This statement is especially true when OTs apply the 'recovery interventions'.

'Recovery interventions' are, for the most part, combined with (a) some kind of functional adaptation of equipment and/or environment, (b) assessment of the performance's degree of severity to be matched with the client's performance abilities and (c) teaching strategies.

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Choice of Activity/Occupation The selection of activities/occupations for therapeutic use can be endlessly varied, as illustrated in the photos with the old lady's visit to a garden, the fishing man and the man in the wheelchair dancing with his lovely lady (see Fig. 1, Part IV). However, the chosen activity should be adapted to the individual client's will, ability and that he/she experiences the performance *meaningfully.* The following citation illustrate the importance of respecting client's will: During a debate among colleagues, professor Kielhofner asked: 'Which do you think it is the best: Enable for the man with a hemiparesis to make a meal, which is a routine intervention at the occupational department where he is a patient, or enable for him to fish, so as he wishes'.

Among the endless possibilities to choose, an activity for therapeutic use, the following are represented in Part V: the Internet technology (Chap. 54), talk and socialize (Chap. 55), recreational activities, e.g. music listening, playing games, doing posters, painting (Chap. 56), client's performances for him/her important occupations in end of life (Chap. 57), gardening (Chap. 58), horticultural therapy (Chap. 59) and music performances or music listening (Chap. 60).

Occupational Therapy Interventions

- *Enabling*. The term was first used by Christiansen and Baum (1997a). *Enabling interventions* are founded on the assumption that being occupied (1) maintains the human being, (2) gives content to otherwise endless days of idleness and waiting for healing, (3) re-orientate leisure activities, (4) offers contact with other people, (5) eases solitude (Mosey 1986) and (6) increases mastery and control of one's environment and the competence to handle it (Christiansen 1991). Enable is supplying a client with opportunities that make it possible for him/her to participate in his/her meaningful occupations.

Outcomes

- *Recovery* is a person's actions to regain control of, or possession of a balanced stage of mind and body that support optimal quality of life. Recovery is the *primary outcome* of 'enabling occupations'. Other possible outcomes are wellness, involvement and avoiding loneliness.
- *Wellness* is synonymous to recovery. The concept was introduced during 1950 by the physician Halbert L. Dunn. According to the World Health Organization, wellness is a person's active process of becoming aware of and making choices toward a healthy life. It is an experience of optimal balance of the mind, body and spirit resulting in complete physical, mental and social *well-being*, i.e. a successful existence and not merely the absence of disease or infirmity. For example, Matuska et al. (2003) showed that 65 elderly people living in a community relieved their solitude through their participation in an occupational therapy wellness programme. They increased their participation from 55 to 65 % for three or more *meaningful* social and community activities per week.
- *Health-related quality of life.* The concept of quality of life (QoL) has its origin in the socio-economical debate during 1950s. The overall QoL concept was specified to health-related quality of life during 1980s. This concept concern

an individual's satisfaction (or dissatisfaction) with his/her ability to function (physical, emotional and spiritual) and living in actual culture and society (Snoek 2000).

- However, it might be called in question how strong predictor QoL is for explaining people's wellbeing (Snoek 2000). Later research shows for example: (a) among patients living with the diagnosis of amyotrophic lateral sclerosis, self-perceived emotional functioning was poorly explained by changes in the physical state [the variances were between 25% (first assessment) and 16% (second assessment)] (Mora et al. 2013). (b) Among older Taiwanese patients with rheumatoid arthritis, the physical component explained ~ 64% and the mental component ~ 26% of total variance in QoL (Lu et al. 2012). The correlation between occupational performances/ADL and QoL is, so far, poorly investigated. An example: Among people living with uncontrolled epilepsy, there was a low (24% of the variance) to moderate (50% of the variance) correlation between QoL (perceived satisfaction) and ADL performances (e.g. participate in education, remain at the job; Nickel et al. 2012).
- *Loneliness* is the person's feeling to be dejected or excluded as a lack of companionship. It is a common condition among frail elderly and people living with mental health disorders but also concerns people who views themselves as different. This health condition is expected to be countered by *involvement* in occupational performances. For example, Poulsen et al. (2008) showed that boys with motor disabilities, who began to participate in team sports, directly experienced less loneliness and increased life satisfaction.

Purpose

The purposes of interventions in which the OT enables the client to be occupied are (1) to fill the clients' time so that they may experience meaning, involvement, and participation, and (2) to give purpose and opportunity to clients as they make choices regarding their activity. These factors contribute to clients' recovery, by enabling their engagement in activity, thus promoting good health and quality of life (Hammell 2004). These purposes are 'independent of whether a product is created or whether the activity gives visible results'. The activity can be a step toward the client's renewed competence (Pedretti and Early 2001).

The Occupational Therapists' Role

The primary role of occupational therapists (OTs; Fig. 53.1) is to arrange the environmental circumstances so that the clients can be gainfully occupied. In other words, the clients take part in an activity/occupation that not necessarily has a defined goal or is resulting in a product (Christiansen and Baum 1997c). Here, the

Fig. 53.1 The occupational therapist's role in the occupational therapy interventions aimed at enabling activities that promote the client's feeling of recovery. The figure is a stylized Ankh-sign

OT's work covers preparation and organization of the selected occupation or activity, and supplying the client with appropriate and necessary material and tools. A fundamental criterion is that the clients' activity should fulfil their wishes and be chosen by them.

The Case of the Group Members

This activity process without goals of producing a product is illustrated by the following case:

> Early in 1970, I was an OT in a long-stay geriatric hospital in Stockholm. I was responsible for a flexible (open) group of six to eight elderly clients, all of whom were about 80 years old. Except for one man, the clients were suffering from moderate-to-severe memory dysfunction. The clients were prescribed periods outside in the fresh air during the summer or changes of surroundings by visiting the winter garden for an hour, three times a week. The normal way of starting the intervention was that the aide placed the clients in their wheelchairs in a line. This precluded any conversation among the clients. I was frustrated by this, and sought some way of generating communication among them. I arranged the wheelchairs in a circle instead of a line. I started a game, a version of 'Who's who?' in which the group has to guess what well-known figure one member is thinking of. In this version, Emma was to think of something particular. A knotted handkerchief was chucked to different group members. The ones who got the handkerchief had to guess what Emma was thinking of. After at least two rounds of this, the man without memory problems said: 'Now you must tell us what you are thinking about, Emma', to which Emma replied: 'I've forgotten'.

At the next session, the clients asked for the same game, suggesting that they felt meaning and implying that the group members' *activity* might have helped their recovery.

This case illustrates that the result of the game was unexpected and unimportant. The activity process was of main importance, the result less so. The clients' involvement in the game was clearly better than sitting in a line in their wheelchairs doing nothing. The game filled the participants' time for a while, and an OT has the professional knowledge of how to enable participation even among clients with severe memory impairments.

Characteristics of the Enabling Interventions

Interaction Between the Client and the Activity

The most prominent feature of the interventions where the OT enables clients' an activity is the *interaction between the client and the activity*. In addition, interactions between group members contribute to the recovery process (Pedretti and Early 2001). The OT has a subordinated role during these sessions, in that *feedback from the activity and from other group members* can affect the clients' recovery. This is illustrated by the following case:

> Together with a colleague, I was a clinical lecturer for OT students doing practice at a Stockholm geriatric rehabilitation clinic. The OT's main work here was to investigate whether clients could be discharged to their homes. I was to demonstrate the assessment process to the students, and had a tape-recorder going during the sessions.
> Three clients, Elizabeth, Joanne and Juliette, formed a group in the training kitchen. Following a stroke, Elizabeth and Joanne had left-side paresis. Juliette's medical diagnosis was not established. The referring document stated that she might be in a deep depression or suffering from arteriosclerotic dementia. She had not said a word for several months.
> The goal of the assessment session was to observe whether and how the three women communicated with each other and to investigate their motor and performances skills. The clients were asked to make coffee and bread and butter according to the Assessment of the Motor Process Skills (Fisher 1993).
> During the assessment session, Elizabeth and Joanne talked briefly in a few short sentences. When the coffee and bread and butter were ready, we all sat together at the table. The coffee was poured out. Then suddenly Juliette said: "Tastes good, this coffee."
> Juliette's words were recorded evidence for the physician, who suddenly realized that Juliette had potential as a client in the 2-month rehabilitation program.

It seems that the process of making and drinking coffee triggered Juliette's recovery of speech! According to Ludwig (1993) such meaningful and planned tasks become therapeutic because the activity mediates between the client's inner and outer worlds. Moreover, such tasks help the client to achieve a sense of self.

The Form for the Interventions

The form for the interventions in which the OT enables activities is planned individual or group sessions. The main purposes are to facilitate clients' insight into their ability levels and their ability to express feelings (Stein and Roose 2000). The

OT's role is to organize and arrange the sessions (Schwartzberg 1998), taking into consideration (1) the leadership style, (2) the structure of the group, (3) the number of group members, (4) the length and number of sessions, (5) selection of suitable tasks based on activity analysis and activity synthesis, (6) the tasks' degree of difficulty, (7) adaptation of the environment and (8) clients' present functioning and ability that enables the clients to manage the chosen tasks (Kaplan 1993; Stein and Roose 2000).

The Therapeutic Media

Enabling recovery is the original form of the occupational therapy interventions often aimed at the elderly or at people with severe mental illness, who participate in day health services (see Chap. 55). These recovery interventions include steps to ensure the clients' activity that result in their being meaningfully occupied. Some of these therapeutic media, which are commonly used (in Sweden; Müllersdorf and Ivarsson 2012) are discussed. Marie-Louise Huss's case illustrates how engagement in occupations brought meaning to the client's life and facilitated her recovery.

- *Arts and crafts,* which are used for providing the clients with a nonverbal form of communication, and which gives them opportunities to express feelings and creative ideas (Macdonald 1964; Reynolds et al. 2008; Stein and Roose 2000).
- *Leisure activities* such as sports, sailing, rugby, or walking (Kratz and Söderback 1998), as well as games, hobbies and shopping. A systematic review (Dorstyn et al. 2014) showed that leisure therapy among the patients' with stroke significantly contributed to their improved QoL and mood.
- *Progressive relaxation therapy* (with or without a focus on music), which can be effective in lowering blood pressure, while qigong (eight sessions of 20 min) can benefit the psychological dimension of cardiac-disease sufferers (Hui et al. 2006).
- *Horticulture therapy,* (Chap. 59) which includes imagining nature, viewing nature, visiting a 'healing garden', and gardening. Horticulture therapy may help recovery, alleviate stress, increase well-being, promote participation in social life and promote reemployment for people with mental or physical illness (Söderback et al. 2004). Martin et al. (2008) reported that spouses separated by illness (one partner lived at home, and the other partner in a nursing home) and who participated together in gardening activities experienced increased feelings of social participation and maintenance of their spouse role.
- Gardening as a therapeutic medium is relevant for use among elderly people (see Chap. 58), dementia patients, those who are visually impaired and those who have brain damage or depression.
- *Complementary therapy incorporating animals* is frequently used for children and adults with special needs such as autism and delayed psychosocial development. When animals are around, children use significantly more language and a greater social interaction occurs (Sams et al. 2006). Horseback-riding sessions

for children at risk of poor school performance can positively affect their behaviour (Kaiser et al. 2006). Mona Sams runs Mona's Ark in Troutville, Virginia, where she explores the value of using llamas, alpacas, ducks, rabbits, goats and specially trained dogs as therapeutic facilitators. The animals become the client's friends, because they do not judge the client's challenges.

Sams states:

> The purpose of incorporating animals [in the recovery intervention programs] is to reach clients who generally have not responded to traditional occupational therapeutic approaches. Clients with cerebral palsy, developmental disabilities, including autism, Down syndrome, posttraumatic stress, visual impairments, and psychiatric disorders have all benefited from occupational therapy incorporating animals.
> Individuals who are nonverbal often make the most significant improvement. Consistently, they will begin nonverbal communication (sign language, picture exchange) and eventually speak to their animal friends. Working with persons who are nonverbal, often the speech pathologist will cooperate with the occupational therapist.
> Llamas are especially therapeutic as they are curious, interactive and pleasant to be visiting. The llamas will instinctively be responsive to people with special needs. They provide tremendous tactile input because of their wonderful fiber. Empowerment occurs when the clients get to a stage where they independently lead the llama. Compassion is consistently elicited by the llama, and this enables the therapy session to be effective and produce measurable positive change.
> The clients attend the complementary therapy program on a weekly basis for a 45-minute session, and some attend two times weekly. Clients are evaluated and individual goals are established. Day programs for adults are seen on a small group basis.
> The unique aspect of the approach is rather than the clients being transported to a farm, the farm comes to the clients.

> Using the therapeutic concept of Mona's ark intervention goals incorporated in the sessions are training of:
>
> - Fine motor skills: grooming (with a metal comb), feeding, cutting carrots, attaching lead clamps on halters.
> - Bilateral coordination: leading a llama through an obstacle course, cart driving with the llama.
> - Sensory stimulation/tolerances: petting/stroking dogs and rabbits, brushing and grooming the llamas (using a circuit blower), throwing a tennis ball for the dog, riding the llama, carding and felting fiber from the animals.
> - Communication: nonverbal communication with the animals using picture exchange or sign language (dogs can respond to signing), talking or reading to the animals, expressing feelings (clients with posttraumatic stress will often talk to the animals before they talk to staff).
> - Proprioceptive, vestibular functioning: riding in the wagon with the Great Dane pulling and the child holds ropes from a harness, riding on the back of the llama, riding in llama cart, guiding llama through an eight-part obstacle course.
> - Psychological goals: observing, responding, interpreting animal behaviours, adapting to natural consequences of behaviours toward animals. Developing nurturance and responsibility (feeding, caring, grooming another being, developing self-confidence, empowerment, when llama follows their lead, training for llama shows. Llama shows allow for cheering for peers, interacting with community at llama shows, receiving awards and social interactions.

- Functional task skills, loading and unloading the animals and equipment at the settings, preparing for a llama show. Wet and dry felting animal fiber to make purposeful projects (e.g. wall hangings, pouches, cushions). (Sams, personal communication 2008)

Some of the activities used for the recovery interventions are represented in this handbook:

- In contrast to music therapy, *music in therapy* is used in hospitals for (1) movement relaxation therapy by creating a mood through the choice of music; (2) movement-balance therapy through client participation in rhythmic groups (Ferguson and Voll 2004; Stein and Roose 2000); and (3) singing (see Chap. 60) as a part of aphasia therapy (Söderback 1981).
- *Recreational activities* such as visiting concerts, entertainments, film, stage plays, cafés and restaurants are employed in clinical practice. Such recreational activities were used in a stimulation programme (see Chap. 56) among Alzheimer sufferers. Comparison with nonparticipants demonstrated a decrease in behavioural disturbances (Farina et al. 2006).

Occupation Brings Meaning to Clients' Lives and a Feeling of Recovery

The activities used as therapeutic media for the enabling interventions aimed at the recovery of the activity process are presented in the case of Marie-Louise Huss (1978).

Marie-Louise's ability to do an activity is interpreted as giving meaning to her life, which to an outsider was a very troubled one.

Marie-Louise was an enthusiastic, 35-year-old person. She was living intensely in the here and now, interested in people, animals, literature, art and experiences. She was a drawing teacher with specialist studies in art and ethnology.

Marie-Louise's brain tumour made her unable to (1) swallow (she was fed through a tube into her stomach), (2) speak, (3) walk (she used a wheelchair), (4) use her right hand (due to paralysis), (5) breath unaided (she was dependent on a cannula in her bronchus, a vacuum apparatus, plus the needed assistants to help suck up phlegm, and (6) see the right side of her body.

Marie-Louise was first my colleague Gunilla Myrin's and then my professional responsibility. During 19 months she was a patient to the Danderyd Hospital Rehabilitation Clinic, Stockholm. She visited the occupational therapy department nearly every weekday, some days twice, up to 4 h per day until her death.

Marie-Louise spent much of this time *typewriting*. She got an ordinary typewriter[1] 5 months after her tumour operation. It was hard for her to learn to write with her left hand and she had also neglected visible sight. However, she was very

[1] Computers for personal use were not invented yet.

glad to have the typewriter. It enabled her to communicate with her friends, to tell us about her will and desire to be occupied, which resulted in her book, Varit Väldigt Nära Döden (Been Very Close to Death), which was, published posthumously (Huss 1978).

Marie-Louise's other main interests were *painting and art therapy*. She was in a special group educated by an art therapist. We planned an exhibition of Marie-Louise art, but it did not take place (Huss 1978, pp. 86, 163, 168, 172).

She completed much of the *handicrafts work,* such as sandpapering of prefabricated woodwork on a candle and a chopping-board, small mosaics, weaving on a narrow loom, cross-stitch embroidery on a cushion, enamel-work on plates and textile printing of tablecloths. These activities enabled Marie-Louise to make gifts for her mother and friends, as well as articles for sale. Moreover, she *participated in games and did jigsaw puzzles*.

Our job as OTs was to enable Marie-Louise's activities by adjusting the tools, material and performance of her various occupations. Thus, we adapted her wheelchair, and ergonomically and environmentally adapted her workspace for the typewriter. For every session, we arranged the embroidery so that she could do it with one hand according to her actual level of adaptation, function, skills and competence. *Visits to exhibitions and museums* were also arranged (Huss 1978, p. 161).

Here are Marie-Louise's own word (translated into English) about how she was able to continue living:

> Looking back, I am mainly happy and surprised that I have *managed so well* in spite of everything. This is a tremendously useful view. When I run into difficulties nowadays, I take this view and it is strange how much smaller problems can seem. (Huss 1978, p. 153)

The *outcome of Marie-Louise's intervention* was expected to contribute to her recovery. Christiansen (1991) and Christiansen and Baum (1997b) observed that, even if not yet well understood, there are important relationships among occupation, health and well-being. Moreover, such recovery interventions reveal how clients, by activity, can experience joy and satisfaction, and can express a sense of their life's meaning (Clark and Larson 1993).

The effectiveness of 'Recovery interventions' in connection to multi-disabled people are documented in the literature, see for example: (a) La Cour et al. (2005) showed that engagement of the terminally ill elderly in creative activities helped them to feel less isolated and more connected to life, (b) a year-long investigation of an occupational therapy programme of 2 h a day, 5 days a week for a group of patients with moderate-to-severe Alzheimer dementia showed that behavioural disorders improved appreciably (Baldelli et al. 2007), (c) participants in psychoeducational groups valued the OT's careful enabling activities that had promoted optimal group structure, interaction among group members, adequate information and a supportive milieu with limits on emotional disclosure (Cowls and Hale 2005), (d) see Chap 34 and (e) Chap. 57.

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Chapter 54
Using Smart Home Technology and Health-Promoting Exercise

Machiko R. Tomita and Susan M. Nochajski

> *The Internet home-based group exercise was great. I got stronger. I have a sense of accomplishment. Now that the program is over, what's next to motivate me to do home-exercise?*
> Participant

Abstract Falls have a very high prevalence in older adults (aged 65 and older) and are probable causes of decreased physical activities, function, and quality of life, as well as increased depression and nursing home placement. Home exercise is an effective way to reduce fall risk factors, but there is often low adherence. The use of smart home technology with health-promoting exercise can be a new method for occupational therapists to reduce fall risks through encouraging an active lifestyle.

Keywords Fall risks · Functional status · Older adults · Smart home · Virtual exercise

Background

One of the major goals for occupational therapists (OTs) in providing services for older adults is to enable them to continue living in their own home, if they so desire (Canadian Association of Occupational Therapists 2011) and being as independent as possible, through promotion of wellness (American Occupational Therapy Association 2013). For this purpose, maintaining their physical as well as cognitive function is of vital importance. One way to achieve this is to improve their home environment by making it *a smart home*. This includes automated lighting and appliance control in addition to a security system through the use of a computer,

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making their home more secure and safe. In addition, including health promotion technology may contribute more to independent living.

When *smart home technology* using X10 (X10 USA 2010) devices was retrofitted in older homes, older adults who had some functional deficit in daily activities benefitted. They maintained levels of mobility, instrumental activities of daily living (IADL; use of telephone, shopping for groceries and clothes, light housework, medication intake) (Fillenbaum 1988), and cognition. In addition, health-care technology in a smart home environment was broadened (Tomita et al. 2010), which is conducive to encouraging an active, healthy lifestyle. Here, OTs are not only responsible for rehabilitation but are also encouraged to promote wellness in their clients carrying over the effects of occupational therapy. The current use of smart home technology may assist in maintaining older adults' mobility and IADL functions. This active approach improves older person's physical strength through home-based group exercise using *web conference technology*. The inclusion of health-promoting technology into a smart home may contribute to the likelihood of residents' improved health and mobility.

Definitions

A smart home is a house that has highly advanced automatic systems for lighting, temperature control, multimedia, security, window and door operations, and many other functions (Craven 2013). The definition of a smart home may include these types of technology but should have a purpose according to the resident. For older adults (aged 65 and older), the purpose of making a home smart is likely to include independent living. By automating the control of the entire home, including appliances, electronics, and a security system through voice-recognition software, it may be beneficial for people with visual impairment and very frail older adults. Unfortunately, if these systems entice a sedentary lifestyle, we may need a technology to reverse the immobility, that is, a technology to encourage exercise.

Purpose

The purpose of the smart home technology, with virtual exercise intervention, is to prevent or reduce fall risks and promote physical activities to maintain independent living in older adults with a history of falls using cyberspace to provide informational, instrumental, emotional, and appraisal support.

Method

Candidates for the Intervention

Candidates for the intervention are those individuals who need to improve physical strength and mobility through regular exercise, such as those with a history of

falling who are at risk for future falls, diabetes, heart failure, hypertension, hypotension, obesity, or arthritis. Also, those who need to prevent bone density loss and osteoporosis, and/or improve pulmonary function are also candidates (Cleveland Clinic 2013), if and when outdoor activities are difficult to carry out.

Epidemiology

Inclusion criteria for the virtual exercise intervention are an individual (a) aged (>65 years) who needs to do regular exercise or increase mobility, (b) having a history of a fall, (c) ability to use a computer or have someone to help operate a computer, (d) ability to follow exercise instructions, and (e) availability of a fast Internet connection (download speed >30 Mbps).

Settings

The intervention took place in *cyberspace* by health-care professionals connecting with participants via the Internet. Participants exercised in their own homes.

The Role of the OT

The OT functions as a teacher, coach, facilitator, and problem solver, by providing scheduled exercises, answering questions about exercise, keeping track of attendance and following-up for absence, solving technological difficulty, and providing feedback regarding improvement or suggestions for improvement. The OT performs assessments of client's fall risks using questionnaires, a goniometer, and isometric strength measurement equipment. In addition, the OT is actively involved in interprofessional research with nurses, physical therapist (PTs), exercise scientists, exercise physiologists, and physicians.

Results

Clinical Application of the Smart Home Intervention

The intervention requires two types of technology: smart home and web conference.

Smart home technology: For older adults, smart home technology should be inexpensive, reacquire no new writing (or retrofit can be done), relatively simple to install, easy to operate, compatible with many products, and control many lights and appliances. For these reasons, X10 products were used. These products include stand-alone products such as door and window security, chime, flashing light,

Fig. 54.1 Example on a lighting module

emergency response system; products with a remote control operation such as lights and appliance module, and motion sensor that work with a transceiver; and software called ActiveHome to set automatic timing for lighting and appliances.

However, currently, there are other smart home technologies such as INSTEON for wireless home control (INSTEON 2013) using universal power line bus (UPB); based on the X10 concept, Z-Wave, which is a wireless technology that makes a regular house smart (Z-Wave 2013); and ZigBee Home Automation, which offers products that uses ZigBee standard for the technology for smart homes (ZigBee Alliance 2013).

Web Conference Technology For the home exercise intervention, web conference technology is utilized. The free version of ooVoo (ooVoo LLC 2013) was used, which is a proprietary video chat and instant messaging participants. This can connect up to 12 people (Figs. 54.1 and 54.2).

Technical Problems Clients encountered some problems when using the smart home technology: (a) motion sensors were too sensitive, as well as not compatible with fluoresced lights; therefore, a wide tape on one side of motion detector

Fig. 54.2 Home exercise using screen ooVoo

was used or moved to another wall, (b) a 5-in-1 remote control stopped working, even with changing the batteries; therefore, a key chain remote was utilized, (c) radio interference was found when the light timer was on; therefore, the code was changed, suspecting other X10 sources inside the home were interfering with the signal, (d) door chime went off in the case of a power outage and resetting chime solved the problem, and (e) if lights were turned off manually, the technology stops working. To resume the scheduled time, the lights should be turned on manually, and then turned off using the X10 program to make it work. Further, old houses and apartment have old phone lines and electricity lines that may interfere with the use of the technology. The solution was to use a filter, a simple plug called SignaLink (Signalink Technologies Inc. 2013), to block noise on the power line. Although OTs needed to intervene to solve each problem, the knowledge was transferred to clients and most of them learned how to manage the smart home technology.

A problem occurred during the exercise session period when Windows or other software updates started and as a result, clients could not join the ooVoo chat room. The solution was to add ooVoo.com to the compatibility setting in Internet Explorer. The clients were encouraged to upgrade software during the intervention period. Clients could participate in the exercise session 100 % of the time using the Internet, even when they traveled away from home in the USA.

Implementing the Smart Home Technology The first step is to decide which smart home automatic features are suitable for a client. Then, load the ActiveHome into the computer and download necessary updates. The PC interface connects a computer via a universal serial bus (USB) cable and sends start and stop instructions to modules through the existing home's wiring. Dials on the lighting and other modules are set using a screwdriver to have its own alphanumeric code, with a choice of 256 combinations. The schedules work, even when a PC is turned off. The PC can catch radio frequency commands from the universal and key chain remotes via the antenna. Online remote connection is now available, if necessary. After testing and checking the battery in the interface device, instruction on how to use smart home technology needs to be done, taking about 30 min. Finally, clients' perception of the use of smart home technology was very positive. Of 50 clients, who participated in the intervention, 87.3 % of them found this technology very useful, and 67.6 % found overall operation of the technology easy. About 80 % of them said they recommend its use to elderly people (27 %) and anyone (53 %; Tomita et al. 2010).

The Exercise Sessions Just before the scheduled exercise time, clients "call in" the chat room to join the session. The monitoring station accepts them as they join the chat room, and they appear on the monitoring screen. The technology is available free of charge, if clients have a dual-core computer and fast Internet connection. Participants are a closed group, and clients can view and talk to all people present on the screen. When the exercise begins, participants enlarge the exercise instructor window for easier viewing. While they are exercising, following the premade instruction video, OTs monitor their safety and correct movements. The exercise

can include progressive strengthening and balance exercise, using a standard (18 in.) sturdy chair, TheraBand® with increasing strength, and ankle weighs with increasing weight.

If participants cannot participate in an exercise session, a YouTube link for the week can be made available through e-mail to make up the missed session. Evaluations or feedback of their improvement are important aspects to motivate and increase self-efficacy for exercise.

