Mapping the Clothing Taskscape: Apparel Needs in Rehabilitation Therapy

by

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Abstract

Dressing is an activity taken for granted until a person's balance and synchronized movements are impaired due to illness, injury, disease, or surgery. This study conceptualized and operationalized the clothing taskscape (CT)—selecting, shopping, dressing, toileting, eating, exercising, sleeping, laundering, and storing—to analyze apparel needs and ways people who have experienced a disabling event interact with clothing. The CT was designed to: map the use scenario and identify the relationship between personal ability and clothing environment; determine compensatory interventions in terms of clothing modifications that improve functional abilities; and distinguish how clothing and independence in dressing enhance well-being and self-image in rehabilitation therapy (RT). The study was framed by a 2-part research question: What factors along the CT impact functional limitations and self-image for people in hospital RT programs, and how can such criteria inform design to address this population's needs? Ethnographically oriented methods were used to examine the clothing context and its meaning to people through field observation of RT sessions and patient routines with personal support workers (PSWs; n=46), and interviews with occupational therapists, physiotherapists, PSWs, and patients (n=34). Precedent analysis was used to source and evaluate clothing in the marketplace; specific garments were purchased and used as probes to invite dialogue during participant interviews and to gauge receptivity to garment innovations. Results reveal patients' experience related to clothing, disability, and functioning as well as clothing's social and psychological aspects. Design recommendations are made to mediate difficulties people have when dressing in relation to fabric choices, garment silhouettes and fasteners, circumference of garment openings, dual waistbands, pockets, loops, and visual clues to guide garment orientation and product development opportunities. Study results may impact fashion designers, specialized product developers, design educators, and rehabilitation therapists.

Preface

This thesis is an original work by Sandra Tullio-Pow. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “MAPPING THE CLOTHING TASKSCAPE: APPAREL NEEDS IN REHABILITATION THERAPY”, No. Pro00052870, 15/01/2015.

Dedication

This dissertation is dedicated to my father, who supported his children in their quest for higher education, an opportunity he never had and to my mother who taught me how to juggle multiple balls in the air and most importantly, which ball could be dropped.

Acknowledgments

Once you make a decision, the universe conspires to make it happen – Ralph Waldo Emerson

This statement certainly sums up my PhD journey. It all began at an annual apparel conference and an impromptu discussion with Dr. Betty Crown and Dr. Rachel McQueen about Ryerson University's new MA program in Fashion. I expressed my desire to pursue a PhD—which prompted the recommendation, "You must speak with Megan"—and this decision began a series of events that eventually lead to the completion of this dissertation.

I am especially grateful to my supervisor, Dr. Megan Strickfaden: thank you for suggesting that I look deeply into Ingold's concept of taskscape. I could not have wished for a better supervisor; with your advice, I have transformed beyond my comfort zone as an intuitive designer to become a design researcher.

This research was completed with tutelage from an academic team. I want to offer heartfelt thanks to my committee members who assessed multiple drafts of my thesis as they guided me along this journey: Dr. Anne Bissonnette, Dr. Patrick Devlieger, and Dr. Mary Ruppert-Stroescu. In addition, I sincerely thank Dr. Susan Ashdown for her review and thoughtful critique of the final manuscript.

I was privileged to have a strong circle of female mentors who nurtured me in many ways. I have special thanks for Professor Lucia Dell'Agnese for her advice and leadership as I embarked on my academic career. I am indebted to both Dr. Joyce Nyhof-Young and Dr. Hong Yu, each of whom honed my research skills through the many projects we worked on together before I began my coursework at the University of Alberta.

Completion of this degree would not have been possible without the incredible support of my Chair, Robert Ott, and the encouragement of the School of Fashion faculty, all of whom had to assume additional service duties while I was on leave.

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Leaving family and friends and moving west was not without its challenges. I am especially thankful to Dr. Arlene Oak, my friend Linda Marie Johnson, and my cousins Paul

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A number of rehab facilities were skeptical about allowing a fashion designer into their hospital to do research. I am extremely grateful to a doctor (who must remain anonymous) for making the necessary introductions that eventually lead me to the team of therapists and care workers in this study who in turn introduced me to patients and facilitated my observations and interviews. I will be forever grateful to the occupational therapists, physiotherapists, and care workers for allowing me to accompany them while they worked. Losing one's health is an especially traumatic experience; I have immense gratitude for the patients who agreed to share their journey of recovery with me.

And finally, I would like to recognize my family for watching over and nurturing my sons David, Cameron, and Geordie while I was living in Alberta or at home, secluded in my office writing. Thank you to my mother and father, my sister Carla, my brother Gerald, my Zia Carol, and my cousin Eileen. Behind every successful woman is a *sometimes* impatient man; thank you Sandy for holding the fort through thick and thin!

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Glossary of Terms

The following terms are used throughout the document and have the meanings set forth below:

Activities of daily living (ADL)	A general term that referring to activities involving "functional mobility (ambulation, wheelchair mobility, bed mobility and transfers) and personal care (feeding, hygiene, toileting, bathing and dressing)" (James, 2008, p. 539).
Activity limitations	Dysfunctions in ADL and IADL (Fricke, 2010).
Adaptive clothing	Modified garment design to facilitate patients and caregivers in the ADL of dressing (Banks, 2001). Ready-to-wear garments may be modified after purchase or specially designed and manufactured to meet the needs of end users.*
Clothing environment	The setting or conditions in which a particular activity is carried on†
Clothing taskscape	The clothing taskscape includes any activity that influences an interaction between the body and the clothing worn. In its most generic sense this includes selection, donning, doffing, toileting, care, and storage. In a rehab environment these activities are more diverse and include selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing. In practice, the clothing taskscape may be customized for any situation; it simply involves observation and identification of the core activities performed with clothing within a specific environment.*
Competence or functional abilities	The ability to do something successfully or efficiently†
Dependence	The state of relying on or being controlled by someone or something else (i.e., necessitating someone's assistance to do an activity)*
Design	As noun: A plan or drawing produced to show the look and function or workings of a building, garment, or other object before it is made† As verb: Decide upon the look and functioning of a garment, typically by making a detailed drawing of it†

Disability	A physical or mental condition that limits a person's movements, senses, or activities. According to Verbrugge and Jette (1994), "Disability is not inherent in a person, it is a relationship between a person and her/his environment" (p. 9).
Disablement	"The impact that chronic and acute conditions have on the functioning of specific body systems and on people's abilities to act in necessary, usual, expected and personally desired ways in their society" (Verbrugge & Jette, 1994, p. 3).
Doffing	Removing (an item of clothing)†
Donning	Putting on (an item of clothing)†
Dress	As noun: A one-piece garment for a woman or girl that covers the body and extends down over the legs. Clothing of a specified kind for men or women† As verb: Put on one's clothes†
Ethnography	The scientific description of peoples and cultures with their customs, habits, and mutual differences†
Fashion	A sociocultural phenomenon in which a preference is shared by a large number of people for particular styles that change periodically and are replaced by other popular styles (Tortora & Keiser, 2014, p. 140).
Functional clothing	Garment designs that prioritize attributes that meet the users specific needs in addition to aesthetic characteristics*
Functional limitation	"Restriction performing fundamental physical and mental actions used in daily life by one's age-sex group" (Verbrugge & Jette, 1994, p. 3).
Identity	The characteristics determining who or what a person or thing is†
Instrumental activities of daily living (IADL)	"Instrumental activities of daily living functions are concerned with a person's ability to cope with her/his environment in terms of such adaptive tasks as shopping, cooking, housekeeping, laundry, use of transportation, managing money, managing medication and the use of the telephone" (Katz, 1983, p. 723).

Ready-to-wear	Apparel that is mass produced in standard sizes (Tortora & Keiser, 2014, p. 340).
Self-image	The idea one has of one's abilities, appearance, and personality[†]
Task/taskscape	A task is "any practical operation carried out by a skilled agent in an environment as part of his or her normal business of life"; a taskscape is "an array of inter-related activities" (Ingold, 1993, p. 158).
Well-being	The state of being comfortable, healthy, or happy[†]

[†] *Oxford Online Dictionaries*.
* Author's definition.

CHAPTER ONE: INTRODUCTION

Clothing is a fundamental part of our material culture; it is designed, manufactured, worn, washed, and eventually discarded (Miller, 2005). Since all people wear clothes "in the ordinary business of life" (Westney, Brabble, & Edwards, 1988, p. 129), the relationship between people, their clothes, and their environment is an issue that is universal. The act of putting on and taking off clothes may be taken for granted, yet in practice, the physicality of dressing requires balance and a synchronized set of movements. When the ability to dress oneself is limited or lost due to illness, injury, disease, or surgery, the reliance on relatives or other caregivers to perform this very intimate and fundamental task impacts one's sense of self (Charmaz, 1987; Corbin & Strauss, 1987). Independently dressing oneself is a critical activity of daily living (Bradley & McAlister, 2008), and anything that impedes an individuals' ability to dress with ease or prohibits them from independently dressing at all triggers two very different trajectories that define people's interactions with their clothing and environment. The inability to dress oneself increases the burden of care, while resuming dressing and other activities of daily living after a disabling event promotes a sense of normalcy. People's relationship with their clothing is magnified within a rehabilitation setting, yet few researchers have investigated apparel needs within this context.

This research employed a human-centred design philosophy, using ethnographically oriented methods of observation, combined with interviews, to systematically investigate parameters for the design of functional apparel for patients in rehabilitation therapy (RT). Rouse (1991) posits that human-centred design is focused "on the roles of humans in complex systems" (p. 2). Responding to a design problem in this way prioritizes solutions that "enhance human abilities, help overcome human limitations … and foster user acceptance" (Rouse, 1991, p. 4). Norman (2013) elaborates by stating "the discipline called human-centered design is to ensure that the result fits human desires, needs and capabilities" (p. 218) and "that the resulting product is understandable and usable, that it accomplishes the desired tasks, and that the experience of use is positive and enjoyable" (p. 219). In the RT environment, many people interact with clothing, patients, their family caregivers, therapists or care workers. For practical purposes, these people are referred to as "users." While user needs are central to the criteria used by designers who develop functional clothing, the process to assess required garment attributes and evaluate the effectiveness of the design may not include the multiple ways that

people interact with their clothing in a systematic manner. Because complex situations demand a more holistic view, this research modeled the assessment of clothing needs upon a user journey map (Martin & Hanington, 2012), which I've called the clothing taskscape. A user journey map, also referred to as experience mapping (Adaptive Path, 2013) is a model used for conducting consumer research that documents a person's interactions with a "product or service over a period of time" (Martin & Hannington, 2012, p. 196). A user journey map is made up of touch-points to identify each interaction experience between the user and the product or service, to target discovery of latent and unmet needs (Richardson, 2010). Thus in this study, clothing is a product, widely defined to include all textiles that come into contact with the body during a person's enrolment in an in-patient hospital RT program (clothing, footwear, and other textiles such as towels). As will become evident in the results section, users of clothing in this setting are not simply the patients enrolled in RT but also the personal support workers (PSWs) who provide dressing aid and the therapists who guide remediation of strength and associated dressing skills.

This introductory chapter begins with an overview of my background and approach, followed by the purpose and justification of this study. The next section describes the clothing taskscape, its inspiration and initial structure as a means of mapping the use scenario. The following section discusses the theoretical underpinnings of the study, firstly that clothing is our near environment (Watkins, 1995), which is important in a RT setting because our environment influences optimal functioning (Lawton & Simon, 1968) and secondly because disability and disablement are manifested only when there are gaps between people and their environments (Nagi, 1991). The final sections of this chapter include the significance of the study, the conclusion and an overview of the thesis structure.

Researcher Background and Approach

Hammersley and Atkinson (2007) remind us of the fundamental concept of reflexivity, in that "we are part of the social world we study" (p. 18) and thus bring personal values and beliefs that have "an effect on the social phenomena we study" (p. 15). With this in mind, I wish to be transparent about my motivation, background, and approach to this research in order to acknowledge how such factors affected the study's design and how I collected and analyzed data.

To begin, I am a fashion designer and a researcher who looks at issues integral to functional apparel design for marginalized populations. My impetus to become a fashion

designer was governed by the desire to learn the craft of making beautiful clothes that in turn allowed women to feel beautiful. My fashion design education focused on apparel production rather than haute couture methods, and after graduation I embarked upon an entrepreneurial path. Along the way I discovered that fashion runways present glamorous clothing options and traditional versions of beauty that are not universally attainable in the real world. Beauty is a highly esteemed attribute in North American culture, yet much of the population does not fit the stringent appearance criteria portrayed in the fashion media.

A change in the direction of my work in fashion design began in the early 1990s. A close friend, who worked as a sales executive for a radio station, was expecting a baby. She visited me, arriving from her workplace wearing what I observed to be completely inappropriate attire—essentially a dress that did little to enhance her appearance or convey her sales acumen. At the time, maternity wear for executives was a scarce commodity and many women resented spending money on a special wardrobe that would be worn only for a period of 6 months. Using my friend's frumpy dress as motivation, I began experimenting with modular concepts in maternity wear. As part of my 4th-year capstone undergraduate work, I designed a collection of maternity wear composed of five interlock knit separates that could be worn in multiple ways. This handful of garments transformed into a variety of looks, enabling a woman to wear a distinctive outfit each day of the week.

Although creating clothing for people who fit traditional ready-to-wear sizing may have some challenges, it is even more difficult to design within the realm of functional apparel due to added constraints related to commercial and economic viability. Considering the glamour associated with being a fashion designer, creating functional clothing for specialized markets was not a popular choice amoung my peers as they embarked upon their fashion careers, but I felt excited and challenged, and ultimately I had a deep sense of satisfaction working within this area. By designing clothing for diverse populations, I also discovered the strong relationship between looking good and feeling better, as fashion enhances social identity and self-image. Over time, I gravitated to projects in which design could positively impact people's lives, and I integrated inclusive and functional design principles into my practice.

Fashion styling and aesthetic elements in addition to usability are central to the design process for all products, services, and environments (Pullin, 2009). My research practice to date has focused on design solutions for extraordinary groups, specifically: improved retail

shopping environments for people with visual impairment (Yu, Tullio-Pow, & Aktar, 2015); sleepwear for breast cancer survivors (Tullio-Pow, Schaefer, Zhu, Kolenchenko, & Nyhof-Young, 2011); clothing and accessories for women with lymphedema (Tullio-Pow, Poon, Barnwell, & Nyhof-Young, 2008); a survival garment for natural disaster survivors (Ahsan & Tullio-Pow, 2015); a therapeutic garment with wearable technology for autistic infants (Dell'Agnese et al., 2011); as well as maternity wear for the Royal Canadian Mounted Police (Tullio-Pow, 1998). These projects have all focused on improving quality of life for people with unique body shapes and special needs through designed solutions that combine both function and fashion. These experiences have nurtured and honed my skills and abilities to complete the project at hand: assessing the clothing needs of people in RT.

Purpose of the Study

This research conceptualized and operationalized a way to examine clothing issues from a human-centred perspective through the clothing taskscape. The purpose of this study was to expand understanding of the relationship between personal ability and the clothing environment; determine the clothing attributes that are needed to enhance functional abilities; and examine how clothing and independence in dressing can support well-being and self-image in RT. The study's central, two-part research question was the following: What factors along the clothing taskscape impact functional limitations and self-image for people in hospital RT programs, and how can such information inform design that will address this specific populations' needs? By examining the clothing context and its meaning, this study explored the clothing taskscape as a method of mapping the use scenario to determine user needs.

Justification for the Study

Clothing is not frivolous nor is it inconsequential, it is an integral part of the rehabilitation process (Banks, 2001; Cole, 1992; Newton, 1976; Topo & Iltanen-Tähkävuori, 2010). Clothing selection provides a means of managing self-image (e.g., Entwistle, 2001), communicating messages to others (e.g., Hethorn & Kaiser, 1998) and influencing individuals' behaviour (e.g., Adam & Galinsky, 2012). Functional apparel for highly specialized use (such as sport, protection or therapeutic use) is in a class of its own, requiring an effective means of assessing user needs in order to create clothing that optimizes human performance. While methods to determine and assess the effectiveness of garment attributes in the domain of functional apparel have evolved over the last 35 years since Orlando DeJonge (1984) highlighted their importance, critical gaps still exist

and may be remedied using a more holistic approach.

Within the rehabilitation setting, occupational therapists (OTs) acknowledge the challenges of dressing (Mann et al., 2005) and train patients to use specific dressing methodologies (Christie, Bedford, & McCluskey, 2011; Fletcher-Smith, 2011; Fletcher-Smith, Walker, & Drummond, 2012; Suzuki et al., 2006; Walker & Lincoln, 1990, 1991; Walker, Walker, & Sunderland, 2003) but have largely ignored the capacity of specially designed clothing as a means to improve dressing competence. Functional clothing may reduce the burden of care (Nevala, Holopainen, Kinnunen, & Hänninen, 2003) and improve dressing abilities (Wang, Wu, Zhao, & Li, 2014). Apparel design researchers have identified specific issues with particular types of garment fasteners and their location but not in conjunction with variables such as clothing silhouette (Dallas & White, 1982; Huck & Bonhotal, 1997; Sperling & Karlsson, 1989). For example, recent innovations in magnetic fasteners and their use for people with disabilities have not been evaluated at all. These factors impact how garments impede or assist with rehabilitation exercises such as dressing.