Evidence-Based Practice

Morris et al. (2012) showed, in a systematic review using a qualitative assessment, that a wide range of smart technologies are available to assist older people to live well at home in the community. However, the authors concluded that the specific evidence for the effectiveness of using smart home technology as a method to promote a healthy and active life is sparsely documented. The study by Tomita et al. (2010) is currently the only study using a randomized controlled trial (RCT). The differences between the two groups were significant. The contributing factor for maintaining (a) cognitive function was the use of the computer to operate the smart home system, e-mail with friends and relatives, connect with the world through Internet sites and play computer games and (b) their mobility level was automated lighting and security systems that kept them safe and active inside their home, maintaining their physical strength. In other words, the participants were not affected by the process of aging in terms of mobility and cognitive function. In contrast, age-equivalent older adults who did not use smart home technology declined in these areas. The gains sustained for 2 years. (Tomita et al. 2006, 2007).

Discussion

Merits of using smart home technology included an increased sense of security from alarms attached to windows and doors and automatic turn on and off feature for lightning and appliances, which help older adults feel independent and, at the same time, improves mobility. The use of web conference technology that enables home exercise was successful in achieving 100 % attendance. This is a way to bring OT to the home environment utilizing a smart home. Because of the convenience of staying home and having close contact with an OT, it is expected that clients will adhere to the therapy, which will likely bring about positive OT results. Technology advancements are useful for people of all ages, including older adults. However, OTs' knowledge about smart home technology needs to be broadened for possible incorporation in OT interventions.

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The Case Study of Rita: Use of Smart Home Technology to Promote a Healthy and Active Lifestyle

Keywords Mobility, physical strength, smart home technology

Introduction

The theme of this case study concerns the use of smart home technology by older adults to maintain independence through adopting a healthy and active lifestyle.

The student's tasks include the following:

- Understanding how home improvement solutions should be planned.
- Finding information on studies using smart home technology.
- Describing the current status of smart homes for older adults.
- Identifying key factors to maintain older adults' independence.
- Synthesizing the information into a report.

As a starting point, students should use the following references to gather background information. Important references are as follows:

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Overview of the Content

Major Goals of the Actual Intervention

The major goals of using smart home technology are (1) maximization of independence, (2) prevention of reduced physical strength, (3) promotion of a healthy and active lifestyle, and (4) improvement in the frequency of regular exercise.

Learning Objectives

By the end of studying this chapter, the learner will be able to:

- Identify common home environmental problems and make recommendations for improvement.
- Understand the process of using smart home technology to promote health and an active lifestyle.
- Use information from the literature and clinical reasoning to develop an intervention plan for the specific case study and similar clinical situations.

The Background History of Clinical Case Study

Personal Information

Rita (pseudonym) is a 90-year-old woman. Her present height is 147 cm (about 4′11″) and her weight is 54 kg (about 119 lbs). She is a widow and lives alone in a senior town house she owns in the suburbs. She communicates with her family over long distance using online Skype once a week. She still drives a car to go to a nearby church 7 days a week.

Medical Information Including Prognoses

Rita is relatively healthy with a few physical conditions, including thyroid symptoms, minor chronic obstructive pulmonary disease, and osteoarthritis in her knees, as well as scoliosis. Rita takes four medications, one of which is to improve her cognition. She had a left hip replacement 3 years ago. Her blood pressure and cholesterol levels are within normal limits. She reported she is very satisfied with her life. A month ago, Rita had a fall in her attached garage and hit her head. She was unconscious for several minutes, but got up and drove to church. She did not have any recollection of these events. Noticing her disheveled appearance and blood on her face, church members took her to the emergency room of a nearby hospital. Rita stayed in the hospital for 3 days for tests, but no abnormality was detected. Her primary care physician encouraged her to begin the exercise program slowly.

Occupational Therapy Interventions

Rita's home environment needed change in increase safety to exercise. An OT completed a home assessment and recommended a number of home modifications

and environmental interventions, and provided needed smart home technology for promoting the exercise program.

Home modifications were (a) to clear clutter in the garage, especially the path from the driver side of Rita's car to the entrance door into her kitchen; (b) to secure the loose railing leading up the steps to the door from the garage; (c) to automate the lighting in the garage ceiling using X10 technology and providing a remote control; (d) to install a motion sensor LED night light to the lower side of the garage wall and the hallway; (e) to use a simple version of the automation system (MT13 MiniTimer); and (f) to add a timed schedule to (1) turn a porch light on at dusk and off at 6:30 a.m., (2) turn off the basement light at night, (3) sound a medication alert time using an alarm clock, and (4) start brewing coffee at 7:15 a.m.

Rita participated in the web conference exercise program during the 6 months. She joined the chat room before anyone else, talked with an OT about her health, and asked about exercise procedures and computer operation. She missed 5 out of 72 sessions because she visited her family out of state for her 90th birthday. When she traveled within the state, she carried the laptop and joined the session. As the progressive exercise advanced, she used ankle weights and shoeboxes for exercise as required. The OT decided not to recommend the use of a TheraBand® because it required postural stability.

Positive effects were noted for lower extremity strength, grip strength, level of physical activity, fear of falling, functional independence, and completion of IADL tasks. Now the study is over, a friend reported that Rita misses the exercise session. It seems home exercise was a just the right amount of activity that she needed to maintain her independence, physically and cognitively.

The Student's Report

The following guiding questions have been identified in developing possible solutions to Rita. These questions were generated from the references found in the literature search:

1. What are the major concepts used in the case?
2. What assessments can be used for home evaluations?
3. What is the research-based evidence on the impact of physical activity on function?
4. What assessments can be used to measure Rita's function and performance?
5. What home modifications could be made by the OT to promote safety and fall prevention?
6. What is needed for Rita to participate in the online exercise program?
7. What are some long-term goals for Rita?
8. What could the OT do to help Rita maintain her exercise program?

Chapter 55
Creating Opportunities for Participation Within and Beyond Community Mental Health Services

Wendy Bryant

Thinking about occupational alienation helped to make sense of people's experiences in mental health day centers.

Abstract Mental health services range from hospital services to support for community living. For people with long-term mental health problems, the occupational and social opportunities available within the services can be used to support recovery and prevent relapse. When developed in collaboration with clients, these opportunities can overcome the experience of occupational alienation, characterized by frustration, withdrawal, and boredom. Occupational alienation as a concept challenges occupational therapists (OTs) to design and adapt occupations that reflect personal and shared meanings, create a sense of ownership and belonging, and negotiate meaningful choices with people.

Keywords Community mental health services · Participation

Background and Definition

This chapter explores how mental health services can promote the recovery of people with long-term mental health problems, informed by the concept of occupational alienation. The original research informing this chapter was based in day centers, which were the hub for a range of activities and services.

Mental health day services were established to (1) provide occupational and social opportunities for people, (2) offer a structure to the day, and (3) support networking with other people with mental health problems (Bryant 2011; Eklund and Tjornstrand 2013).

Activities in day centers and hospitals have often reflected a tension between facilitation and support. An overemphasis on safety and seclusion undermines efforts to promote recovery and provide meaningful occupational choices

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(Bates et al. 2006). Emphasis on recovery gives priority to the meanings that individual clients give to their experiences (Bird et al. 2011). When occupations are perceived to be meaningless, it can be understood as occupational alienation, a risk factor contributing to occupational injustice (Townsend and Marval 2013).

In community mental health services, *occupational therapy* is concerned with restoring and maintaining skills and abilities that have been impaired or disrupted by the consequences of long-term mental health problems. This involves developing opportunities to engage in occupations that have been identified by the client for their meaningfulness and relevance to everyday life.

Purpose

Community mental health services aim to promote, support, and facilitate the recovery of people with long-term mental health problems. Here, the concept of occupational alienation can be used to understand individual and collective experiences of meaningless occupations, withdrawal, and boredom (Bryant 2008; Bryant et al. 2004, 2005).

Method

Candidates for the Intervention

A range of community mental health services have been established to (1) provide occupational and social opportunities for people, (2) offer a structure to the day, and (3) support networking with other people with mental health problems, such as schizophrenia, mood disorders, and anxiety disorders (Bates 2008; Bryant et al. 2004, 2005; Eklund and Tjornstrand 2013). These problems can cause long-term difficulties for people, requiring services to focus on enabling the use of personal capacities to cope with stress, be productive, and make a contribution to social life (WHO 2013a).

It is recognized that people with mental health problems experience social exclusion to a greater extent than other marginalized groups (Ulfseth et al. 2013). At times, this might be in the interests of public safety, when people are detained to prevent harm to themselves or others. However, the stigma of using mental health services extends beyond acute crises (Thornicroft 2006). Promoting social inclusion has therefore involved challenging discrimination and prejudice, and developing services that make it easier to participate in community life (National Social Inclusion Programme 2008; Bird et al. 2011). To achieve this, people who have used mental health services have suggested that they should be involved in research and service development, drawing on their direct experience of services, and the

research evidence for this chapter is based on service user perspectives (Beresford 2013; Bryant et al. 2004, 2010, 2011).

Epidemiology

Mental health problems affect the world's population in many different ways, with a disproportionate number of people experiencing multiple problems, such as poverty and comorbidity. Despite the widespread experience of mental ill-health, within the developed and developing world, significantly fewer health and social care resources are designated for people with mental health problems (World Health Organization 2013a, b).

Settings

Social perspectives have become influential in how mental health services are designed and commissioned (Tew et al. 2012). For example, in the UK some public funds are allocated as direct payments to individuals, to support their personal social goals and needs (Larsen et al. 2013). The social model of disability identifies many factors that create disabilities beyond primary impairments, limiting activities and restricting participation (World Health Organization 2001). In the context of mental health problems, this can mean experiencing segregation and exclusion from community life because of powerful assumptions about a person's capacity, resulting in prejudice and discrimination (Bird et al. 2011). Day services have been established to increase access to opportunities to be included in community life. These services vary: many are based within designated centers which people attend during the day. However, these centers have been seen as socially exclusive, creating barriers to accessing community life. The WHO action plan (WHO 2013a) and recent developments in the UK (Bates 2008; Sweeney et al. 2012) have highlighted that services can be dispersed and provided by different agencies, increasing inclusion but raising other issues about continuity of care and access to specialist staff. The Care Programme Approach addresses this for some people, offering a formal structure for planning and reviewing support from services (Gould 2012).

The Role of the Occupational Therapist

Historically, occupational therapists (OTs) have been key team members of mental health day services, promoting an occupational and social focus alongside medical and psychological approaches (Farndale 1961; Bryant 2011). This focus has evolved to facilitate recovery and reintegration with the community, supporting people in a safe and tolerant environment.

Knowledge of local community life is an important aspect of occupational therapy, especially if it is knowledge based on direct experience of both mental health problems and life in the local community. This knowledge can facilitate social integration and inclusion through the collaborative design, creation, and evaluation of occupations. This collaborative process should take place on an individual and collective basis to overcome occupational alienation. Ongoing challenges posed by prejudice, ignorance, and fear about severe mental illness can severely limit occupational choices for clients. To achieve acceptance in the community, it is often necessary for clients to conceal their mental health problems (Thornicroft 2006). However, OTs can model inclusive practice by supporting, creating, and developing opportunities for participation in mainstream community settings. Shared occupations can be the basis for creating safe and supportive relationships, giving clients a sense of choice and control over their own recovery process. This sense of ownership and belonging is also facilitated by establishing repeated occupations, or habits, or routines in a social context (Ulfseth et al. 2013).

Results

Clinical Application

Engagement in Occupations

Combining an occupational and social perspective could be applied across community mental health services, recognizing different occupational values (Eklund and Sandlund 2013). Drop-in services, emphasizing social contact and support, offer people flexibility and choice in terms of whom they have social contact with, when they attend, and what they do. Alternatively, a person may be expected to turn up at a particular time in a particular place for a specific activity, for example, an education class. From a distance, it could be assumed that clients would be more occupationally alienated and socially excluded if they were sitting alone in a drop-in session, doing nothing and not speaking with anyone (Fig. 55.1).

Conversely, an individual attending a class to improve basic literacy and numeracy skills might be assumed to be engaged in a meaningful occupation and to be socially integrated. In some instances, this might not be true, and so these assumptions have to be questioned, considering the value of the occupation(s) (Eklund and Sandlund 2013). OTs have to recognize the interpretations they impose on clients' experiences. Collaborative work will expose the validity of these interpretations.

Content of the Occupational Therapy

Increased awareness of occupational alienation will offer a way of understanding why people appear to be bored, disengaged, or uninterested, and how to respond

Fig. 55.1 Sitting alone
Drawing: Wendy Bryant

by adapting or creating occupational opportunities collaboratively with individuals, groups, and communities. Occupational alienation describes the combined experiences of meaninglessness, withdrawal, and boredom. In response, the OT could consider meaningfulness, belonging, and occupational choice:

- *Meaningfulness* is a personal perspective, and often changing, reflecting subjective occupational values. Thus, there is potential for people, including OTs and other staff, to be occupationally and socially alienated in every session or setting. The meaning or symbolic value of an occupation may not be evident until after the experience (Eklund and Sandlund 2013). Recognizing this through an increased awareness of alienation can enhance collaborative work to promote engagement and recovery.
- A person might find that what they are doing is meaningless because of their own mental state. In this situation, it is important to *design occupational opportunities* in collaboration with clients to identify what could be meaningful and what could transform their internal sense of alienation. Safety, in terms of the physical, social, and emotional environment, is vitally important to support this process.
- *Belonging:* Clients might be withdrawn and occupationally alienated because the sessions offered are not interesting. They do not feel a connection or sense of belonging to the sessions. By focusing on what people do, it is possible to foster a sense of belonging through occupation, using shared experiences to support relationships and attitudinal changes (Fig. 55.2; Argentzell et al. 2013; Ulfseth et al. 2013). There is a risk that these experiences may not always be positive, which is why the social aspect is important to explore the challenges together. The sense of belonging can be achieved through relationships of good quality, with people accepting who you are, and equally, recognizing and accepting what you do (Argentzell et al. 2013). These issues of acceptance and recognition are important for the final issue of occupational alienation.
- *Making occupational choices:* Being able to make realistic, informed choices requires a client-centered approach (Sumsion 2007). A *dialogue* should take place to facilitate this process. It could be nonverbal, expressed through the *occupations performed.* Locating this dialogue in a social context, for example, a group,

Fig. 55.2 Shared experiences
Drawing: Wendy Bryant

will help clients perceive what can be achieved through occupation not only through their own participation but also through observing that of others. This promotes a sense of ownership over the process and products of their activities, reducing occupational alienation.

Evidence-Based Practice

Living in a Glasshouse

Modernization of community mental services in the UK was driven by a concern about social exclusion, reviewing the therapeutic and supportive functions of the services (Catty et al. 2005a). As services have dispersed and specialized, research has considered continuity of care, revealing the importance of how staff are enabled to support people (Sweeney et al. 2012). This has been recognized as an organizational issue, with staff having limited power to promote social inclusion for individuals (Clifton et al. 2013).

The social environment of day centers has been valued by clients, but the extent to which social aspects are given priority over therapeutic functions depends on the organizational priorities (Catty et al. 2005a; Tjornstrand et al. 2013). Social contact and support are emphasized more in day services provided by social care and nongovernmental organizations, in contrast to the time-limited treatment offered in health-care settings. However, repeated evaluation has not distinguished significant differences for long-term clients (Carter 1981; Catty et al. 2005b; Jones 1972).

The importance of organizational priorities has implications for occupational therapy, which needs to give equal consideration to the social and occupational aspects of recovery, for which there is no agreed definition (Kartalova-O'Doherty et al. 2012; Tew et al. 2012). Notions of hope, person-centered dialogues, and empowerment (Bird et al. 2011) reflect the principles of occupational justice, which stress the importance of individual and collective capacities for engagement in occupations which promote health and well-being (Durocher et al. 2013; Townsend and Marval 2013). Occupational alienation is considered a risk factor for occupational

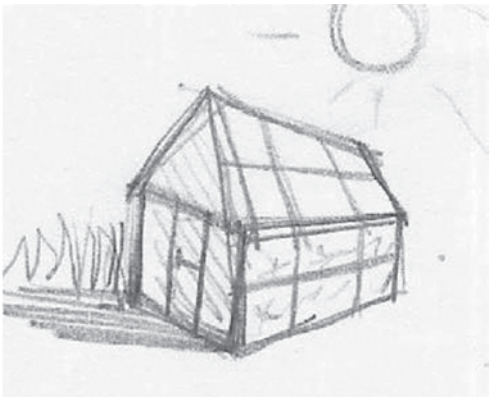

Fig. 55.3 Living in a glass house Drawing: Wendy Bryant

injustice, where participation is hindered by external factors (Bryant 2008; Durocher et al. 2013).

The research that informed this approach comprises two studies. The first involved 39 mental health day clients in four focus groups (Bryant et al. 2004). Clients highlighted their experiences of feeling separate and unconnected, of being prevented from supporting each other, and of being rejected by the wider community because of their mental health problems. The metaphor of the glasshouse for day services suggested the potential for fostering vulnerability and dependency, while offering shelter from the wider world (Fig. 55.3). Within the glasshouse, what people did was restricted and highly visible from the outside. Thus, there were tensions between shelter and segregation, safety and dependency, and visibility and invisibility. These tensions resulted in organizational efforts to control occupational opportunities and the social environment. It was suggested that the concept of occupational alienation offered a way of understanding and working with these tensions, and allowing clients more control and choice. The second study (Bryant et al. 2010) used *participatory action research* to explore these issues in more depth, revealing the importance of a safe space (Bryant et al. 2011), sharing knowledge about community resources and the need for good support for the development of user-led day services.

Discussion

Clients have emphasized the importance of having meaningful occupational opportunities in a safe and social environment, to which they felt they belonged (Bryant et al. 2011). The importance of belonging in terms of mental health and well-being has been supported in recent research by OTs (Tjornstrand et al. 2013; Eklund and Tjornstrand 2013). The social dimension, beyond medical and psychological approaches, has been emphasized in strategies to overcome social exclusion (Tew et al. 2012). Considering occupational alienation not only incorporates the social

dimension but also emphasizes the importance of what people do and the right to participate in valued occupations, not only to safeguard health and well-being but also to achieve a sense of belonging. It also raises questions about how the meaningfulness of occupations is judged and by whom, and the necessity for ongoing critical dialogue.

In the research informing this chapter, clients had some positive experiences of day services, and it is suggested that increased awareness of occupational alienation would, in many instances, confirm and illuminate good practice as well as inform service development. In particular, it would enable occupational and social aspects to be considered as equal to, if not more important than, medical and psychological aspects from the perspectives of clients and staff. Future research could explore the tension between seeking social integration and sustaining a safe place for clients to recover. It is important to develop a greater understanding of *how* people judge what is a *meaningful* occupation and what is a *meaningless* occupation, and who makes that judgment and with what implications. The experience of clients suggests that occupational alienation may be intrinsic to the experience of mental health problems at certain stages, especially in the context of risk management and the restriction of occupational choices for safety reasons. Reflecting on and exploring these issues in depth will enhance practice and thus the client experience.

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Case Study: Anna, Who Wanted to Reengage with Occupation in Community Settings

Keywords Mental health services, occupational alienation, recovery

Introduction

The theme of this case study is focused on a journey from acute mental ill-health to reengagement with community life.

The students' tasks include:

- Investigating the experience of a serious mental health problem from a range of perspectives
- Analyzing an occupation which the student(s) engage(s) in with other people in a community context
- Identifying the barriers and facilitators for engaging in this occupation from varied perspectives
- Exploring how an occupational therapy service could enable participation in this occupation
- Synthesizing this information into a proposal for a new session in community mental health services

As a starting point, the students could use the following sources:

- Websites on user experiences of mental health problems and the ICD-10
- A structure for activity analysis
- 100 Ways to Support Recovery: http://www.mentalhealthrecovery.com/recovery-resources/documents/100_ways_to_support_recovery1.pdf

Overview

Major Goals of the Intervention

Individuals within a group engage with occupations which:

- Enable choice about the nature of the occupation and how it is performed
- Encourage collaboration to negotiate the occupation as it unfolds
- Enable the acquisition or performance of tasks, skills, and activities which are relevant to the individual and promote their health and well-being

Learning Objectives

Studying this chapter will give the reader opportunities to:

1. Consider the challenges in enabling participation of people with mental health problems in community settings
2. Understand how the concept of occupational alienation can inform the process of enablement
3. Reflect on the specific barriers created by a mental health problem
4. Consider service redesign to promote access and engagement

Background

Personal Information

Anna is 30 years old. She lives with her husband on the edge of a large town, where there are local shops and a community center. To access community mental health services and other community resources, she could travel on a bus during the day, but the bus service is reduced in the evening. Currently, she works as a volunteer for a local animal charity once a week.

Previous Experience of Mental Health Problems and Occupational Therapy

Anna experienced her first episode of psychosis while studying for her degree. She had to give up her studies because her mood was so unstable and was diagnosed with bipolar disorder. For the first 2 years, she had repeated compulsory admissions for acute mental health care, but this situation improved, partly because of her medication and regular support from a community psychiatric nurse. She was able to start working and got married at the age of 25. In the past 2 years, she has experienced further instability which she blames on the pressures on her marriage. Her husband is keen to start a family but she is anxious about her mental health and the demands of being a mother. In the past 1 year, she has experienced two further compulsory admissions. When elated, she becomes angry and accuses her husband of being unfaithful. When depressed, she becomes suicidal, blaming herself for the problems in her life. She is currently emerging from a depressed mood but struggles to get out of the house. She has been referred to the occupational therapy within the community mental health team to support her reengagement with previous occupations and explore new ways of promoting her recovery.

Previous Occupational Therapy Interventions

Anna has had occupational therapy before, in hospital and in the community. It was the OT at the hospital who set up the placement with the animal charity, which Anna derives great pleasure and satisfaction from. Other interventions have focused on life skills, ensuring that Anna is able to care for herself. After the previous admission, Anna joined a social activity group in the community, which was at her local community center and organized by a mental health charity. She enjoyed it initially but felt that the other members were much older than her and at a different stage of life. Gradually, she got bored with the activities they did. She has often said how much she would like to learn more about animal care, but there do not seem to be any opportunities to develop her skills and knowledge.

Further Study and Reflection

These guiding questions could help develop a solution for Anna within a redesigned occupational therapy service:

1. What would help Anna most now?
2. How could an OT be involved in enabling her to access and participate in appropriate occupations?
3. What changes might that require for current service provision?
4. What other service needs should be considered in service redesign?

Chapter 56
Intervention Program Mediated by Recreational Activities and Socialization in Groups for PWA with Alzheimer's Disease

Elisabetta Farina, Fabiana Villanelli and Francesca Baglio

Behavioral, cognitive and possibly functional gains occur in people with Alzheimer's disease who participate in occupational therapy interventions mediated by recreational and occupational activities.
Scientist

Abstract Interventions mediated by recreational activities (games and art therapies) are frequently offered to people with dementia in nursing homes or day care centers. These recreational–occupational activities result in behavioral and cognitive gains in people with Alzheimer's disease compared to those undergoing other kinds of cognitive treatment or receiving ordinary routine care.

The intervention program comprises cognitive activities, exercise, recreational activities (music listening, party games, card games, poster creation, and painting on tissue or pottery), and activities of daily living (setting and clearing the table, preparing tea or coffee, washing hands and dishes, preparing simple cakes or fresh pasta). Caregivers receive educational and psychological support and then support the client to perform physical and cognitive activities at home.

Keywords Alzheimer's disease · Occupational therapy · Recreational activities

Background and Definitions

Interventions mediated by recreational activities, such as games and art therapies involving music, dance, and art, are frequently offered to people with dementia and are useful to ameliorate mood and avoid social isolation in nursing homes or day care centers.

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Activity is a basic human need expressed in leisure and work pursuits. Unfortunately, dementia leads to boredom and isolation due to a low rate of activity participation, resulting in agitated or passive behaviors and functional loss. Recreational services enable recreational resources aimed at improving PWA health and well-being (Fitzsimmons 2003; Kolanowski et al. 2011). Occupational therapy also demonstrated to be cost-effective, leading to reduction of behavioral and psychological symptoms of dementia (BPSD), improvement of PWA mood, and empowerment of caregiver's coping abilities (Gitlin et al. 2008, 2010a, b).

- *Alzheimer's disease* (AD) is the most common form of dementia. There is no cure for the disease, which worsens as it progresses, and eventually leads to death. It was first described by German psychiatrist and neuropathologist Alois Alzheimer in 1906 and was named after him (Berchtold and Cotman 1998). Although AD develops differently for every individual, there are many common symptoms. Early symptoms are often mistakenly thought to be "age-related" concerns, or manifestations of stress (Waldemar 2007). In the early stages, the most common symptom is difficulty in remembering recent events. As the disease advances, symptoms can include confusion, irritability, aggression, mood swings, trouble with language, and long-term memory loss. As the sufferer declines, they often withdraw from family and society (Waldemar 2007; Tabert et al. 2005). Gradually, bodily functions are lost, ultimately leading to death.
- *Group therapy*: In the case of AD, it is preferable for the PWA to work in group than to work individually for the importance that the factor group embodies. The group sets itself as the "third element" in the therapeutic relationship, allowing PWA to observe and better understand their relational patterns in a more natural and complex way than the simple dyadic interaction with the therapist. The observation of the interactions of other people and those of the group as a whole also allows to derive important inferences about communicative dynamics and each participant's role. These inferences are often of considerable clinical importance. In the group situation, the client doesn't feel/feels himself/herself under examination; he/she's freer to make mistakes and to see others make mistakes without being judged. It's a more relaxing setting; people are less embarrassed and can look other elderly people doing activities, using them as a model in order to start, continue, or finish works and games.
- *Recreation* means spending time in pleasant activities. Recreational activities are funny and enjoyable activities as party games (e.g., scrabble, bingo, domino, cards games, and table games), collages, poster creation, and painting on tissue, wood, or pottery.
- *Socialization* is the interaction between people with different inclinations, experiences, and intelligences who stay in group and share with others their characteristics in order to work together, have fun, and spend time.

Purpose

The primary purposes of using recreational activities, according to the guidelines of American Therapeutic Recreation Association, are to restore, remediate, or rehabilitate function in order to improve functioning and independence, and reduce or eliminate the effects of illness or disability. According to this definition, the aims of our intervention program are (a) to reduce behavioral disturbances, (b) to improve the PWA well-being, (c) to support the maintenance activities of daily living (ADL), and (d) to favor socialization.

Methods

Candidates for the Intervention

The inclusion criteria are (a) a diagnosis of AD (McKhann et al. 1984), (b) with or without associated cerebrovascular lesions, and (c) mild or moderate cognitive impairment between 0.5 and 2 on the clinical dementia rating (CDR) assessment (Hughes and Berg 1982).

The *exclusion criteria* are (a) severe cognitive dysfunction (Mini-Mental State Examination (MMSE) score less than 15/30; Folstein et al. 1975), (b) severe aphasia (token test score less than 20; Spinnler and Tognoni 1987), (c) severe auditory or visual loss, or (d) overt behavioral disturbances (delusions, hallucinations, agitation).

Epidemiology

Cohort longitudinal studies (studies where a disease-free population is followed over the years) provide incidence rates between 10 and 15 per 1000 person-years for all dementias and 5–8 for AD, which means that half of new dementia cases each year are AD. Advancing age is a primary risk factor for the disease, and incidence rates are not equal for all ages: every five years after the age of 65, the risk of acquiring the disease approximately doubles, increasing from 3 to as much as 69 per 1000 person-years (Bermejo-Pareja et al. 2008; Di Carlo 2002). There are also sex differences in the incidence rates: women having a higher risk of developing AD particularly in the population older than 85 (Di Carlo 2002; Andersen 1999).