The Clothing Taskscape

My interest in mapping the user experience was initially inspired by Ingold's (1993) proposition of taskscape theory in his essay "The Temporality of the Landscape." He explains that "just as the landscape is an array of related features, so—by analogy—the taskscape is an array of related activities" (p. 158). There are many features that constitute a landscape, however while their basic elements remain constant, the landscape scene changes.The view depends on your vantage point and how the light changes over the course of the day and from season to season. As Ingold emphasizes, "it is to the entire ensemble of tasks, in their mutual interlocking, that I refer by the concept of the taskscape" (p. 158). Thus, while the essence of a taskscape will remain the same but morph slightly according to time and place, attention to the relationship between tasks and taskscape activites is also important. For the purpose of this work I do not critically examine the concept of taskscape; rather I work toward conceptualizing, developing and using the idea of the clothing taskscape as a means to better understanding the deep and complex relationships people have with their clothing.

The concept of taskscape has been used in other ethnographic studies, although unrelated to apparel design. Dunkley (2009) utilized taskscape as a means to determine the

dynamic processes that enhance the effectiveness of therapeutic places and Vannini (2011) examined passenger performance in catching a ferry. Based on my experience as a researcher, fashion designer, and apparel educator, I initially defined the clothing taskscape to include the following touchpoints: garment selection, donning, doffing, toileting, care, and storage. This definition evolved from my design practice creating functional garments for people with diverse needs. The clothing taskscape provides a lens to capture the dynamic interactions people experience during garment use in specific environments while performing multiple tasks and activities.

Within this context, selection involves personal choices regarding what to wear. The garment's functional, expressive, or aesthetic features may influence such decisions. Donning and doffing are technical terms used to describe the act of dressing and undressing. Although toileting involves similar actions to donning and doffing, it is distinct because it requires the partial removal of clothing that may occur with a sense of urgency, followed by re-dressing. Clothing care is a series of activities that includes laundering, ironing, and a consideration of soiling propensity—that is, thought must be given to a garment's performance during use and care. Storage refers to the ways we keep our garments between wear; for example, folded flat or hung on a hanger. As outlined in this research design, the clothing taskscape is further contextualized by examining the needs of people in a specific situation, namely those who are in hospital in-patient RT programs.

In order to critically implement a human-centred design philosophy, I explored, further developed, and used the clothing taskscape to guide the way data were collected and subsequently analyzed. In addition, specific clothing prototypes were implemented as cultural probes. Martin and Hanington (2012) reference the seminal work of Gaver, Dunne, and Pancenti (1999) to provide a definition of cultural probes as "provacative instruments given to participants to inspire new forms of self-understanding and communication about their lives, environments, thoughts and interactions" (p. 54). To harness the potential of this methodology, I used particular garments as clothing probes during interviews in order to illicit feedback and promote understanding of the use context and meaning of clothing for people in hospital RT, information that is essential to the design of functional apparel solutions. This setting and population were chosen because individuals enrolled in RT are extreme users; they were people outside of their home environment, and their needs and limited abilities were amplified due to the acute and

sudden onset of disability, resulting in challenges getting their limbs and core into and out of clothing. Observing the person/garment interfaces within the context of people's reduced mobility, strength and endurance as well as required use of dressing tools and compliance with OT prescribed dressing methods was integral to understanding of the range of problems encountered by people within their clothing taskscape. People's capabilities were also in flux, with improvement over the course of their stay in RT. This environment promoted comprehension of the dynamic change experienced by people with various disabilities. The research results will likely be applicable for other specialized user groups such as people who have reduced mobility, including older adults, bariatric patients and more. Dressing is an activity taken for granted until the ability to do so is reduced or lost. Whether this remains temporary or permanent, patients and their caregivers must re-evaluate their clothing choices and this information is important to apparel designers and product developers because it provides a niche for the design of clothing for the targeted population in this study.

Clothing Environments and Disablement

Human ecology provides a way of thinking about and examining the relationships between people and their environments (Westney et al., 1988). Watkins (1995) defines clothing as a portable environment, one that "is carried everywhere with an individual, creating its own room within a room and its own climate within the larger climate of our surroundings" (p. xv). In other words, because clothing is worn on the body, it creates a near environment, one that is closest to the self. This connection between self, body, and clothing is indivisible, as Entwistle (2007) describes, "the body constitutes the environment of the self, to be inseparable from the self" (p. 273). Thus, the analysis of people's clothing needs in RT must be examined by considering their body capabilities, their near and surrounding environments.

According to Nagi (1991), disability and disablement are contingent upon gaps between people and their environments. Lawton and Simon (1968) argued that the environment impacts people's functional abilities, crystalizing the relationship between competence (an individual's ability) and environmental press (the pressure exerted from specific environmental characteristics on an individual). Disability becomes evident when there is a gap between personal capability and the demands of specific activities, such as dressing. It is important to examine the clothing environment with people who have been recently disabled to discover ways to maintain the delicate balance between independent functioning and dependence. A person's

functional performance is measured along a continuum, successful achievement of tasks and goals may be improved by either increasing personal capability, through occupational therapy and physiotherapy, or by reducing environmental demands through the design of apparel that is mindful of user needs and abilities (Verbrugge & Jette, 1994).

Lawton (1977) suggests that considering human factors provides a way "to design improvements that could enhance [product] usability by the competent and make the critical difference between independence and dependence among the marginally competent" (p. 282). This is an approach that Clarkson and Coleman (2015) endorse, "design can enable or disable people" (p. 236). They elaborate on this by advocating that designers consider the needs of all users of a product or service on a bell curve, with the large central part of the curve representing people with 'average' capabilities and the smaller areas on either side of the curve characterizing those with higher or lower capabilities. In thinking about people in a RT environment, it seems reasonable to assert that clothing design and specific design features have the power to support individuals towards feeling independent and capable, or to disable them and make them feel disempowered and incapable. My interpretation of the consequences of clothing design is illustrated in Figure 1.1. Clothing attributes such as garment silhouette, fabric and fastener choices directly impact a person's ability to dress independently. The ability to dress without assistance invokes feelings of dignity, conversely, if unable to dress with ease, frustration ensues and this impacts self-image and ultimately, quality of life.

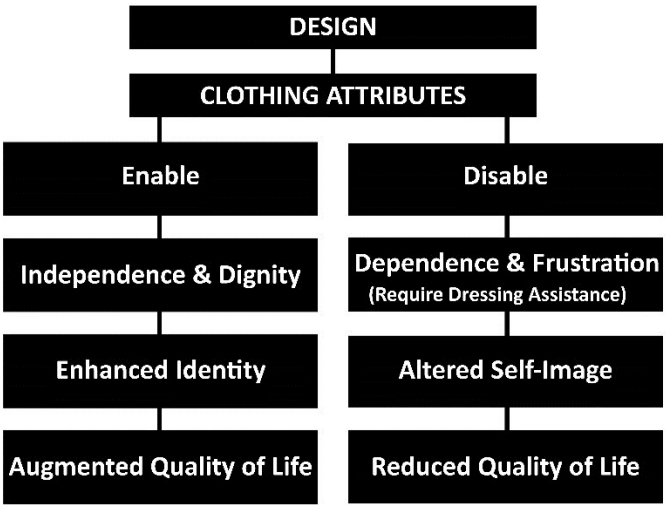

Figure 1.1. Consequences of clothing design.

Significance of the Study

In contrast to previous functional apparel design methodologies, the clothing taskscape provides a means to strucutre systematic observation and inquiry in order to assess user needs with respect to garment attributes that enhance functional abilities within a context that highlights environmental, social, cultural, and therapeutic issues. The results of this study are relevant to designers, product developers, and design educators in addition to patients, their families, and the OTs, physiotherapists (PTs), and PSWs who provide care. The recommendations derived from this research offer important information about the clothing needs of recently disabled people, sensitizing designers and product developers to the range of functional limitations encountered by people who need RT and how clothing might mediate and support people's independence, well-being, and self-image. Descriptions of functional limitations in relation to clothing enhance existing knowledge about the relationship between people and their clothing environment. Thus, designers and product developers as well as occupational and physiotherapists will be better able to improve their respective creative and therapeutic practices with people in RT.

The clothing taskscape framework used in this research is essential for design educators to teach students how to develop creative problem solving competencies. Previous studies in functional apparel design have focused on assessment of user needs, the analysis of required design attributes for specific use situations, and the evaluation of design effectiveness in apparel products created to mediate specialized needs—that is to say, *what* to look for, and *how well* a design intervention works. This study expands the design process by employing ethnographically oriented methods that utilize a *how* approach, to more holistically assess the use scenario specifically through clothing taskscape analysis.

Understanding the clothing taskscape of people admitted to in-patient RT programs may be of interest to hospital administrators, OTs, PTs, and PSWs in order to develop education materials and patient-centred policies and procedures. For example, results from this study may be used to create patient and caregiver education materials such as clothing resource guides that identify certain disabling conditions and link them to clothing solutions that facilitate independent dressing. I believe that the information collected about the clothing taskscape may be of considerable interest to OTs, because they teach and reteach people how to handle their clothing after an injury or disabling situation. Given that length of stays in hospital RT programs

have been reduced due to cuts in government health care funding, this information may also assist OTs toward improving the efficiency and long-term effect of therapy. Functional clothing may be employed as another compensatory measure, much like the reaching tools and sock aides OTs train patients to use to help them dress independently.

Chapter Summary

This research contextualizes and operationalizes the clothing taskscape to more holistically determine factors related to personal ability within the clothing environment and the impact those factors have on the functional limitations for people in hospital in-patient RT programs. This introductory chapter has provided an outline of this research study which looks at clothing within a very specialized situation: one in which people have suffered a disabling event, requiring enrolment into a hospital RT program and that has limited their ability to act competently within the clothing taskscape. Because of the intimate nature of clothing, it is clear that clothing is not simply fabric manipulated by a few strategically placed seams; rather, it has infinite capacities to "mediate relationships between the self and others" (Keane, 2005, p. 200). The focus of this study is individuals' relationship with clothing and the impact of temporary or chronic functional limitations on people due to illness, injury, disease, or surgery.

Overview of the Thesis Structure

This thesis is structured into five chapters following this introductory chapter. Chapter 2 begins with a literature review that introduces: the significance of clothing choice and how it communicates and relates to self-image and behaviour; apparel product development for ready-to-wear and functional clothing; design processes to discern user needs; as well as dressing practice in RT. Chapter 3 outlines the research design and more explicitly, the clothing taskscape framework, as well as details associated with the methodology employed, including participant recruitment, observation protocols, interview methods, including data types, analysis and coding strategies. Chapter 4 includes the results of fieldwork in the hospital's RT unit, with the data categorized according to the clothing taskscape framework. The range of taskscape activities are presented with rich description in order to expand understanding of the use scenario and the multiple factors that impact people's functional limitations and self-image. Chapter 5 discusses the results and their implication to designers, beginning with an overview of the clothing taskscape in relation to experience mapping and design recommendations that mediate the difficulties people have when dressing, specifically through consideration of fabric choices,

garment silhouettes, the circumference of garment openings, types of garment fasteners, dual waistbands, pockets, loops, and visual clues to guide garment orientation. In keeping with the aim to identify factors that impact people's functional limitations in order to inform design, the discussion of the results highlight problem garments and suggest a range of opportunities for product development, as well as the need for educational resources for patients, their caregivers, therapists and care workers. Chapter 6 outlines the contributions of this study to knowledge, design methods and education as well as patient-centred care and occupational therapy (ORT) practice. Also included are the limitations of the study and plans for future research. The final appendices section of the thesis include patient information documents provided by the hospital, diagrams of dressing maneuvers from the occupational therapy toolkit used by therapists, the observation form used during therapy sessions, a chart used to analyze precedent data, photographs of dressing boards with various fasteners and interview guides used with different participant groups as well as an example of design criteria as derived by the data using the clothing taskscape.

CHAPTER TWO: LITERATURE REVIEW

This literature review is structured into three main sections to provide an understanding of prior research related to this study. The first section discusses the significance of clothing choice in everyday life as it relates to communication, identity, behaviour, and well-being. The second section focuses on design practice and how best to assess user needs. By defining the differences between clothing designed and mass manufactured for the ready-to-wear market and that which is adapted or constructed for a special user group through a review of human-centred design, we understand the place of clothing in everyday life while distinguishing the multiple ways of looking at people within the use scenario in order to evaluate functional and symbolic clothing values. The last section of the literature review looks at rehabilitation therapy (RT), dressing practice, and how functional clothing enhances people's dressing and toileting independence.

Clothing Choice: Communication, Identity, Behaviour, and Well-Being

Clothes in their most generic form are simply "garments worn to cover the body" ("Clothes," 2006, p. 172). Yet, in reality, clothing does far more than merely cover and protect the body; it is the most visible way that individuals present themselves to the world (Entwistle, 2001) and thus people's clothing choices communicate messages to others (Barthes, 2006; Hethorn & Kaiser, 1998; McCracken & Roth, 1989). Eco (1979) established that clothing is a code, a semiotic process in which messages are conveyed, and interpreted, based on the clothing we wear. Davis (1992) emphasizes that the inherent challenge with clothing is code translation; that is, comparing the relative clarity of speech, with its governing syntax rules, to the ambiguity of fashion symbols and their significance, a sentiment first expressed by Stone (1962). Clothing conveys an array of information about the wearer, including age, gender, occupation, socioeconomic status, marital status, interests, values, and attitudes, including mood and personality (Ryan, 1966)—or what might collectively be known as identity. Kaiser (1985) defines identity as "the self-in-context, a self that is embedded in social relations and situations" (p. 96). Thus, clothing becomes an "extension of the body and acts as a second skin in establishing the physical boundaries of the self" (Horn & Gurel, 1981, p. 138). As such, there are merged boundaries between the body and self as well as clothing and dressing.

Identity

Davis (1992) claims that our social identities do not remain the same throughout the life course. Chronic or temporary fluctuations in health and well-being due to illness, injury, surgery,

or disease—and the resulting changes in personal functional abilities—impact our sense of self (Charmaz, 1987; Corbin & Strauss, 1987; Mattingly, 1998). If people are unable to complete fundamental activities like dressing themselves independently, they must accept assistance from others. The loss of ability and independence in one's own personal care can be traumatic as these are activities people have been in control of from a very young age. Corbin and Strauss (1987) suggest that chronic illness is accompanied by "body failure" which manifests through a person's ability to perform an activity (like dressing) and through appearance (clothing); failure in one or both areas affects "the inner core of a person's being" (p. 250). Because dressing is viewed as a fundamental activity of daily living, clothing that promotes dressing independence after a disabling event "can act as identity boosters which enhance conceptions of self" (Corbin & Strauss, 1987, p. 257). Thus functional clothing that enables independent dressing becomes an important way to mediate identity and self-image, in fact creating a "restored self" (Charmaz, 1987, p. 287) in the wake of changes in health status. If, as Lurie (1981) describes, "To choose clothes, either in a store or at home, is to define and describe ourselves" (p. 5), then clothing choices should expand or develop in tandem with ever-changing social identities corresponding with changes in health and functional abilities. The findings from these studies support the value of clothing as a means to manage self-image.

Behaviour

While it is accepted that clothing, identity, and self-image are closely linked, a number of researchers have investigated the effect of clothing on individual behaviour as well as on the actions of others, thus suggesting important associations between people and their environments. The rationale behind garment selection and clothing's effect on behaviour (i.e., thoughts, feelings, actions) as well as individuals' perceptions of others has been long documented (Ryan, 1966). Clothing substantiates individuals' self-image to themselves and those with whom they interrelate (Horn & Gurel, 1981). For example, research studies have investigated the power of clothing in a number of situations, including: influence of clothing on perceived intelligence among students (Behling & Williams, 1991) and teaching assistants (Morris, Gorham, Cohen, & Huffman, 1996); how women's clothing may sway recruitment decisions (Forsythe, 1990); and opinions related to job competence (Glick, Larson, Johnson, & Branstiter, 2005). More recently, Adam and Galinsky (2012) proposed that clothing elicits symbolic implications:

> When a piece of clothing is worn, it exerts an influence on the wearer's psychological processes by activating associated abstract concepts through its symbolic meaning—

> similar to the way in which a physical experience, which is, by definition, already embodied, exerts its influence. (p. 2)

Adam and Galinsky designed and executed a series of experiments to determine people's perceptions related to a white lab coat. In their research study, participants performed a series of standardized tests while wearing lab coats described to two participant groups as belonging either to a doctor or to an artist painter, respectively. Individuals who were told they wore medical coats had improved selective attention and achieved higher accuracy scores in the standardized tests. The research team coined the phrase "enclothed cognition" to describe how symbolic clothing attributes are manifested with the physical act of wearing specific garments. Such studies suggest that clothing may influence behaviour and people's perceptions of others.

Well-Being

In light of these important psychological and behavioural effects, clothing and medical textiles may also be used as a therapeutic interventions, providing people with a means to enhance healing or better cope with the effects of disease. For example, medical gowns protect the wearer against bodily fluids and bacteria; garments such as hip protectors mediate the risk of hip fracture from falls; and compression garments enhance healing and reduce scarring of severely burned skin (Sau-Fun et al., 2011). In a recent interdisciplinary project, a team of biomedical engineers, neuroscientists, medical clinicians, and caregivers came together to create pants integrated with electronic wearable technology to stimulate muscles and thus prevent pressure ulcers (Wilson, Mushahwar, Chan, & Kawasaki, 2011). In a study by Barnwell, Tullio-Pow, and Nyhof-Young (2009), faculty from a university fashion design program paired with an urban cancer research hospital to determine the wardrobe challenges faced by female breast cancer survivors with lymphedema, a condition that manifests as fluid accumulation and swelling in the arm and hand on the affected side. In response to concerns identified in focus groups, the design team created a modular purse with an arm sling integrated into the back of the bag[1]. A belt and wrist strap were also constructed to work with the modular bag components. Participants reported that in comparison to a traditional arm sling, the modular bag became a

[1] Patents: 2009 (Canada) – Sling for a Handbag. Industrial Design Certificate of Registration No.: 124353. 2009 (USA) – Sling for a Handbag. Patent No.: US D587,457 S.

fashion accessory that allowed them to unobtrustively rest their swollen arm in their handbag while still projecting a stylish image. The sling provided comfort and enabled women to avoid awkward questions about "how they hurt their arm." This study verified the importance of looking good in order to feel better. Specially designed objects such as the modular bag and belt can act as a fashionable prosthetic, supporting the wearer's arm as well as improving self-image and well-being.