Prevalence of AD in populations is dependent upon different factors, including incidence and survival. Since the incidence of AD increases with age, it is particularly important to include the mean age of the population of interest. The World Health Organization estimated that in 2005, 0.379% of people worldwide had dementia, and that the prevalence would increase to 0.441% in 2015 and to 0.556% in 2030

(World Health Organization 2006). Other studies have reached similar conclusions (Ferri 2005). Another study estimated that in 2006, 0.40 % of the world population (range 0.17–0.89 %; absolute number 26.6 million, range 11.4–59.4 million) was afflicted by AD, and that the prevalence rate would triple and the absolute number would quadruple by 2050 (Brookmeyer 2007).

Recruiting Method and Setting

Our typical referral method entails recruiting PWA from the Alzheimer Assessment Unit of "S. Maria Nascente," Clinical Research Center, Don Gnocchi Foundation, Italy. They are then treated and periodically tested in the center's day care unit.

Sessions are performed in a large room with a kitchen area, including cooking equipment and eating utensils, tables and chairs, and all the material necessary for the recreational and occupational activities.

The Role of the Occupational Therapist in Applying the Intervention

The intervention program is administered by an occupational therapist (OT), who is a member of a multidisciplinary team (Teri et al. 2003). He/she performs a functional and psychological assessment of the subjects in order to define the activities to include in the intervention program, specifically for the group that was formed. The OT chooses the occupational and recreational activities from a list of standard activities, preferring those which are significant for the PWA (see Case Study "Occupational Therapy Intervention" paragraph). He also chooses activities that can be started and completed in the session time available in order both to respect PWA time (above all slowness) and show the results (i.e., baking cakes and eating them during the work sessions or taking home slices to eat with caregivers). Important elements of the intervention program are (1) the close interaction between PWA and OTs (Wood et al. 2005), (2) an attractive environment (see "Recruiting Method and Setting" paragraph), and (3) an educational program for caregivers (see "Intervention Program Organization" paragraph).

Results

Clinical Application

Intervention Program Organization

PWA participate in groups of six in the intervention program. The group constellations are organized according to the mix of women and men (ideally three males

and three females, but, if it's not possible, we prefer six people of the same sex) and their dementia severity.

The PWA follow a multidimensional program which includes cognitive exercises, physical activity, and, in large part, occupational ADL and recreational activities.

Close interaction between participants and therapists is very important; all proposed activities try to respect the cognitive and functional potential of each group component (if the person with dementia cannot make or complete an activity, the therapist accompanies him/her towards the solution with all the necessary help in order to avoid sense of frustration and inferiority to others group members).

Caregivers have a support interview with a psychologist at the beginning and at the end of the program (1.5 h for two sessions). This procedure ensures psychological support to the caregiver to face the disease and gives him/her useful ways to interact positively with the client.

Caregivers have also an initial 2-h informative meeting about the program schedule and contents and take part in an educational program (1.5 h for three sessions) which deals with a general presentation about dementia, its causes, the current knowledge pathogenesis, the diagnostic flow chart, typical cognitive and behavioral deficits, nursing problems, legal aspects, etc. General principles and strategies to cope with memory and behavioral disturbances, to support the PWA with their ADL, and to make the home environment safer are included. During the psychoeducational meetings, caregivers are also trained by the therapist in order to continue the stimulation treatment at home (e.g., using a calendar, giving phonetic cues to those PWA who can't find the words in conversation, walk every day for 45 min, playing with "memory cards," solving crosswords, puzzle together, etc.). It is clear that these "duties" can generate a reduction of compliance towards treatment. Therefore, it's necessary to strengthen motivation by underlining that a constant application is a fundamental requisite in order to obtain positive results. Both (PWA and caregivers) are subjected to a questionnaire, at the end of the period of interventions, in order to understand the pleasantness of the treatment and obtaining suggestions to improve it.

Recreational and Occupational Activities

The intervention program is mediated, besides cognitive exercises and physical activity, using the following:

1. Recreational activities, such as
    a. *Music listening* to melodies and songs typical of PWA young years. After listening, they are asked to make comments about the kind of music, the singer, etc.
    b. *Party games* such as bingo, dominoes, Scrabble, Snakes and Ladders, stick games, etc.
    c. *Poster creation* with collage and painting
    d. *Painting* on tissue or pottery.

These proposals have a strong stimulation value because they're funny and enjoyable and require the activation of multiple cognitive functions (attention, memory, executive functions, language, and visuospatial abilities). These activities include step identification, verbal prompting and modeling, used to assist participants. The PWA work individually inside the group (i.e., painting pottery) or in group, collaborating to the same task (i.e., poster creation).

2. Occupational ADL, such as

   a. Serving table and clearing the table
   b. Preparing tea or coffee
   c. Washing hands and dishes
   d. Baking simple cakes (e.g., tiramisù, yogurt cold cakes, or sponge cakes) to be served during the "coffee/tea pause"
   e. Prepare fresh "pasta"

The recipes are proposed by PWA or by the therapist, often taking into account the season and the regional origin of PWA or places where they spent their holidays. The aim of this activity is to favor orientation throughout the kitchen activity and execute the recipe in its different steps (Farina et al. 2013).

At the moment of occupational activities, the therapist tries to become an observer only in order to allow PWA to act freely. When necessary, he/she uses step identification: verbal prompting and modeling are used to assist participants. Prompting and modeling are behavioral–cognitive strategies to modify PWA behavior in order to reach the goal. *Prompting* means suggesting to the PWA a step of the whole action they're making (i.e., suggesting to add an ingredient of the cake that has been forgotten). *Modeling* means that the OT acts as a model to be followed by the client in order to do something. For example, PWA can look at the OT who gives the right shapes of a type of fresh pasta with fingers or a fork (i.e., in order to produce "orecchiette"). Each client with AD can also act as a model for other participants. In fact, we consider that this kind of group therapy can represent a way to exploit mirror neurons activity in rehabilitation.

Occupational activities should:

- Match the PWA functional skills (level of dementia) and interests
- Provide appropriate stimulation and enrichment
- Stimulate the available cognitive resources
- Support fulfillment of the performance in the chosen activities avoiding PWA frustration

Administration of the Intervention Program

Each session includes the following:

- Reality orientation activities and cognitive exercises for about 45 min. In fact, an orientation task is first conducted for about 10 min. Spatial and temporal orientation is trained, and each member is encouraged to introduce himself or herself to other

participants. The orientation training follows the principles described in the literature (Olazaràn et al. 2004; Spector et al. 2003). Two reality orientation boards, one for time and one for place, assist the participants. Paper and pencil or, more rarely, computerized cognitive exercises aimed to reinforce attention, reasoning, procedural, semantic, and autobiographic memory and executive functions then follow. We usually begin with the stimulation of memory, and afterwards, we continue with activities which stimulate attention and other cognitive functions.

- *Reinforcement of spatiotemporal parameters* is applied for the whole session using the boards.
- The PWA then perform *physical activity and psychomotor exercises* for about 30 min.
- Later, o*ccupational activities* follow for about half an hour.
- Finally, group members are involved in *recreational activities* for about 45 min.

Evidence-Based Practice

Cognitive and functional gains and improvement in behavior in people with AD who participated in recreational and occupational activities associated with psychotherapy for PWA and caregivers were approved (Farina et al. 2002, 2006a). When comparing baseline with post-training condition, PWA displayed a substantial reduction in disruptive behavior, and a tendency to a general reduction in behavioral symptoms compared to controls. This reduction was mirrored by a significant reduction in caregiver reaction to behavioral disturbances (Farina et al. 2006b). People with AD taking part in the protocol described in this chapter have more recently shown an improvement of behavioral disturbances and some cognitive functions (above all language and memory) in a controlled randomized trial. A tendency to reduction of caregiver distress due to behavioral disturbances was also present. These results are in accordance with literature in this area (Gitlin et al. 2008, 2010b; Buettner and Fitzsimmons 2011). In a subgroup of people with AD, we also performed functional magnetic resonance imaging (fMRI) which demonstrated increased fMRI activations in temporal brain areas, right insular cortex, and thalamus (Baglio et al. 2011)

Discussion

According to our data and the literature, PWA with AD who participated in a group activity program, mainly based on recreational and occupational activities, improved their *behavior* (Farina et al. 2006b; Baglio et al. 2011, Martichuski et al. 1996; Rovner et al. 1996) and their *cognitive functioning* (Farina et al. 2006a; Baglio et al. 2011). Actual neuroimaging data also support the contention that such a kind of intervention promotes cerebral plasticity (Baglio et al. 2011).

The intervention program described in this chapter can be easily implemented with both ambulatory PWA, such as in our case, and institutionalized ones and applies to people with behavioral disturbances in the moderate range. As severe psychotic symptoms (hallucinations, significant delusions, or evident aggression) would preclude the participation in a group therapy, we did not include this type of PWA in our study. Behavioral disturbances which benefit most from our intervention program were depression, anxiety, irritability, and aberrant motor behavior. As already mentioned, other authors (Gitlin et al. 2008, 2010b) signaled a reduction of behavioral problems as a result of an occupational therapy intervention with empowerment of caregiver's coping abilities. Reduction of apathy, a symptom very difficult to treat, has been reported with an occupational therapy approach (Buettner and Fitzsimmons 2011).

As far as the cognitive domain is concerned, we found an improvement above all of language and memory. Group therapy facilitates social interaction among participants promoting the language function and reducing the additional handicap due to social isolation of people with dementia.

In a previous study, the cognitive improvement in our PWA was lost in a relatively short period, while the improvement in behavior was more long lasting (Farina et al. 2006b). However, long-term reinforcement programs can have lasting effects (Metitieri et al. 2001; Orrell. et al. 2005; Spector et al. 2000; Zanetti et al. 1995). The necessity for long-term interventions to maintain positive effects raises the problem of costs. However, the program is based on group sessions, allowing savings in personnel resources compared to individual techniques. In a recent work, Gitlin et al. (2010a) showed that non-pharmacologic management of behavioral disturbances with occupational therapy is cost-effective and recommended because it can significantly improve quality of life and client–caregiver satisfaction. Moreover, relatives and caregivers assisting PWA at home can be trained to conduct this type of intervention to reinforce and prolong the benefits (pp 510–519).

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The Case Study of PWA with Alzheimer's Disease Participating in the Recreational Activities and Socialization Group Intervention

Keywords Alzheimer's disease (AD), behavioral and psychological disorders (BPSD), recreational and occupational activities

Introduction

The theme of this case study deals with PWA participating in the recreational activities and socialization group intervention. The aim of the group therapy is to ameliorate mood, reduce behavioral disturbances, avoid social isolation, lessen apathy, and maintain independence in daily activities at home.

The students' tasks include the following:

1. Finding adequate literature about neurodegenerative disorder (Alzheimer's disease) involving cognitive functioning, behavioral disturbances and functional–physical skills, and about non-pharmacological therapies in dementia, especially occupational therapy.
2. Organizing and administrating the recreational and socialization intervention.
3. Synthesizing the information into a report.

As a starting point, students should use as an example the following references to gather background information:

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Overview of the Content

Case study

Major Goals of the Actual Intervention

1. Identifying recreational and occupational activities able to stimulate people with Alzheimer's disease (AD) and increase their level of participation and socialization both in the group and at home
2. Decreasing behavioral disturbances through participation
3. Supporting functional independence in everyday life

Learning objectives

By the end of studying this chapter, the students will be able to

1. Integrate medical clinical history with psychological characteristics of people with AD, their personal interests, and difficulties;
2. Propose recreational and occupational activities tailored to each participant to be conducted in group; and
3. Monitor client's interest and participation and change the work project, if necessary, by taking into account the actual cognitive resources and abilities.

The Background History of the Participants' Clinical Case Study

The group described here is composed by five PWA three men and two women, who fulfilled the medical inclusion criteria to take part in the intervention program as mentioned in the main part of this chapter.

At the beginning of the treatment, participants perform the functional skills assessment (Farina et al. 2010), a standardized ecologic battery, to evaluate performance in high level activities of daily living (ADL); their caregivers complete ADL (Katz et al. 1963), instrumental activities of daily living (IADL; Lawton and Brody 1969), neuropsychiatric inventory (Cummings et al. 1994), caregiver burden inventory (Zarit et al. 1980, pp 649–655), and a quality of life (QoL) scale (Logsdon et al. 2007). The same assessment tools are used at the end of the intervention and 3 months later at follow-up. The training involves 24 (three times a week) 2.5-h session. Using this standardized assessment along with interviews with the PWA and their families, it is possible to collect data about life of group participants. These data concern PWA abilities, usual behavior, family and social relationships, previous work, interests and hobbies, caregivers' level of stress or wellbeing, etc. It is also possible to characterize their difficulties in everyday life activities and their consequences on quality of life of both PWA and caregivers. The final aim of using these standard assessments is to identify recreational/occupational activities useful and interesting not only for the single participants but also for the group as a whole.

Participants

Mary is a woman, 76 years old, with 5 years of education. She lives alone, but two adult children live near her. She had been suffering of depression from many years. After her husband's death, she suffered from loneliness, and this situation increased both her confusion and memory disturbances (e.g., she didn't remember where she put her personal belongings) and her apathy (she didn't go out and she do not cook anymore). Mary has got her diagnosis one year before. She's taking acetylcholinesterase inhibitors. She is able to perform her basic ADL abilities, while she has some difficulties in performing IADL. She only knows a few telephone numbers and cooks only if someone furnishes her of all ingredients, performs only a few household chores, and needs some help to take her medical therapy and to manage her finances. Mary shows memory and executive functions deficits at neuropsychological tests together with temporal disorientation. Mini-mental state examination (MMSE; Folstein et al. 1975) shows a score of 24/30, meaning a mild dementia.

John is a man, 82 years old, with 5 years of education, and an ancient flower seller. He lives with his wife and daughter; he has also other children who live far from him. He has been suffering from memory deficits (above all prospective mem-

ory) and irritability for one year (for this reason, he also takes benzodiazepines). AD was diagnosed one year before. He is taking acetylcholinesterase inhibitors. He still retains his basic ADL abilities, while he exhibits some difficulties in IADL (he can only answer to telephone, but not form the numbers; he could buy only a few things near home). He has never performed tasks traditionally linked to women. At neuropsychological tests, he exhibits visuospatial and planning impairment with mild semantic memory impairment, along with behavioral control deficits. MMSE shows a score of 26/30 (a very mild dementia).

James is a man, 81 years old, with 11 years of education, and a previous employer. He lives with his wife and has two daughters. He has been suffering from memory deficits, temporal disorientation, confusion, and depression for 3 years, and he is now taking acetylcholinesterase inhibitors. He still has a good performance in basic ADL abilities, while he shows deficits in several IADLs (e.g., he cannot travel on public transportation, manage his money, or take his pills without aid). MMSE shows a score of 16/30 (i.e., he is in the moderate stage of dementia).

Ruth is a woman, 84 years old, with 8 years of education, and a previous employer. She is widow, lives alone, and has one daughter. She was diagnosed with AD one year before the training, and she is taking acetylcholinesterase inhibitors. Her performance in basic and instrumental ADL is still good with some deficits in managing money and her personal drugs. Neuropsychological tests show long-term memory and executive deficits with tendency to confabulation and perseveration, visuospatial impairment, temporal disorientation, and some problems in writing and calculating. However, her global cognitive level is still very good (MMSE score of 26/30, mild dementia). Unfortunately, she is significantly depressed.

Martin is a man, 84 years, with 8 years of education. Martin is married, and he lives with his wife, who is also affected by dementia. He has two sons, and he previously worked as a tailor. He is in the mild stage of dementia with slight problems in everyday activities. (MMSE score of 21/30, mild to moderate stage). Recent neuropsychological evaluation has revealed the presence of deficits in long-term memory functions, planning skills, praxis-constructive abilities, working memory, verbal fluency, and time orientation. Martin also shows deficits in the control of inhibition and mild psychomotor slowdown.

Occupational Therapy Intervention

Occupational and recreational activities have two objectives: maintaining functional activities in everyday life and reducing disturbing behaviors by favoring socialization and improving self-esteem and mood.

The intervention is administered in a well-lighted, large room, a quiet and pleasant place that ensures peace and privacy where the group participants have possibility to relax and perform activities without being disturbed. Inside the room, there is a kitchen area, tables, chairs, and all material necessary to carry out activities.

Silence without disturbance interruptions is very important in order to favor learning of new information such as name–face association of other participants and therapists. Here the OTs clearly favor learning with implicit learning techniques. An example is as follows: In one occasion, an OT, who wasn't that person who performed the intervention, entered the room while the group members were working to ask some information to the group's leading OT. While the OT was answering to the colleague, she noticed that Ruth had stopped her work. Ruth's work task was to browse through magazines looking for images to be cropped. From that moment of disturbance till, more or less, 15 min, Ruth went into confusion, and she forgot what she was doing, and she began to cut images not related to the theme of collage, and she struggled to understand the explanations provided by the therapist.

Democratic opportunities to communication are also very important, allowing everybody to tell personal life information, listening to the others, and asking to group leader clarification or feedback about activities.

Every performed activity is proposed by the OT, explained and shown in its practical execution, in order to stimulate mirror neurons.

The OT acts as an imitable model, and during the activity, she repeats instructions several times in order to avoid a sense of frustration in group members if they did not understand quickly or forget. For each activity, the OT uses step identification (verbal prompting and modeling).

Forthis group, we have used the following occupational and recreational activities:

- *Coffee pause*: Each group member, when it's her/his turn, places coffee or teacups, teaspoons, napkins, sugar cubes, slices of bread and jam on the table. Another participant prepares coffee or tea, and another one, after a break during which the group members are chatting friendly, clears the table and washes dishes and cups. This easy occupational activity is useful to encourage socialization and collaboration among group participants; it allows them to fight isolation, apathy, and depression and to rediscover the pleasure of being competent in activities that promote their own wellness and that one of the others getting their thanks and generating a virtuous circle of positive personal and external feedbacks.
- *Preparing cakes*: In November, during the period of All Saints, on request of Mary, the group prepared typical biscuits of Milan called "Pan dei Morti." The OT asks group participants to list the ingredients and tell the recipe procedure. This task allows group participants not only to remember the biscuit ingredients (almonds, cocoa, flavor, pine nuts, etc.) by watching photos but also to remember episodes of their childhood to share with the groups.
- *Playing cards*: The group often asked to play a game called "Scopa" ("Broom") in Italian. Each group participants receives three cards while four cards lay on the table. Group participants try to pick up a card on the table with a card of equal value. During the game, the OT remembers rules and helps people to play in order to make the game easy and funny. Martin is very passionate and competitive

in the game, and he often won. John is also an expert player and tried to give hard time to his opponents. Despite the competition, the atmosphere during the game was friendly and playful.

- *Painting on pottery or on wood with acrylic colors*: The women of the group (above all Ruth) loved using bright colors to paint objects, especially cups, wooden spoons, or cutting boards. They tried to be careful in the choice of the subject to paint (John had a great passion for flowers since he was a flower seller), the choice of colors to use, and the respect of the drying times. They dedicated several hours to their works doing comments of approval to the works of other participants and to their own work (they often asked to the OT constructive criticism in order to ameliorate it).

For *recreational activities,* the group leader often proposes prices in order to motivate group participants who can choice the price among a wide range of gadgets for man and woman, such as key rings, wallets, telephone books, bracelets, brooches, driers, etc.

The objective of each intervention is to create a favoring condition in which group participants can perform activities, exploiting their residual abilities by avoiding frustration and the feeling to be wrong, thus experimenting competency and satisfaction (enabling approach).

The OTs tells occupational and recreational activities developed in each session to group members' caregivers in order to reinforce group participants with verbal appreciations and proposes similar activities at home: this is done with the aim to strengthen and extend the session benefits, to contrast apathy and improve mood.

Relationship between the members of the group was quite good. Of course, due to education and age, the women supported each other, but they were available to talk with the men and to help them when kitchen tasks were carried out. Mary loves to chat and to be at the service of her colleagues in the group. She often offered herself to clean the table, cutlery, and crockery. She loves dancing and listening music. Ruth is shyer but socialized with a real pleasure, especially with James who was temperamentally similar to her. John was very competitive in games, and sometimes this exuberance gave a little bothersome to Martin, who was also competitive, but in a more discreet and less exuberant manner.

Results

Participants were very pleased with the proposed activities. Rare episodes of negative feelings faced with difficulties were quickly managed by the OT and signaled to caregivers and to referring neurologist at the end of the session.

All group participants with the exception of James improved in the measure of performance of everyday skills (Farina et al. 2010); for Martin, Ruth, and John, the improvement was still present at 3-month follow-up evaluation. ADL and IADL scores were stable for all participants both at the end of the study and at follow-up.

Ruth and Mary showed an improvement in behavioral symptoms after treatment; this improvement was mirrored by a reduction of caregivers' stress. The same was not true for other two participants (John and James), who showed some anxiety increase at neuropsychiatric inventory (Cummings 1994). However, the same two participants exhibited improvement at a QoL scale (Logsdon et al. 2007).

Today, after 3 years from intervention, John, Martin, and Mary still exhibit a good cognitive level, with MMSE scores ranging from 22 to 29. Two of them are also completely independent in basic ADL and only partially dependent in IADL. The same PWA are also stable or even improved from a behavioral point of view. One participant Ruth has worsened in everyday performance, but she is still in the moderate stage of AD (MMSE score of 16/30). Only one PWA (James) has greatly worsened, and he is now in the severe stage (MMSE score of 6/30).

For the students' report it is suggested that a new group is constructed. This group might include six men as group members, whereas all is in a moderate state of Alzheimer's dementia.

Which recreational activities might promote the group members' socialization?

Which IADL activities, other than cooking and baking, will be useful for the group members' maintaining of cognitive functions, especially memory function?

How can the training gains be transferred to the group member's home environment?

Chapter 57
Enabling Participation in Meaningful and Essential Occupations in End-of-Life Care

Deidre D. Morgan and Kahren M. White

> *The patients and carers were particularly keen on some of the non-pharmacological self-management strategies taught…and that they were 'listened to' about their breathlessness. Time and again there were comments on the usefulness of the hand-held fan from all participants.*
> (Booth et al. 2006)

Abstract People receiving palliative care are living while they die. Evidence demonstrates that they strive to continue participation in valued and essential occupations at this time of life for as long as possible. Further, emerging research suggests that it is through the process of occupational engagement that people adjust to functional decline at the end of life. Occupational therapists (OTs) play a significant role in optimizing a person's occupational performance in order to enable participation during this time. Management of symptoms such as refractory breathlessness needs to occur within the context of valued and essential occupational activities.

Keywords Breathlessness · Optimize · Palliative care · Participation

Definitions

Palliative Care	'provides relief from pain and other distressing symptoms, affirms life and regards dying as a normal process…offers a support system to help patients live as actively as possible until death…is applicable early in the course of illness in conjunction with other therapies that are intended to prolong life'. (World Health Organization (WHO) 2002, p. 84)

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Terminal	last days to hours of life.
Dyspnoea	'a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity'. (Parshall et al. 2012, p. 435)
Refractory dyspnoea	relates to dyspnoea or breathlessness 'that persists despite maximal treatment of underlying pathological processes responsible for the breathing discomfort'. (Parshall et al. 2012, p. 435)

Background

Occupational Therapy has a pivotal role to play in optimizing participation in valued and essential occupations for those receiving palliative care. Several terms used extensively throughout this chapter require clarification. The words *palliative* and *terminal* are used interchangeably in multidisciplinary literature and by the general community. However, palliative care is not always synonymous with terminal care, the latter referring to the last days and hours before death. Advances in physical symptom control may mean, while a cure is not forthcoming, a person may still live for a significant period of time. This extended period of survival gives rise to a prolonged experience of both dying and living with progressive debility and impaired function. The World Health Organization acknowledges this duality and notes that palliative care 'offers a support system to help patients live as actively as possible until death' (WHO 2002, p. 84).

In palliative care, occupational therapy interventions focus on enabling participation in valued and essential occupations to the best of a person's ability (Bentley et al. 2013; La Cour et al. 2009; La Cour et al. 2007; Lyons et al. 2002; Svidén et al. 2010). In order to enable living in the face of dying, core occupational therapy skills are required along with those of symptom management.

Purpose

Occupational therapy interventions at the end-of-life address occupational restrictions that arise from symptoms such as pain, fatigue or breathlessness (Solano et al. 2006). The aim of symptom management in this context is to optimize patient's function and facilitate participation in essential and valued occupations. Given its prevalence as end-of-life approaches and its impact on function, *breathlessness has been chosen for the focus of this chapter*.

Method

Candidates for Intervention

Historically focusing on cancer, palliative care now encompasses all life-limiting illnesses, e.g., chronic obstructive pulmonary disease (COPD), progressive neurological disease and congestive cardiac failure. OTs' unique role in symptom management lies in its application within a functional context in order to optimize occupational participation.

Epidemiology

Prevalence Dyspnoea (breathlessness) is a distressing symptom experienced by people with advanced cancer and advanced non-malignant disease (Bausewein et al. 2011; Currow et al. 2010; Davidson and Currow 2010). While 70 % of people with advanced cancer experience breathlessness (Simon and Bausewein 2009), it is more prevalent and present for longer amongst those with COPD and heart disease (Solano et al. 2006).

Settings

Most OTs are likely to encounter patients with a life-limiting illness in acute and subacute inpatient hospitals as well as ambulatory and community care settings, and small numbers who work in specialist palliative care settings.

The Role of the OT

OT's *facilitate* a patient's control over occupational participation as function deteriorates, through teaching strategies to manage symptoms of disease such as breathlessness (Miller and Cooper 2009).

Results

Occupational Approach to Palliative Care

Assessments and interventions tend to be brief and occur within an occupational context due to patients' fatigue. An understanding of different disease trajectories

and likely progression of breathlessness guides treatment. However, *intervention goals are informed by the patients' preferences for occupational engagement,* which may vary with diagnosis and prognosis. An effective starting point to establish goals is to ask the patient what occupations are important to them to be doing at this time of life, and judge how performance is affected by breathlessness. The OTs should not assume they know what is important (Gysels and Higginson 2008). There are no existing standardized occupational therapy palliative care specific outcome measures to evaluate occupational performance.

Occupational Therapy Interventions

A number of approaches may be employed to manage breathlessness and include relaxation training, stress and anxiety management, fatigue management, positioning and breathing techniques. Compensatory techniques such as the use of handheld fans to cool the face during functional activities may also be used (Booth et al. 2011; Morgan and White 2012; White 2013). Pulse-oximetry can be used as a biofeedback tool and can provide immediate feedback about the implementation of breathing techniques and other strategies. This objective visual feedback can improve patients' sense of efficacy and self-control in the management of their breathlessness (White 2013).

Discussion

Breathlessness is one of the most common symptoms experienced by people at the end of life (Gysels and Higginson 2011). Occupational therapy's unique role in palliative care is its dual focus on living *and* dying that occurs at the end of life. Whilst acknowledging death is pending, OTs identify and facilitate ways to optimise occupational participation, to the best of a person's ability. Meaning attached to occupational roles and experiences is intensified at the end of life (La Cour et al. 2009; Svidén et al. 2010) and achievements that may seem small to a clinician (e.g., OT), can be very significant for a patient (Morgan 2012). Trying and failing in occupational tasks has been found to mediate adjustment to functional decline (La Cour et al. 2007, 2009). However, it may also be confronting for the patient. Care must be taken to acknowledge both the opportunities and the challenges and losses at this time of life.

Conclusion

Management of breathlessness to enable occupational participation is highly valued by patients at the end of life, even as function declines. An emerging body of evidence supports interventions to manage refractory breathlessness; however,

little is occupation specific and more rigorous research is required. Efficacy of core occupational therapy interventions such as relaxation and fatigue management and their impact on breathlessness at the end of life urgently warrants further attention.

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The Case Study of Craig: Management of Breathlessness to Optimise Occupational Participation

Keywords Breathlessness, palliative care, occupational participation, task analysis

Introduction

The theme of this case study is about interventions to optimise occupational participation for a person with advanced lung cancer.

The students' tasks include:

- Understanding the meaning and goals of palliative care
- Understanding epidemiology of symptoms in advanced lung cancer
- Non-pharmacological interventions for refractory breathlessness
- Identifying key occupational therapy principles in palliative care
- Develop an understanding about the experience of breathlessness and importance of participation at the end of life

As a starting point, students should use the following references to gather background information.

Important references are: Abernethy A, Shelby-James T, Fazekas B, Woods D, Currow D (2005) The Australia-modified Karnofsky performance status (AKPS) scale: a revised scale for contemporary palliative care clinical practice [ISRCTN81117481]. BMC Palliat Care 4(1):7

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Overview of the Content

Major Goals of the Actual Intervention

The major goals of occupational therapy intervention in palliative care are:

1. Optimise occupational participation with increasing symptom burden
2. Facilitate mastering of breathlessness management techniques
3. Facilitate participation in essential and valued occupations

Learning Objectives

By the end of studying this chapter, the learner will:

- Be able to use the literature to inform a palliative care approach to the occupational therapy management of refractory breathlessness
- Be able to apply the Case Study Method in clinical reasoning to the case study and similar clinical situations
- Write a report identifying occupational therapy interventions to manage refractory breathlessness

The Background History of Clinical Case Study

Personal Information

Craig is a 57-year-old married man, who was working as a bus driver and until recently he was active in family activities.

Medical diagnoses and prognosis: Craig came to hospital with acute shortness of breath (SOB) and found to have a pleural effusion, which was drained. He was subsequently diagnosed with advanced metastatic lung cancer and underwent a trial of palliative chemotherapy. However, his disease continued to progress throughout the chemotherapy.
Occupational status: Craig requires increasing assistance with activities of daily living due to pain and breathlessness on exertion. He has an Australia-modified Karnofsky Performance Status (AKPS) score of 60, which means he is generally independent with self-care but requires occasional assistance. Unable to work due to symptoms; he relies on his wife to complete domestic activities of daily living. He has ceased driving due to increasing breathlessness.

A personal care assessment was completed with Craig in his home to evaluate ways to manage his breathlessness. Craig stood to bathe in a shower over the bath and used no assistive equipment. He rushed bathing to complete it as quickly

as possible, subsequently experiencing severe breathlessness which he found very distressing. His wife assisted with drying and dressing due to his fatigue and breathlessness. He uses the basin to assist with his toilet transfers.

Craig and his wife enjoy visiting their local café for breakfast every Saturday morning. However, Craig becomes breathless when walking for more than 50 m on flat ground and is exhausted on arriving at the cafe. Craig wants to continue to visit the cafe with his wife and also wants to be able to take a shower and dress himself daily without experiencing severe breathlessness.

The Students Report: The following guiding questions have been identified in developing possible interventions and solutions for Craig.

- What are the important issues and goals for the OT to focus on with Craig?
- What are the common non-pharmacological interventions the OT can use to manage Craig's refractory breathlessness?
- What evidence is there to support these interventions?
- What are the short and long-term goals for Craig and what time frames would they be set in?
- What interventions would assist Craig in meeting his identified goals?
- People with advanced disease experience multiple symptoms. How might the following restrict occupational performance:
  - Cancer cachexia
  - Pain from bony metastases
- What OT interventions would assist management of these symptoms?
- How can the OT address Craig's distress?
- Describe the implications of facilitating patient-centred goals in a palliative care setting. Do they always align with therapist goals? When is this problematic or otherwise?

In addition to the reference list of this chapter the following references are recommended: BIS (2013) Breathlessness Intervention Service (BIS). http://www.cuh.org.uk/addenbrookes/services/clinical/breathlessness_intervention_service/breathlessness_index.html

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Chapter 58
Gardening: An Occupation for Recovery and Wellness

Tania Wiseman and Gaynor Sadlo

> *...just watching it flourish, and then the tomatoes in the pots, you know, watching them grow, and the little yellow flower coming, and then you get that little tiny thing appear, ah wicked...!! (Iris, 73)*
> (Newton and Wiseman 2010)

Abstract Gardening is widely used in promoting recovery and wellness. The use of gardening as a medium within therapy has a long history, and there is evidence of its effectiveness (York and Wiseman 2012). The focus in this chapter is on the purpose of gardening as an occupational therapy intervention (OTI). Gardening is a normal authentic common activity that is easily graded to all situations, from indoors in a nursing home, to community gardens. It is a versatile therapeutic medium, and different aspects of gardening can be graded and adapted to meet the needs of a wide range of clients. Evidence from occupational therapy gardening research supports its use in stress reduction. Skills and knowledge that an occupational therapist (OT) needs such as plant care are considered. Evaluations of the effectiveness of gardening in occupational therapy conclude that it increases motivation to participate, provides enjoyment, and creates a profound and intimate connection to the natural world.

Keywords Achievement · Connection · Enjoyment · Gardening · Learning · Occupational therapy

Definitions

Gardening in occupational therapy is performance of all activities involving the care of plants and their environment. Gardening is facilitated by an occupational therapist (OT) and has clear therapeutic aims for the participants (Kam and Sui 2010).

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Recovery

A process of (re)gaining physical, spiritual, mental, and emotional balance when one encounters illness, crisis, trauma, or life stressors (Swarbrick 2009).

Wellness

Wellness is an active, conscious, deliberate process that requires a person to become aware of and make choices for a more satisfying lifestyle. It is multidimensional, and includes physical, emotional, intellectual, social, environmental, and spiritual dimensions (Swarbrick 2009).

Background

The use of gardening to provide for basic human needs has a long history. Wilcock (2006) explains that a fundamental change in the evolution of human occupation began 12,000 years ago when people started domesticating plants. As more formal health care developed, there is evidence of an innate understanding that cultivation of plants is therapeutic. For example, in 1881, the commissioners for Scottish asylums revolutionized the treatment of people with mental health needs and reinforced the usefulness of agriculture in promoting metal health, stating "inmates of the asylums will be so stirred in connection with the prospects of the crops…the lifting of the potatoes, the growth of the trees" (Wilcock 2001, p. 491). Gardening in occupational therapy today is one of many different media available to therapists to promote recovery and wellness in many settings (York and Wiseman 2012). In contemporary society, the therapeutic outcomes of participating in gardening are so well established that there are specialized charities, such as Thrive in the UK, whose aim is to enable positive change in the lives of disabled and disadvantaged people through the use of gardening and horticulture (Sempik et al. 2005a). Specialized training is available in social and therapeutic horticulture, and many OTs develop their horticulture skills through this training.

The contribution that gardening makes to health and well-being includes increased connectedness to other people and the world, the ability to make a difference as a carer for the natural environment, as well as taking care of fellow gardeners. The nurturing aspects run deeply through the literature, with the physical aspect of gardening interpreted as taking care of the self through health-promoting exercise. Expression of pride, competence**,** and personal and group success in the production of a garden and the process of working together are well explored in qualitative research (York and Wiseman 2012). There are contraindications such as risk of trips and spills, back injuries, fractured bones, machinery accidents, skin and eye infections (Park and Shoemaker 2009), and fears and aversions relating to the garden environment (Van den Berg 2005).

Purpose

Gardening is an activity that is used in a wide range of settings, with people of all ages and capacities. The aims of interventions in gardening are very flexible, for example:

- To calm, reduce stress (Kam and Siu 2010), and foster wonder
- To enjoy the sensory activity, alone or with others (Eriksson et al. 2011)
- To learn about plants and their care, from success and failure
- To provide an opportunity for physical activity (Jonasson et al. 2007)
- To accommodate visual or auditory impairment, through experience of fragrance, touch, and taste (Thrive 2008)
- To focus concentration on a productive task
- To experience efficacy by improving the environment of the garden
- To increase self-esteem, feelings of competence, and spiritual connection (York and Wiseman 2012)
- To provide an understanding of the potential of gardening as a hobby or vocational interest (Eriksson et al. 2010)

Method

Candidates for the Intervention

If a person or community has an interest in gardening, or wishes to try something new, then gardening can be adapted and graded to suit them. Research supports the use of gardening for people with (a) mental health needs, including schizophrenia, depression, anxiety, psychosis, and bipolar disorder (Sempik et al. 2005a; Kam and Siu 2010; Parkinson et al. 2011); (b) stress disorders (Eriksson et al. 2010, 2011; Adevi and Lieberg 2012); (c) dementia (Jarrott and Gigliotti 2010); (d) Huntington's disease (Spring et al. 2013); (e) cancer (Unruh and Hutchinson 2011); (f) brain injury (Soderback et al. 2004); and (g) neurological conditions (Jonasson et al. 2007) are also ameliorated through gardening. Gardening can be used to help promote community cohesion, in addition to individual recovery and wellness at any age (York and Wiseman 2012).

Settings

Gardening is facilitated in private gardens, community gardens, and schools (York and Wiseman 2012); allotment gardens (Parkinson et al. 2011); indoors in pots and tubs (Gonzalez and Kirkevold 2013); in hospital gardens (Soderback et al. 2004); and nursing homes (Spring et al. 2013). In some places, gardening is carried out in a team or as a part of the community of residents (Middling et al. 2011), reducing

responsibility and labor. People in times of difficulty may experience gardening as a burden; communal groups mean that the obligation aspect is managed through adaptation and gardening can still be enjoyed (Hawkins et al. 2013).

The Role of the OT

During the gardening sessions, the OT acts as facilitator, teacher, and fellow gardener. The therapists must have a good knowledge of gardening in order to maximize its therapeutic potential. Four key considerations are space; instruction on tasks; provision of plants; and adaptation of gardening environment, equipment and tools, and aftercare.

The OT can play a key role in the process of finding access to space for the gardening activities, through discussion, exploring possibilities, and advocacy. With domestic gardens, the rights to access are clear, but in any other situations, access to space must be negotiated (Ravenscroft and Gilchrist 2011).

Results

The process and the products are both important in gardening, and careful attention to the needs of the plants and gardening environment are essential.

The therapeutic sessions are arranged around key tasks. These may be determined by the season, the needs of the garden, the preferences of participants, or the availability of materials. For example, collecting and drying seeds would take place in the autumn outside in an established garden. Whereas planting seeds could happen at any time of the year. A typical session could last for 2–3 h, comprising an achievable warm-up task, followed by instruction in the main task, then tidying and reviewing the session and continuing plant care needs.

There are many tasks involved in gardening, and each one can be graded in many different elements and adapted to meet the needs of the participants; an example of seed planting is given below. The OT will need sufficient gardening knowledge to be able to teach participants skills in sowing seeds, germinating, potting on, preparing beds, designing layouts, planting, and taking care of plants. Additional skills which are useful are taking stem, leaf, and root cuttings; composting; and collecting and drying seeds and herbs. There are many activities within gardening that are suitable for inclement weather; some examples are picking and arranging flowers, preparing fruit and vegetables, sprouting edible seeds, helping wildlife, and making garden ornaments and accessories. OTs will need to explain the constant needs of plants and plan to ensure that they are met, including watering, weeding, tidying, and monitoring for pests and diseases. For indoor gardening, temperature control and light will also need to be considered (Sempik et al. 2005b; Simson and Straus 1998).

Many participants in gardening sessions will have prior knowledge and experience to share with the group, and books, television, and Internet resources support the OT and the participants.

An OT will use the growing material as therapy by helping the participants to appreciate the wonder and magic of nurturing plant life, and creating activities that present physical and psychological challenges appropriate to the participant's level of functioning (Adevi and Lieberg 2012). The environment should be monitored and adjusted to maximize sensory engagement (Parkinson et al. 2011). The passive elements of gardening should be fostered, including the appreciation of the elements, the seasons, and passing of time. Sensory aspects of touch, smell, and taste and auditory and visual appreciation should be actively attended to. The daily care of the plants places a demand on the participants and exerts pressure to activate caring (Bhatti and Church 2004).

Example Gardening Session: Seed Planting

Conducted during 3 h, including tea break.

- *Participants:* Six women in shared housing in later life with a variety of health conditions. Two of them impacted the design of the session. One person needed to use a powered wheelchair and the other had significant visual impairment. The remaining people had a range of physical fitness, and were advised to work within comfortable limits. Some were experienced gardeners, but seed planting was a new activity for all participants.
- *Therapeutic purpose:* To *develop occupational repertoire* through experiencing comfortable and enjoyable gardening tasks and learning about growing plants from seed.
- *Materials:* A variety of seeds, seed trays, moist seed compost, trowels, labels, a watering can with fine rose, coir pellets, and large gravel trays to contain mess were the essential materials. In addition to this gardening material, glasses were needed by some participants to manage tiny seeds.
- *Environment:* This task was carried out inside and outside at a table or worktop. The weather was variable, so some of the group sat inside at a table and others sat out in the garden. *Facilitating the social environment to enable people to work together* was important in order to foster shared responsibility for the plants (Fig. 58.1).
- *The role of the OT:* Seeds were chosen to meet needs by the group members and the OT from the range provided. This included a range of seed sizes, and a range of planting styles to enable choice and accommodate varying dexterity and visual ability. Seeds were planted while seated, or in standing, depending on the needs of the person. Equipment was placed nearby, but those people who wanted to stretch their balance and agility carried and moved things between the group and the shed. For example, one person wished to learn about the use of

Fig. 58.1 Being outside, in the fresh air, creates an opportunity to chatter, be messy, and have fun

coir pots, and another had a visual impairment, so together they soaked the pots, then planted a large bean in each (Fig. 58.2).

- Another person used a powered wheelchair and was therefore able to carry heavy bags of compost for the rest of the group. The compost was troweled into seed trays, and tiny lettuce seeds were placed in the cupped hand of the person who had limited use one arm, so that the wind would not blow them away, and other members of the group took small pinches and sprinkled them into the trays. Equipment and numbers of tasks were limited to increase interaction, but there was an option to have a set task and equipment in order to facilitate quiet solitary working.

The OT demonstrated and advised on techniques, and read instructions for seedling care aloud to the group from seed packets for the first seeds. Other members then took on this role for other seeds. Members of the group took on the role of labeling the pots. The group agreed who would check on the seeds during the week, and were advised by the OT that when the seedlings started growing, they would need daily monitoring to ensure they were kept moist. A plan to plant fruit bushes and review the exciting seedling progress was made for the following week.

Fig. 58.2 Adapting the activity using large seeds and coir pots that reduce any spillage

Evidence-Based Practice

Therapeutic outcomes of gardening can enhance participation in work, home maintenance, or leisure. The following evidence from practice highlights:

Gardening for *recovery and wellness* is well supported by research that informs occupational therapy practice (York and Wiseman 2012, Wang and MacMillan 2013). Gardening offers moderate physical exercise (Park 2007), stress reduction (Van Den berg and Custers 2010, Hawkins et al. 2013), *social interaction* (Fieldhouse 2003), *social inclusion* (Simo-Algado 2013), and *spiritual experiences* (Unruh and Hutchinson 2011).

Creative and leisure activities are used more in mental health than in physical health practice (Müllersdorf and Ivarsson 2012). The research that reports on occupational therapy gardening reflects this bias. A single-blinded randomized control trial for people with severe mental health needs participating in a horticultural program found statistically significant *less depression, anxiety, and stress* using the Depression Anxiety Stress Scale 21 (Kam and Siu 2010). Experience of success and failure helped clients with stress-related disorders to feel free to try new things and those who had gardened *increased their occupational repertoire* (Eriksson et al. 2010). Women with burnout *experienced enjoyment, competence, and space for reflection and recovery* (Eriksson et al. 2011). People with Huntington's disease ex-

pressed *being happy* when doing and being in the garden. They also enjoyed related activities, such as garden-focused television and painting pictures of the garden (Spring et al. 2013). Occupational therapy outpatients with neurological conditions experienced *beneficial feelings of joy,improvement in physical abilities,and pride and satisfaction in production of tangible results*. They valued choices that voluntary participation offered, and confidence was fostered by succeeding at complicated tasks. They also noted the problem of access for wheelchairs and those participants with poor balance on uneven ground (Jonasson et al. 2007). Furthermore, being a gardener indicates reduced risk of mortality (Eckel et al. 2012).

Parkinson et al. (2011) highlight that the benefits of engaging in horticultural activity in a mental health service are not automatic. The external environment provides challenges, which can be graded to maximize the therapeutic benefit, providing physical exercise and enhancing sensory experience. Personal interest was rated as the most important factor in participation. Problematic factors included awareness of pollution, hay fever, and inclement weather, and access to toilets, kitchens, and comfortable seating. The work of Simo-Algado (2013) exemplifies advocacy to reduce social exclusion though gardening.

The effectiveness of occupational therapy gardening activities was strongest in research relating to groups of people with mental health needs. Experimental research strongly supports the acute stress-relieving effects of independent gardening (Van Den Berg and Custers 2010). Hawkins et al. (2013) explored mechanisms by which this stress reduction occurs, reporting that both the "doing" and the "being" in the environment are important, and time alone is an essential feature of this benefit. Overall, this research clarifies the importance of quiet, solitary, contemplative time, as well as enjoyment of the vigorous active and social elements of the activity that participant's value.

Discussion

Gardening is used within the process of recovery to encourage nurturing and self- nurturing. OTs can grade and adapt gardening to develop the participants' physical, emotional, cognitive, social, spiritual, and occupational capacities. Research has shown that gardening is a way to gain confidence, self-esteem, and develop positive roles and identity. People learn new skills, gain qualifications, and developed work-type roles in less stressful and aesthetically pleasing environments that reduce the pressure to perform. People express pride in achievements, creating tangible and edible outcomes. People describe having a sense of belonging (York and Wiseman 2012)**.**

Gardening outcomes are important too, and the success of the projects undertaken will be experienced by participants. If the gardening is managed well, and the tasks provide a challenge that is appropriate, then there will be the opportunity to enjoy achievements in the beauty of the garden and taste of its produce. The special element of gardening as an occupation is that it deals with living plants that are imbued with a form of agency (Bhatti and Church 2004), and they demand care

and attention, increasing the levels of activity, and this care results in the miracle of creating living, growing plants which can foster a spiritual connection.

Conclusion

Gardening is a simple ubiquitous activity, but facilitating gardening as therapy requires commitment, imagination, excellent skills in activity analysis, grading and adaptation, and the motivation to learn for and with clients. Important aspects of gardening that an OT can highlight are choice in how to enjoy free time, connection with the miracle of life, the experience of joy, and measured risk—that means, participants can have wonderful achievements or even failure and feel braver as a result. A little magic in the world is easily swamped by the complexity of human relations; gardening affords an opportunity to pause and appreciate the little miracles in order to connect with a world of hope and wonder.

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A Case Study of Residents in Supported Housing for People in Later Life: Starting a Gardening Group

Keywords Achievement, connection, gardening, later life, supported housing, wonder

The theme of this case study concerns adaptation of gardening in later life in supported housing for people with a range of functional abilities.

The students' tasks include:

- Finding information about the therapeutic potential of gardening (e.g., Hawkins et al. 2013; York and Wiseman 2012)
- Explaining the occupational needs of people in later life (NICE 2008)
- Describing the materials and skills required to facilitate a gardening session (e.g., Simson and Straus 1998; Thrive 2014)
- Reasons for prescribing gardening in later life (e.g., Simson and Straus 1998)
- Synthesizing the information into a report

As a starting point, the students should use the following references to gather background information:

- Hawkins J, Mercer J, Thirlaway K, Clayton D (2013) "Doing" Gardening and "Being" at the Allotment Site: Exploring the Benefits of Allotment Gardening for Stress Reduction and Healthy Aging. Ecopsychology 5(2):110–125
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- York M, Wiseman T (2012) Gardening as an occupation: a critical review. Br J Occup Ther 75(2):76–84

Overview of the Content

Major goals of the intervention are as follows:

The major goals of this gardening group in supported housing are (1) learning skills for gardening to expand occupational repertoire, (2) minimization of social isolation, (3) maximization of enjoyment of the environment and interactions with plants and other people, and (4) to foster a sense of hope and wonder.

Learning Objectives

By the end of studying this chapter, the learner will:

- Be able to use a literature review to solve the case study based on the case method (CM)
- Be able to apply the CM in clinical reasoning to the specific case study and similar situations
- Understand the justification and ethical considerations related to starting a new gardening group in a communal setting, with people who have varied needs
- Write a scientific report on facilitating a gardening group

The Background History of the Participants

Personal Information

Participants are aged between 60 and 99. They live in supported housing. The housing complex contains 40 households, with private bedroom, bathroom, and cooking facilities. Shared areas included a large seating area, dining room, and garden. There are some activities available, but these are inside and are not physically challenging. The six clients participating in the gardening group have a range of physical impairments which may impact on the form that the gardening takes.

Medical Diagnoses, Impairment, and Reasons for Participation

Iris, 73, has a history of four cerebral vascular accidents over 15 years, the most recent was 3 years ago. Iris had previously seen OTs. She uses a powered wheelchair inside and outside. Assistance is received to support activities of daily living. Iris wishes to be more active, and enjoy a new "vital" activity. Iris lacked an opportunity to learn, and participate in fun activities, when she was offered the chance to join in a new gardening group she was very enthusiastic, and loved the idea of "getting outside," but she was concerned about the possible constraints on participation.

Jan, 67, has type 2 diabetes and mild osteoarthritis in her hips, neither result in functional impairment. She currently experiences limited participation in group activities in the housing complex, but would like to join in more.

Alice, 99, has a visual impairment. She was active in the social life of supported housing, and local community, and visited local shops independently until 2 years ago when her eyesight declined. Alice would like to find new activities that she could enjoy.

Sophie, 60, has coronary heart disease. She is currently active in the social life of the supported housing, and reports that she has good days and bad days. On bad

days, she feels lethargic, but is able to walk the length of the garden without discomfort. She wants to expand choice of activities in the housing complex, and especially in the garden, for herself and others.

Elizabeth, 82, has chronic obstructive airway disease which results in shortness of breath on exertion. She is independently mobile, but she wishes to be more active, and enjoy a new activity in the fresh air.

Sarah, 86, has type 2 diabetes and osteoarthritis in her hips and knees, with some functional impairment. This results in reduced mobility, which means she is unable to kneel comfortably, but Sarah is independent in activities of daily living, and wishes to be more active and have some fun.

Occupational Performance Issues

An assessment was made of the physical and social environment, noting access to potential gardening opportunities. There was level access to the garden area through automatic sliding doors. There was no history of group gardening in the complex, and the garden was maintained by an external contractor.

The Student's Report

The following guiding questions have been identified to help develop possible opportunities for Iris and the others to participate in a gardening group:

- What are the major definitions and concepts used in the case?
- What is the research-based evidence for choosing gardening as an intervention?
- What occupational needs might Iris experience?
- What risks are there in gardening and how might an OT plan for this?
- What are the short- and long-term goals for Iris within the group?
- What are the important issues and occupational capacities for each participant? Choose a specific gardening task for this group, and explain how it could be adapted and graded to ensure social interaction.
- What can the OT do to enhance the group's opportunity to experience a "connection to nature?"

Chapter 59
Horticultural Therapy for the Cognitive Functioning of Elderly People with Dementia

Midori Yasukawa

Horticultural therapy using a periodic and effective method may improve cognitive and psychosocial functioning of elderly people with dementia.

Abstract Horticultural therapy (HT) is an intervention using a set of recreational activities that include the beneficial effect of plants and nature for the prevention or treatment of illness. The intervention is not limited either by the client's age or illness. The aim is to improve the patients' quality of life (QOL); (Fukushima et al., Health Soc Care Community 13:30–37, 2005). This cost-effective therapy has advantages at the community level compared with other therapies.

Keywords Cognitive function · Dementia · Horticultural therapy · Mini-mental state examination (MMSE) · Quality of life (QOL)

Background

Horticultural therapy (HT) is used in recreation, leisure, and vocational and social programs. It includes working with all kinds of plants and natural materials. Programs include plant growth (seed germination and development of seedlings), propagation (seeds and cuttings), houseplants, bulbculture, desert gardens (cacti and succulents), plant identification, nature crafts, outdoor gardening, hydroponics, hybridization, plant nutrition, wildlife habitats, landscape design and ecology, enhancement of outdoor environments for clients and visitors to enrich the restorative, and gardening and nature experience (McDonald 1976). Moreover, horticultural activities are action oriented and used for maintaining musculoskeletal, cognitive,

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and sensory functions; to stimulate human senses; to give opportunity to adaptation and coping; and for socialization (Hazen 2012).

HT has been applied in many countries, such as Australia, Germany, Korea, New Zealand, the USA; and Sweden (Söderback et al. 2004). The patients have physical and mental impairments due to illness or injury. Some hospitals and health-care centers have applied HT for bedridden patients and those with a history of depression and lack of self-esteem (Lee et al. 2008a). It has also been used for the rehabilitation of prisoners (Lee et al. 2008b).

In developed countries, there is a rapidly increasing occurrence of dementia in the elderly. Dementia is normally treated with drugs that offer temporal symptomatic control of cognitive decline and have demonstrated efficacy for patients with mild to moderate dementia, although some drugs have some deteriorating effects. The non-pharmacologic interventions are alternative therapies that include bright light therapy, exercise and behavior management techniques, validation therapy (i.e., improvement of communication), psychotherapeutic intervention, art therapy, music therapy, and HT.

Among these therapies, HT is aimed at improving dementia patients' cognitive function and thus their quality of life. It encourages patients to use their five senses in activities such as basking in the sun, feeling the wind blow, and hearing the song of birds and the sound of water flowing.

In Japan, the keeping of houseplants and private gardens is a popular recreational activity, and the traditional arts of bonsai (potted plants) and Buddhist rock gardens attest to a long history of the application of gardening for maintaining the balance between physical and mental health. Currently, approximately 40 % of the population of Japan is engaged in recreational horticultural activities (Matsuo 2002).

HT in Japan was developed in 1980 because of a growing elderly population and an insufficient system of care for patients with dementia. These factors caused the patients' reduced self-control and social abilities that could be the reason for many cases of depression. This issue encouraged the development of new therapies that followed a more holistic approach, addressing both physical and mental aspects of dementia. Among these therapies, HT seems to be very suitable for Japanese patients who feel inclined to horticulture, as many do. This therapy (1) is tailored to the patients' needs and abilities; (2) has clear goals for the patient; (3) emphasizes gardening activities; (4) is conducted by health-care professionals, such as horticultural therapists or medical/health and welfare experts; and (5) focuses on improving health and welfare. This therapeutic approach has been studied in the elderly who have participated in HT during the past 10 years (Yasukawa 2002).

HT is exemplified in this chapter by the Kanazawa University HT Program (KUHTP) for elderly people with dementia.