This compilation of evidence supports the importance of clothing choice in terms of managing self-image through appearance and nurturing the self. Clothing not only covers and protects the body, it influences behaviour on multiple levels, that of the wearer and the perceiver. Additionally, it provides important therapeutic value. Given the depth and implications of clothing's meaning, my position is that clothing should be available and accessible by all people, especially people in RT.

The Design Process: From Ready-to-Wear to Functional Apparel

Apparel designers approach clothing design development in multiple ways depending on the intended target market. Categories include mass produced ready-to-wear and functional apparel. While clothing once may have been exclusively stitched at home by the wearer or carefully crafted by tailors or dressmakers for specific individuals, the bulk of fashion apparel produced today is ready-to-wear, meaning that it is mass manufactured for the general public and sold at brick-and-mortar retailers or through associated print and on-line catalogues (Diamond & Diamond, 2008). Although clothing designed for ready-to-wear markets and functional apparel share similar phases of development, there is a fundamental difference and that centres on the prioritization of user needs. Ready-to-wear fashion and functional apparel are mass manufactured; however, functional apparel is targeted to a more specific market of end users, catering to people engaged in specialized activities within a specific-use environment which Gupta (2011) categorized into six classes including: protective, medical or therapeutic, sports related, vanity (i.e., body shaping), wearable technology and clothing for special needs. Thus functional apparel may serve a highly specialized set of needs depending on the end user and the environment (i.e., astronauts in space). However, ready-to-wear apparel may also benefit from functional design approaches. A human-centred design philosophy supports functional clothing development (Rouse, 1991).

Development of Ready-to-Wear Fashion

In order to better contextualize user needs and how required garment attributes are prioritized in the design of clothing, it is important to understand how ready-to-wear clothing is developed. While recent developments in computer aided design, 3-D body scanning and digital printing offer some promise in faster garment prototyping and mass customization of apparel products, most clothing is still produced using the traditional process illustrated in Figure 2.1 (Kincade, Regan, & Gibson, 2007). The product development process for ready-to-wear fashion and accessories relies on collaborative efforts between sales and marketing people as well as those in design and manufacturing. Apparel production sources have moved from domestic to overseas manufacturing facilities, requiring longer lead times (Diamond & Diamond, 2008). In addition, this development cycle faces greater time constraints as new products are now available to consumers on a monthly basis, rather than at seasonal milestones (spring/summer, fall/winter, and holiday) common only a decade ago. Within this development scenario, there is little time to specifically determine and assess user needs, and designers rely instead on customer profiles that are derived from filtered data sets compiled by marketing consumer researchers.

According to McKelvey and Munslow (2012), traditional apparel design development follows a number of phases (see Figure 2.1). Target market information typically includes demographic parameters such as age, occupation, income, marital/family status, and retailer preferences. Marketing and sales representatives augment this information and provide guidance on best-selling styles from the previous season. While the order of activities within the fashion product development cycle may differ, it will include a trend analysis with a review of industry forecasting publications that provide seasonal reference on styles, silhouettes, colours, print motifs, and fabric trends.

Designers interpret such information and translate applicable elements to create collections that are suitable to the brand's target market. Sometimes a company will develop a persona of their target customer. Personas provide a human reference to bring demographic information to life and typically include a photograph and a description of lifestyle and behaivour attributes (Martin & Hanington, 2012). Fabrics are sourced in tandem with planning colour stories and line development (groupings of garment styles according to a theme) within the season's collection. Designs are sketched and critiqued, selected styles are drafted into patterns or draped directly on the dress form, and prototype garment samples are sewn in factory-

grade muslin or fashion fabric. Garment fit and styling (to assess garment details, shape and proportion) are evaluated on a dress form or human fit model. Style and fit modifications are decided upon, corrections made to the pattern, and sometimes additional muslins are fabricated and evaluated as the designer moves to perfect the garment prototype. Product costing is determined. Upon final approval, clothing samples are duplicated and provided to sales representatives who in turn show the collection to retailers. Garment styles that are approved for production undergo a final stage of development, this includes perfecting the pattern for mass manufacturing, developing specifications, and grading for sizing.

All of these activities are done with minimal direct input on design concepts from the customer/end user who will buy and wear the clothing produced. As such, ready-to-wear clothes are designed and mass manufactured to appeal to the general population within the intended target market, yet as each garment size works only for a subset of the population may not be viewed as a universal design. Universal design (sometimes referred to as accessible design) is defined as "the design of all products and environments to be usable by people of all ages and abilities to the greatest extent possible" (Story, 2001, p. 10.3). The European term "design for all" promotes design that accommodates a maximum number of users (Iwarsson & Stahl, 2003, p. 61). However, within the realm of clothing, it is not feasible to design one garment for everyone to wear, that is, ready-to-wear clothes intended for children are in no way appropriate for adults. For a comprehensive history of inclusive design, see Clarkson and Coleman (2015). As suggested by Waller, Bradley, Hosking and Clarkson (2015), "Inclusive design is about choosing an appropriate target market population for a particular design, and making informed decisions to maximise the success criteria for the target market" (p. 299). Thus, an understanding of the types of design features that exclude use (as described by Clarkson, Waller & Cardoso, 2015) or make dressing difficult is useful to designers. Knowledge of the necessary garment attributes that might be incorporated into different styles would likely enhance usability in ready-to-wear clothing for the general population. While the assessment of user needs and the need to respond to those requirements is evident, a design conundrum remains: should design be highly specialized to meet users' unique needs or widely applicable to satisfy a range of needs?

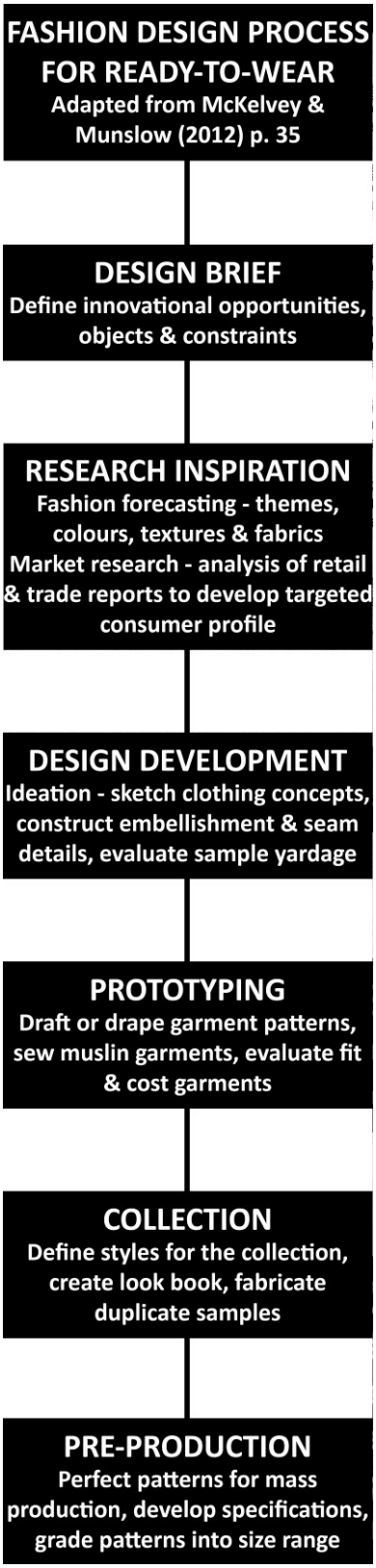

Figure 2.1. The ready-to-wear fashion design process.

The Functional Design Process

While traditional clothing design for ready-to-wear markets begins with statistical information about people such as consumer demographic and psychographic statistics, and incorporates seasonal colour, and trend forecasts, it does not feature direct contact between the designer and the target market (the user). Conversley, functional clothing design typically draws on information directly from the user in one-on-one interactions. Placing a higher priority on consumer needs promotes development of design solutions that enhance human performance (Norman, 2013; Rosenblad-Wallin, 1985; Watkins & Dunne, 2015). Functional apparel is one way to integrate human-centred design principles because people operating within many of the functional clothing categories identified (i.e., sports, protective workwear, medical/therapeutic, disability and smart textiles) need to achieve optimal performance (Watkins, 1995; see Figure 2.2). Considering how clothing might optimize human performance helps conceptualize design, or more specifically here, clothing attributes that might help certain people in RT perform dressing tasks independently, and how such attributes could be integrated into clothing. Such questions are part of the clothing taskscape because people are dynamic and their interactions with clothing must be examined during activity.

Thoughts of functional, practical, and utilitarian fashion may conjure visions of drab, stark, and somewhat unattractive attire. There is a misconception that design, form, and beauty must be sacrificed in order to achieve functionality, and Lamb and Kallal (1992) contested this claim, arguing that "The challenge for apparel designers is to create designs that will be attractive and socially acceptable on bodies that may not conform to typical contours, surfaces or motions" (p. 42). Functional designs that prioritize human-centred needs fit perfectly within a human ecology model, as this kind of clothing "optimizes human functioning" (Westney et al., 1988, p. 129).

Bearing these words in mind, apparel researchers have refined the functional apparel design process over the last 35 years. The conceptual frameworks related to functional apparel design are very similar, with minor differences corresponding to phases of inquiry and analysis (LaBat & Sokolowski, 1999; Orlando DeJonge, 1984; Orlando Yep, 1979; Rosenblad-Wallin, 1985; Watkins 1995). Orlando Yep[2] (1979) first identified the fundamental difference between ready-to-wear apparel and functional clothing, as well as the need to systematically structure the

[2] Author's name changed from Jacquelyn Orlando Yep (1979) to Jacquelyn Orlando DeJonge (1984).

design process. She presented a 7-step research framework adapted from a design process model created by Jones (1970), and the framework was further developed and included as the Forward in Watkins's (1984) classic text *Clothing: The Portable Environment*.

Figure 2.2. The functional apparel design process.

In so doing, Orlando Yep (1979) articulated a fundamental departure from the established "black box" intuitive, designer-led creative process, advocating instead a "glass box" approach (p. 128), one that examines the clothing development process centred on dividing the design problem into specific elements to facilitate analysis in a transparent and systematic manner. This framework for functional design emphasized interaction with end users through observation (i.e., activity and movement assessment) and interviews in addition to relevant literature review and market analysis in order to fully define the research problem. Orlando Yep also proposed that designers chart, weigh, and rank criteria derived from their research investigation to prioritize essential design attributes. Textile testing and an evaluation of construction techniques were also integral to the process.

The assessment of user needs was further enhanced by Rosenblad-Wallin's (1985) 9-step design process, which provided additional clarification to focus clothing research and analysis, namely through determination of user needs and the demands of the use situation, looking both at activities and objects. The design process described also emphasized the categorization of needs according to functional and symbolic values. Functional attributes included those related to protection, security, survival, climate, environment, aspects of comfort such as thermal, garment weight, and ease of movement as well as fit, pressure, friction, garment hand, and static. Symbolic attributes included those related to self-esteem, well-being, group membership, fashion styling, adornment, and respectability. Rosenblad-Wallin also elaborated how the designer might derive and better understand the user/clothing interface with a comprehensive list of methods that included interviews, questionnaires, focus groups, participant diaries, lab and field observation, literature search (including archives and statistics), anthropometric measurements, and environmental mapping.

Conceptualizing User Needs: FEA and Other Models

Defining user needs and the demands of the use situation are critical in order to explore the design context in a meaningful way. Lamb and Kallal (1992) refined use value and symbolic design attributes as outlined by Rosenblad-Wallin (1985) and developed the functional, expressive, and aesthetic (FEA) consumer needs model. The FEA model unifies functional and fashionable design elements providing a way to assess the contextual relationship between people, their clothing, and their environment. Their model is depicted using architecture consisting of concentric circles, with the "target consumer" in the centre (see Figure 2.3).

Figure 2.3. FEA consumer needs model (Lamb & Kallal, 1992, p. 42).[3]

Lamb and Kallal (1992) suggest beginning the design process by creating a user profile with details regarding body characteristics, day to day activities, and preferences categorized according to "needs and wants" (p. 43). Within the FEA model, "culture" surrounds the target consumer. Clothing must be considered within the milieu of society and culture as those are the environments in which people live and play. Our ethnicity, background, principles, and beliefs influence our clothing choices and consequently the way of presenting ourselves in the world (Kaiser, 1990).

In the FEA model, design criteria are categorized as functional, expressive, or aesthetic. Functional details are concerned with protection from the environment, thermal comfort (balance against heat loss or gain), fit, and mobility, with special attention to garment shapes and fastening systems that allow one to dress and undress easily. Expressive details correspond to the symbolic meanings of dress—those related to dignity and self-esteem. Aesthetic details include aspects that relate to beauty; visual elements such as line, colour, form, and texture; as well as design principles of unity, focal point, rhythm, and harmony.

Conceptual diagrams such as the FEA model may be criticized because they attempt to simplify a multifaceted set of interactions. Sterman (2002) suggests that model boundaries

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[3] Reprinted with permission from Sage Publications.

create “invisible fences in the mind” (p. 511). Humanity is complex and requires a detailed and refined understanding of people and human nature, which may not be realized with simplistic thinking because “just like snowflakes, no two of us are alike” (Moore, 2012, p. 11). The real value of the FEA model is that it offers a place to begin systematic thinking about user needs more holistically within a given context; the framework also provides a viable method to thematically analyze clothing attributes.

Modifications to the FEA Model

Clothing researchers have continued to hone the ways that user needs might be better assessed and articulated to improve design outcomes since Orlando Yep (1979) first suggested the importance of systematically developing functional clothing. The FEA model is often cited in the field of functional apparel design, and most recently has been adapted by clothing researchers exploring user needs within diverse contexts. Chae and Schofield-Tomschin (2010) modified the FEA framework by adding regulatory requirements to functional, expressive, and aesthetic considerations, thereby creating the FEAR model to facilitate their research regarding the design characteristics needed for snowboarding helmets.

Stokes and Black (2012) revised the FEA model in their research which assessed the clothing needs of adolescent girls with disabilities. Their model included dotted rather than solid lines dividing the FEA classifications within the circle to accommodate the interrelationship between these attributes. An additional outer circle surrounding the original model includes consideration of the interface between the garment, body, and near environment (see Figure 2.4). Kallal, Keiser, MacDonald, and Stefan (2002) combined the FEA model with the Clothing Purchase Decision-Making Factors (CPD) model (MacDonald, Bua-Iam, & Majumder, 1994) to create the Apparel Product Appearance Factors (APAF) framework geared to the design of clothing for older adults (see Figure 2.5). This model augments FEA attributes with additional criteria categorized as Forms: body mass, silhouette, and posture; Expressions: skin, hair, and eye colour; and Motions, which include an individual’s range of motion, gait, limb use, and need for assistive devices (MacDonald, 2010).

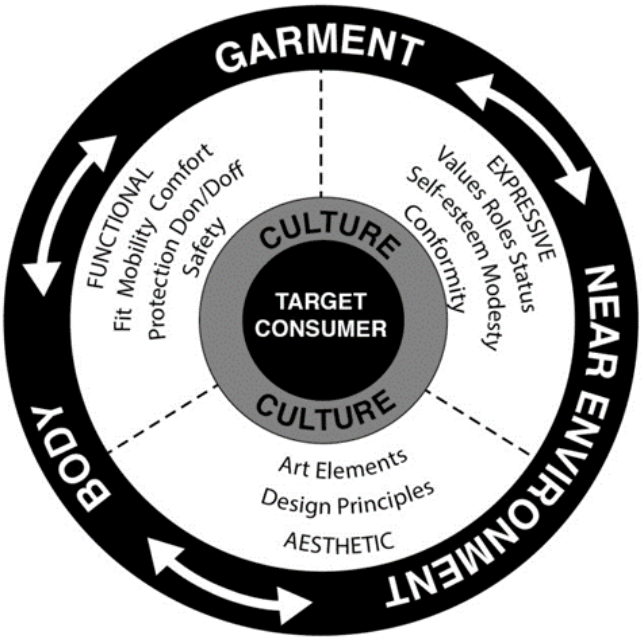

Figure 2.4. Modified FEA model (Stokes & Black, 2012, p. 185).[4]

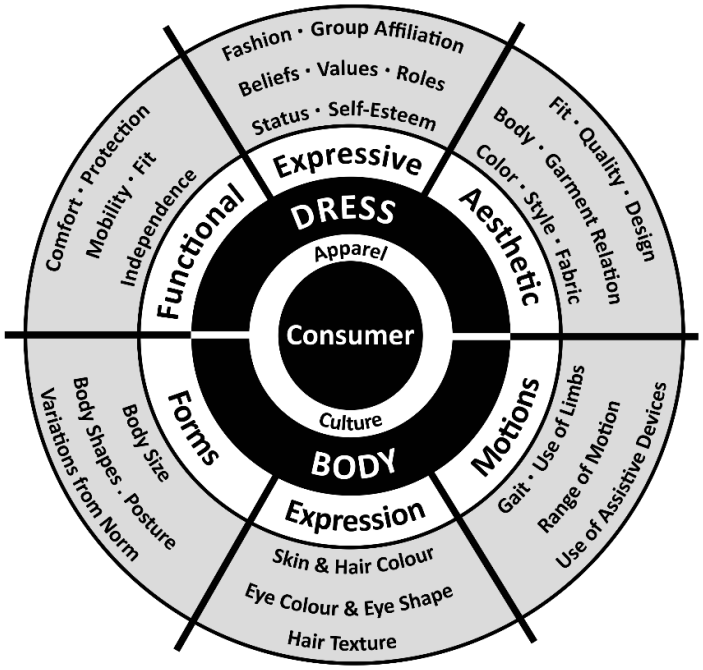

Figure 2.5. Apparel product appearance factors (Kallal et al., 2002).[5]

[4] Reprinted with permission from Taylor & Francis.

[5] The model is also published in MacDonald (2010).

Design Anthropology: Exploration and Complexity

As outlined in the previous section, there are many ways to determine people's clothing needs. Identifying the sheer diversity of user needs and their analysis is a complex undertaking. The synthesis of needs and their translation into product design may manifest as "wicked problems" (Rittel & Webber, 1973, p. 160). So-called wicked problems involve poorly defined issues that may be viewed from several vantage points, each of which has its own unique, best-fit solution (Vicente, Burns, & Pawlak, 1997).

Designers and marketers are continually looking for ways to synthesize the complexity that is inherent in the assessment of user needs and the ensuing product development process. Design anthropology is a hybrid practice that seeks out the interconnections between what people think, feel and do in order to design products, services and environments that are in tune with human nature (Tunstall, 2008). Using an anthropological method like ethnography is now common place in design companies, for a detailed narrative as to how ethnography became established in the design community, see Wasson (2000) and Nova (2014). Salvador, Bell and Anderson (1999) state that "design ethnographers … look deeper into what people do, what tools they use, and how they think to understand how to better make and sell products" (p. 35). Mariampolski (2006) advises that ethnographic methods are well suited to exploring people and situations that the design team may be unfamiliar with, suggesting that moving from traditional research methods to ethnography "is somewhat like moving from black and white to colour the immediacy of the smells, textures, tastes, heat, sounds, movements and muscular strain all stimulate an enriched level of understanding" (p. 17). Hanington (2000) describes adapted and innovative research methods that are derived from traditional ethnographic approaches, endorsing their value in teasing out how people behave with "designed artifacts…in natural settings of work, home and play" (p. 14). For example, Strickfaden and Devlieger (see Devlieger & Strickfaden, 2012; Strickfaden & Devlieger, 2011a, 2011b) used an anthropological approach when looking at the redesign of the Brussels Metro for people with visual impairment and blindness. In their study, they detail the importance of considering disability in situ and identify how very simple things are revealed by approaching the design problem as complex. While the use of ethnographic methods yields a rich and complex yet rather messy data set, they also provide a fertile breeding ground for

innovation, however, the domains of business and marketing are more comfortable with familiar, traditional consumer behaviour models (Graffam, 2010).

One way to structure the inherent complexity of anthropological approaches is to operationalize ethnographic methods to create a consumer journey map (Richardson, 2010). Consumer journey mapping traces the interactions that a consumer has with a product, service or environment, with special attention paid to time and place as well as what people are "doing, thinking and feeling" (Adaptive Path, 2013, p. 9). The key moments from the consumer journey are then analyzed and depicted visually in a model to illuminate the best and worst experiences. The filtered information contained within the consumer journey map is then manageable, experiences that are problematic become innovation opportunities and are then used as a "catalyst" to action (Adaptive Path, 2013, p. 25).

Functional apparel design prioritizes people-centred needs, desires, expectations, and preferences to incorporate clothing solutions that enhance performance (Lamb & Kallal, 1992; Rosenblad-Wallin, 1985). Approaching design from this perspective demands a thorough understanding of people's interactions with their clothing. Watkins and Dunne (2015) advocate that the assessment of needs centre on the user, the task and the environmental context. Squires (2002) notes that "the role of research in the creative process is to discover and draw out design implications of real cultural phenomena" (p. 103). Figure 2.6 illustrates my interpretation of the three research platforms identified by Squires that support product development: discovery, definition, and evaluation.

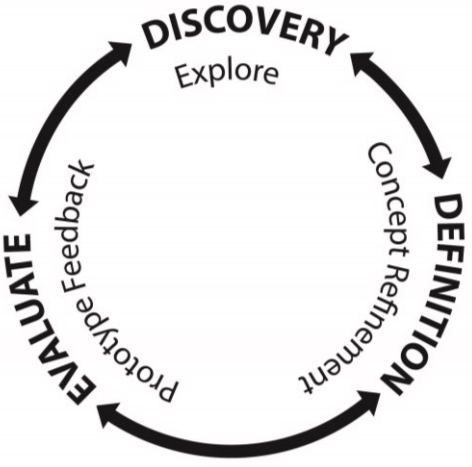

Figure 2.6. Research platforms identified by Squires (2002).

In considering the research platforms identified by Squires, discovery is exploratory, geared toward unearthing new product/service ideas or novel uses for conventional/emerging technologies. Definition isolates concepts and develops them into product ideas. Evaluation utilizes a developed prototype to gather consumer feedback on usability in order to refine design details and preferences.

Practical Challenges

My research approach has been situated within the discovery and definition research platforms through analysis of user needs along the clothing taskscape. My previous research in functional design has focused on design processes by Orlando Yep (1979) and Watkins (1995) as well as Lamb and Kallal's (1992) FEA model. As an apparel educator who teaches textiles, however, it has become apparent to me that serviceability is not explicit within these design models. Kadolph (2013) defines serviceability as the "measure of a textile product's ability to meet consumers' needs" (p. 22). This includes thinking about fabric choices in relation to a number of concepts, which include fabric performance, aesthetics, durability, comfort, appearance retention, care, sustainability and cost.

Drawing from experience using the taskscape concept with the assessment of usability for people with low vision or blindness as they navigated shopping malls, I considered all of the clothing interactions people might have while in a hospital RT program to determine the components of the clothing taskscape as a way to discern patients' apparel needs. In so doing, I acknowledge that the more complex the design problem, the more crucial it is to define the problem well. Christiaans (1992) indicates that "the more time a subject spent in defining and understanding the problem, and consequently using their own frame of reference in forming conceptual structures, the better able he/she was to achieve a creative result" (as cited in Dorst & Cross, 2001, p. 431). My work is situated in this design philosophy, whereby exploring in-depth human wants, needs, desires, and expectations are put to the forefront of designing. Therefore, the following section explores methodologies that best address user needs in relation to apparel design problems.

Pricing and selling unique design solutions for RT patients may be problematic from manufacturing and marketing perspectives. According to Watkins (1995), "the size and wealth of the group that needs special clothing is often perceived to be insufficient to merit the

investment in design development and production" (p. 331). Carroll (2015) attests that the ready-to-wear fashion industry has disregarded the needs of consumers who are temporarily or permanently disabled. Design and associated approaches are governed by philosophical worldviews (Creswell, 2009). Paradigms are integral to our world view as they encompass basic beliefs and values that situate our thoughts and guide our actions (Guba, 1990). Sometimes there are disconnects between the currently held paradigm and reality, meaning there are societal anomalies that cannot be explained, which over time instigate a shift toward a new set of beliefs. Some designers inherently enjoy making beautiful things, an activity that exemplifies "façade design" (Norman, 2007) if beauty and form are prioritized over function. This idea is further integrated when people view the exaggerated fashion concepts presented on publicized runway shows and question who in society wears the clothes presented. Other designers believe that their talents can and should be used to improve quality of life (Berman, 2009). But as Carroll (2015) notes, "fashion operates on a mass market model" in which economic and commercial realities are part of the decision-making process for brand managers, and thus "consumers who are differently abled have had no place in this paradigm, as their needs are considered too specific to address in the mass market" (p. 181). It appears that the time required to gather and assess human needs within the use scenario along the clothing taskscape is not viable for ready-to-wear clothing development (Holston, 2011).

The FEA model, as well as the adapted frameworks described above, extend priorities in relation to functionality and performance through careful analysis that considers the many environments in which we wear apparel. Every person, regardless of demographic characteristics and categorization within a defined target market, has individual clothing needs, desires, expectations, and preferences that clothing designers need to consider. While modifications to the FEA model extend the analysis of user needs in a variety of ways, there are gaps in analysis, as we will see in the following research studies. An all-inclusive assessment of people's needs along the clothing taskscape (i.e., selection, donning, doffing, toileting, care, and storage) provides a way to examine the use scenario more holistically.

Methods of Defining User Needs

Discerning user needs and defining them well are critical to the design process, a deceptively complex undertaking. As outlined by Orlando Yep (1979), although many design projects begin with client-based problem identification, it is essential that user needs be

reviewed within the use situation. Norman (2013) suggests that designers look beyond the "symptoms" of the real problem (p. 217) and states that "a brilliant solution to the wrong problem can be worse that no solution at all" (p. 218). As LaBat and Sokoloski (1999) observed, the client's definition of the problem may indeed be a description of a symptom, as was the case regarding the design brief for an athletic ankle brace. The client had initially characterized inferior elastic as the issue with the brace, which proved to be incorrect. Ultimately, this was discovered when the research team investigated consumer use patterns amongst multiple stakeholders, namely interviews with sales staff and customers, a survey with athletes regarding use and preferences, as well as an assessment of laundering procedures, competitors' braces, textile materials used, manufacturing process, and product returns.

The way that designers approach the assessment of user needs is the focus of the next section of the literature review. Watkins and Dunne (2015) devote an entire chapter to user-centred design with methodological recommendations to achieve this aim. Essentially these methods may be divided into three categories, defining user needs from existing data, through direct feedback from people or the evaluation of fabric and prototypes, as illustrated in Figure 2.7.

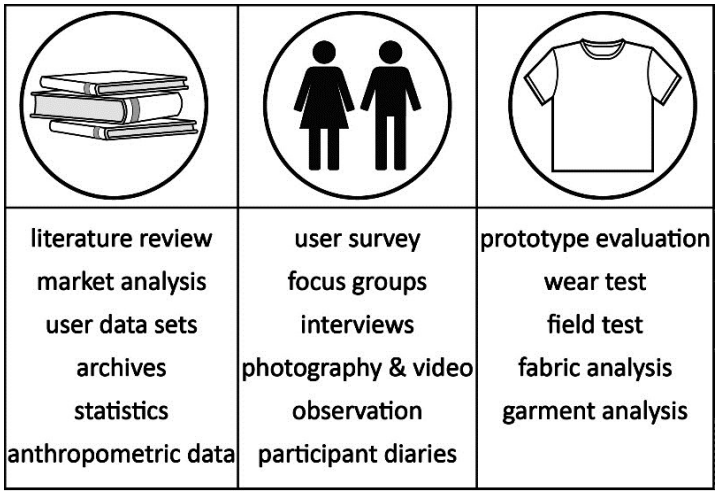

Figure 2.7. The assessment of user needs. Such assessment is achieved through analysis of existing documents, through people or the evaluation of artifacts.

Given that the assessment of user needs is critical to the apparel design process, I began searching the literature to pinpoint research pertaining to the development of functional garments

that utilized design frameworks by Orlando Yep (1979) and/or Lamb and Kallal (1992). The research studies chosen reflect the typical categories for functional apparel: uniforms, clothing for those with disability or special needs and sport. The design of functional garments typically centres on investigation of user needs *before* and *after* product development, initially to determine required design attributes and later to then appraise the effectiveness of the prototype. Some of the studies examined in this review of literature completed the entire design process from user needs analysis through product development and prototype testing; some of the researchers focused only on user needs and others only on prototype testing and evaluation.

The research studies shown in Table 2.1 utilized a range of methods to define user needs for a variety of functional apparel products including clothing for premature infants, pilots, sailors, hospital patients, adolescent girls with disabilities, as well as bicycle patrol officers. I critically assessed these studies to illustrate the variety of ways that one may determine and understand user needs in order to design functional apparel.

Methods used to collect information to inform design were categorized as follows: from existing documents and data, from people, and from fabric or garment artifacts.

Documents and Data

Designers are advised to become familiar with the user and use situation prior to collecting data. Understanding "where to look and what to look for" is a skill that is honed with experience (Watkins & Dunne, 2015, p. 4). All the research studies reviewed began investigation of their respective design problem with a foundational review of published academic literature, and some also incorporated popular or industry trade publications. For example, in order to understand the needs of bicycle police officers, Black and Cloud (2008) reviewed a number of articles from *Law and Order*, a trade magazine for police management.

Understanding what is commercially available in the market is a viable next step, this is important to order to avoid duplicating design solutions that already exist. Bergen, Capjack, McConnan, and Richards (1996) assessed garments and commercial sewing patterns for pre-mature babies to determine features and benefits, this was done in conjunction with an assessment of infant anthropometric data. Tan, Crown, and Capjack (1998) reviewed burn injury data from accident reports in order to frame their subsequent assessment of flightsuits. Cho (2006) searched patents for hospital gowns. Although not sourced in this group of research studies, other documents that may yield valuable information include company archives, trend reports, ergonomic and demographic data (Rosenblad-Wallin (1985).

Table 2.1

Summary of Studies Pertaining to Functional Clothing Development

Study	Product	Design process method	Method to determine user needs	Sample size	Categories for analysis
Bergen, Capjack, McConnan, & Richards (1996)	Sleepwear for pre-mature infants	Orlando DeJonge (1984)	– literature review – anthropometric analysis – market analysis – fabric/garment analysis – observation in neonatal intensive care units – user survey of caregivers, parents and hospital administrators – infant wear test prototype evaluation by hospital neonatal nurses	# of caregivers & parents not specified; 2 directors at large urban hospitals Prototypes wear tested on 21 infants between 2 different hospital sites	Hospital safety: – Functional (ease of use, fit & comfort) – Psychological (aesthetics) – Production (cost, manufacturing ease, stitch & seam type) Prototype evaluation: – 19 questions using a 5 point Likert-type scale that focused on evaluating comfort safety, adjustability, accessibility, aesthetics & production • Missing from the clothing taskscape: care & storage
Tan, Crown, & Capjack (1998)	Thermal protective flightsuits	Orlando Yep (1979); Rosenblad-Wallin (1985)	– literature review – market analysis – material & garment analysis – indirect observation of photographs and TV documentary – focus group interviews with male military helicopter and transport pilots (identification of flightsuit likes & dislikes) – video-taped movement analysis based on pilot simulation – prototypes produced for wear testing	18 male pilots	Thermal protection: – Functional (comfort, fit, mobility) – Psychological (styling compatibility with military image, neat) – Production/Maintenance (mass product, quality) • Missing from the clothing taskscape: toileting, care, & storage

Study	Product	Design process method	Method to determine user needs	Sample size	Categories for analysis
Bye & Hakala (2005)	Women's sailing apparel	Watkins (1995); Lamb & Kallal (1992)	– literature review – Personal interviews with competitive female sailors – 17 open ended questions – field observation – photographs of key crew positions on the boat to determine range of motion – wear test using a questions with a Likert scale	15 female competitive sailors 100 photos	– Functional: thermal balance, mobility (quick change, lightweight, toileting, pockets), safety (visibility & floatation), fit, quality & durability. – Expressive: self-esteem – Aesthetic: feminine, crew image fit. • Missing from the clothing taskscape: care
Cho (2006)	Hospital gowns	Lamb & Kallal (1992)	– Literature review (including patents) – Personal interviews with former patients and nurses – wear test using questions with a Likert scale	5 former hospital patients 5 nurses 12 females	Opinions about hospital gowns: – Patient activities – Garment problems – Suggestions for improvement • Missing from the clothing taskscape: storage & care
Black & Cloud (2008)	Bicycle patrol officers	Orlando DeJonge (1984)	– Literature review – Questionnaire with patrol officers, both open ended questions and Likert scale	238 bicycle patrol officers (male & female) from 15 different U.S. states	Product performance satisfaction (Swan & Combs, 1976) as measured by instrumental attributes (durability, fit) and expressive attributes (role, appearance) • Missing from the clothing taskscape: storage
Stokes & Black (2012)	Clothing for teenage girls with disability	Lamb & Kalall (1992)	– Literature review – Questionnaire with open ended questions that focused on FEA attributes	33 girls with disability	Functional (fit, comfort, safety, donning & doffing); expressive (self-esteem, modesty and insecurity regarding appearance) and aesthetic (concealment of assistive device, looking attractive) clothing attributes • Missing from the clothing taskscape: toileting, storage, & care

People

Communicating with people before, during, or after product development is key to the assessment of user needs. Observation is a methodology that allows the designer to become familiar with the use situation, to see garment/person/environment interfaces, all necessary steps to the formulation of relevant interview questions. Norman (2013) advocates that observation focus on activities, he acknowledges that people are different but the way that people perform activities tends to be similar, "let the activity define the product and its structure" (p. 231). Orlando Yep (1979) also suggest observing people engaged in activities as a means to assess movement, and Rosenblad-Wallin (1985) recommended that the evaluation of user needs should include an understanding of people's actions in relation to objects.

There are different ways to approach observation. Direct observation is site specific. Bergen et al. (1996) spent time watching medical personnel, infants and parental caregivers in neonatal intensive units at two different hospitals. Bye and Hakala (2005) observed male and female sailors at four different regattas with photography of sailors in key positions on the boat, which provided data for visual analysis to further define the use situation. Indirect observation is a viable method if it is not feasible to watch users in their native environment. Given the confined quarters of the cockpit of a plane, Tan et al. (1998) watched a TV documentary on planes and pilots to better understand flightsuits as well as video-taped simulations of pilots performing typical work tasks. Participant observation is a method whereby the designer tries to experience the lived realities encountered by their user. For example, the Michener Institute in Toronto has created an aging simulation suit which alters vision and restricts range of motion and hearing to mimic older, frail consumers in order to build empathy into the design process (Leung, 2015).