Purpose

HT entails people interacting with plants and, to improve the cognitive function of elderly patients with dementia or with mental or physical disabilities. The main purpose of HT is to provide these patients with graded and carefully

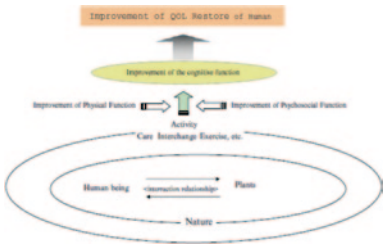

Fig. 59.1 The process of development of human welfare and improvement of quality of life (QOL) using horticulture therapy

designed gardening activities. The interactive idea of HT is presented in Fig. 59.1 (Yasukawa 2002).

Method

Candidates for the Intervention

HT is applicable for a wide range of patients, e.g., having serious illness (Barley et al. 2013), are cancer survivors (Nakau et al. 2013), suffering from musculoskeletal pain (Verra et al. 2012), are depressed (Gonzalez et al. 2011), or having a wide variety of diseases and disabilities (Annerstedt and Währborg 2011).

The patients participating in KUHTP are presented in Table 59.1.

In Japan, HT is favorably used by senior citizens who prefer a home-based activity and live in group homes. Traditionally, adult children will take care of the health of their elderly parents. However, the increasing number of working women prevents many families from taking care of their elderly family members at home (Okamoto et al. 1998). Some reports show that dementia-affected elderly people who are admitted to hospitals or nursing homes quickly develop more advanced dementia symptoms (Motonaga and Asada 2002; Shimamura et al. 1998; Tanaka and Kato 2007), with a decrease in cognitive function along with socially inappropriate behavior. The most common problematic behaviors among people with dementia are delusion, refusal of care, and verbal abuse (Tanaka and Kato 2007).

The symptoms of dementia can act as a barrier to communication, creating frustration and disruptive behaviors, particularly for long-term care residents (Moniz-Cook et al. 2003), because of three factors: neurogenic causation (Foundas et al. 1995), psychogenic causation (Pietrukowicz and Johnson 1991), and deterioration of physical condition (Horowitz 1997).

Epidemiology

In Japan, the numbers of demented elderly are expected to increase from 2 800 000 in 2010 to 4 700 000 in 2025 (Japan Ministry of Health, Labor, and Welfare 2006).

Table 59.1 Patients participating in the horticultural therapy presented in this chapter

Group	Patient	Age	Sex	Previous profession	Physical condition									Conversation ability	Experience in gardening and agricultural activities
					Physical function				Present medical record						
					Walking	Eye sight	Hearing	Paralysis	Hypertension	Diabetic	Hyperlipemia	Heart disease	Other		
GH-S: (n=9)	A	85	Male	Office worker	Δ* 2		Δ* 5		×		×		Gout, glaucoma		No
	B	85	Female	Unclear	Δ*				×	×					Yes
	C	80	Female	Unclear	2				×				Osteoporosis, spinal disease		Yes
	D	90	Female	Entrepreneur	Δ*	Δ*	Δ						Brain apoplexy		Yes
					2	4									
	E	92	Female	Farmer			Δ		×			×	Malignant tumor		Yes
	F	87	Female	Kimono maker					×				Malignant tumor, abdominal and aortic aneurysm		Yes
	G	71	Female	Office worker									Brain apoplexy		No
	H	80	Female	Entrepreneur	Δ* 2	Δ			×			×			Yes
	I	76	Female	Restaurant worker	Δ* 2	Δ	Δ		×				Brain apoplexy, brain atherosclerosis		Yes

Table 59.1 (continued)

Group	Patient	Age	Sex	Previous profession	Physical condition									Conversation ability	Experience in gardening and agricultural activities
					Physical function				Present medical record						
					Walking	Eye sight	Hearing	Paralysis	Hypertension	Diabetic	Hyperlipemia	Heart disease	Other		
GH-T: ($n=12$)	J	90	Male	Organization worker	Δ*2		Δ					×		Δ	
	K	76	Male	Unclear	Δ*2				×	×		×	Prostatomegaly		
	L	82	Male	Farmer		Δ									
	M	90	Male	Civil servant					×					Δ	
	N	86	Male	Entrepreneur	Δ*2		Δ						Malignant tumor	Δ	
	O	97	Male	Farmer			Δ			×		×		Δ	
	P	81	Female	Farmer											
	Q	88	Female	Entrepreneur	×*1										
	R	84	Female	Farmer	Δ*2				×						
	S	85	Female	Teacher			Δ		×	×					
	T	80	Female	Part-timer											
	U	88	Female	Farmer			Δ		×						

Δ little disorder; × disorder; *1 using wheelchair; *2 uses a cane; *3 dyschromatopsia; *4 nearsighted; *5 uses a hearing aid

Setting

Patients with dementia who participate in HT in Japan live in group homes, nursing homes, long-term care facilities, long-term medical treatment hospitals, and centers for disabled people.

The Role of the Horticultural Therapist

The horticultural therapist acts as *a teacher, a guide,* and *a facilitator* for the patients in the horticulture sessions (Table 59.2), and *an advisor* for the other staff. Through interviews, the therapy content is adapted to the individual patients' condition.

Prior to each therapy session, the horticultural therapist conducts relaxing activities and mild gymnastics. These activities are also repeated after the sessions and before the patients return to their wards. The therapy sessions end with a discussion of the patients' perception about the value of participating. This part of the therapy sessions is aimed at increasing the patients' self-esteem.

The role of the staff is to assist the horticultural therapist and to help the patients to carry out a therapy session. The staff is responsible for maintaining the continuity of the session and for recording additional information about the patients' physical and psychosocial condition during the therapy sessions.

Table 59.2 The therapist's role during a therapy session and its purposes

Session time	Activity	Purpose
Before	Interview	Obtain information on the physical and mental condition of patients
	Relaxing gymnastic	Warming up of body before activity
During	Horticultural activity	Teach basic techniques in horticulture
		Assist the patients' activities during therapy
After	Relaxing gymnastic	Cooling down and relaxing after horticultural session
	Interview	Obtain information on the patients' feelings about the session
		Encourage patients to increase their self-esteem
		Provide some direction in life for patients

Results

Clinical Application

The KUHTP was carried out for 3 months, with 12 sessions each week (Table 59.3). Prior to a HT session, information on the patients' physical and psychosocial conditions is gathered by the horticultural therapist. This information is combined with weather data, such as air temperature and humidity. This information is used to decide where to hold the session—outdoors or indoors. In hot weather, rain, or high humidity, the HT is carried out indoors in order to prevent any negative effects on the patients. The therapy session is facilitated by using a specially designed mobile gardening cart for outdoor (Fig. 59.2) and indoor use (Fig. 59.3).

The HT Sessions

The therapeutic sessions are performed in the following way:

- Prior to a session, the patient's physical and mental condition is investigated and a short interview is carried out with the aim of determining the present mood of the patient (Fig. 59.4).
- The activities that will be carried out during the session are carefully explained.
- The patients perform 5 min of relaxing gymnastics and sing a song accompanied by some music (Fig. 59.5).
- The patients work in groups of three or four, together performing a horticulture task. In addition, each patient performs an individual horticulture task (Fig. 59.6). Examples of tasks performed during therapy sessions are (1) artistic activities, such as flower pressing (Fig. 59.7); (2) picking flowers; or (3) pick vegetables, and cooking and eating them.
- A discussion is held at the end of every session, during which the therapists and the patients share their feelings about the session and their expectations for the next one (Fig. 59.8).
- After the session, the staff meets to plan the next session.

How the Intervention Eases Dementia

HT encourages elderly people with dementia to participate in physical activities. These easy exercises performed in contact with nature may stimulate movements, cardiac activities, and brain frontal lobe activities. In addition, the interaction with other group members and the experience of doing horticulture activities are expected to stimulate memory and basic psychosocial functions.

Table 59.3 Program for horticultural therapy

Session	Contents	Allocate time (h)	Temperature (°C)/ Humidity (%)
1	Opening remarks	1.5	28/28
	Planting sunflowers		
	Group planting of summer flowers in a round planter		
2	Observing the sunflowers	1.5	28/28
	Planting white radish sprouts		
	Group planting of summer flowers (flower "Ya-tai")		
	Care for group planting in a round planter		
3	Observing the sunflowers	1.25	28/38
	Planting qing-geng-cai		
	Observing the white radish sprouts		
	Care for group planting in a round planter and flower "Ya-tai"		
4	Harvesting and tasting the white radish sprouts	1.25	32/36
	Hydroponic cultivation of pothos		
	Care for group planting in a round planter and flower "Ya-tai"		
5	Replant the qing-geng cai	1.25	30/34
	Plant the radish		
	Care for group planting in a round planter and flower "Ya-tai"		
6	Observing the sunflowers	1.25	24/40
	Observing water cultured pothos		
	Replanting the radish		
	Care for group planting in a round planter and flower "Ya-tai"		
7	Observing and thin out the radish	1.5	24/40
	Caring for group planting in a round planter and flower "Ya-tai"		
	Make pressed flowers		
8	Replanting the pothos	1.5	24/40
	Observe and care the radish		
	Care for group planting in a round planter and flower "Ya-tai"		
9	Observing sunflowers	1.5	28/35
	Lay out the pressed flowers		
	Care for group planting in a round planter and flower "Ya-tai"		
10	Making pressed flowers–1	1.5	24/50
	Care for group planting in a round planter and flower "Ya-tai"		
11	Making frame for the pressed flowers–2	1.5	18/68
	Care for group planting in a round planter and flower "Ya-tai"		

Table 59.3 (continued)

Session	Contents	Allocate time (h)	Temperature (°C)/ Humidity (%)
12	Harvesting the radish and qing-geng cai	1.25	18/53
	Care for group planting in a round planter and flower "Ya-tai"		
	Framed pressed flower show		
	Taking a ceremonial photograph		
	Tasting party		
	Closing address		

Fig. 59.2 Outdoor horticultural therapy group session using a mobile garden, Hana-Ya-tai

Evidence-Based Practice

The KUHTP significantly ($p < .05$) influenced the *cognitive function*s of patients with dementia (Table 59.1), as demonstrated by the results of the mini-mental state examination (MMSE; Folstein et al. 1975); the scores were 16.9±4.3 before participation and 18.9±4.2 after participation (Yasukawa, unpublished data). These results were similar to the results for schizophrenia patients (Minie et al. 2008).

In the interviews, the patients experienced improvement in communication, affect display, expression, spontaneity, activity, interest in communication exchange, and role behavior that contributed to normalization of family relationships and life rhythm adjustment. These results agree with Neuberger's (2008) statement that HT positively influences recovery, communicational skills, and body functioning.

In later years, HT has been proved as an effective intervention. A systematic review of 29 scientific articles concerning nature-assisted therapy conducted among, e.g., patients with obesity and schizophrenia, 26 of the studies showed evidence for health improvement (Annerstedt and Währborg 2011). Patients with chronic musculoskeletal pain participated in a 4-week, seven 1-h sessions of HT. The results showed improved quality of life (QOL), pain behavior, coping ability, and decreased anxiety compared to the patients who did not participate in HT (Verra et al. 2012). Patients' depression severity declined significantly during the intervention of HT and remained low at the follow-up (Gonzalez et al. 2011). HT significantly improved functional and spiritual well-being, improved QOL, and reduced cancer-associated fatigue among Japan cancer survivors (Nakau et al. 2013). Finally, Barley et al. (2013) concluded that HT is a feasible model for improving well-being in patients in primary care who live with serious illness.

Fig. 59.3 **a** Indoor horticultural therapy setting using, **b** the Walk-in-Garden

Fig. 59.4 Meeting of therapist and staff after session, discussing and exchanging ideas and information

Fig. 59.5 Relaxing gymnastic activities before and after horticultural therapy sessions

Fig. 59.6 **a**, **b** Participants in horticultural therapy taking care of plants

Fig. 59.7 Artistic activity of making pressed flowers from a therapy garden

Fig. 59.8 Information exchange between therapists and participants after horticultural therapy sessions

Conclusion

The elderly patients with dementia who participated in KUHTP showed increased cognitive ability. Key factors for successful cognitive improvement are the contact with growing plants and the interaction among the participating patients and staff that generates patients' improved QOL (Yasukawa 2003).

There is an increased interest in a holistic approach to medical treatment. Here, HT offers a combination of medical, environmental-friendly, and artistic approach that benefits the development of new values and the culture of modern society (Mooney and Milstein 1994).

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Chapter 60
Music as a Resource for Health and Wellbeing

Norma Daykin and Leslie G. K. Bunt

'It has had a huge, huge influence on me…it did make me change my mind and change my college course, zwhich … improved my life…. I've got something to motivate me….'

'It gave me something to look forward to…it was good… gave us all an opportunity to spread our wings and try things that we would like to try…. He helped me…put certain things into perspective.'—

Quotes from Ethan and Elisa, participants in a participatory music project for young people in youth justice settings, from De Viggiani et al. 2013

Abstract This chapter explores the use of music as a resource for health and wellbeing. Drawing on recent evidence, the contribution of music to a range of health and wellbeing outcomes, including physiologic, psychological, clinical, and social impacts, are outlined.

The chapter identifies key issues for practitioners to consider when using music. These include the background and experience of clients, the importance of facilitation skills, and the need to cope with the sometimes powerful emotional responses to music.

Finally, the chapter highlights the need for further research into the ways in which music can contribute to treatment, rehabilitation, and quality of life in a wide range of settings.

Keywords Health · Music · Music therapy · Quality of life

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Background

Music can be a resource for health and wellbeing in a range of settings, and there are many ways in which music can contribute to the treatment and rehabilitation. There are key issues, challenges, and considerations for practice in using music therapeutically. Music has been used to enhance health and wellbeing for centuries. Up until the second half of the twentieth century, music was used mainly in hospitals as an entertaining diversion, as an aid to convalescence, and as a morale booster (Bunt and Stige 2014). During the past 50 years, there has been a growing recognition of the clinical benefits of music, including listening and playing, in a wide variety of health-care settings. These benefits have mostly been explored within professional music therapy literature. However, the purpose of this chapter is to identify the broad uses of music in health care.

Purpose

Recorded music and live music performance can be used in a variety of ways to contribute to the prevention and rehabilitation for the children and adults with a wide range of conditions. Music can do the following:

- Create a *relaxing and calming atmosphere*
- Be a form of *physical activity; music making* supports both individual and group treatment plans
- Offer *emotional and psychological support*
- Enhance *motivation*.
- Provide *opportunities for enjoyment and social interaction*.
- Help clients *cope with chronic or challenging conditions*.

Method

Candidates for the Intervention

Music can benefit a wide range of clients of all ages, both genders, and different socioeconomic backgrounds.

Settings Where Music Is Used

Diverse musical approaches are adopted in many health and social care settings including primary care, preschool nurseries, hospitals, hospices, residential care homes, community day centres for adults with physical disabilities and sensory impairments,

prisons, special schools, and mainstream schools. Music therapy is well established in a number of health-care areas, particularly child and adult mental health and learning disabilities services (Bunt and Hoskyns 2002; Bunt and Stige 2014). Music is also increasingly used in other disciplines, such as cancer care (Daykin et al. 2006) and in community and public health settings (Clift et al. 2012, 2013).

Results

Clinical Application

The Contribution of Music

Bruscia (1998) distinguished between music *in* therapy and music *as* therapy. We can distinguish between music therapy and more broadly based music for health activities; however, in reality, these often work towards similar goals and may be better considered as existing along a continuum, with different professionals contributing to the range of musical activities in between.

Music for health exists in a variety of settings, as many professionals might use music to enhance quality of life and create an atmosphere conducive to healing and rehabilitation. For example, rhythm can be used to structure and organize activity, helping people with physical disabilities to improve control over their movements.

Playing instruments and singing can offer alternative means of communication for people with impairments, for example expressive aphasia language impairment. Music can help to reduce depression and anxiety relating to a wide range of conditions, boosting self-esteem, and facilitating expression of a range of emotions. Listening to music and taking part in music making can facilitate exploration and cathartic release as well as providing opportunities for reflection, reminiscence, and self-awareness. Further, music can offer patients and clients a valuable resource for creating meaning in their lives, and helping them to make sense of their situation. Finally, music can enhance communication between professionals and patients and among individuals, significant others, and families.

Music as an adjunctive therapy (American Music Therapy Association 2013; Dileo and Carnell 2013), supporting a range of treatment objectives, can be a therapy in its own right. In *music as therapy,* music is the agent of therapeutic change, and practitioners rely on specialist knowledge of psychotherapeutic approaches and music-therapy techniques (Hanson-Abromeit 2010).

Evidence-Based Practice

There is a growing evidence base regarding the impact of music making on health and wellbeing. Evidence of a wide range of clinical effects of using arts, music included, in health-care settings was reviewed by Staricoff (2004). She identified

outcomes such as reduced anxiety and depression, as improvements in physiologic indicators, such as blood pressure, and improved clinical care in a number of fields including cancer care and cardiovascular care.

More broadly, a growing body of research has examined health and wellbeing outcomes of music in public health and community settings. For example, health benefits of choral singing for older people have been identified in a recent randomised trial (Skingley and Bungay 2010; Clift et al. 2012). Improvements in breathing and wellbeing for people living with medical conditions such as chronic obstructive pulmonary disease (COPD) have also been identified following group singing (Clift et al. 2013). A review of music making with young offenders, who often experience high levels of mental ill health and associated poor educational and social outcomes, identified improvements in young people's self-esteem as well as in mood, anger, and motivation (Daykin et al. 2013). Qualitative research revealed the processes of engagement, group relations, identity, expression and creativity, as well as the musical facilitation skills that shape these potential benefits (DeViggiani et al. 2013).

Clinical studies of music *as an adjunctive therapy* have identified evidence-based outcomes for people with specific conditions/diseases/disabilities, examples are in autistic spectrum disorder (Gold et al. 2006), schizophrenia (Gold et al. 2005), stroke (Särkämö et al. 2010), and depression status (Maratos et al. 2008; Erkkilä et al. 2011).

Discussion

Research has shown that music can offer a wide range of benefits in health-care settings, from environmental enhancement to clinical benefits, and therapeutic outcomes. To benefit from music, participants do not need to have any particular knowledge, and even taking part in music making does not require any kind of instrumental ability, provided the session leaders have the appropriate facilitation skills. However, participants' views about music may be influenced by previous experience, such as education, which may not always be positive (Daykin et al. 2007; DeViggiani et al. 2013). When music is used to facilitate expression and communication, it can evoke powerful emotional responses in participants. Those leading these activities require sensitivity as well as appropriate knowledge and skill to ensure that these responses are not negative for clients.

While clinical studies have identified outcomes for music therapy, further research is needed on the benefits and risks of music activity more broadly defined. Research is also needed to understand the roles and contributions of the different professional groups that currently make use of music as a resource for health and wellbeing in health-care settings.

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Part V
Interventions: The Occupational Therapist Promotes for the Client's Health and Wellness

Fig. 1 **a** Prevent injuries through use of tools with optimal ergonomic design. When climbing the stool stands absolutely still. Photo Unknown **b** Health and wellness walk using Nordic Walking Sticks http://www.youtube.com/watch?watch?v=ZKTufkzpo8E Photo Bo Disbo (The photos are unrelated to occupational therapy.)

Chapter 61
Interventions: The Occupational Therapist Promotes for Health and Wellness

Health and Wellness Interventions: Overview

Ingrid Söderback

Abstract This part of the Handbook surveys the occupational therapy interventions (OTIs) in which the occupational therapist (OT) promote the client's occupations and measures to sustain healthy and with optimal feeling of wellness. One chapter each explains the theoretical foundation of promoting, health and wellness, clients' motivation towards behavioral changes and three chapters exemplify these preventing OTIs.

Keywords Behavior · Ecological approach · Health · Motivation · Older people · Prevention · Promotion · Road users · Wellness · Theoretical foundations · Workers

Introduction

"Health and Wellness Interventions" comprise all measures taken that support or encourage and motivate (see Chap. 66) the client applying a healthy lifestyle (see Chap. 37) that increase his/her higher position or rank in health, wellness, or quality of life.

Occupational therapist's (OT's) role as *health promoter* is to offer a single or, more often, a group of clients' participation in ill-health preventive or health promotion activities. OTs' role here is often on a consultative basis, working in a health-care team. He/she acts as a teacher and uses, for example, knowledge based on motivational interviewing (Batty 2013) or behavior therapy (e.g., Nakashima 2014), or instruments commonly used for marketing, which all are approaches to advocate client's behavioral changes (Fig. 61.1). In connection to "Health and Wellness Interventions," OTs also use the occupational therapy interventions (OTIs): "Manage Adaptations," e.g., prescription of assistive devices that prevent injuries, diseases, and disabilities.

The *outcome* of "Health and Wellness Interventions" are (a) *health,* that means clients' state of complete physical, mental, and social well-being and not merely the

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Fig. 61.1 The occupational therapist's role in occupational therapy interventions aimed at promoting the client's health and wellness. The figure is a stylized Ankh-sign

absence of disease or infirmity and (b) *wellness,* i.e., the clients' state or condition, where they maintain a healthy balance of the mind, body, and spirit that results in an overall feeling of well-being. These outcome concepts are often converted to measurement of quality of life (for further information about quality of life, see Chap. 8).

This part of the Handbook begins with a chapter "Prevention and Health Promotion in Occupational Therapy: From Concepts to Intervention" (see Chap. 62). The theoretical concepts are explained, which makes the foundation for *prevention* of injuries, diseases, and disabilities and *promoting* wellness.

The preventive intervention approach is most often directed to people where an injury has already occurred, or having a disease or a disability and who are at risk for new accidents or decreased function in activities of daily life (ADL). In the Handbook, this part is represented by OTIs directed towards preventing falls among elderly (see Chap. 63) and traffic accidents (see Chap. 64).

The promoting interventions are based on the ecological approach and might be directed to all people living in a community, especially to those who are in some way marginalized and therefore having a higher risk of becoming sick. Promoting interventions is an advocated approach for OTIs, which so far is represented with few scientific studies. For example, such an OTI could be implemented in future on bases of the description of the organizational factors on a workplace that influence the workers' health and well-being (see Chap. 65). The final chapter contains (see Chap. 66, Reprinted from International Handbook of Occupational Therapy Interventions, first edition) Shannon's important report on how the clients' motivation to behavioral change will be enhanced by use of a specific consultative method.

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Chapter 62
Prevention and Health Promotion in Occupational Therapy: From Concepts to Interventions

Johanne Filiatrault, Manon Parisien, Anne Sullivan, Lucie Richard and Chantal Pinard

Every patient carries her or his own doctor inside.
Albert Schweitzer, French philosopher and physician (1875–1965)

Abstract This chapter focuses on the role of occupational therapists as health and wellness promoters. Although occupational therapists more typically offer preventive services to individuals or groups presenting with specific risks or disabilities in their clinical practice, they may also play a broader role in promoting the health and wellness of groups, communities, and whole populations by developing and implementing interventions designed for people without any specific health problems or disabilities. They may also impact people's health and well-being (either with or without health problems) on a wider spectrum via interventions aimed at the five targets of the ecological approach to health promotion. This approach is based on a holistic perspective of health and its determinants. It provides a useful framework for understanding the scope of targets and strategies that occupational therapists can use to prevent diseases and injuries and to promote the health of individuals, groups, communities, and populations. By an increased understanding on

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how health is influenced not only by individual characteristics and behaviors, but also by the physical, social, cultural, and political characteristics of the environment in which people live, work, play, and interact, occupational therapists can certainly play a meaningful role in health promotion.

Keywords Ecological approach · Health promotion · Prevention

Background

Occupational therapists (OTs) have a unique understanding of how occupations impact people's health and well-being, and thus play an important role in preventing disabilities and promoting health. This role is embedded in the very definition of the profession: "Occupational therapy is the art and science of enabling engagement in everyday living, through occupation; of enabling people to perform the occupations that *foster health and well-being*; and of enabling a just and inclusive society so that all people may participate to their full potential in the daily occupations of life" (Townsend and Polatajko 2013, p. 380). Occupational therapy is based on the belief that a relationship between occupations, health, and well-being exists (Wilcock 1993) and that engagement in occupations that have meaning and value for people can promote, maintain, and restore health (Baum 1995; Yerxa 1998).

Although OTs intervene more often with persons (either on a one-to-one basis or with groups) who already present disabilities that interfere with occupational performance, they can also play a larger role in prevention and health promotion. OTs can intervene upstream, that is, before the occurrence of disease and injury, by implementing health education actions designed for populations without specific health problems or disabilities. Besides implementing strategies that focus directly on people with or without illness and disabilities, OTs may have a wider impact on health promotion by targeting the broader socio-environmental conditions that influence people's health. Based on an ecological approach to health promotion, this larger role involves the use of less traditional strategies, besides health education, and other strategies typically used by OTs to influence individuals' beliefs, skills, and behaviors. For examples, OTs may use advocacy, social marketing, and community capacity building to improve the health and well-being of specific groups, communities, or whole populations.

Although occupational therapy includes health promotion and wellness in its scope of practice (Moyers 1999), it seems that health promotion is still a challenging field for OTs, given that there are few models and theories to provide guidance on engaging as a discipline in such a role (Hildenbrand and Lamb 2013). An ecological framework is a useful tool for expanding on OTs' role and understanding the scope of preventive and health promotion interventions that OTs can develop and implement to benefit individuals, groups, communities, and whole populations.

This chapter covers occupational therapy's role in prevention and health promotion. First, each level of prevention (that is, primary, secondary, and tertiary) is defined and exemplified. Then, the concept of health promotion and basic health promotion principles are presented and exemplified. This is followed by a

description of the ecological approach to health promotion, a useful framework to guide OTs in their health promotion actions. Illustrations of occupational therapy interventions (OTIs) aimed at each of the five targets of the ecological approach are also provided.

Definitions

Prevention

Preventive interventions aimed at preventing or stopping the development and progression of diseases, disabilities, and any other health problems (Brownson and Scaffa 2001). They can be conducted on a primary, secondary, or tertiary level, and they focus either on people presenting with risk factors (primary prevention) or people who already have specific health problems (secondary and tertiary prevention).

- *Primary prevention* aims at preventing diseases and injuries. It focuses on reducing health risks or decreasing vulnerability to diseases, injuries, and disabilities by intervening on known risk factors. For example, implementing health education sessions to prevent absenteeism and illness due to work-related stress or to prevent work injuries in a factory is a primary prevention strategy relevant to occupational therapy (see the intervention described by Rafnsdottir and Heijstra in Chap. 65).
- *Secondary prevention* focuses on the detection of *individuals at risk* of diseases or injuries, as well as early intervention to limit disease progression and prevent complications and disability. Screening for developmental problems among children attending a kindergarten is an example of a secondary prevention strategy. A fall prevention intervention conducted among seniors who sustained a recent fall is another secondary prevention intervention commonly offered by OTs (see Chap. 63).
- *Tertiary prevention* focuses on people with a disease or disability, and attempts to prevent further complications, minimize the effects of a medical condition, and promote the social participation and integration of these people. Tertiary prevention strategies include rehabilitation services for patients with a chronic or irreversible condition (e.g., multiple sclerosis or schizophrenia) and interventions to promote their social integration and participation. Tertiary prevention is the most common type of prevention offered by OTs (see Chap. 51).