Observation lays the ground work for subsequent interviews because it allows the designer to formulate relevant questions. This also provides a mechanism for the validation of data because there may be differences between what people do and what they say they do (Watkins & Dunne, 2015). Questioning methods may be open-ended or use predetermined responses on a Likert-type polar scale, and be administered through a variety of formats (i.e., personal interviews, focus groups, and questionnaires). Interviewing a range of people is advised; this includes the user as well as other stakeholders involved.

Multiple methods with different stakeholder groups were utilized to assess user needs in the research reviewed, for instance, to determine the design attributes required in a hospital gown, Cho (2006) interviewed experienced nurses (n=5) and patients who had recently been in hospital (n=5). While both groups used the hospital gown their perspectives were different. Bergen et al. (1996) gathered multiple viewpoints through personal interviews with nurses and hospital administrators in addition to a questionnaire with caregivers and parents to examine problems encountered with clothing for premature infants. Tan et al. (1998) utilized focus groups with Canadian Forces helicopter and transport pilots (n=18) to discuss likes and dislikes of the current uniform as well as suggestions for improvement. Bye and Hakala (2005) investigated women's sailing apparel with personal interviews that incorporated 17 open-ended questions to male and female competitive and recreational sailors (n=25) to help define the design problem. Black and Cloud (2008) used a questionnaire to request demographic statistics and included questions that related to riding conditions and satisfaction with the current bicycle uniform (jacket, shirt, trouser, short, helmet, gloves, socks, belt, and shoes) in terms of functionality, professionalism, and role identification. Both open-ended questions and forced response questions using a bi-polar scale were included. Open-ended questions targeted suggestions for uniform improvement, detail on pockets, comfort, protection, and garment change after laundering. Stokes and Black (2012) utilized open ended interview questions that focused on participant satisfaction with a range of garments: coats, dresses, pants, shirts, and skirts. The FEA model formed the basis of questioning, and participants were asked for details regarding FEA clothing attributes. A demographic survey was used to record age, area of the body with disability, and the nature of assistive device used.

While questioning people and other stakeholders provides information that is critical in the assessment of user needs, there are issues that the design researcher must be aware of. As discussed by Watkins and Dunne (2015), "use of questionnaires … allow a designer to reach a much greater number of individuals in a much shorter period of time" (p. 7) but cautioning that it is important to formulate questions carefully which demands statistical expertise in order to accurately analyze responses. While the information derived from these types of questions will identify the scope of a problem, that is how many people experience problems with a particular issue, the data may not reveal why there are problems. The absence of detail makes the process of defining design problems and conceptualizing solutions difficult.

More importantly, asking open ended or forced response questions as the sole method of determining user needs is flawed. As highlighted by Mariampolski, (2006), there are "limitations of asking" (p. 22), in that if the researcher does not make an inquiry about a specific issue, it may not be recounted in participants' responses. Thus, asking questions specific to the clothing taskscape provides a framework for gathering detail that is important for designers. For example, many of the research studies examined did not ask about garment care. Black and Cloud (2006) authored one of the few studies in the literature review that included care data, specifically propensity of staining, static, wrinkling, and overall laundering ease. While the importance of evaluating care was identified in Bergen et al.'s (1996) evaluation, it was not included in the assessment of user needs. The care procedure used for hospital garments is of critical importance (Black & Toriel, 2013). Fibre content is a key care consideration; 100% polyester has low absorbency, reducing the ability of laundering detergent to penetrate the fibre for effective cleaning. Polyester also has an affinity to oil stains and holds on to bacteria, important aspects to consider for a garment used within a hospital environment (Kadolph, 2013). In comparison, adult hospital gowns are 100% cotton and are laundered in hot water and bleach to kill bacteria. The infant sleepwear prototype also incorporated a hook and loop tape closure (commonly known as Velcro) on a garment made of a polyester tricot knit fabric with a brushed (napped) inner surface. Bergen et al. acknowledged that care testing should be done and anticipated that lint from the brushed fabric surface would accumulate in the hook component of the tape, impacting its ability to form a secure closure. While Bergen et al. identified that the hook portion of the tape may harm delicate skin, they did not consider the snagging and abrasion it may cause to the loop structure of the knit fabric. This would occur if the hook and loop tape was not secured prior to laundering and might also occur during donning and doffing.

Bye and Hakala (2005) authored one of the few studies reviewed that included toileting and storage considerations. The quality of the fabric and associated durability issues were prioritized in the prototype; however, care procedures were not evaluated, an important performance factor considering the multiple materials and findings used in the sailing garment prototype developed.

Stokes and Black (2012) investigated the needs of adolescent girls with disabilities. Although limited information was provided regarding specific methods, it is clear from the results that interview questions were open ended and focused on participant satisfaction with a

range of garments: coats, dresses, pants, shirts, and skirts. The FEA model formed the basis of questioning, and participants were asked for details regarding FEA clothing attributes. While Stokes and Black identify the differences between ease of doffing clothing as compared to donning, there is no discussion regarding toileting, garment care, and storage, factors which would impact the functioning of people with limitations in ability.

Using the clothing taskscape as a means to collect data ensures that a wide range of clothing information is collected. However, if the clothing taskscape is not used during data analysis, information may be lost or overlooked. For example, Tan et al. (1998) reported results in a table which summarized opinions (likes/dislikes) of current flightsuits. This list of uniform issues mentioned specifically by pilots included ease of toileting and care concerns regarding dry cleaning and loss of thermal protection after laundering. Yet care and storage criteria were not included in the garment specification matrix, nor was toileting. For men, some toileting activities do not require donning and doffing. In a one-piece garment (as proposed by the design team) this is an important consideration, as some toileting activities for men could be facilitated with a two-way zipper.

Garment and Fabric Artifacts

Prototype evaluation is a necessary phase of the design process, and this may be achieved by using laboratory tests, wear tests or a field trial. Tan et al.'s (1998) study included thermal textile testing on a mannequin as well as garment analysis. Bergen et al. (1996) asked nurses to wear-test and evaluate prototypes on 21 premature infants in hospital. There are critical differences between a wear test and a field trial. A wear test is simply trying the garment on, whereas a field trial involves actual use over a period of time. Nurses were instructed to try the garment prototype on an infant but did not specify "how long garments were to remain on the baby before evaluating" (Bergen et al., 1996, p. 230). So while nurses evaluated donning and doffing, it is not clear if they changed diapers or completed medical procedures while infants were wearing the test garment.

Gaps in the Apparel Research Literature

The analysis of research in this part of the literature review has revealed that current design process can be improved in order to examine people's clothing needs more holistically. All of the research studies reviewed followed Orlando Yep's (1979) and Orlando DeJonge's (1984) design process which offers a systematic method of inquiry. The number of participants

included in these studies varies considerably. Data collection methods used with a large sample of people will yield statistical information regarding how many people have a specific clothing concern; however, information regarding why people have such a concern is harder to discern. The use of open-ended questions and responses that may be further probed by an interviewer yield richer data and this is more useful when developing design concepts as compared to forced-response, Likert-type queries (Holston, 2011).

Although observation is a specific component of Orlando's model, only Bye and Hakala (2005) fully use and describe how field observation, as traditionally employed in ethnographic methods, was incorporated into their research methodology. As identified by Watkins and Dunne (2015), it is complicated for designers to know "where to look and what to look for" when characterizing the design problem in a research setting (p. 4). Yet how to practically approach observation is not covered in the apparel research literature. One study introduced the measurement of clothing performance satisfaction using instrumental and expressive attributes (Swan & Combs, 1976). Some of the research reviewed categorized clothing attributes according to Lamb and Kallal's (1992) FEA model. The FEA model provides guidance as to "what" to look for; that is, factors relating to functionality, expressiveness or aesthetics. Stokes and Black (2012) acknowledge that these attributes do not fit neatly within these categories, and suggest that FEA elements be considered in addition to the body, garment and near environment. The studies that centred only on specific phases of systematic inquiry (i.e., exploring the design situation and perceiving the design problem) offer a wealth of information for apparel designers. Studies that reported findings based on Orlando Yep/DeJonge's entire design process from start to finish offered less usable information for designers; this may have been due to word limits set by journal publishers. For example, Cho's (2006) article has only one paragraph on identified user needs whereas Black and Cloud (2008) have 11 paragraphs and two tables of information. Tan et al. (1998) divide their research study into two articles. The first focuses on needs analysis and flight suit prototype development and the second one centres on prototype evaluation (not included in this literature review).

The research approach used in this study suggests that consideration of the clothing taskscape using ethnographically oriented methods of observation combined with interviews may provide a more systematic way to evaluate the use scenario. The clothing taskscape is configured with reference to the multiple activities that comprise the clothing context to ensure that

information relevant to the use scenario is not overlooked. This is evident in the study by Tan et al. (1998) where pilots identify toileting and care in their list of "likes and dislikes," but this important criteria was not included in the clothing attribute matrix meant to guide design development. While issues such as comfort, donning, and doffing are unanimously included in apparel research studies, issues such as toileting, care, and storage are not. Yet these items are critical to human performance and the serviceability of the garment. If designers do not happen to observe particular activities or ask people about their opinions regarding activities along the clothing taskscape, important use issues may be missed. Looking at all of the activities and associated tasks where people interact with their clothing within a specific context of use highlights gaps that may not become evident using more traditional methods.

Enhancing Ability: Occupational Therapy and Dressing Practice

Ensuring the most effective match between clothing design and RT outcomes involves calibrating design with the specific practices of occupational therapists (OTs). Collaboration between these two domains holds much potential, "one cannot minimize the value of designers who move across fields with which they have had less experience. Their lack of knowledge of specifics may actually help them to develop exciting new, untried approaches because they have no preconceptions about what cannot be done" (Watkins & Dunne, 2015, p. 2). That being said, it is important that designers understand the goals of RT and the role that OTs play.

OTs play a key role in enhancing the abilities of people after they have been diagnosed with a chronic disease or experienced illness, injury, or surgery, helping individuals improve engagement and function in daily activities related to self-care, work, or leisure (Canadian Association of Occupational Therapists, 2010). The following sections explore dressing methodologies used by OTs to enhance dressing practice (chaining methods, use of assistive devices); the approaches OTs take in training people to dress (remedial and functional); and the factors influencing their success (degree of paralysis, types of fasteners, etc.). It is valuable to consider these practices in detail.

Within the realms of capability and environmental demand, OTs help people relearn skills through remedial and functional training as well as instruction targeted to specific dressing methodologies like chaining (Marcil, 2007). In turn, OTs reduce environmental demand by showing people how to use assistive dressing devices (e.g., reaching tools, buttoners). Although the ultimate therapeutic goal is to rehabilitate individuals back to their full potential level, there

may be limiting physical and cognitive factors that influence the realistic level of success that may be achieved (Mattingly, 1998). What happens if the skills regained are inadequate to support independent dressing with the range of ready-to-wear clothing currently available? Specially designed clothing may be created and used as a way to enhance well-being by mediating functional abilities. That is to say, by identifying the functional limitations that people experience while in occupational therapy (ORT), the design of clothing with self-help garment attributes become another assistive dressing device, enabling a higher level of dressing competence.

Dressing or undressing oneself is an essential activity of daily living. Many OTs have researched ways to enhance dressing practice, exploring the challenges of dressing frail, elderly people (Mann et al., 2005) and children with cognitive limitations (Lee, Muccio, & Osborne, 2009). In addition, several studies have concentrated specifically on ways to teach stroke survivors to regain their dressing skills (Christie, Bedford, & McCluskey, 2011; Fletcher-Smith, 2011; Fletcher-Smith, Walker, & Drummond, 2012; Suzuki et al., 2006; Walker & Lincoln, 1990, 1991; Walker, Walker, & Sunderland, 2003). The following section outlines related dressing methodologies as this will help with understanding the clothing context.

Remedial and Functional Training Methods

Much of the research associated with stroke patients and dressing practice has focused on methodology; that is to say, how best to teach people to relearn how to dress (Walker et al., 2003). Two training approaches are used by OTs. Remedial or cognitive methods focus on improving visual matching skills and perception of spatial relationships by having patients do puzzles or copy diagrams of graphic shapes, with the aim of transferring recovered abilities toward support of related dressing activities. The more common technique utilized by OTs is the functional or compensatory method which involves repeated step by step dressing practice (chaining) guided by verbal cues and physical prompting. As well, OTs teach people how to dress using one-handed dressing techniques and the use of assistive devices (tools such as buttoners). In short, people are taught any means that will support independence in dressing, focusing on the types of garments worn prior to the onset of disability.

Chaining

Dressing and undressing independently requires performance competencies, those with a predictable functional outcome, as well as process skills to organize and adapt to the task

environment (Case-Smith, 2005). Children with limited cognitive abilities may experience difficulty negotiating their limbs into the appropriate garment part and distinguishing back from front (Lee et al., 2009) a difficulty also experienced by stroke patients (Walker & Walker, 2001). Chaining is a methodology whereby a complex task sequence is divided into multiple simple components (Peck, 2000). Chaining is one way to simplify the dressing process, for example, Suzuki et al. (2006) itemized 10 steps for donning a front button shirt as follows:

1. insert paralyzed arm into sleeve,
2. pull sleeve up over elbow,
3. pull sleeve up over shoulder,
4. pull shirt across back to opposite shoulder,
5. insert other arm into sleeve,
6. adjust collar,
7. fasten first button,
8. fasten second button,
9. fasten third button,
10. fasten fourth button.

The forward chaining method begins with the wearer completing the first step in the sequence, and building with additional practice; each subsequent action is mastered and eventually the garment may be donned independently. Backward chaining would be used to undress, with the caregiver doing most of the steps and allowing the wearer to perform the last action, again adding additional actions with each daily practice, until the undressing task is mastered.

Assistive Dressing Devices

Assistive dressing devices are tools that facilitate the donning and doffing of garments. Mann et al. (2005) investigated upper and lower extremity dressing and use of assistive devices through interviews and functional assessments with home-based elderly people (n=1,101) between the ages of 60 and 106. Almost 75% of participants were female. Functional independence measure scores were used to categorize participants into four groups: those with no difficulty dressing (n=295), those with upper extremity difficulty (n=23), those with lower extremity difficulty (n=118), and those with both lower and upper extremity dressing difficulty (n=665). Participants reported on the types of assistive devices owned and used. Results showed that men experienced more difficulty with lower extremity dressing. As well, participants

reported use of 18 different assistive dressing devices; the most popular included shoe horns, button aides, shoes with hook and loop tape, and functional clothing. Although this study gathered opinions from a large sample of participants, details regarding the types of functional clothing used were not included.

Factors That Limit Dressing Independence

There are defining factors that influence success for stroke survivors relearning how to dress. Walker and Lincoln (1990, 1991) suggest that the degree of hemiparesis (or paralysis on one side), especially related to the person's dominant hand, is an important factor. Their research also indicates that dressing difficulties with garments worn on the lower body are related to physical impairment and those related to the upper body are governed by cognitive impairment. To better understand which dressing-related maneuvers were most problematic, Walker and Lincoln (1990, 1991) documented the problem areas encountered by 60 stroke patients (37 men and 23 women between the ages of 21-79) as they were relearning how to dress themselves. This necessitated the creation of a standardized form, the Nottingham Stroke Dressing Assessment (NSDA), in order to map common dressing movements and tasks according to typical garments worn by men and women (for the complete NSDA, see Fletcher-Smith, 2011). Study results indicated similar dressing problems for both men and women, namely pulling trousers up, putting footwear on the affected leg, and lacing shoes. Fasteners were noted as being particularly problematic. The fasteners listed on the NSDA form include zippers; large, small, and round buttons; hook and loop tape; hook and eye; press stud; bow; buckle; and trouser clip. Documentation of the range of products within these fastener categories must be determined as they may directly impact functional abilities. For instance, are buttons flat, convex, or round like a ball? What size are the fasteners, as larger ones will typically be easier to manipulate that smaller ones. Are flat buttons shaped (with a ridge or formed square or oval), 2 hole/4 hole, or sewn on with a shank? What type of pull is used on the zipper? Answers to these queries about fastener details will influence success with dressing independently. Visual documentation of fastener details will help designers integrate components into garment designs that facilitate independent dressing.

Fletcher-Smith (2011) investigated the reliability of the NSDA in her master's thesis. Her research was associated with the Dressing Rehabilitation Stroke Study (DRESS) which examined both cognitive and functional approaches to dressing (Walker et al., 2012). The NSDA

is available in male and female versions; both are included as appendices in her thesis, which is valuable as these standardized assessment tools had not been published previously.

Regaining independence in dressing is of critical importance to people as they recover from stroke. Fletcher-Smith (2011) investigated patients' opinions regarding the importance of independent dressing ability. As part of the DRESS project, participants (n=46) completed an interview survey upon completion of the study, and most people felt that the ability to dress without help was very important (74%) or important (22%). This taken-for-granted activity was viewed as integral "to restoring and maintaining their independence, self-esteem and dignity" (Fletcher-Smith, 2011, p. 148). Given the importance of independent dressing to diverse groups of people, it is essential to review how functional clothing might propel an improved match between people's functional abilities and their clothing. Regardless of the methods used, intensive dressing practice improves recovery outcomes of stroke survivors (Christie et al., 2011; Fletcher-Smith et al., 2012). This, in turn, reduces the burden of care (Christie et al., 2011).

Modifying the Clothing Environment

For people with limited functional abilities, clothing design provides a means to mediate dressing challenges (Hoffman, 1979; Kernaleguen, 1978). Clothing is also viewed by medical professionals as an integral part of the rehabilitation process (Banks, 2001; Cole, 1992; Newton, 1976; Topo & Iltanen-Tähkävuori, 2010). Collaborative work between multidisciplinary groups may lead to innovative solutions. Watkins (1974) questioned why medical personnel were "often the only ones involved in developing splints or rehabilitative devices when they could get so much help from textiles and clothing majors who have considerable work with various clothing closure systems and with the suspension of clothing on the body" (p. 33). Yet there appears to be limited comprehensive research in this merged domain between OTs and apparel designers. Few research studies have teamed these two groups to work in partnership solving clothing problems related to activities of daily living.

However, the literature does include recent examples of collaboratively designed clothing interventions. These included two studies investigating how to reduce the strain encountered by support workers caring for clients with disability (Nevala et al., 2003; Wang et al., 2014), by creating an ergonomic set of garments to facilitate dressing, undressing, and toileting for wheelchair users. Also of special interest are collaborative research studies between OTs and clothing specialists that focused on use of clothing fasteners by diverse

groups of people, namely women with arthritis (Dallas & White, 1982), patients in long-term care (Sperling & Karlsson, 1989), and hemiplegic stroke survivors (Huck & Bonhotal, 1997).

Reducing the Burden of Care

Clothing design may reduce the burden of care and enhance activities of daily living, such as toileting and dressing. Personal support workers and nurses dress and undress people as part of their care; these activities involve bending and twisting with heavy loads which may lead to back injury. Dressing and/or partially undressing a person who is immobile is physically demanding work and the re-design of clothing and the environment may ease these activities. This motivated an investigation as to how the redesign of outerwear for people in wheelchairs might reduce the workload of personal support workers (Nevala et al., 2003; Wang et al., 2014). The former study considered dressing manoeuvres through analysis of hand motions and grasping actions. However, with only a technical diagram of the new clothing design, it is not clear how the redesigned clothing differed from garments usually worn by study participants, and there was no explanation of how specific clothing styling features provided associated benefits to the wearer or caregiver, information that is critical for designers. In contrast, the garment developed and tested in the later study (Wang et al., 2014) included technical drawings and details of the special crotch component in the trouser. In addition, the wheelchair was adapted to accommodate a special toilet pot. The garment and chair modifications allowed participants to remove their pants by themselves and thus toilet independently. Caregivers no longer needed to lift their clients to complete this necessary activity. These studies highlight the importance of considering the environment and all potential users of a product, in this case the wheelchair, the people wearing these redesigned garments and the caregivers who aid them in activities of daily living.

Clothing Fasteners

Dressing not only involves getting one's body into clothing but also joining garments together around the body, which presents challenging issues for people with functional limitations, thus fasteners may be considered technical affordances that facilitate dressing ability (Gibson, 1977). For a foundational understanding of fasteners, see Watkins and Dunne (2015). They provide a comprehensive analysis of the importance of fasteners, their type, location, ability to remain closed during activity, as well as recommendations to consider the wearer's dexterity while reaching and grasping in comparison to the amount of force needed to operate the fastener. With this in mind, it is valuable to review empirical research that has focused on

fastener use within clearly defined populations, namely participants who had arthritis (Dallas & White, 1982), who were in long-term care (Sperling & Karlsson, 1989), and who were recovering from stroke (Huck & Bonhotal, 1997).

The following research studies were multidisciplinary, combining OTs and clothing experts, and utilized experiments with various test prototypes to evaluate fastener ease of use, fastener position and participant preferences. The first study examined the dressing challenges related to the garment fasteners used by people with arthritis, an inflammatory disease that affects the joints. Dallas and White (1982) designed an experimental study that incorporated a wear test using a bodice vest equipped with multiple types of fasteners (buttons, zippers, hook and loop tape, and snaps) to assess participants' range of motion and their ability to manipulate the fasteners open and closed. Participants discussed their arthritic condition with reference to dressing challenges, clothing preferences, functional limitations, and use of assistive devices. While all the participants (n=97) had some form of arthritis; not all were experiencing an acute phase of their disease, thus tempering their clothing fastener needs. This experiment provided defined information as to what type of fastener on the bodice vest was able to be opened with ease. This included an exposed zipper with large teeth and ring tab pull as well as a convex button with shank and vertical buttonhole. The most difficult to operate were invisible zippers & snap dome fasteners, while the least preferred fastener was hook and loop tape. It is not clear how those fastener types and positions might be incorporated into ready-to-wear clothing or if participants would have the same fastener preference during toileting activities or when considering laundering the garment. Study results would have provided more valuable information to designers if photographs of the various fasteners had been provided; the text alone suggests that all zippers were one way, non-divisible, and adapted with a ring pull. Similarly, the no-sew grippers referred to in the article also are not clearly defined or illustrated. While trouser hooks are used on men's garments, and separating zippers are commonly used in outerwear garments, these fasteners were not assessed, another limitation of the study.

The second study included male and female participants in long-term care (n=10), with multiple medical conditions. Sperling and Karlsson (1989) followed Rosenblad-Wallin's design process to systematically determine user needs prior to prototype development, and afterwards for the prototype evaluation. This experimental study tested a prototype that

incorporated different openings with oval buttons applied with a ribbon shank and an innovation called a “finger strap” that facilitated one-handed dressing, an important direction. Most participants preferred the centre front garment opening, the diagonal position was most difficult to use. An oval button with ribbon shank and vertical buttonhole was the easiest to manipulate.

Sperling and Karlsson’s (1989) research used an advisory group to create new prototypes harmonizing with Rouse’s (1991) suggestion to integrate multiple stakeholders in decision making, and confirming that simple changes to fastener type improves functional capability. This is an especially important finding considering one solution may fit multiple disabilities and corresponding medical conditions (Orlando Yep, 1997). Sperling and Karlsson also recommend that laundering requirements and costing be considered in fastener development, although this was not included in their research design. Study results demonstrated that changes to fastener type impact independent dressing abilities, thus reducing the burden of care, further evidence to support continued assessment and development of clothing with attention to fasteners that help people with diverse needs and abilities.

The third and final study (Huck & Bonhotal, 1997) investigated fastener use with patients who were recovering from stroke (n=10), using an experiment to test manipulation of round buttons as a control measure as compared to oval buttons, a special type of hook and loop tape (Wavelok Velcro®), and trouser hooks. Again, in this study participants were using a test garment with multiple fastener types and locations to evaluate preferences and ease of use, looking at a small part of the clothing taskscape. Participants preferred the Wavelok Velcro®. While fastener use is integral to donning and doffing, this experiment did not incorporate all of the other interactions people have with clothing (i.e., selection regarding functional, expressive, and aesthetic attributes; while toileting, laundering, or storing garments). Study results must also be considered given the diverse range of hemiplegia in the study participants which ranged from finger paralysis to hemiplegia along the whole side of the body.

Gaps in the Literature Related to Dressing Methodology and Fasteners

It is clear from this section of the literature review that that fastener preferences and ease of use vary according to the type of functional limitation. Multidisciplinary teams provide a way to explore design problems from multiple perspectives. While observation and identification of problems is fairly straightforward, finding solutions is less so. This is where

the value of multidisciplinary teams is most evident, as thinking in one domain may facilitate solutions in another. Teaching people specific dressing methods helps them to dress independently. However, research in this area has been done primarily with OTs and these studies have focused on physical motions of dressing, with little regard to undressing and toileting. While the NSDA is a helpful assessment tool to identify garment types and related actions that are problematic when dressing (Fletcher-Smith, 2011), the information provided is not detailed enough to assist clothing designers in creation of functional apparel.

Additionally, there has been no assessment as to the effect that clothing silhouette has on the ease with which people dress and undress or otherwise interact with their clothes along the clothing taskscape. The literature indicates that the use of assistive dressing devices also helps people to function independently; however, the influence of clothing silhouette and styling on dressing ability has not been investigated. While the literature indicates a common concern with fasteners, there are no recent studies that test fastener innovations beyond hook and loop tape. Some fasteners have not been assessed. The fastener studies reviewed included one way, non-divisible zippers yet two way separating zippers are commonly used in outer wear garments. Also noteworthy is a new self-aligning zipper called the Magzip,[6] which was included in products manufactured by the Under Armour brand for the Fall 2014 season. This new fastener development holds much promise if it can be operated with ease using one hand and thus improve dressing abilities of people with functional limitations. Magnetic closures are also often used in apparel and fashion accessories, which present new research opportunities in functional apparel. These gaps provide opportunities for continued research augmented with use of the clothing taskscape.

Chapter Summary

This literature review has critically examined research studies that focused in three areas: needs assessment for the development of specialized functional apparel, dressing methodologies used by OTs, and the role of fasteners as a way to modify the clothing environment to improve people's functional abilities. The design of functional clothing is clearly a complex domain and it is critical to define the problem well. Design processes as outlined by Orlando Yep (1979) and Rosenblad-Wallin (1985) provide ways to map the use

[6] U.S. Patent 20130061436.

scenario from needs analysis to prototype evaluation. The FEA model (Lamb & Kallal, 1992), and modified variations thereof, guide designers in their assessment of clothing attributes, however, as noted, some aspects of the use scenario are missed during evaluation. I have proposed the clothing taskscape as a way to more holistically look at user needs within the clothing context. The specific approach to the research design and methods to achieve this aim are outlined in the following chapter.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

As discussed in the previous chapter, apparel research literature supports the systematic assessment of user needs as being essential to the design process because an incomplete understanding of the use scenario (i.e., taskscape) inevitably leads to the formulation of a solution that is inadequate, ill-defined, or simply wrong (LaBat & Sokolowski, 1999). People in hospital rehabilitation programs, who have a complex relationship with their clothing, were selected for this study because they represent a group of extreme users whose needs and ability limitations are amplified due to the sudden onset of health-related disability[7]. The needs analysis included perspectives of occupational therapists (OTs) and physiotherapists (PTs) as well as those of their assistants and personal support workers (PSWs), because people in rehabilitation therapy (RT) require therapeutic intervention from health professionals in order to perform self-care while simultaneously remediating their strength and associated dressing skills.

This research used ethnographically oriented methods to examine the clothing context and its meaning to people by applying the clothing taskscape as a means of mapping the use scenario to: better understand the relationship between personal ability and the clothing environment; determine the clothing attributes needed to improve functional abilities; and distinguish how clothing and dressing independence enhances well-being and self-image in rehabilitation therapy (RT). To frame the study, this chapter outlines the research design and, more explicitly, the clothing taskscape framework as well as details of each phase of the research process, including participant recruitment, observation and interview methods, as well as data types, analysis, and coding strategies.

Research Design

Qualitative studies offer a way to explore a situation with a purposive sample of people in order to expand understanding (Creswell, 2009). Ethnography is one such qualitative approach, which Creswell (2009) defines as "a strategy of inquiry in which the researcher studies an intact cultural group in a natural setting over a prolonged period of time by collecting, primarily

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[7] This methodology, centring on a needs analysis with groups of extreme users, was inspired by the design firm IDEO which observed and interviewed groups of children as well as professional chefs to gain critical insights prior to redesigning Zyliss kitchen tools (Brown, 2009).

observational and interview data" (p. 13). While the traditional definition of ethnography may conjure up images of research with distant ethnicities, this methodology may also be "focused ethnography" (Spencer, Krefting, & Mattingly, 1993, p. 304) and well suited to informing designers (Crabtree, Rouncefield, & Tolmie, 2012; Holston, 2011; Mariampolski, 2006; Wasson, 2000). Design researchers have adopted and adapted ethnographic methods, and I have identified this difference through the phrase "ethnographically oriented." Norman (2013) calls it "applied ethnography" (p. 222) and provides this explanation: "Applied ethnography differs from the slower, more methodical, research-oriented practice of academic anthropologists because the goals are different. For one, design researchers have the goal of determining human needs that can be addressed through new products. For another, product cycles are driven by schedule and budget, both of which require more rapid assessment that is typical in academic studies that might go on for years" (pp. 222-223). Thus in this study, ethnographically oriented methods have been strategically applied to examine a specific problem—that is to say, used to observe and discuss clothing issues with participants in the real life setting of RT, in order to interpret and integrate findings into recommendations toward design solutions.

According to Agar (2010), "ethnography is fundamentally about *translation*, about the exploration, learning and documenting of one perspective together with a mapping between it and another" (p. 290). Agar also suggests that "translation at its roots is about connecting the contexts and meanings of one world with those of another" (p. 290). Thus, in this study, the context and meaning of clothing for people enrolled in hospital RT programs were explored through observations of patients' therapy sessions, as well as their morning and evening routines with PSWs. Following observation sessions I interviewed: patients; OTs and occupational therapy assistants (OTAs); PTs and physiotherapy assistants (PTAs); as well as PSWs, in order to guide design recommendations that address this specific population's needs. While all of the aforementioned health professionals interact with patients in the rehabilitation environment, their perspectives on independent dressing and the meaning of clothing, as well as required garment design attributes, are different. Discerning those differences and commonalities provides valuable information to designers that may ultimately guide the design of apparel products, services, and environments to aid the recovery process, as will become evident in the following results and discussion chapters.

The Clothing Taskscape

While I highlighted the clothing taskscape concept in the introductory chapter, it is helpful now to discuss its evolution since it was integral to the methodology used in this study. Taskscape, as a theory, acknowledges the range of people's actions and experiences when accomplishing tasks. Tim Ingold (1993), a social anthropologist, first referenced the taskscape theory in his seminal article "The Temporality of the Landscape." He defined a task as "any practical operation carried out by a skilled agent in an environment as part of his or her normal business of life," and taskscape as "an array of inter-related activities" (p. 158). This way of looking at a given situation provides a more holistic vantage point in that "every task takes its meaning from its position within an ensemble of tasks, performed in series or in parallel" (Ingold, 1993, p. 158). Kirsh (1996), a cognitive scientist, also discusses the "task environment" (p. 417) as a means to examine the ways that we engage with artifacts, stressing the importance of assessing tasks in isolation as well as within the broader general environment in order to reveal the layers of activity that people act out unconsciously.

While the clothing taskscape was initially inspired by Ingold (1993) and Kirsh (1996), practical applications of the taskscape theory have been honed by designers and consumer researchers, under the guise of customer journey mapping or experience mapping (Martin & Hanington, 2012; Rawson, Duncan, & Jones, 2013; Richardson, 2010). In essence, a customer journey or experience map provides a way to track and analyze "complex customer interactions …with a product, service or ecosystem" (Adaptive Path, 2013, p. 4). Customer interactions may be assessed within activities and tasks that Norman (2013) defines as being "all performed together toward a common high-level goal. A task is an organized, cohesive set of operations directed toward a single, low-level goal" (p. 232). Thus, this research followed people along their patient journey, examining their interactions with clothing and related products during specific activities, such as dressing and associated dressing tasks such as donning socks and underwear, within the context of hospital RT.

Others have examined people's experiences by integrating Ingold's taskscape framework into their research designs. Dunkley (2009) utilized taskscape as a means to determine the dynamic processes that enhance the effectiveness of therapeutic places. Dunkley's taskscape included analysis of the camp's layout, activities and regulations as well as staff practices

interacting with campers. Vannini (2011) examined passenger performance in catching a ferry by analyzing people's perceptions of clock time, island time, ferry timetables, cut-off policies, weather factors, and changes to the size of vessel servicing the route, providing valuable insights into the competencies needed to successfully negotiate ferry travel. Tullio-Pow, Yu, and Strickfaden (2013) adopted a taskscape framework to assess how people with low vision or blindness shop within a mall environment, and viewed shopping not as a single act but rather a series of related activities. The shopping taskscape in Tullio-Pow et al.'s (2013) study included participants' planning actions related to travel from home or work to the mall; finding the intended retail store; searching for, trying on, and evaluating clothing; assessing product pricing; and finally, purchasing merchandise and storing receipts. Accompanying participants along their shopping journeys systematically captured all of the activities people engaged in while shopping and prompted participant recall of detail that may have been considered too mundane to share in a traditional interview setting (Kusenbach, 2003). Academic literature that cites consumer journey mapping is scant, however, Fichter and Wisniewski (2015) utilized this methodology to examine library services from the perspectives of their patrons, tracking their actions as they accessed the library webpage, contacted librarians by email and phone or visited the main branch and satellite locations.

Taskscape Pilot

As illustrated in the literature review, design processes outlined by Orlando Yep (1979), Rosenblad-Wallin (1985), Lamb and Kallal (1992), and more recently Watkins and Dunne (2015) are essential to systematically evaluate user needs; however, some aspects of the use scenario are overlooked. Design attributes related to comfort, donning, and doffing were typically included in user needs assessments but common and universal activities associated with toileting, care, and storage were not considered, which supports the need to test the use of the clothing taskscape as a way of determining people's clothing needs more holistically.

As illustrated in Figure 3.1, my preliminary and somewhat generic clothing taskscape was comprised of garment selection, donning, doffing, toileting, care, and storage. This initial generic clothing taskscape was based on personal and professional observations (e.g., through teaching and making), but also through journaling and logging my own personal clothing taskscape and asking a colleague to do the same.

Figure 3.1. Activities within the generic clothing taskscape. This was comprised of selection, doffing, donning, toileting, care, and storage.

To further refine details associated with each phase of the clothing taskscape, a colleague and I developed and executed a small-scale pilot test. The pilot involved both of us independently journaling clothing decisions and activities over a 24-hour period. We then thematically analyzed the journals to further define people's activities generically within the clothing taskscape. Based on our analysis, we defined each phase of the clothing taskscape; selection involved a person's choices regarding what to wear, with the assumption that such decisions may be influenced by the garment's functional, expressive, or aesthetic features. Donning and doffing are technical terms used to describe the act of dressing and undressing. Although toileting involves actions similar to donning and doffing, it is distinct because it requires the partial removal of clothing that may occur with a sense of urgency, followed by re-dressing. Clothing care is a series of activities that includes laundering, ironing, and a consideration of soiling propensity—that is, thought must be given to a garment's performance during use and care. Storage refers to the ways garments are kept between wear, either folded in drawers or hung up in a closet.