Health Promotion

The concept of *health promotion* has been defined in numerous ways, often without any clarification of meaning (Naidoo and Wills 2009); its definition and scope are still being debated, even though health promotion has been gaining prominence in

public health actions and discourse in the past three decades. However, the definition of the World Health Organization (WHO; 1986) is largely recognized and used in practice: "Health promotion is the process of enabling people to increase control over, and to improve, their health." Health promotion typically *focuses on the health of groups, communities, and whole populations,* but OTs may also apply health promotion principles to their one-to-one interventions with their clients. These principles include *empowerment,* as well as *equity and social justice*.

The notion of *empowerment* is an important principle underlying the concept of health promotion. *Empowerment* "is the process by which individuals and communities are enabled to take power and act effectively in gaining greater control, efficacy, and social justice in changing their lives and their environment" (Kasmel 2011, p. 36). An example of an OTI focusing on community empowerment is an initiative called *Tools for Living Well* (Lockett et al 2004). This project consisted of working with seniors "to approach businesses in their own communities to encourage: (1) retailers to increase the availability and visibility of canes, grab bars, bath/shower seats and non-slip bath mats; (2) hoteliers to increase the number of guest rooms equipped with grab bars, non-slip mats, and bath seats; and (3) builders to display grab bars in model homes and to offer these as options to buyers." (Boudreau 2003). OTs also provided community education and point-of-purchase information to help people become more informed consumers.

Another principle underlying health promotion is the concept of *equity and social justice*. This means that health promotion services should aim at improving *health for all,* and strive in particular to reach marginalized and disadvantaged groups, whose risks of disease and injury are higher than those of the most educated and wealthy populations. This principle is exemplified by the *Mobile Outreach Street Health* (MOSH) service in Nova Scotia (Canada), which involves a team of health professionals including an OT offering primary healthcare services to people who are homeless, street-involved, or at risk of homelessness. The team "is available by appointment at any community location or dwelling, by drop-in at one of twelve partner agency locations during the weekly scheduled time, or by van, foot or bicycle outreach on the streets" (Marval and Townsend 2011).

Health promotion is based on a view that health is influenced by a range of individual and socio-environmental factors (known as *health determinants*). According to Dahlgren (1995), these determinants include biological and hereditary factors as well as four other categories on which interventions can be conducted to improve health: (a) individual lifestyles; (b) social and community networks; (c) living and working conditions; and (d) general socioeconomic, cultural, and environmental conditions. OTs believe that meaningful occupations are part of a healthy lifestyle and are crucial for health (Clark et al. 1997, 2012).

This broad perspective of health determinants suggests that for optimal impact, health promotion efforts should not focus solely on interventions at the individual level. Because of the reciprocal relationships between people and their environments, groups, and social networks, organizations, communities, and the political environment must also be considered as important targets for intervention (Wilcock 1998). It thus requires a broader approach known as *the ecological approach to health promotion*.

The Ecological Approach to Health Promotion

For more than 25 years, an *ecological approach* has been advocated as a useful framework for health promotion actions and research (McLeroy et al. 1988; Sallis et al. 2008; Stokols 1992; Richard et al. 2011). Derived from the premises of ecology, this *approach rests on a wide perspective of health determinants* and emphasizes the complex interactions between individuals and their environments. Besides considering individual health determinants, an ecological approach to health promotion focuses on all dimensions of our living environment: physical, social, organizational, cultural, and political.

Theoretical Development Several authors contributed to the *theoretical development* and application of the ecological approach to health promotion. Most efforts have been devoted to defining the concept and identifying its components (McLeroy et al. 1988; Simons-Morton et al. 1989; Stokols 1992). Many applications of this approach have been described, namely for promoting a healthy lifestyle (Richard et al. 2012).

Targets for Interventions For intervention to have an optimal impact on health, the ecological approach advocates that multiple settings and multiple targets should be considered by health promoters. There are five possible targets for intervention, as shown in Fig. 62.1: (1) individuals ultimately targeted by health promotion efforts (IND); (2) the interpersonal environment, namely the people and groups with whom these individuals interact (INT); (3) organizations (ORG) to which individuals belong; (4) communities in which individuals live (COM); and (5) the political systems in the macro-social environment (POL).

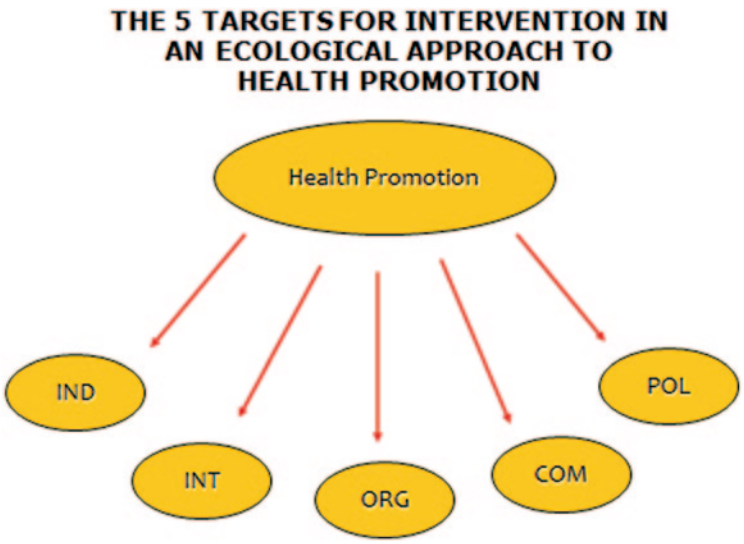

Fig. 62.1 The five possible targets for intervention within an ecological health promotion framework. *IND* individual, *INT* interpersonal, *ORG* organizational, *COM* community, *POL* political

Health Professionals' Involvement The ecological approach to health promotion encourages health professionals to intervene on multiple targets (individuals, their family and social networks, health professionals, organizations, communities, political environment) to optimize the impact of their actions on health. Following this framework, OTs are invited to develop and implement programs in multiple settings where people live, work, play, and interact (home, school, workplace, etc.), and to consider the wide range of health determinants, besides individual health determinants on which they intervene most typically in their clinical practice (e.g., knowledge, attitudes, beliefs, skills, and behaviors).

Purposes

Intervening upstream, that is, before the occurrence of diseases and injuries, is an important goal for OTs, and complements habilitation/rehabilitation interventions offered to people who already present health problems and disabilities. OTs are frequently involved in preventive interventions within a clinical context of practice, as exemplified by Chaps. 61–66 of this handbook. Moreover, OTs are also involved in health promotion when they engage in activities to help people become empowered and gain control over the determinants of health (including occupational lifestyle).

The ecological framework for health promotion invites all health professionals, including OTs, to intervene not only on individuals' characteristics and lifestyle for achieving health, but also on people's immediate and broader environment (Reitz et al. 2010). The next section characterizes the role of OTs using an ecological health promotion framework.

OTs' Role in Health Promotion

Candidates for Health Promotion Intervention and Settings OTs may promote health and prevent diseases and injuries across various populations, including people with or without disabilities of all age groups. To optimize the impact of interventions, the ecological framework for health promotion suggests that OTs be involved in a diversity of settings. These include the home, school, and workplace, as well as other organizations and community settings. In keeping with the principle of equity and social justice, OTs should be sensitive to the needs of populations that are not typically reached by the usual channels of communication, such as immigrants, marginalized, or disadvantaged groups, and people with low literacy levels.

Intervention Targets Health promotion actions can target people in a direct manner both on a one-to-one basis and in groups. However, to optimize health promotion

Table 62.1 Examples of suggested OT interventions according to an ecological health promotion framework

Target	Children	Adults	Elderly people
Individual (IND)	Designing educational material on optimal posture and body mechanics principles provided to high school students	Leading stress management classes for people living with a mental illness	Developing a group program to maintain cognitive vitality
	Leading an awareness class in primary school on safe sports practices to prevent head injuries	Leading a workshop for nursing aids on how to use proper body mechanics principles when lifting patients	Accompanying seniors in redesigning their daily routines to adapt them to the aging process
Interpersonal environment (INT)	Organizing early stimulation classes for new parents in a community health center	Enabling some employees to act as physical activity promoters in the workplace	Implementing support groups for caregivers of seniors living with dementia
	Training babysitters on how to adapt play activities for children according to their developmental stage	Leading a support group for families of persons who were recently diagnosed with schizophrenia	Training volunteer peers to become fall prevention promoters
Organizations (ORG)	Providing screening tools for day-care educators to enable them to identify toddlers who need an OT assessment	Counseling employers on how to adapt the work environment to prevent injuries in a factory	Organizing and adapting the physical environment of a residential facility to promote meaningful occupations and routines for seniors
Community (COM) or political environment (POL)	Lobbying with elected government representatives to promote the integration of children with special needs into regular schools	Submitting a brief to the government with recommendations to improve access to financial support for home adaptations among wheelchairs users	Assisting volunteers involved in community work in encouraging local retailers to increase the availability of common assistive devices for seniors
	Counseling municipal leaders on safe playground design		Promoting a positive vision of seniors and their contribution to the community during a municipal event

actions, efforts should also be directed towards other targets that may have a substantial impact on health. Table 62.1 exemplifies how OTs could intervene on each of the five targets of the ecological approach (IND, INT, ORG, COM, and POL) and across different age groups (children, adults and elderly people).

Intervention Strategies Several strategies can be used to promote health. *Education and other individual approaches* are the most commonly used strategies by OTs to restore, maintain, or improve clients' health and well-being. They also use these strategies with clients' family or caregivers, or any other members of clients' interpersonal social network. Several health behavior theories and education principles

are available to guide OTs as they plan their interventions (Berger 2014; Filiatrault and Richard 2005; Naidoo and Wills 2009; Reitz et al. 2010; Richardson 2013).

To impact on other targets of the ecological approach (e.g., organizations, communities, and the political environment), OTs can use organizational strategies, community development methods, media communication, as well as advocacy strategies. At the organizational level, OTs may use their knowledge and understanding of systems to recommend organizational change (e.g., develop new services, modify work stations and routines, facilitate skill building among employees) to allow organizations to become health-promoting environments. To intervene at the community level, OTs may use community development methods (Lauckner et al. 2011, 2007; Rhynders and Scaffa 2010; Trentham et al. 2007). These include identifying community needs, reviewing particular issues and resources, networking, and working with community representatives to empower and build community capacities to influence decisions that may impact on health.

OTs can also use *media communication* (written material, radio, television, and internet) to convey health-promoting messages at a larger community or population scale. This is also referred to as social marketing, which consists of using marketing techniques "to influence the acceptability of healthy lifestyles so that they seem desirable and easy to adopt" (Naidoo and Wills 2009). OTs can also use mass media to change social norms in a health-promoting way. One example is posters hung at several locations in the municipality to promote a positive image of seniors and illustrate their unique contribution to the community. Knowledge and skills related to efficient communication and literacy may guide OTs in such actions (Smith et al. 2010; Smith and Gutman 2011).

Finally, OTs can also act in the political environment to improve health. For example, they may work towards convincing elected officials to implement health-promoting laws and regulations using *advocacy* methods (Dhillon et al. 2010). Indeed, these methods can be used to generate organizational, community, or policy changes that support healthy individual behaviors (Rimer and Glanz 2005). For example, OTs may write briefs or participate in parliamentary committees to advocate for the rights of people with disabilities.

Evidence-Based Practice

Several preventive interventions developed and implemented by OTs are supported by evidence and have shown their capacity to prevent disease and injury. For example, a number of community-based preventive interventions designed for seniors who have fallen or are afraid to fall have shown positive outcomes on falls, balance performance, and fall-related psychological factors (Clemson et al. 2004; Filiatrault et al. 2008; Robitaille et al. 2005; Tennstedt et al. 1998; Zijlstra et al. 2009). As described by Clemson in Chap. 63, a multifaceted program combining group sessions, a home visit by an OT, and a booster session demonstrated a positive impact on falls and mobility efficacy in a large randomized controlled trial.

There are several other examples of evidence-based preventive interventions offered by OTs in this handbook.

There is a growing evidence of the benefits of health promotion interventions involving OTs. A program developed by OTs in California called the *Well Elderly Program* (Jackson et al. 1998) is of particular interest for supporting the benefits of OTs' health promotion interventions. Its aim is to promote and enhance the health of community-dwelling elders through lifestyle redesign. More specifically, it focuses on the power of occupations and the ability to design daily routines in a health-promoting fashion. The program combines individual and group meetings, covering a range of topics relevant to seniors. The *Well Elderly Program* has proven its benefits in two randomized controlled trials. The first trial (conducted from 1994 to 1996) showed significant positive effects of the intervention on seniors' physical and mental health, physical and social functioning, vitality and life satisfaction (Clark et al. 1997). The second trial (conducted from 2004 to 2009) confirmed the benefits of the program, with significant positive impact on participants' mental health, vitality, life satisfaction, and social functioning, as well as marginally significant improvements on physical health and functioning (Clark et al. 2012). The program was also shown to be cost effective and to have beneficial effects for ethnically diverse older people recruited from a wide array of community settings (Clark et al. 2012).

The *Healthy Occupations for Positive Emotions* (HOPE) is another example of health promotion program offered by OTs that highlights occupations as a means of promoting health and well-being (Bazyk and Bazyk 2009). HOPE is a group intervention that aims to promote occupational balance in youths from low-income families. It is offered after school and involves participation in a structured leisure activity, followed by a discussion period on expressing feelings and on anger management (Williamson and Dorman 2002). A phenomenological study with 70 children aged 7–12, who participated in the program, reported interesting findings. Children expressed that the groups were fun, mostly because of the group structure which enhanced support from fellow group members, and opportunities to try new, challenging activities. The children also appreciated learning strategies to communicate feelings and express anger constructively.

Although a growing number of occupational therapy initiatives have been developed to impact on the organizational, community, and political targets of the ecological approach to health promotion, evidence to support these interventions is presently limited due to scarce research in this domain (Scaffa 2013). Indeed, up until now, few studies have documented the impact of such interventions. In fact, health promotion research in occupational therapy can still be considered in its infancy (Christiansen and Matuska 2010).

Discussion

OTs are distinguished by their unique focus on occupations and their links to health and well-being. Thus, OTs may play a leading role in the prevention of diseases, disabilities, and injuries, as well as in the promotion of health and wellness. At

present, OTs have mostly been involved in prevention and health promotion interventions on a one-to-one basis with their clients and their interpersonal network or in small groups. However, as advocated by the ecological approach to health promotion, OTs may promote health and well-being via actions at broader levels. More specifically, they are invited to intervene on larger socio-environmental targets, such as organizations, communities, and political environments. This broader role of OTs in health promotion involves the use of several strategies, besides health education and other individual strategies, namely organizational strategies, community development, media communication, and advocacy methods.

OTs are increasingly recognizing the importance of adopting a broader ecological approach in their interventions towards the improvement and maintenance of people's health and well-being (Scaffa, 2013). Research and education in this domain will certainly advance the profession and encourage OTs to act upon the numerous opportunities to contribute to the health and wellness not only of individuals, but also of groups, communities, and whole populations.

Furthermore, occupational therapy training curricula and continuous education programs for OTs should provide increased opportunities for developing and mastering the broader set of knowledge and skills required to intervene at each level of the ecological approach (Dhillon et al. 2010). This will allow OTs to increase their ability to develop and offer interventions that will have a more sustainable impact on the health and wellness of groups, communities, and whole populations.

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Chapter 63
Preventing Falls in the Elderly: Opportunities and Alternatives

Lindy Clemson

It's made me more aware, just so much more aware. Of the buses, of my place. Of making it brighter inside, getting rid of leaves outside, of everything.
Roleena

What you have done is focus on our abilities. No one else has done that.
Nancy

I feel more confident and I'm going out more.
Marie

Abstract About 30% of older people who fall lose their self-confidence and start to go out less often. Inactivity leads to social isolation and further loss of muscle strength and balance, increasing the risk of falling again. The causes of falls can be multiple, and there are several successful preventive programs that occupational therapists (OTs) have had a key role in developing and implementing. These include (a) home environmental adaptations conducted on home visits—the Westmead approach, (b) a multifaceted group educational program based on cognitive learning techniques—the *Stepping On* program, and (c) a nontraditional approach to balance and strength training embedded in daily routines—the *LiFE* program. All three are evidence based with randomized trial evidence and are manualized to enable therapists to implement them.

Keywords Accidental falls · Falls prevention · Habit reframing · Home and community safety · Self-efficacy

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Background

Home safety audits have consistently proven to be effective in reducing the risk and rate of falls when conducted by occupational therapists (OTs; Clemson et al. 2008b). *The Westmead* is an iterative approach to assessment and intervention whereby the OT moves through the home environment with the client jointly identifying hazards and risky behaviors, problem-solving solutions, and assisting to prioritize actions (Clemson 1997). In randomized trials of this intervention, falls have been reduced both at home and in the community (Campbell et al. 2005; Cumming et al. 1999), suggesting there is generalization of hazard awareness and safety behaviors beyond the home environment.

Stepping On is a multifaceted falls prevention program for the community-residing elderly (Clemson and Swann 2008). The program was developed by OTs in 2003. It evolved from a review of evidence-based interventions, contributions from content experts, and the views of older participants. It is different from a tailored approach where therapists assess risk factors and prescribe interventions based on risk assessment. In Stepping On, the older person is encouraged to have ownership of which strategies are relevant to them. Homework and follow-up support their engagement in relevant preventive strategies.

The *LiFE* program (Clemson et al. 2014) fills a gap for those older people who have struggled with maintaining regular exercise on a set time each week and provides another choice of an evidence-based program that reduces falls risk. Taught on home visits, movements which improve balance or increase hip, knee, and ankle strength are embedded in routine daily activities and done multiple times each day. LiFE activities or movements are closely aligned to functional activity. The participant learns the principles behind the program and engages with the therapist in planning weekly activities and upgrades. The LiFE program demonstrated significant improvements in balance and also resulted in improved functional capacity and more energy (Clemson et al. 2012).

Definition

A fall is defined as an event, including a slip or a trip where the person loses their balance and inadvertently lands on the ground or floor or other lower level. It is important to understand people's perception of their fall, what they think could have caused the fall, and what they think could be done to stop a future fall.

Purpose

The programs aim to reduce falls and fulfill one or more of the following:

- Manage personal fall risk.
- Maintain safety at home and in the community.

- Build confidence in negotiating the environment and in other fall risk situations.
- Improve balance and lower limb strength to protect from falling.

Method

Candidates for the Intervention

The home safety intervention is best targeted to at-risk older people and works best with people who have had a fall in the past year. At-risk groups include frail older people, those recently hospitalized, and people with severe vision impairment.

Stepping On and *LiFE* are also suited to community-residing elderly people who are around 70 years of age and over and who have had a fall. Stepping On is also offered to people who have concerns about falling but is not suitable for people with a cognitive impairment or homebound as the focus includes community mobility. Typically, there are more women in the *Stepping On* groups than men, but the research supports specific benefit for men who have fallen, so inclusion of both genders are encouraging. The *LiFE* program's randomized trial recruited people who had two falls or an injurious fall (Clemson et al. 2012), and a translational project successfully implemented the LiFE program in a post-hospital reablement program (Burton et al. 2013).

Epidemiology

Falls are a common and serious problem for older people. Some 30–35 % of persons who are age 70 or older fall each year (O'Loughlin et al. 1993). Injurious falls are a leading cause of hospitalization and can lead to social isolation and premature institutionalization (Tinetti and Williams 1997). Risk factors for falls include poor balance, reduced lower leg strength, poor vision, chronic disorders, depression, and sleep disturbances (Deandrea et al. 2010). Fear of falling is also a common occurrence, with reported incidence of 30–70 % and increasing with age (Vellas et al. 1997). It is more prevalent in those who report multiple falls, poorer health, or unsteady balance (Lack 2005). Core interventions known to have an impact supported by meta-analyses are exercise, environmental adaptation, and medication management (Gillespie et al. 2012).

Settings

The prevention intervention is performed by home visits or group based in community venues. Venues chosen should be in an accessible place in the community, situated near public transportation.

Clinical Application of Preventing Strategies

It is important that theory underpins each of these programs and from which these specific preventive strategies are derived. Each has a different conceptual model, but overlap in that they use *principles of self-efficacy, personal control,* and *enable a sense of ownership of solutions or strategies*.

The following criteria define what should be included in a *quality home safety intervention* (Clemson et al. 2008a):

1. Formal and observational evaluation of the functional capacity of the person within the context of their environment. This includes physical capacity, behavior, functional vision, habits, and how the person uses and moves within home spaces. What is a hazard for one person may not be a hazard for another. For example, tripping hazards and clutter may be more of an issue for someone who is frailer with mobility problems, where as an active person may need to reconsider how they change a light globe or climb to reach high cupboards. For someone with a vision impairment, lighting and contrast at changes of level are particularly pertinent in all areas of the home.
2. A comprehensive evaluation process of hazard identification and priority setting taking into account both personal fall risk and environmental audit. Hazards can be trip or slip hazards, situations that could lead to loss of balance, or habitual behaviors that place the person at risk of falling.
3. Use of an assessment tool validated for the broad range of potential fall hazards.
4. Actively involving the older person in identifying the hazards, priority setting, and problem-solving. This collaborative process is critical to raise awareness of environmental and behavior risk, identify safer strategies, and plan ways of prompting to change the environment or embed more protective behaviors into habitual routines. For example, a range of strategies could be considered to prevent rushing to answer the telephone.
5. Provision of adequate follow-up by the health professional and support for adaptations and modifications.

The following assessment tools are recommended for use in a quality home safety intervention:

- The *Westmead Resource* (Clemson 1997) includes a manual that provides background information to falls and environment–person assessment and a comprehensive assessment tool to assist in identifying hazards.
- The *Falls Behavioral Scale* (Clemson et al. 2008a) is sometimes sent to a client prior to a home visit. It provides a useful checklist that (a) provides a profile of risk-taking, (b) provides protective behaviors currently in place, and (c) can act as an awareness-raising tool for the older person, showing of the wider range of potential contributing factors to their falls. It would be recommended that safe mobility practices in public places and when using transport be included.
- *The Stepping On manual* (Clemson and Swann 2008) provides a range of handy hints and strategies that can be used as a resource, for example, safe walking strategies to compensate for low vision and handy hints when catching trains or busses.

Intervention Approaches

Stepping On, led by a therapist as group facilitator, runs for seven 2-h sessions with a follow-up home visit (or telephone) contact and a booster 3-month session. Key content areas include home-based balance and strength exercises, home and community safety, coping with visual loss and regular visual screening, medication management, footwear audits, mobility mastery, and sleep hygiene. Content experts who are skilled in relevant aspects of falls prevention introduce some of the key content areas. For example, we include a physiotherapist to teach the exercises in the initial stages of the program and a mobility officer from the Guide Dogs Association to introduce the strategies for coping with low vision. Information is shared and reinforced within the context of the group by the OT facilitator. Each session provides time for reflection and sharing accomplishments and ends in planning action and homework for the next week. The balance and strength training is practiced or reviewed each week, and one session includes a community mastery experience (usually just outside the venue) during which community mobility and discrete skills (e.g., negotiating grass or curb ramps) are practiced.

The conceptual basis of *Stepping On* are as follows:

- Incorporates a *decision-making model* (Janis and Mann 1977) used to explore barriers and options. The model has been operationalized into a list of five prompts to elicit reflection and prompt discussion (Clemson and Swann 2008).
- Applies Bandura's (Bandura 1997) *social cognitive theory* on the influences of self-efficacy and skill mastery. It uses mastery experiences and positive reframing to encourage adaptation and action.
- Uses *adult learning principles* to help participants self-manage their risk of falls. This aspect of the program recognizes that the older adult has the capacity for learning and change. A variety of learning strategies include storytelling, brainstorming, and problem solving.
- Uses the *group process* as a learning environment. This enables the participants to draw on "knowledge from outside the group in order to process it within, and subsequently use it outside" (Jacques 2000). A sense of ownership of strategies is fostered, and sharing occurs in a trusting environment.

LiFE is taught during five home visits over an 8-week period, with one or two follow-up booster visits and two support phone calls. The notion that balance can be improved is not easily understood by older people. In LiFE, the principles of how to challenge balance are taught along with eight balance actions that are individually matched to very specific routines and daily living activities. For example, leaning to your "limit of stability" may be done every time you clean your teeth, or tandem walk every time you walk down the hallway. Similarly, principles of strength training or "loading your muscles" are taught and chosen activities which align to seven specific strength actions are embedded in routine daily living activities. For example, bend your knees to close a drawer or pick something up instead of bending your back or standing on one leg while ironing or talking on the phone. These are all way to load your muscles and make them work harder. There are many opportunities to add balance and strength activities into daily life.

The manual describes the key concepts underpinning the *LiFE* program which centers around habit reframing to embed balance and strength training into daily activities. LiFE is based on an understanding that planning, practice, and visualization are important aspects of intent to act and to follow through. Linking the LiFE activities to situational or environmental cues prompt the change to routine. This may include moving the milk to a lower level in the fridge to prompt "bending the knees" or a specific task such as chopping vegetables may prompt a "tandem stand." The LiFE tools that are used to plan and record activities are closely linked to support this as a process, and this is why the program is recommended to be taught over at least 8 weeks.

Results

The Role of the OT in Applying the Intervention

The *home safety* intervention has been found to be effective when conducted by an OT. They provide specialized expertise in being able to identify environmental hazards and behavioral risks in relation to the person's fall risk and their capacity and expertise in solutions. They need to engage the older person in the process.

Stepping On is facilitated by a therapist experienced in group work and in working with the elderly. OTs are ideal to fill this role (Peterson and Clemson 2008). A focus is on boosting follow-through with safety behaviors by targeting those behaviors that have the most impact on reducing risk and reinforcing their application to the individual's home and community setting. The facilitator requires the capacity to engage the participants in reflection, problem solving, and behavioral change strategies. This program requires an approach that aligns within a paradigm of enablement and empowerment (Townsend and Whiteford 2005).

The *LiFE* program can be taught by OTs. This program is unique and provides a challenge to OTs to consider how some environmental stressors are beneficial to maintaining mobility and independence, if imbedded in daily performance routines. For example, getting up and down from a lower chair will load our quadriceps muscles and help maintain strength, and can be an exercise if done slowly each time. This is an alternate philosophy to using chair raises as a compensatory strategy, a more usual occupational therapy home visiting approach. In the LiFE program, the OT teaches the activities and assists the person to find opportunities in their daily life to embed them. The OT needs to facilitate habitual change and help plan small incremental steps.

All programs are manualised to enable therapists to implement them, and in the USA and Australia, some training is offered. In the USA, licensure for Stepping On is offered to ensure standards are met, as well as a master trainer course is available. It is recommended that self-report or peer assessment be used to ensure fidelity of intervention as they are intended. Fidelity tools are being developed for all programs that will be included within recommended training.

Evidence-Based Practice

All three programs have been evaluated using randomized trials, where the primary outcome measure was falls, ascertained by using a monthly calendar for each participant. They have also been included in meta-analysis and Cochrane Systematic Reviews. Cost-effectiveness studies have shown that home safety interventions by OT and balance enhancing falls specific exercises taught on home visits are cost saving (Davis et al. 2009).

The latest Cochrane Review of community fall interventions (Gillespie et al. 2012) concluded that *home safety* interventions were effective in reducing rate of falls (RaR 0.81, 95% CI 0.68–0.97; 6 trials; 4208 participants) and risk of falling (RR 0.88, 95% CI 0.80–0.96; 7 trials; 4051 participants). These interventions were more effective in people at higher risk of falling ($p=0.0009$), that is with a history of falling or specific risk factors for falls. Home safety interventions appear to be more effective when delivered by an OT, illustrated particularly in the Pighills et al. (2011) trial where they compared the outcomes of OTs and others delivering the program. Our meta-analysis (Clemson et al. 2008b) supported that the most effective home safety interventions were also those that used interventions that were of higher intensity and comprehensive and that also targeted people who were at risk of falls.