It is understood that the clothing taskscape may be further contextualized by examining the needs of people in a specific situation or who engage in particular activities, in this case, patients in hospital RT programs. Looking through the lens of the clothing taskscape, I was able to investigate the clothing needs for this population with added perspectives of stakeholder groups involved in their care (OTs, OTAs, PTs, PTAs, and PSWs) by exploring such groups' lived environment in a hospital, which included both human and non-human (material) factors along each phase of their clothing taskscape. As I will elaborate in the results and discussion chapters, after participant observations and interviews were completed, the clothing taskscape evolved to incorporate a number of additional activities that influenced clothing interactions. As such, the clothing taskscape for people in RT included: garment selection, shopping, dressing, wearing clothes during specific activities (toileting, bathing, eating, sleeping, and exercising), as well as care and storage (illustrated in Figure 3.2).

Figure 3.2. Activities within the rehab clothing taskscape. The final version of activities within the rehab clothing taskscape include selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing.[8]

Research Questions

The study was designed to answer the following primary research questions: What factors along the clothing taskscape impact functional limitations and self-image for people in hospital rehabilitation programs, and how can such information guide design recommendations that address this specific population's needs? To address these research questions, my study conceptualizes and operationalizes the clothing taskscape for patients in hospital RT, and looks specifically at the relationship between their personal abilities and their clothing environments, as well as the functional and symbolic clothing attributes they desire. Further, the study investigates the following related areas of inquiry:

1. What characterizes a clothing taskscape for people in hospital RT?
2. What is the relationship between personal ability and the clothing environment?
3. What are the functional and symbolic attributes of clothing for people in hospital RT?

This research was conducted in a RT setting to better "identify the forces that enhance human development, actualize human potential, optimize human functioning, and improve the human condition and the quality of the lives of people" (Westney et al., 1988, p. 129). In other words, it was necessary to observe participants in the right setting to be able to identify the clothing factors that might improve the quality of their lives. The following section outlines my preparation for fieldwork and methodology for data collection and analysis.

Preparing for Fieldwork

In addition to considering how best to develop a framework to assess user needs, it was necessary to negotiate access to the desired research setting. Relationships are an essential component of ethnographic work. Ongoing conversations about project logistics began with the patient care manager of a teaching hospital in southern Ontario well before the outset of the study.

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[8] The specific components of the clothing taskscape evolved based on evidence collected during fieldwork, thus the ordering and modification of activity icons will be elaborated upon in the data reduction and analysis section of this chapter.

Prior to drafting my research plan, I met with two senior OTs in the hospital's ACTIVE RT unit and shadowed them during their morning sessions with patients. This enabled me to observe the location site and ask questions regarding the best approach for data collection. This information facilitated development of the research proposal and ethics documents. Ethics protocols were filed concurrently with the University of Alberta (where I am a student) and the hospital (the research site); upon receipt of approvals from the latter institutions' research ethics boards, were submitted to Ryerson University (where I am a faculty member).

Data Collection

Setting

The hospital is part of a larger health system that services a culturally and demographically diverse population of 1.3 million people living in communities northwest of a large urban city. The setting for this study was the hospital's in-patient RT program, offered insights into a space and time that was outside of patient's ordinary lives. The RT environment provided a homogeneous setting with a diverse group of people who had recently become temporarily disabled from a medical incident (e.g., stroke, hip surgery) and who were having difficulties negotiating their limbs into clothing. Their recovery involved physiotherapy and occupational therapy, as well as an array of exercises and activities to promote the healing process while remediating strength and endurance Because of the recent onset of disability, their clothing needs were in flux, and in many cases their existing wardrobe was incompatible with the expected activities required during RT. Some patients had to learn new ways to dress themselves. The RT environment provided an ideal research setting, patients experienced constant change in their capabilities and needs throughout their stay in RT. Capturing all of the activities that comprised the clothing taskscape with a range of people would not have been feasible in their respective home settings. Given that the hospital was a teaching facility, my presence was not unusual. Patients were accustomed to nursing, physiotherapy, and occupational therapy students watching procedures and participating in their care. Figure 3.3 illustrates the hospital's patient census (March 6, 2015), specifically the number of patients enrolled in the ACTIVE RT unit and their admission diagnosis. Figure 3.4 illustrates the rehabilitation client group statistics from the Canadian Institute for Health Information (CIHI, 2015). Figure 3.5 illustrates patients' ages, also based on the hospital's March 2015 patient census. The participant sample in this research study reflected national standards, with stroke and orthopedic conditions being the most prevalent reasons for admission to RT.

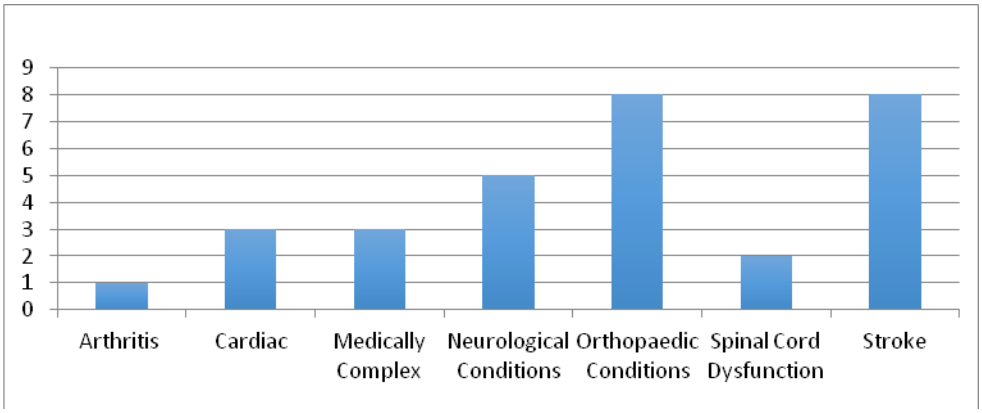


Figure 3.3. Hospital patient census—Active Rehabilitation Unit (March 6, 2015).

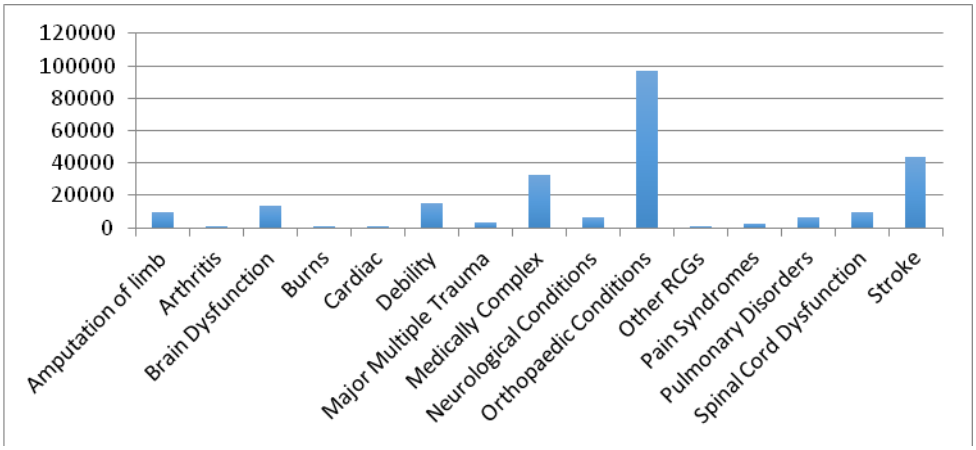
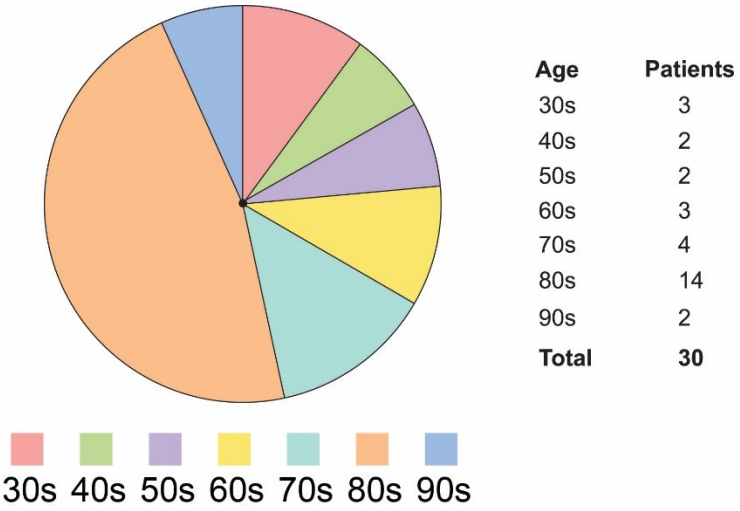


Figure 3.4. CIHI rehabilitation client group (2015).



Age	Patients
30s	3
40s	2
50s	2
60s	3
70s	4
80s	14
90s	2
Total	**30**

Figure 3.5. Patients' age (based on hospital census, March 6, 2015).

The hospital has three general rehabilitation streams. The STAR program is for adults over the age of 60 who require a short period of therapeutic intervention (2 weeks). ACTIVE and LTLD (low tolerance, long duration, or SLOW) RT programs range in duration from 4-8 weeks and are geared to adults over the age of 18 who require 24-hour hospital care. Patients participate in 30-60 minutes of continuous therapy (including physio, occupational, speech, and recreational therapy sessions), once or twice per day, 5-6 days per week.

Provincial targets stipulated a prescribed number of days in RT based on specific medical conditions. The average length of stay for a patient on the ACTIVE RT unit was 27 days; for example, a person recovering from a hip surgery due to an accident received 12-15 days of RT, mild to moderate strokes 10-24 days, and severe stroke 51 days (Patient Care Manager, personal communication, August 6, 2015). This research study was situated primarily in the ACTIVE rehab unit, a 32-bed facility. Full time day staff included: one speech and one recreational therapist, three OTs, three PTs and three OTA/PTAs, four PSWs, two registered nurses (RNs), and two registered practical nurses (RPNs), with fewer staff working during the nightshift and weekends.

Recruitment and Participants

To capture the widest possible range of issues regarding people's relationship with their clothing, participants in this study included male and female patients, OTs and OTAs, PTs and PTAs, as well as PSWs, most of whom were recruited from the hospital's ACTIVE (in-patient) rehab program. My original intent was to also interview family caregivers, but repeated attempts to recruit participants from this stakeholder group were ineffective. Some of the OTs and OTAs/PTAs also worked on the SLOW unit, providing an enhanced perspective of the range of patient abilities and therapy expectations in each RT stream. The patients enrolled in the ACTIVE program were recovering from stroke, orthopedic surgery (primarily hip), and general deconditioning related to an extended hospital stay due to a prolonged illness or surgical complications. This study did not include patients with dementia, acquired brain injury, or spinal cord injury as these situations were considered highly complex and beyond the scope of this research. In light of these exclusions, the populations I studied will therefore be described as my target group (in the ACTIVE program, stroke, orthopedic and generally deconditioned patients). Although some of the therapists from the SLOW unit were interviewed, patients were not included because many had cognitive issues and complex medical conditions and thus did not fit

the inclusion criteria of the study. A summary of the participant groups I observed and interviewed are presented in Table 3.1.

The project launch included two information sessions scheduled as part of the "Lunch and Learn" seminars series held regularly in the RT unit. This allowed me to become acquainted with full- and part-time PTs, OTs, and their assistants. The information sessions were advertised through posters prominently displayed on the doors to the occupational therapy (ORT) and physiotherapy (PRT) gyms as well as through an email to staff from the lead OT. The therapists all shared a common office and were aware of the impending project launch.

Table 3.1

Summary of Participant Groups Observed and Interviewed

Summary of observations		Summary of interviews	
Group and activity	Participants (n = 46)	Group	Participants (n = 34)
ADL sessions with OTs/OTAs	14	Patients	15
ORT gym rehab activities	6	OTs	6
PRT gym rehab activities	5	OTAs/PTAs	6
PSWs during nighttime routine with patients (doffing clothing/ donning sleepwear, toileting, transfer to bed)	11	PTs	3
PSWs during morning routine with patients (toileting, bathing dressing)	9	PSWs	4

OTs/OTAs and PTs/PTAs met with me in the ORT gym during lunch and viewed an audiovisual presentation on a large laptop. The presentation included a brief overview of my

design work and an outline of the approved study. Assorted refreshments, baked goods, and chocolates were provided as incentives to entice people to give up their lunch hour. The end of the session focused on questions from the group to clarify what kinds of patients I hoped to observe, the expected duration of field work, and how best to organize recruitment and the patient consent process. An information summary sheet with my contact information was then offered to each of the people in attendance, allowing them time to reflect and to contact me by phone or email about participating in the study. Extra copies of the information sheet were left with the lead OT to distribute to staff who were not able to attend. Although I had originally planned to give a similar presentation to patients, the patient care manager suggested this might be too complicated. It was agreed that OTs/OTAs would begin rolling out the project as I observed their therapy sessions with patients (as outlined in the next section). To facilitate the process, recruitment posters were printed on coloured paper and displayed around the unit (on ORT/PRT gym doors and near the elevators) to introduce the project to potential participants (patients and care workers).

Data Collection Framework

Data were collected in five phases utilizing multiple methods and data sources in order to triangulate and correlate results. Each phase of data collection was designed to foster a "progressive journey of empathy and learning" (Battarbee, Fulton Suri, & Gibbs Howard, 2014, p. 8). With this in mind, Phases 1 and 2 centred on observation, allowing me to better understand the scope of physical restrictions, endurance limitations and frustrations people had while dressing. Seeing patients in multiple settings (i.e., ORT, PRT, their hospital room, the dining hall) facilitated rapport building with patients, care workers, and therapists alike, all necessary for effective interviews. Observation of people doing various activities related to self-care and therapy allowed me to develop and refine my interview questions for Phases 4 and 5 of the research design. In addition, the observation sessions also prompted me to search for clothing resources (Phase 3) as potential solutions to the problems people experienced.

While in acute care, hospital patients were dependent upon primary medical personnel (i.e., doctors and nurses). However, once patients were medically stable, they moved to the RT unit. This study focused on targeted patients' clothing needs during rehabilitation and collected

the perspectives of the specific patients themselves, PTs, OTs, and their assistants as well as PSWs through observations and interviews. Figure 3.6 illustrates the data collection framework.

My approach began with two separate phases of field observation, firstly during multiple sessions with OTs/OTAs and PTs/PTAs during therapy sessions and secondly with PSWs taking care of patients before breakfast and again after dinner as patients prepared for bed.

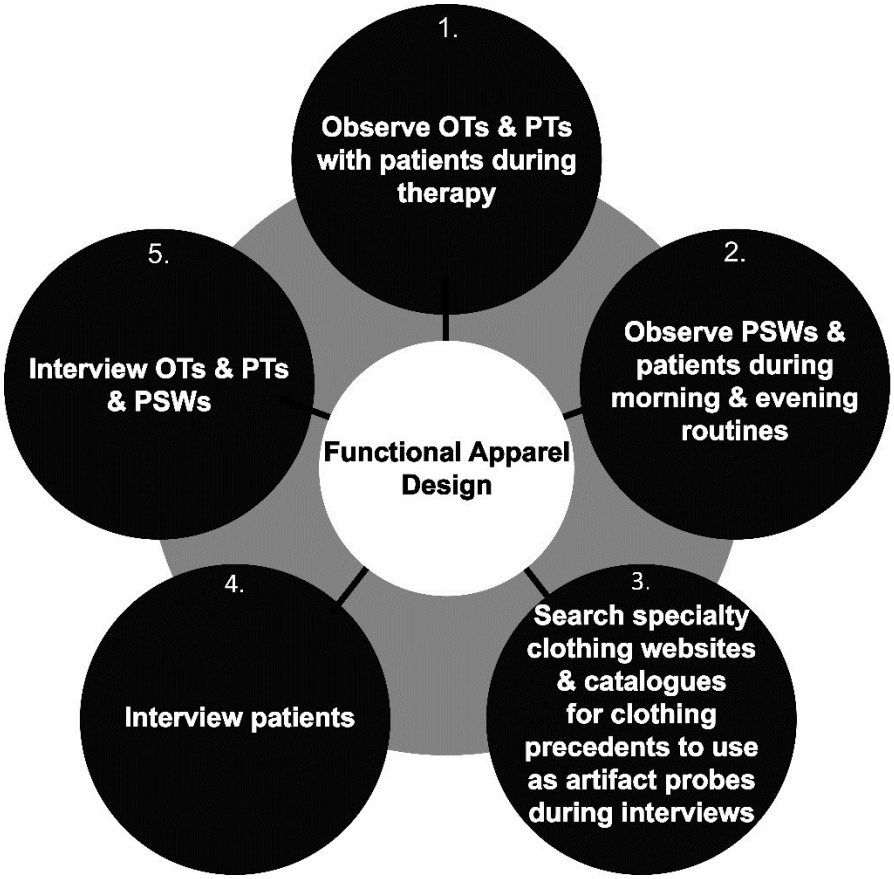


Figure 3.6. Data collection framework.

Phase 1: Field observation with OTs/OTAs and PTs/PTAs. Observation of people and objects within the use scenario is integral to the functional design process. Orlando Yep (1979) suggested observing people engaged in activities in order to assess movement, and Rosenblad-Wallin (1985) recommended that the evaluation of user needs should include an understanding of people's actions in relation to objects. Thus, Phase 1 focused the context of inquiry on field observation of OTs and OTAs doing ADL assessments and PTs and PTAs during physiotherapy with patients enrolled in the ACTIVE RT program.