The *Stepping On* trial showed that after 14 months, the intervention group had reduced falls by 31% ($p=0.025$; Clemson et al. 2004). There were better outcomes for those in the program in that they maintained their confidence in the more mobile activities of daily living (ADL) tasks (Mobility Efficacy Scale, $p=0.042$; Lusardi and Smith 1997) used more protective behaviors (Fall Behavioral Scale for Older People, $p=0.024$; Clemson et al. 2008a). They maintained their physical activity levels to a greater degree compared to the controls, though the difference in this latter finding did not reach significance.

The *LiFE* program demonstrated a significant reduction in the rate of falls after 12 months follow-up (IRR = 0.69) compared to a control group (Clemson et al. 2012). There were significant and moderate effect sizes for balance (Balance Hierarchy Scale, $p<0.0001$; Lindy Clemson et al. 2012) and for balance confidence (ABC Scale, $p=0.004$; Talley et al. 2008). Ankle strength was significantly improved, and there were moderate to large effects sizes in measure of function (Late-Life Function Index; Jette et al. 2002) and daily activity (NHANES; Finucane et al. 1990) and in a measure of participation (Late-Life Disability Index, frequency; Jette et al. 2002). Adherence was sustained with 64% still engaged in LiFE activities at 12 months.

Discussion

Lessons can be learnt from experiencing a fall and falling does not need to be an inevitable part of aging. Fall prevention interventions provide very positive outcomes for older people that include safety, better balance and mobility, and

maintaining independence. It may be that those at higher risk may be more appropriate to be seen in a home-based intervention.

Being involved in a multifaceted intervention such as Stepping On builds the therapist's skills base, provides a broader perspective of falls prevention, and builds capacity within service delivery. Home safety falls prevention requires a very different approach than a usual occupational therapy home modifications intervention, and specific training is useful.

Three different evidence-based programs were presented aimed for preventing falls. Two are single-mode interventions—home safety or balance and strength training—and one a multifaceted program. All have differing theoretical basis that guide how they are delivered and the role of the therapist. Yet, all of these interventions build on core skills of occupational therapy.

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The Case Study of Mavis—Identifying Fall Risk Behavior

Keywords: Accidental falls, Fall prevention, Fall risk factors, Home hazards

The Students' Tasks Include:

1. Which intervention program approaches for preventing falls would you recommend for Mavis?
2. What specific solutions can be recommended?
3. Do these recommendations differ from what Mavis' believed caused her falls.
4. Use the Westmead Home Safety Assessment as a guide to review an older person's home environment for identifying fall hazards.
5. Determine an action plan for homework that might arise from a mobility practice session.

As a starting point, the students should use the following references to gather background information:

Clemson L (1997) Home fall hazards: a guide to identifying fall hazards in the homes of elderly people and an accompaniment to the assessment tool, the Westmead home safety assessment. Co-ordinates Publications, West Brunswick

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Overview of the Content

The Major Goal of the Actual Intervention

For Mavis, the goal is to expand both her and her daughter-in-laws' understanding of the multiple risk factors for falls and help her institute a plan of action to reduce her fall risk.

Learning Objectives

By the end of studying this chapter, the learner will:

1. Be able to assess the person and their environment and be able to list a range of potential risk factors
2. Have an understanding of how to interview an older person to gauge their perceptions of fall risk and facilitate them to make decisions about risk and solutions
3. Develop skills in observing the environment and the person in their environment for fall risks

Mavis' Background History of Falls and Living Circumstances

Personal Information

Mavis was referred for a home hazard audit following a fall outdoors, tripping over uneven bricks. She was 82 years old and lived alone in a two-bedroom villa. She was overweight, was always accompanied when leaving home for fear of falling, and used a cane outdoors. She was accompanied on the home visit by her daughter-in-law.

Occupational Therapy Intervention

Mavis scored over 15 s on the timed Get Up and Go (Podsiadlo and Richardson 1991). The Fall Behavioral (FaB) Scale for Older People (Clemson 2003) identified that her perception of risky behaviors included not taking care when she is unwell, difficulties crossing roads and negotiating her environment, rushing to get the phone, and not using a light at night, but believed that a number of protective strategies were in place, including discussing medications with her pharmacist.

The driveway, the only access, was a fairly steep gradient with lots of trees and leaves. She had a backyard with two exit doors but used only one, and that was now just to feed the birds. She minded her daughter's lapdog each day during the week. She refused meals on wheels, and received home care twice a week. They helped her cook a meal, and her son and daughter cooked for her on some other days but not routinely. She had a series of falls several years ago and attributed those to having transient ischemic attacks (TIA) which has now resolved. She revealed a number of recent falls which her family were unaware. These were two outdoors and another at night going to the toilet. On observation, she was shuffling and was unaware she was tripping as she walked on loose mats between the kitchen and living areas. Mavis perceived falls were due to the TIAs or things the "old lady" who was her neighbor had, because she was thin and frail and actually was younger than Mavis.

A walk through her home and its environs using the Westmead Home Safety Assessment (Clemson 1997) as a structure revealed the following fall hazards:

a. Unsecured or slippery mats at all doorways internally, in the bathroom, and in the kitchen. One had been secured in the garage entry, and the main door had a heavier non-slip mat.
b. There was clutter in the walk areas in the living room which seemed to be the day activities: knitting, crosswords, books, and numerous TV programs.
c. The bathroom had a large vanity, and Mavis had filled up any spare space with small wicker chairs that she very much liked but gave difficult access to the small bathroom. The bath was never used, and there was no rail in the shower or next to the toilet, and she used the bath edge for support.
d. The tiles were nicely non-slip, but the laundry had soapy water from the washing machine. This was also a narrow area and a walkway from the garage.
e. The footwear audit revealed both her slippers and everyday shoes were ill-fitting, worn, and very slippery.
f. There appeared to be no consistent nighttime light arrangements for getting up at night.
g. The small dog was under Mavis' feet as soon as she stepped outside.
h. Walking down the front steps, it was difficult to see where they started and finished.

The OT explored Mavis' recent fall experiences. Mavis believed the outdoor fall was to do with the uneven bricks, but, reflecting on more detail of the fall event together with the OT, she agreed her slippers, though comfortable, were in a very poor condition and contributed to her shuffling. They also discussed the possibility that her shuffling was worse and that her ankle strength and balance were perhaps not as good as they could be. This provided the starting point for prioritizing fall prevention actions. They then went through the major discussions and suggestions for solutions that arose from the Westmead "walk-through" to determine recommendations and an action plan.

The Student's Report

The following guiding questions have been identified to developing possible solutions to Mavis:

1. What was Mavis' perception of risk and how could this be improved to be more relevant to her range of risk factors?
2. What could motivate Mavis to make changes?
3. Mavis had many loose, slippery, and trippable mats throughout her home. What strategies and suggestions could you use to help her make decisions for removing and changing mats.
4. There were numerous hazards and risk factors identified. How would you assist Mavis to follow through with solutions?

Chapter 64
Issues Related to the Use of In-Vehicle Intelligent Transport Systems by Drivers with Functional Impairments

Marilyn Di Stefano

The parking aid helped Sam to position the vehicle appropriately in the parking space, despite his neck range of movement restrictions.

Abstract The use of in-vehicle intelligent transport systems (ITSs) by drivers undertaking driver evaluation and rehabilitation with occupational therapy driver assessors (OTDAs) is discussed. Key issues related to the use of ITSs by drivers with functional impairments are outlined, and general principles to guide practice in this field are proposed.

Keywords Driving · Driver evaluation and rehabilitation · Intelligent transport systems · ITSs

Background

Prior to any on-road assessment, occupational therapy driver assessors (OTDAs) undertake a range of clinical evaluations to understand clients' abilities and limitations relevant to driving. Such assessments establish that clients' sensorimotor and perceptual/cognitive abilities, along with their more general psychological characteristics, are adequate for driving. Also, the client must meet medical and licensing prerequisites as specified in applicable guidelines (e.g., American Medical Association and National Highway Traffic Safety Administration 2003; Austroads 2013; Canadian Medical Association 2006). Then the OTDA usually conducts an in-car evaluation of driving performance.

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In-car assessment is usually required because (1) there is typically a significant degree of variation in the performance abilities of clients within any particular medical diagnostic category, so that diagnosis alone cannot be relied upon in establishing exclusion criteria (e.g., see Di Stefano and Macdonald 2003a; Lovell and Russell 2005), (2) the capacity of clinical assessments to predict on-road driving performance is not high (Bedard et al. 2008; Molnar et al. 2006), and (3) driving errors can have fatal consequences (Di Stefano and Macdonald 2006a).

An emerging issue for OTDAs is the possible use by their clients of in-vehicle intelligent transport systems (ITSs). Such systems may play a positive role by reducing the difficulty of the driver's task, but their impact is likely to be negative if they add to task complexity or distract attention from more important aspects of driving.

Definitions

In broad terms, ITSs include any computer-based system that permits advanced sensing, processing, communications, or control technologies to be applied to any system component related to the driver controlling a vehicle on a road within a road-traffic environment (Regan et al. 2001).

The ITSs of most immediate relevance to OTDAs are those that require some allocation of driver attention while driving. They may be either customized (applied postproduction) or available as standard vehicle devices supporting driver performance and offering safety benefits. Common examples include cruise control systems, navigation systems, parking assistance devices, alternative steering devices (such as joystick or multifunction steering wheel systems), and electronic secondary control systems for indicators, lights, horn, and environmental controls (Kalina and Green 2006; Whelan et al. 2006).

Purpose

Consideration of the potential ways in which use of an ITS may impact upon the person–activity–environment fit will help occupational therapists (OTs) appreciate how such devices might aid or hinder the achievement of driving independence by a client.

The purpose of this chapter is to explore the issues that OTDAs and generalist OTs need to consider when evaluating and supporting client safe use of an ITS and prescribing or implementing related interventions.

Method

Candidates for the Intervention

Any person of driving age with impairments or functional limitations who otherwise meets required medical standards and has the potential to be an independent driver may be considered for ITSs prescription. ITSs may eliminate, overcome, or compensate for the driver's restrictions. For example, they may reduce the effects of major motor–sensory or minor visual or cognitive impairments on performance in monitoring the traffic situation, or in maintaining good control of the vehicle. Drivers with amputations, reduced limb or spine function, or some mild cognitive limitations may be suitable candidates. Some drivers with significant cognitive–perceptual and deteriorating conditions, such as dementia or Parkinson's disease, may not possess sufficient capacities to cope with the new learning required to operate some ITSs systems (Bradshaw et al. 2013; Di Stefano and Macdonald 2010).

Frequency of Use

Although OTDAs commonly consider the application of vehicle modifications including ITSs during assessments (Wheatley and DiStefano 2008), little is known about the nature or extent of adoption of these technologies by people with disabilities. It is likely, however, that as ITSs become more popular and are increasingly included as standard features in domestic vehicles, their availability and use will increase in the future. Further, as greater numbers of people look upon driving as their main form of transportation and as the proportion of people who are older and have disabilities increase (Organisation for Economic Co-operation and Development; OECD 2001), the application of customized devices to support driving independence is likely to gain in popularity.

Settings

Consideration of ITS applications most commonly occurs during the initial phases of an occupational therapy assessment, when impairments and functional limitations are discussed and evaluated in relation to the client's driving needs and vehicle characteristics.

The Role of the OT

OTs play a major role in assisting individuals with performance limitations to achieve or resume independence in personal and community mobility. For some

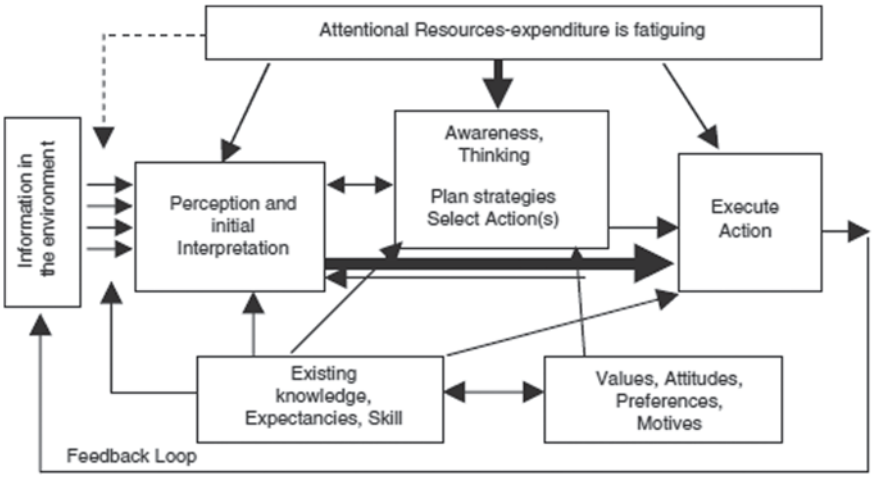

Fig. 64.1 A generic depiction of how people "process" information during activities such as driving. (From Macdonald 2004, with permission)

clients, this may include assistance to commence or resume driving a motor vehicle. Generalist OTs consider a broad range of mobility options and issues with their clients often identifying the need for, and, supporting implementation, and monitoring of driving-related interventions. Specialist OTDAs, who have particular expertise in driver evaluation and rehabilitation, consider in more detail the requirements of this very important instrumental activity of daily living (Stav 2004). OTDAs must complete postgraduate training to gain specialist skills in driving. Some countries require certification or registration with professional groups or jurisdictional licensing authorities (Di Stefano and Macdonald 2010). Individualized assessment conducted by specialist OTDAs plays a vital role for determining driving fitness as self-assessment tools may not be suitable to assist with driving decisions for all drivers at all life and disease stages (Lang et al. 2013).

Results

Clinical Application

An Assessment Framework: Human Information Processing

In evaluating the fit between a particular client and a specific ITS, it is useful to conceptualize the driving task as one of processing information. A simple model of the human as a processor of information is depicted in Fig. 64.1. This shows an individual's sensory uptake and subsequent perception of information from the environment, leading to the execution of vehicle control actions, from which there is

feedback that is then available for perception, and so on. It can be seen that between perception and action, there might be very little demand for expenditure of attentional resources (shown by the large arrow bypassing conscious awareness), or, if there is a need for conscious decision making, a large amount of attention might be needed (Macdonald et al. 2006).

Such a model can help the OT to identify the critical aspects of a client's interactions with an ITS. Driver deficits affecting any stage of information perception, cognition, and subsequent response processes can affect the quality of driver interaction with the ITS, with consequent impacts on their driving performance. There are various possible means of addressing deficits in one or more aspects of a driver's information processing abilities, including driver remediation, training such as in compensatory strategies, customized (re)design of the ITS interface, or modifications to the task or environment such as by route planning to avoid complex intersections.

Assessment Issues: Evaluating Quality of the Fit Between Driver Abilities and the Demands of Interacting with an ITS

The OTDAs need to consider the client's pre-existing driving experience and skills, their presenting limitations, and how effects of these limitations might be either ameliorated or exacerbated by use of an ITS (Di Stefano and Macdonald 2006b). In addition, the client's access to vehicles and available funding for modifications needs to be considered in relation to their driving requirements and expectations (Di Stefano and Macdonald 2003b). For example, consider the use of an advanced technology steering system by someone with reduced motor control. The client's successful performance will be dependent on the following:

- *Human factors*: Whether or not the driver has adequate attentional resources to cope with the demands of the concurrent subtasks that comprise the overall driving task, including the demands of interacting with the ITS (Regan 2004).
- *Interface design factors*: The fit between the driver's hand and the ITS control; the quality of feedback information from the device to the driver, whether proprioceptive, auditory, or visual, which determines whether the degree of movement can be easily perceived with sufficient accuracy.
- *Task and environmental complexity*: Affect the difficulty of various driving subtasks, such as steering an appropriate path, including avoidance of contact with other road users; maintaining an appropriate speed; obeying all road laws.

Table 64.1 depicts some common health/disability conditions, and their possible implications for ITS use. The examples given here illustrate that the process of matching driver needs and abilities to the characteristics of an ITS can be quite complex.

Table 64.1 Examples of common health/disability issues, related impairments, and their impact upon the use or need for intelligent transport systems (ITSs)

Health condition/ disability	Example of long-term impairment	Possible functional impact of disability on driving or being a passenger	Potential difficulties/benefits of common ITSs
Spinal cord injury	Limited hand and upper limb function	May impact upon use of steering wheel	Difficulty using standard steering wheel, but potential to use alternative steering devices (e.g., hand controls, joy stick)
Dementia (early stages)	Reduced/variable memory	May forget to apply seat belt, check to rear of vehicle when reversing	Seat-belt reminder and vehicle reversing systems may provide visual and auditory cues to support appropriate behaviours
Acquired brain injury	Reduced information processing, arousal and executive functions	Automatic vehicle systems that demand a significant level of driver attention may degrade other aspects of driving performance	Application and use of cruise/speed control and vehicle-positioning systems need to be carefully evaluated
			Need to evaluate driver tendency to multitask (e.g., use mobile phone, in-vehicle entertainment), since this reduces the driver's capacity to attend to core components of the driving task
Arthritis	Joint stiffness in neck/ upper spine	Difficulty with neck/ trunk rotation required for checking external mirrors and performing head check	Parking aid and vehicle reversing systems used in conjunction with internal mirrors may compensate for physical restriction

Evidence-Based Practice

Much of the recent research examining ITSs has drawn upon the theory and body of literature examining cognitive information processing. For example, there is now a considerable body of research evidence demonstrating the information-processing demands and consequent road safety risks of using a mobile phone or engaging in other potentially distracting activities while driving (Caird et al. 2008; Klauer et al. 2014; McCartt et al. 2006; Patten et al. 2004).

There is also research demonstrating distraction effects, attentional resource demands, and more general impact upon driving behaviours of some in-vehicle communication and information devices (Blanco et al. 2006; Regan et al. 2009; Tractinsky et al. 2013; Young et al. 2003). Some studies have considered these issues

in relation to older drivers (Horberry et al. 2006; Strayer and Drews 2004; Vrkljan and Miller 2007).

However, there is still relatively little evidence specifically on the use of ITSs by drivers with various disabilities. Current publications in the disability literature referring to ITS use typically take the form of descriptive accounts, viewpoints, or reviews (Baldwin 2002; Bouman and Pellerito 2006; Landau 2002; Murray-Leslie 1997; Pellerito and Burt 2006). There is a paucity of more targeted research examining ITS issues for drivers with particular types of impairment. In this context, OTDAs must keep up to date with new research developments, as well as being guided in their practice by applicable standards relating to ITSs (see Abram 2004, for an outline of some international standards).

Conclusion

Many technologies are being applied to the domestic motor vehicle. Those that interact directly with the driver may simplify the driving task, or, conversely, may make it more complex, particularly for drivers who may be accommodating new impairments, be unfamiliar with the specific interface requirements, or have limited experience with problem solving when such systems break down. Further, there may be a greater need for interdisciplinary collaboration around ITS prescription and training as greater choice and complexity complicates product specification.

As more vehicles equipped with ITSs become available, there will be an increasing need for both generalist and specialist driver–assessor OTs to be cognizant of, and evaluate, the potential risks and benefits these technologies present for drivers with functional limitations. This chapter has discussed some of the key factors that need to be considered by OTs responsible for considering driving-related issues with their clients.

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The Case Study of Tim: Resumption of Driving Post Acquired Brain Injury with Executive Function Impulse Control Sequelae

Keywords Acquired Brain Injury, Instrumental Activities of Daily Life, Cognitive impairments, Mobile phone/in-vehicle distractions

Introduction

The themes of this case study revolve around the compensation approaches applicable for a young client with an acquired brain injury (ABI) who is resuming the task of driving in the context of his occupational roles. Driver evaluation and rehabilitation interventions are managed by specialist OTDAs who work in partnership with generalist OTs. He/she does the implementation and follow-up with the driver and is responsible for other rehabilitation strategies.

The Students' Tasks Include

- Finding information about occupational therapy driver evaluation.
- Reflecting on own/others' experience driving a motor vehicle, and appreciating how in-vehicle visual and cognitive distractions like using a mobile phone or a navigation aid can interfere with information processing.
- Understanding the importance of educating clients and relevant others about driving with impaired cognitive function and strategies they can use to minimise in-vehicle distractions.
- Reviewing sources of information about brain injury sequelae: epidemiology, progression and prognosis, occupational performance issues, and common OT interventions.

As a starting point, students can use the following references to gather background and specific information:

Klauer S, Guo F, Simons-Morton B, Ouimet M, Lee S, Dingus T (2014) Distracted driving and risk of road crashes among novice and experienced drivers. N Engl J Med 370(1):54–59

Tractinsky N, Ram ES, Shinar D (2013). To call or not to call—that is the question (while driving). Accid Anal Prev 56:59–70

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Ricability (2011) Motoring after a brain injury. Forum of Mobility Centres, London. http://www.rica.org.uk/sites/default/files/documents/pdfs/mobility/motoring-after-brain-injury.pdf. Accessed 21 Nov 2013

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Recent occupational therapy textbooks and reliable Internet sites that discuss OT interventions for people with specific health issues facing driving-related performance challenges will be useful.

Overview of the Content

The major goals of the intervention are:

a. Evaluating client insight and behaviours that may require intervention considering the client's specific social role and environmental contexts.
b. Providing client and family education regarding risks and interventions to support self-management and reinforcement of appropriate behaviours.

Learning Objectives

By the end of studying this chapter, the learner will:

- Understand in-vehicle technologies available in domestic vehicles and how they can both support and hinder driver independence and safety
- Appreciate the underlying human information processing requirements that support driving-related tasks and that may be impacted by impairment and behaviours
- Have an appreciation of the complimentary roles of the generalist occupational therapist (OT) and the specialist occupational therapy driver assessor (OTDA) when implementing driving related interventions

Personal Information

Chris is 20 years old and has spent the past year in rehabilitation as a result of multiple trauma associated with a serious motor vehicle crash. He was the sole occupant and driver of the vehicle that caused the crash. Chris was a full-time university student on summer holidays at the time of the incident.

Medical Information Including Prognoses

Chris sustained an ABI resulting in loss of consciousness and fractures to his pelvis and left leg. He has recovered from his physical injuries but has residual left foot drop for which he wears an ankle–foot orthosis, and he still experiences executive function limitations (e.g., distractability, memory lapses, low arousal, reduced impulse control), particularly when fatigued. Chris has managed to resume independence in all personal and most instrumental activities of daily living and has

returned to live with his parents and two siblings. One of his goals is to return to driving so he can continue with his studies at a university located some 15 km from home.

Current Circumstances

Chris' OT rehabilitation included interventions addressing musculoskeletal and cognitive–perceptual remediation and compensation (see Chap. 30). He was not given medical clearance to attempt a return to driving until 9 months after the crash. Chris was then assessed by an OTDA and subsequently completed a driver rehabilitation programme. After 3 months of driving under supervision (mostly with his parents), and lessons from a driving instructor, Chris passed a practical road test and has resumed independent driving in an automatic vehicle. In addition to licence conditions imposed as part of a graduated licensing system (e.g., no more than one peer age passenger, zero blood–alcohol level), Chris must also abide by other recommendations as a result of his residual impairments, including not driving for longer than 1 h, no in-vehicle distractions (e.g., use of radio, navigational systems, or mobile phones) and a geographical area restriction of 20 km based from his home. This will allow him to live at home and drive to and from his university.

Occupational Performance Issues and Occupational Therapy Interventions

Chris' longer-term OT rehabilitation needs have been transferred from the specialist trauma rehabilitation centre to the generalist OT at the local community health facility. Chris' family have expressed concerns about his transition back to regular driving and his ability to cope with study and social components of his university student role given his ABI sequelae. They are particularly worried that he will resume his previous habits of staying out late, binge drinking, and constantly checking social media sites and texting using his mobile phone while driving.

The Student's Report

1. Your first goal-setting session includes both Chris and his family. What important information pertaining to Chris, his goals, family, and lifestyle should be collected and what therapeutic relationship aspects would you establish to foster self-management?
2. What potential personal and peer-related social pressures and related behaviours might Chris be exposed to when he returns to his university studies and social group?

3. How might these interact with his ABI sequelae and impact upon his occupational performance, specifically his ability to drive safely and within his licence conditions?
4. What vehicle components might you look for in the car that Chris drives to evaluate potential in-vehicle distraction risks and management features?
5. Considering Chris' social situation and disability status, what lifestyle general principles and compensatory strategies would you support him/his family to implement considering:

   a. aspects of driving:

      - managing in-vehicle distractions
      - limiting driving to no more than an hour at any one time
      - avoiding drinking and driving
      - avoiding driving while fatigued

   b. development of regular sleep and study routines
   c. monitoring and self-management?

Chapter 65
Work-Related Health: Organizational Factors, Risk Assessment and Well-Being

Guðbjörg L. Rafnsdóttir and Thamar M. Heijstra

There is a connection between poor work organization and distress among employees.

Abstract Today, a large proportion of the population in Western societies is in the labor market. As absenteeism due to illness has reached such a level that it is now perceived as an economic problem, it is of major importance to map out the causes, prevent future absenteeism, and improve the health of employees. By discussing the job strain and the effort–reward imbalance models, this chapter provides some insight into the connection between the work organization and the well-being of its employees. The importance of risk assessment is discussed, as it provides a method for staff members to become aware of the organizational factors that affect their well-being. If absenteeism due to illness among workers can be reduced, it will have positive effects for everyone involved—not only for workers and their organizations but also for society as well.

Keywords Burnout · Organizational risk factors · Risk analysis · Well-being · Work-related stress

Background

This chapter discusses the connection between the work organization and the well-being of employees. Too high workload and lack of psychosocial well-being are two of the biggest health and safety challenges that we face in the Western labor market today. Due to the economic crisis in Europe and the USA since 2008, downsizing and insecurity are of growing concern, as they impose stress on employees and may affect the health and working ability of individuals in various ways (Snorradóttir et al. 2013). Job stress affects the well-being of millions of people throughout the world, and absence from work due to sickness has been defined as an economic problem. The lack of well-being and the use of sick leaves are partly related to the

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employees' work situation (Rafnsdóttir et al. 2004; Røed and Fevang 2007; Siegrist and Marmot 2004; Virtanen et al. 2005). Stress may also threaten workplace safety. The changing world of work is making increased demands on workers, through downsizing and outsourcing, increasing use of temporary contracts, increasing job insecurity, higher workload, more pressure, and poor work–life balance.

A study on work organization and well-being in the field of geriatric care showed, for example, that mental exhaustion and finding work mentally difficult were associated with a number of factors that related to the organization of work, such as time pressure, bad communication with supervisors, and difficulty in harmonizing demands and expectations of patients, employees, and supervisors (Rafnsdóttir et al. 2004). In the past decades, radical changes have come about in the organization of work due to the new technology, monitoring, and surveillance of employees. These changes are complex. In some cases, it has improved management and the work organization for the employees. In other cases, it has decreased the flexibility and increased the stress among employees. Therefore, it is important to develop a policy about how to use new technology without threatening work organizations and employees' well-being (Rafnsdóttir and Gudmundsdóttir 2011). The Information and Communication Technology (ICT) and virtual work also play an important role here, as they enhance the employees' possibilities to work from home. At the same time, however, while it increases the flexibility of the worker, it also makes it increasingly difficult for employees to disengage themselves from work. This tendency, as has been demonstrated, can enhance both work–family conflict and increase the risk of burnout (Heijstra and Rafnsdóttir 2010). The organization of work and the psychosocial work environment can be risk factors for musculoskeletal disorders. Gunnarsdottir et al. (2003) showed that mental exhaustion and having been exposed to harassment, violence, or threats at work are workplace factors that are associated with discomfort in the neck and back of the head, shoulders, and lower back among women working in geriatric care. Dissatisfaction with supervisors, lack of information at work, failure to be consulted about intended changes, and lack of solidarity in the workplace also played an important role for one or more musculoskeletal symptoms.

Purpose

Taking the organization of work into account leads not only to a healthier workforce but also to workplaces that are more productive, and thus results in a better economy. Workplace illness leaves everybody involved disadvantaged. There is the human cost for workers and their families and the cost of reduced productivity for organizations. There are costs for governments as well, as illness and accidents place a burden on the health-care systems. Workplace health is therefore also a public health issue Siegrist and Marmot 2004; Virtanen et al. 2005).

Method

Candidates for the Intervention

Different from many other risk factors, organizational and psychosocial factors are found in any sector and in any size of work organization. The focus on the organizational work environment has become stronger as the world of work is undergoing change due to factors like globalization, increasing use of information technology, changes in employment practice, and the increasing importance of the service job sector in Western countries. This has led to new methods for analyzing organizational risk factors at work.

A frequently used method is risk *assessment*. It can be used to evaluate systematically the risks to workers' health and safety. If used correctly, it can enable employers and employees to identify and understand the action they need to take to eliminate or minimize the risks at the workplace. It looks at all aspects of the workplace and the work itself, considering what could cause harm, whether hazards, accident risks, longer-term health risks, or illness can be eliminated, and, if not, what preventive or protective measures should be put in place (European Network for Workplace Health Promotion (ENWHP) n.d.).

Epidemiology

Hassan et al. (2009) more than two million people in the UK were suffering from an illness in 2001 and 2002, which they believed was caused or made worse by their current or past work. This prevalence estimate includes long-standing as well as new cases. Moreover, more than half a million people in the UK experienced work-related stress at a level that was making them ill. In addition, up to 5 million people in the UK feel their work is very or extremely stressful; and in 2004 and 2005, 12.8 million working days were lost due to stress, depression, or anxiety. Stress has also surpassed musculoskeletal disorders as the biggest contributor to absenteeism because of work-related stress illnesses. This can have major impact on other elements of business, such as productivity, organizational image, health and safety, and morale.

According to the European Agency for Safety and Health at Work (2008), stress was the second-most-reported work-related health problem in 2005 in Europe, affecting 22% of the workers. Rubin and Brody (2010) points out that the work in the 24/7 global economy is characterized by stress, long hours, and reconfigured work days in which work time is deepened, accelerated, expanded and otherwise transformed from the previous ideal of a 5-day work week characterized by regular 9–5 workdays. One persistent outcome of these changes is the feeling of being overworked. Poster (2007) points out that even if it is known that roughly one third of US workers are chronically overworked, problems of overwork are a global phenomenon. Rafnsdóttir and Heijstra (2013) show that overwork, stress, and

work–family balance are worth analyzing by gender lenses as long work hours even exacerbate gender inequality in families.

Galinsky et al. (2001) showed that where gender differences are concerned, women were found to feel more overworked than men did, and women were reported to have more jobs that were demanding. They were more frequently interrupted at work, and had to perform multiple tasks, without receiving appropriate time to do so. However, when men and women with these same complaints were compared with each other, the gender difference in feeling overworked disappeared. In this study, the consequences of being overworked became clear as well. Not only are overworked employees likely to experience more work–family conflict, to neglect themselves and to sleep less, but they are also significantly less likely to report their health as very good or excellent.

The Role of the Therapist

Traditional occupational health and safety methods are used by labor inspectorates and social insurance institutions to ensure that the laws of health and safety in the workplace and regulations are followed. Such inspections are important and have improved health in the workplace by reducing accidents and preventing occupational diseases and illnesses. However, in recent decades, it has become clearer that sustainable health promotion and prevention call for collaboration across different professions and policy fields, especially when working with organizational factors. Cooperating partners can be experts from public health sciences working in research institutions or academia, as well as experts representing the field of occupational health and safety, labor inspectorates, social insurance institutions, and consulting services (European Network for Workplace Health Promotion (ENWHP) n.d.). The attempt to mainstream occupational health into the daily life of management is of importance, a part of the new Agency Strategy 2009–2013 and on the agenda of European Agency for Safety and Health at Work (2008).

Results

Clinical Application

Theories about the relationship between work conditions and the well-being of the employees are still under formulation. Research on the organizational work environment has increased, and the factors that should be taken into account in measuring organizational factors and psychosocial strain are discussed and debated (Cox et al. 2005).

When discussing organizational factors at work, two concepts come up repeatedly: stress and burnout.

Stress

The experience of stress arises from an imbalance between the perceived demands of the environment and the perceived resources available to the individual to cope with those demands. Some studies suggest that psychologically demanding jobs that allow employees little control over the work process even increase the risk of cardiovascular disease (Niedhammer et al. 1998) and the importance of stress management is highlighted in European guidelines for cardiovascular disease prevention (Steptoe and Kivimäki 2012).

Reducing work-related stress and psychosocial risks is not only a moral but also a legal imperative. There is a strong business case as well. In 2002, the annual economic cost of work-related stress in the European Union (EU-15) was estimated at 20 billion Euros. The good news is that work-related stress can be dealt with in the same logical and systematic way as other health and safety issues (European Agency for Safety and Health at Work 2008).

Burnout

Burnout is related to stress. Tracy (2000) points out that understanding burnout to be personal and private is problematic because burnout is largely an organizational issue caused by long hours, little own time, and continual peer, customer, and employer surveillance. Mental exhaustion is considered the most obvious manifestation of the burnout syndrome and the basic individual stress dimension of it (Schaufeli and Enzmann 1998; Van Emmerik 2002). Researchers have studied quantitative job demands, and the findings support the general notion that burnout is a response to job demands, overload, time pressure, and lack of resources (Demerouti et al. 2001; Nirel et al. 2004).

Coping with Stress and Burnout

Two models are presented here that have been developed to better understand the connection between the organizational factors at work and the well-being of the workers. These are the job strain model and the effort–reward imbalance model.

The Job Strain Model

Psychosocial work environment has been assessed mostly with two theoretical models: job strain and effort–reward imbalance (Aboa-Éboulé et al. 2011). The job strain model, also called the demand–control model, proposes that strain, such as distress or adverse health effects, occurs when an employee is exposed to a combination of high demands and low control. According to this model, high demand and little control give rise to dangerous levels of stress. Stress increases if the social situation is poor, that is, support from fellow workers and managers is lacking. A high level of demand by itself does not necessarily lead to stress if it is accompanied by sufficiently good control over the work situation. The *control* concept relates to autonomy, to what extent individual workers can structure and control how and when they should do their particular tasks, and to participation in planning and decision making, that is, to what extent the workers are given opportunities to control or influence their job environment outcome. Control may act as a buffer for job demands, and improvement in control may improve the perceived quality of the work environment (Karasek and Theorell 1990).

According to Levi (2000), it soon became evident that a third component was needed in the model, namely *social support*. Several different aspects of social support can be relevant, but it became clear that the addition of social support makes the demand–control perspective more useful in *job redesigning*.

The Effort–Reward Imbalance Model

The rewards we receive from work play a decisive role in our social status. Therefore, the relationships between the efforts invested in work and the rewards are central. High levels of effort combined with no, or random, gratification will adversely affect workers' health. Research has shown that workers who put forth a high amount of effort but receive low rewards and have low job security and low status have a 2–4.5-fold higher risk for coronary heart disease compared to workers who report a satisfactory effort–reward balance (Siegrist 1996). In a recent study, Aboa-Éboulé et al. (2011) showed that post myocardial infarction workers holding jobs that involved effort–reward imbalance or low reward had increased risk of recurrent coronary heart disease. Even though most studies that discuss the effort–reward imbalance have focused on health, the impact is broader. Derycke et al. (2010) show, for example, that perceived effort–reward imbalance is a significant predictor of the intent to leave the workplace among health-care workers.

Risk Assessment

As mentioned before, many studies show a clear connection between work organization and well-being of the employees (Gunnarsdottir et al. 2003; Heijstra et al. 2011; Rafnsdóttir and Gudmundsdottir 2004; Siegrist and Marmot 2004). Therefore, it is important to consider these organizational factors in management and when working with prevention and rehabilitation. Risk assessment, an examination of what, in the work environment, could cause harm to people, psychosocially or physically, is an example of a useful method for most organizations to create a good work environment, both physically and mentally.

Risk can be assessed in the workplace by a few steps. It is necessary to identify the hazards and decide who might be at risk and how. Then it is important to evaluate the risks and decide on precautions, recording the findings, and implementing them. Last but not least, it can be useful to review the assessment and update it if necessary (Frostberg et al. 2003).

In many organizations, the risks are well known and the necessary control measures are easy to apply. In other organizations, it is more complicated. People, who run a small organization and are confident and understand what is involved, can sometimes do the assessment themselves. However, employers in a larger organization often need to ask a health and safety adviser for help. In all cases, the staff or their representatives must be involved in the process (Health and Safety Executive (HSE) 2008b).

Evidence-Based Practice

Management Standards

The management standards for stress (Health and Safety Executive (HSE) 2008) are an example of a method, *related to risk assessment,* that makes it possible to identify the gap between preferable conditions at work and the current performance. These standards may help employers develop their own solutions to close this gap. The standards contain tools to analyze the workplace performance in six areas:

- *Demands:* workload, work patterns, and the work environment
- *Control:* how much influence employees have in the way they do their jobs
- *Support:* encouragement, sponsorship, and resources provided by the organization, line management, and colleagues' cooperation and attitudes
- *Relationship:* promoting positive work to avoid conflict and dealing with unacceptable behavior
- *Role:* whether people understand their role within the organization and whether the organization ensures that the person does not have conflicting roles
- *Change:* How organizational change (large or small) is managed and communicated in the organization.

Together with any existing data, this information can be used in focus group discussions with employees to determine what is happening locally and what should be done to close the gap.

When promoting workplace health, it can be useful to learn about the good practices in other companies or institutions and compare them to some of the good practices at the European Network Education and Training Occupational Safety and Health (ENETOSH) (2008) and on Health and Safety Executive (HSE) (2008b).

Discussion

The workplace and the work organization can affect the health and well-being of the employees in various ways, and workers and others have a legal right to be protected from harm or illness caused by failure in the work organization or the work environment. Therefore, all workplace health promotion is important for the employees, the companies, and the society. To increase well-being among employees, it is necessary to analyze the characteristics of the work and the conditions that are perceived as risks. Therefore, employers, managers, and occupational consultants must consider the organizational factors that affect the employees' well-being. These factors include work–family balance, time pressure, qualitative job demands, role conflict, lack of adequate information for completing tasks, lack of feedback, inequality, and lack of latitude for making work-related decisions. Absence of job resources such as social support from supervisors and coworkers is also of significance. As the labor market is widely gender segregated and women and men in many families have partly different roles in their homes, it is always of importance to consider gender when analyzing well-being at work.

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Chapter 66
Motivational Interviewing: Enhancing Patient Motivation for Behavior Change

Robert John Shannon

Despite our telling the client about the need to change his behavior, he just wouldn't do it.

Abstract The success of many therapies depends to a large degree on the extent to which patients engage with their treatment and adhere to the lifestyle changes that are recommended to them. However, this usually requires a high degree of effort and motivation on the part of the patient, and poor adherence is a common problem. A key task for occupational therapists (OTs), therefore, is enhancing motivation for behavior change. This is especially important given the increasing emphasis on helping patients to take more responsibility for their own care (Department of Health http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4094550. Accessed 10 March 2009, 2004; Pill et al. J Adv Nurs 29:1492–1499, 1998). Motivational interviewing has been shown to be an effective and efficient method for use in occupational therapy (Antonisen Luleå University Student thesis: Bachelor thesis, 2012) for building motivation for behavior change in a number of problem areas (Hettema et al. Annu Rev Clin Psychol 1(1):91–111, 2005).

Keywords Behavior · Counseling · Motivation

Definition

Adherence	Agreement between the patient's actual behavior and what was agreed to or prescribed.
Ambivalence	The experience of being of two minds about behavior change. It is a conflict between two courses of action, each of which has perceived costs and benefits. Unresolved ambivalence is a key barrier to sustained behavior change.

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Change talk	Patient's expressions of desire, ability, reasons, or need for change and commitment language (intentions, obligations, or agreements about change).
Motivation	Incentives or driving forces that encourage behavior change.
Motivational interviewing (MI)	A person-centered, counseling method designed to build motivation for behavior change by exploring and resolving ambivalence.
Resistance	Arguments or disagreements about change; can be viewed as patients' attempts to have their ambivalence understood in the face of the therapist's arguments for change; can take a passive form, such as agreeing to change without an intention or commitment to do it.

Background

Traditional approaches to motivating patients to change behavior involve the provision of advice or education. When we see something that patients would benefit from, our "righting reflex" is to step in and "set things right" (Miller and Rollnick 2002, p. 20). In an attempt to facilitate change, we often explain the benefits and importance of change, and the consequences of no change. The *righting reflex* reflects a genuine desire to help the patient. However, the problem is that many patients are of two minds (ambivalent) about change, and giving advice does little to resolve this. Indeed, giving advice to someone who is ambivalent can be detrimental to the change process. It is part of being human to want to be understood by others. So if patients are ambivalent about change and a therapist takes up the change side of patients' ambivalence, the natural response from them is to give voice to the other side of their ambivalence: "Yes, but I'm worried about…" This is commonly labeled *resistance,* and is often interpreted as a sign of poor motivation, but in fact, it simply represents patients' attempts to have their ambivalence understood. The more a therapist ignores aspects of the patient's ambivalence, or assumes greater importance or confidence for change than actually exists, the more the patient will resist (Rollnick et al. 1999). The problem with this is that our attitudes, beliefs, and intentions regarding behavior change are influenced by what we say (Bem 1972). Therefore, if patients are counseled in a way that results in their defending their reasons not to change, they will become committed to that side of their ambivalence and talk themselves out of change.

A basic tenet of motivational interviewing (MI) is that patients are more likely to be persuaded by their own arguments than by those of the therapist (Miller and Rollnick 2002).

In health-care settings, particularly when patients feel vulnerable, resistance is often displayed passively by apparently listening and agreeing to change, but without intention or commitment. This can also undermine change.

MI represents an alternative approach to advice giving. Rather than installing perceived deficits in knowledge, skills, or attitude, MI views patients as having an inherent motivation and capacity for change, which can be evoked (Miller and Rollnick 2002). To resolve ambivalence (and thereby trigger change), the therapist provides a supportive, empathic atmosphere while selectively eliciting and strengthening the patient's own reasons for change (Miller 2004). Once the patient is committed to change, a plan of action can be negotiated, itself increasing the likelihood of change.

Purpose

The goal of MI is to explore and resolve a patient's ambivalence about behavior change.

Method

Candidates for the Intervention

MI was originally developed for people with alcohol problems (Miller 1983), but has since been used in a variety of different settings and with a broad range of behaviors. Examples of the different contexts in which MI has been studied and in which an occupational therapist (OT) may be involved include (1) alcohol abuse treatment, (2) asthma/chronic obstructive pulmonary disease, (3) brain injury rehabilitation, (4) cardiovascular health/hypertension, (5) chronic pain management, (6) diabetes risk reduction and treatment, (7) drug abuse treatment, (8) dual diagnosis (substance abuse and mental illness), (9) eating disorders and obesity, (10) emergency department/trauma/injury prevention, (11) employment readiness, (12) gambling treatment, (13) health promotion (e.g., physical activity), (14) HIV/AIDS risk reduction, (15) mental health treatment, and (16) tobacco use (Rollnick et al. 2008).

Settings

MI can be used as a motivational prelude to other active clinical interventions. For example, an OT offering a treatment program for patients with chronic pain based on principles of cognitive behavior therapy might use MI initially to build patients' motivation to make better use of the self-regulatory strategies that they will learn

in the treatment program. There is good evidence that people who receive MI at the beginning of treatment are likely to stay in treatment longer, engage with the treatment to a greater degree, and experience better outcomes following the treatment than do people who receive the same intervention without the MI prelude (Hettema et al. 2005; Miller and Rollnick 2002). One or two brief sessions of MI are often enough to provide the motivational catalyst to promote adherence to the treatment that follows.

MI has also been used as a stand-alone intervention, and most studies showing significant effects have generally involved relatively brief MI (one to four sessions). The mean dose of MI delivered in the Hettema et al. (2005) meta-analysis was about two sessions (mean 2.24 h).

Another common application of MI is to *blend* it with other treatments; in other words, to use MI *throughout* the treatment. There is evidence that therapists' adherence to the collaborative, evocative, and autonomy-respecting spirit of MI is a strong predictor of behavior change beyond the technical components (Moyers et al. 2005). *Integrating* the spirit of MI with other interventions often improves outcome. To continue the pain management program example from above, a therapist delivering aspects of a cognitive behavioral therapy program in an MI style might ask for the patient's perspective on ways to problem-solve rather than teach those things. The therapist might discuss the relevance of maladaptive cognitions, but then carefully draw from patients their own perception of their thought patterns without labeling them as problematic or implying that the patient has to change; this is the MI style (Miller and Rollnick 1991).

The Role of the OT

Developing Proficiency in MI

In MI, the client and the OT bring different types of expertise to the consultation and work together to discuss the possibility of behavior change. The OT provides direction and support and elicits the client's thoughts about change. The therapist also provides information where necessary or when requested. However, the client is the active decision maker (Rollnick et al. 1999).

An important step in developing proficiency in MI involves suppressing the righting reflex (Miller and Moyers 2007), that is, all temptation to tell clients that they must change should be avoided. This is the case if the client shows signs of resistance, but in reality, the client will decide whether to change or not. The reason is that the signals that the client must change send a clear message of nonacceptance, which inhibits the change process. Like other psychological interventions and clinical procedures that OTs use, MI requires specific knowledge. It is a skilled counseling style that represents a fundamental departure from traditional approaches to encouraging behavior change. The most common form of training is a one-off

workshop, but for most, this is insufficient in itself to promote clinically meaningful changes in MI proficiency. Additional coaching and feedback on practice is necessary (Miller and Mount 2001; Miller and Moyers 2007; Miller et al. 2004; Walters et al. 2005). A frequent occurrence, however, is that follow-up training is seldom well attended despite initial expressions of enthusiasm.

Results

Clinical Application

The Use of MI

MI may be delivered in the following ways:

- Prior to another active intervention as a motivational prelude to improve engagement with the treatment
- In conjunction with another treatment
- As a stand-alone treatment

Miller (2004) has argued that because the outcomes of MI are generally realized after brief amounts of counseling, it may be appropriate to consider MI as a first intervention in stepped care. If behavior change does not occur after a reasonable amount of MI, a more intensive intervention can be used.

MI can also be used as a brief opportunistic intervention in circumstances where the patient has sought help or assistance for a problem but not specifically for help with behavior change (Rollnick et al. 1999). An example of this is talking about diet and exercise with patients who have diabetes and poor control of their blood sugar. The consultation provides a good opportunity to raise gently the subject of behavior change, even though it was not the patient's principal issue for discussing.

MI: Theoretical Underpinning

MI was not founded on theory; rather, the original description was based on principles derived from its founder's, William Miller, intuitive practice (Miller 1983). MI has been logically linked with a number of influential theories:

- It is grounded in Rogers's (1959) patient-centered counseling approach, which maintains that given the therapeutic conditions of empathy, acceptance, and support, people will draw on their own wisdom and desire to realize their potential, and as a consequence will change in ways that benefit their health and well-being.

- It is linked to Bem's (1972) self-perception theory, which holds that people's attitudes, thoughts, and beliefs are influenced by how they talk. In the context of discussions about behavior change, patients who spend most of the time engaged in change talk rather than defending their current behavior are most likely to talk themselves into change.
- MI was originally tied to Festinger's (1957) cognitive dissonance theory, but Miller and Rollnick (2002) have since used the more general term *discrepancy* to describe mechanism by which motivation is developed. As clients talk loudly about their own reasons for change, a discrepancy develops in their mind between what they say they want and what they are currently doing. The bigger the discrepancy, the stronger the motivation is for behavior change.

Conducting MI

The method of MI has been described in detail elsewhere (Miller and Rollnick 2002; Rollnick et al. 2008). Therefore, a brief overview is presented here.

The Spirit

The essence of MI lies in its spirit. It is not a simple method to get patients to do things they do not want to do. Rather, it is a way of being with patients that draws on their motivations and values (Miller 2004). While MI advocates specific skills and strategies, they need to be used in the context of a spirit that is collaborative, evocative, and respectful of the patient's autonomy (Miller and Rollnick 2002).

The Key Guiding Principles

The key guiding principles of MI practice are to (1) resist the righting reflex, (2) understand and explore the patient's motivations, (3) listen with empathy, and (4) empower the patient, encouraging optimism and hope (Rollnick et al. 2008). The basic skills that are used to manifest the principles of MI are (1) asking open-ended questions, (2) affirming the patient, (3) expressing empathic reflective listening statements, and (4) providing summaries. These skills help create a nonjudgmental, supportive, empathic atmosphere, which frees patients to consider the possibility of change (Miller and Rollnick 2002; Rogers 1959). It draws on these skills to build motivation, strength, and commitment, and foster confidence for change by evoking and reinforcing the patient's own reasons for change (change talk) and responding to resistance (arguments against change) in a way that diffuses it.

The Change Talk

Change talk is a key component in MI. It is elicited when OTs suppress their righting reflex. The correct way is (1) to ask questions that evoke the patient's own views about why change may be beneficial, (2) to ask what is wrong with the way things are, and (3) to ask how the patient might go about it in order to succeed. Examples of such questions are:

> "In what ways would it be good for you to ____?" "What do you hope will be different?" "How does [the behavior] fit into that?" "How might you go about it in order to succeed?"

Steve Rollnick's motivation and confidence rulers provide another way of evoking change talk (Rollnick et al. 2008, pp. 58–60). It begins with two open-ended questions (here the example of regular exercise is used to illustrate):

> On a scale from 0 to 10, how motivated are you right now to exercise on a regular basis, where 0 on the scale is not motivated at all and 10 is very motivated?

Then patients are asked how confident they are that they can make the change:

> How confident are you that you could stick to a new level of exercise if you decided to do so, where 0 is not confident at all and 10 is very confident?

After getting scores for motivation and confidence, patients are asked to justify their scores: "Thinking about the motivation scale, why did you say X and not 0 (or a lower number)?" The responses will be change talk. This exercise can be repeated for the confidence scale.

Once change talk emerges, empathic reflective listening statements, which capture what was said, encourage further exploration. Asking for examples and elaboration ("In what ways?" "When was the last time?" "Can you give me an example?" What concerns you most about ____?") encourage patients to develop their arguments.

The resistance in a consultation may reflect that the therapist has misjudged some aspect of the patient's confidence or motivation for change and is a clear signal for a shift in communication. A simple reflective listening statement that acknowledges the patient's thoughts and feelings is often enough to diffuse the resistance.

For example, this dialogue might occur in a pain management context:

> Patient: I tried that pacing thing in the last program I was in, but sometimes there are things that you have to do and it just goes out of the window.
> Therapist: You've got responsibilities and so far have not found a way to incorporate those into your pacing plan.

The following example uses a complex reflective listening statement to acknowledge what the patient has said but reframes it in a more positive way without undermining the patient's experience:

> Patient: I can't stand this. Just when things were going so well, I get this flare-up. You know, I was walking nearly a mile every day and I was able to bathe my son. And now I find it hard to move. It's like I'm back at the beginning. What's the point?
> Therapist: You've noticed by staying active, you've been able to do things that are important to you, but it's really hard to see the progress in light of this setback.

Other ways to respond to resistance involve different types of complex reflective listening statements and strategies such as *shifting focus and emphasizing personal control*. These are discussed in Miller and Rollnick (2002).

MI also draws on specific strategies for providing information and developing a plan of action.

Evidence-Based Practice

Meta-analyses of controlled trials of MI show that it is effective for enhancing *health behavior change in general* and for reducing drug and alcohol consumption in particular (Burke et al. 2003; Hettema et al. 2005). In the most recent meta-analysis of MI, the mean, short-term, between-group effect size was $d=0.70$, decreasing to $d=0.30$ at up to 1-year follow-up (Hettema et al. 2005). The change in effect size over time in the studies was generally because the control group got better or changed and started to catch up with the MI group, rather than the MI group relapsing. People also make better use of treatment after MI; when MI is used as a prelude to other proven interventions, attendance and engagement improve, as does long-term treatment outcome. A mean effect size of $d=0.6$ (which persists over time) was observed across studies where MI is added to other active treatments. The Hettema meta-analysis was based on 72 clinical trials of MI. Now there are over 160 randomized trials of MI (Rollnick et al. 2008).

MI is considered an efficient method for effecting behavior change too. Most of the MI interventions in the Hettema meta-analysis were relatively brief, with the average dose of MI being about two sessions (mean = 2.24 h). A large multicenter randomized controlled trial (Project MATCH Research Group 1997) designed to assess how people respond to different treatment approaches for alcohol problems compared four sessions of an adaptation of MI (Motivational Enhancement Therapy, MET) with 12 sessions of 12-step facilitation or cognitive behavioral coping skills training. The outcomes for each of the three interventions were similar, but those randomized to receive MET reduced their drinking with less therapist contact time.

[1]Although promoted for use in occupational therapy, MI has not been explicitly evaluated. However, studies have proved that MI is an effective method to affect patients' willingness to change behavior/lifestyle (Linden et al. 2010; Prochaska et al. 2008; Vriezekolk et al. 2012).

Discussion

The challenge of motivating patients to change behavior is a common one. Many of the patients with whom OTs work have conditions that can be improved, controlled, or managed through a change in behavior. While most, if not all, patients

[1] The manuscript has been updated with this paragraph.

are motivated to achieve the outcome of behavior change, many are less motivated to engage in the behaviors necessary to achieve those benefits. In general, MI has been shown to be an effective and efficient method for achieving change in many of the health behaviors studied.

We are also beginning to understand the mechanisms involved in the effectiveness of MI. There is good evidence to support its relational component, specifically the use of patient-centered counseling skills and its spirit (Moyers et al. 2005). Process evaluation has also shown the importance of the selective eliciting and reinforcement of patient change talk as well as the importance of responding to resistance in a way that does not reinforce or prolong it. The level of resistance in a consultation is inversely related to behavior change (Miller et al. 1993), and change talk has been shown to be predictive of behavior change (Amrhein et al. 2003).

In its pure form, MI involves a number of sessions, often of long duration. Not all therapists have the luxury of such extended contact time, and for this reason, adaptations of MI have been developed to manifest the spirit of MI but in a briefer format (Rollnick and Miller 1995; Rollnick et al. 1992, 1999). A recent text (Rollnick et al. 2008) provides guidance on how MI might be blended into consultations when an OT has a number of tasks to undertake simultaneously.

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