As noted in this document's Glossary of Terms, ADL is a general term that refers to activities of daily living that involve "functional mobility (ambulation, wheelchair mobility, bed mobility and transfers) and personal care (feeding, hygiene, toileting, bathing and dressing)" (James, 2008, p. 539). The morning ADL assessments by OTs/OTAs focused on personal care, specifically transferring out of bed, toileting, doffing sleepwear, sink-side washing or showering, general grooming, as well as donning clothing and footwear. These assessments were scheduled early in the morning, prior to breakfast to best simulate "real life" at home, and clearly involved people's actions in relation to objects (clothing). The goal of these ADL assessments was to observe and evaluate what the patient could do safely, independently and consistently. During these sessions OTs/OTAs reminded patients "not to rush" and reassured them that assistance would be provided if the tasks at hand (e.g., dressing or grooming) could not be accomplished independently.

Observation is fundamental to ethnographic research with noted advantages. Bernard (2006) advocates field observation as a preliminary method because it allows the researcher to develop a judicious line of questioning and provides "an intuitive understanding of what's going on in a culture and allows you to speak with confidence about the meaning of data" (p. 355). By watching OTs/OTAs as well as PTs/PTAs work with patients, I gained a better understanding of dressing methodologies, specifically the person/garment interfaces, the complex relationship of the body to clothing, the range of physical challenges patients had while dressing, undressing, and bathing, their use of assistive dressing tools and the range of exercises that supported ADLs. The field observation phase also facilitated the formulation of general interview questions as well as more personal inquiries tailored specifically to patients.

The most vital aspect of ethnographic research to consider is that participants are observed "in the ordinary business of life" (Westney et al., 1988, p. 130). Most people expect to experience injury, illness, and surgery at some point over the life course. When these changes in health occur, rehabilitation is vital to help people regain functioning and independence. Field observation of OTs/OTAs, PTs/PTAs and PSWs working with patients facilitated the building of trust and respect (Creswell, 2009), which enabled me to continue the other phases of my research with the same participants. Because the hospital was a teaching facility, there were nursing, physiotherapy, and occupational therapy students doing hospital field placements. Patients were accustomed to students watching procedures and participating in their care. Each ADL session involved two

participants: the OT/OTA and the patient. A written consent form was signed by each OT/OTA prior to my observation of the ADL assessment. The OT/OTA then privately approached the patient asking for explicit verbal consent to allow me to observe the therapy session, explaining that I was a design researcher working at the hospital who was interested in clothing and dressing challenges experienced by people in RT. As Bernard (2006) succinctly put it, field observation "[got me] in the door" (p. 344) and allowed me to become a familiar face at the hospital on the rehab floor.

Field observation in the hospital environment required sensitivity and careful ethical consideration, especially since it involved patients who were partially clothed or nude and sometimes suffering in pain and/or experiencing anxiety about their ability to make a complete recovery. The loss of health and physical ability was a particularly emotional experience for people, especially as they tackled previously independent activities like toileting, bathing, and dressing themselves. I was able to observe many very "real moments that involved real people doing real things" (Agar, 2010, p. 294). At times, these moments were raw and emotional, allowing me to truly "experience the lives of the people [I was] studying" (Bernard, 2006, p. 344). These experiences fostered insights that simply would not have been possible through interviews alone, allowing me to "build … bridges of insight through empathy, … see the world through the eyes of others, understand the world through their experiences, and feel the world through their emotions" (Brown, 2009, p. 50).

Field observation during this phase of inquiry included a daily research activity log, a participant log, a standardized ADL assessment observation form (illustrated in Figure 3.7), field notes, and photography, all of which were completed by myself as the principal investigator. To elaborate, during each ADL session I used a standardized observation form on letter-sized paper (landscape format), and a similar sized page of lined paper (both pages clipped into a leather portfolio) as well as a digital camera to capture images focused on the person/clothing relationship.

The standardized observation form (see Figure 3.7) included the following information: the date; participant number, age, sex, and medical history; generic graphic images of the body in order to classify the disability site; and type of mobility device used by the patient (wheelchair, cane, or walker); columns to record the ORT lesson, tools used, clothing items worn, and the dressing challenges experienced as related to a specific type of garment or fastener, with a

coding system to identify perceived level of dressing difficulty, ranging from 1 (with ease) to 3 (with great difficulty). The lined page allowed for additional field notes, which typically included detailed step-by-step dressing actions, statements made by patients and therapists, as well as my personal insights (for a complete guide to writing field notes see Emerson, Fretz, & Shaw, 2011).

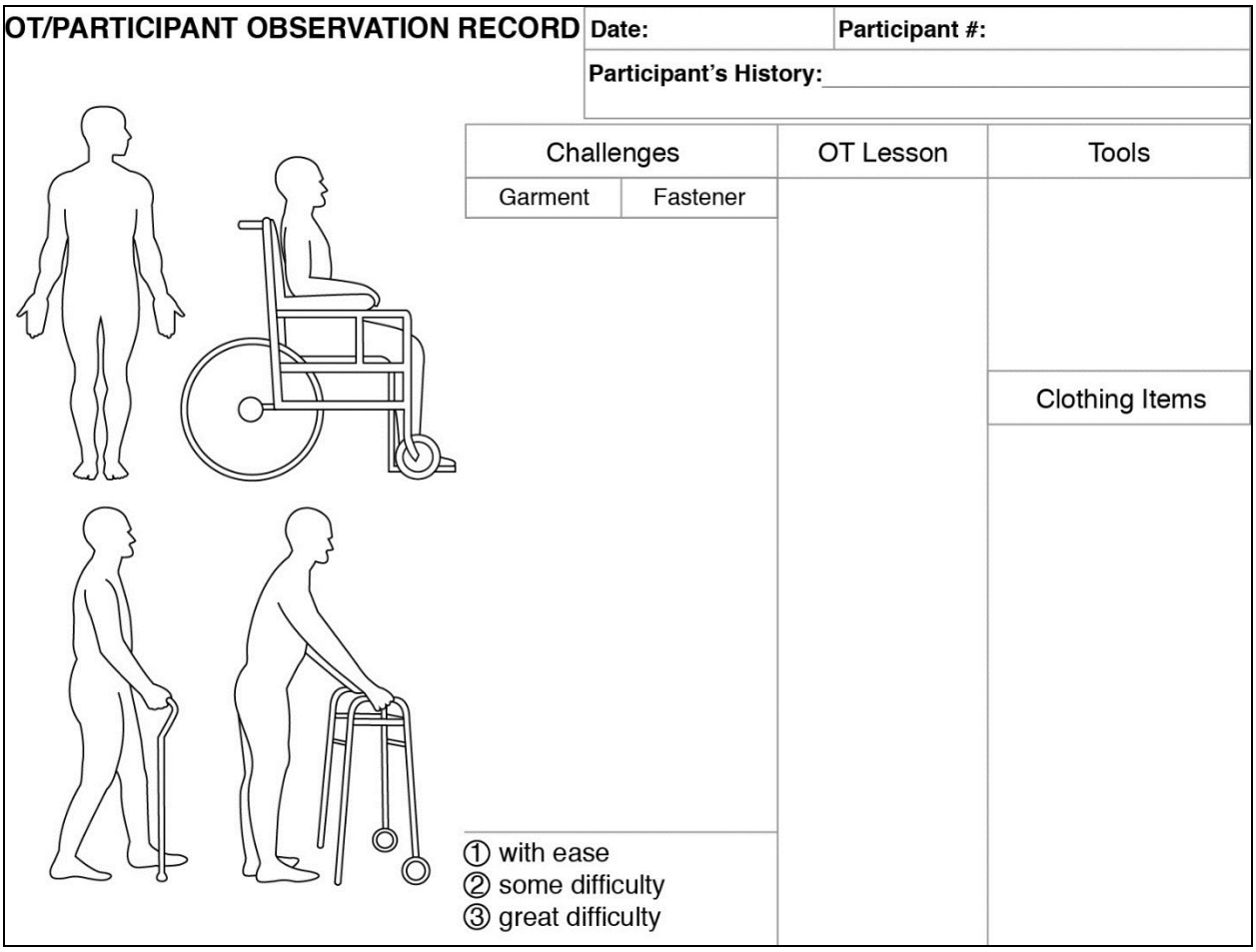


Figure 3.7. Standardized observation form used during ORT ADL therapy sessions.

After the therapy session was complete, I provided patients with the research information sheet and consent form and asked them to consider participating in an interview. Objects, such as assistive dressing devices (e.g., the reaching tool or long-handled shoe horn) and environment (e.g., bathing area) were photographed to document the surroundings. Due to patient confidentiality, these photographs did not include people's faces, most focused strictly on environments and objects. A participant log was created in order to effectively manage the data

(both observations and interviews). The names of participants who consented to observation were logged in numerical order and that number was assigned to their observation form and field notes. Digital copies of all hard copy documents followed the same file system to provide a back-up of all data. Participants who later agreed to be interviewed were also logged in numeric order, prefaced with a letter to indicate the group to which they belonged to (i.e., the first person interviewed was a patient and her/his files began with "P"); each group had its own specific prefix (OT, OTA, PT, PTA, and PSW) and this number was used on all corresponding documents/files, both digital and hard copies. The interview log also included two columns to record the digital audio file number and the corresponding time duration, as this facilitated organization of transcription.

Phase 2: Field observation with PSWs. Observation sessions with PSWs began approximately 3 weeks into the field work. The staff were familiar with me at that point, as were most of the patients. To facilitate recruitment of PSWs, the nurse manager discussed the study during the weekly staff huddle meeting. I then discreetly approached whichever PSWs were working and asked for explicit verbal consent to shadow them during their morning and evening routines with patients. PSWs have the responsibility of patient personal care, which included activities like eating, toileting, personal hygiene, bathing, and dressing. During observations, I simply shadowed the PSW (all of whom were women) as she worked with her roster of eight patients and documented in field notes what I observed. Patients included adult males and females. The patient population was random, there was no attempt to screen for gender, specific disabilities or those patients in my targeted group because it was whomever had been admitted to the hospital RT program and assigned to a particular PSW during the observation period.

The same consent procedure used during observations of ADL sessions was applied when observing care workers interacting with patients. While the activities observed with PSWs and patients were similar to those observed with OTs/OTAs, they were also very different as will be elaborated upon in the results chapter.

Observation interviews. There were opportunities during observation sessions with OTs/OTAs, PTs/PTAs and PSWs to ask questions. Combining observation with informal "go along" interviews was an effective methodology (Carpiano, 2009, p. 263) to further understand the patients' body–clothing relationship. Brown (2009) reminds us that "people are so ingenious at adapting to inconvenient situations that they are often not even aware that they are doing so"

(p. 40). That is to say that observation plays a more important role in discerning latent needs than just discussing those needs because "simply asking people what they want will rarely yield important insights" (Brown, 2009, p. 40).

Walking interviews are used by researchers to encourage detailed and rich data recall because information is prompted by significance and association to the surroundings (Carpiano, 2009). This technique was valuable in teasing out "phenomena that may often escape awareness of people who inhabit a particular setting" (Carpiano, 2009, p. 266). Kusenbach (2003) suggests that "go-alongs can unearth mundane details too trivial to think and talk about during more formal research occasions" (p. 470). Some mundane details are also difficult to articulate; this was highlighted in my previous research with people who were visually impaired. While out on a shopping expedition with a participant, for example, she discussed the light levels in the mall and their variation from store to store, a topic that might not have been included in the interview schedule and something that would have been difficult to describe to the research team but was experienced on our "shopping and talking" interview.

While the hospital's observation protocol prohibited conversation with patients and OTs/OTAs during therapy sessions, a brief meeting with the therapist followed each ADL session; this typically was situated in the ADL suite, a therapy environment set up like a small apartment with a full kitchen, eating area, bedroom, and bathroom. Meeting immediately after the ADL session allowed me to clarify details regarding the patient's age and medical condition and to ask questions about what I had observed to clarify my understanding. If other questions arose as the day progressed, I would simply ask them; since I was stationed in the RT office, there were many moments throughout the day when I had the opportunity to have private conversations with the therapists. The information derived was typically prompted from the ADL observation and thus was recorded in the field notes for that particular patient.

During my field work at the hospital, I was visibly present in the ACTIVE RT unit when I did not have ADL observations scheduled, and I roamed on the floor, PRT gym and in the dining room, greeting staff and patients alike. Patients were in the dining room during mealtimes, thus their rooms were empty during which time PSWs would be tidying up, changing bed linens, et cetera. This allowed me to have impromptu discussions that were relatively private with PSWs as they worked, on topics that were prompted by the activity being done by the PSW or the patient's room they were in. Discussions included various topics, the challenges they

encountered when bathing and dressing people, helping with clothing selection and organization. Information from these informal conversations were recorded in my daily log notes.

Materials collected during observation sessions. A variety of hospital documents and resource materials were shared with me during fieldwork. Two patient information pamphlets were available from the hospital website: Rehabilitation Program (which was photocopied and distributed to patients upon their arrival to the rehab floor, see Appendix A-I) and the Reactivation Program Client & Family Information Handbook (Appendix A-II). The OTs suggested I review a number of documents that were distributed to patients while in RT, including tip sheets on meal and home management (laundry) and self-care activities (dressing and bathing), another that focused solely on dressing, and lastly illustrations of prohibited maneuvers after hip surgery. Other documents that OTs regularly photocopied for patients included pages from the Occupational Therapy Toolkit (Appendices B-I to B-XIII) which had illustrations of multiple dressing methods for an assortment of garments, using dressing tools.

Phases 1 and 2 involving field observation, the former from a distance and the latter as an informal interview, were a crucial part of discovering the use scenario of people in hospital RT programs and understanding the complex relationships and interfaces among people and clothing. These initial phases of data collection highlighted a range of patient needs and prompted thoughts about design solutions that might exist in the marketplace.

Phase 3: Clothing precedent analysis and artifact probes. Looking at established precedents is an integral part of the systematic exploration of the design problem. Orlando Yep (1979) advocated market analysis and Rosenblad-Wallin (1985) suggested archive appraisal. Thus Phase 3 included an investigation of clothing precedents in the academic literature as well as catalogues and websites specifically targeted to address people's special clothing needs related to temporary or chronic disability.

Precedent-based analysis is a well-established method of inquiry used in law, architecture, and various other design disciplines (Eilouti, 2009; Hodder, 2003; Lepofsky & Graham, 2009; Mida & Kim, 2015; Oxman, 1994). "Prior knowledge has been recognized as a significant source of knowledge in the creative process of design" (Oxman, 1994, p. 141). Eilouti (2009) further justifies the use of this methodology because "a past design solution that has some interesting … features may provide partial or total exemplars of new design solutions" (p. 340). Thorough understanding of artifacts that have already been designed and produced allow

designers to "project older solutions into new problems" (Eilouti, 2009, p. 341). Vicente et al. (1997) remind us that design development has an inclination to be evolutionary; new designs that source inspiration from those produced earlier save the designer time and effort by not having to "reinvent the wheel."

Observations with OTs/OTAs, PTs/PTAs, and PSWs, combined with go-along interviews, enabled a foundational understanding of the range of patient needs and abilities. This informed a search of specialty clothing catalogues and websites to locate specific products that might ease patient and caregivers' requirements, allowing me to benchmark the range of manufactured clothing and to begin to categorize assorted functional, expressive and aesthetic (FEA) attributes (Lamb & Kallal, 1992) in order to see which garment features promote independent dressing. A comprehensive search of the literature was initiated using the phrase "disability AND clothing" to yield significant journal articles and books related to adaptive garments. Two-thirds of the patient population in RT were over 70 years old. Clothing artifacts designed for both people belonging to a senior demographic and for those with disability, as presented through associated websites and catalogues, were examined. A Google search using the terms "clothing elderly" and "clothing disability" yielded a global assortment of clothing companies. Content analysis methods were used to evaluate these data sources. Martin and Hanington (2012) define content analysis as "the systematic description of form and content of written, spoken, or visual materials expressed in themes, patterns, and counted occurrences of words, phrases, images, or concepts" (p. 40). Bell (2004) emphasizes that content categories be explicitly delineated for coding consistency. While visual content analysis is often used to analyze social and cultural aspects of media (Bell, 2004), my investigation utilized a visual examination of data sources to discern garment information.

Eilouti (2009) recommends the following assessment process: artifact search, selection, observation, interpretation, analysis, evaluation, and categorization. In order to systematically categorize artifacts, Oxman (1994) advocates the process of "chunking" or isolating specific parts of a multifaceted design precedent "into distinct, relevant, smaller components" (p. 143). Mida and Kim (2015) encourage use of a checklist to systematically review dress artifacts. With this in mind, an observation sheet was developed for this assessment process; general information documented in this study included company name and background history, website address, and location as well as a product photo, garment type, size assortment, and pricing (see

the clothing precedent analysis form shown in Figure 3.8). The process of chunking the vast amount of detailed garment information was facilitated by use of the FEA model as a means of categorization (Lamb & Kallal, 1992). Sub-themes within the functional domain included silhouette fit, garment entry location, clothing fasteners, and fabric specifications (weave, weight, finish, and fibre content). Subthemes within the aesthetic category included contemporary fashion styling, colour, and fabric texture. Expressive attributes were defined as being linked to the concept of human dignity, social identity, and self-esteem.

Company	**Image**	**Product Range** **Men's Women's Outerwear Sleepwear Accessories Other**							
Website		Garment Type Style #	Fabric Fibre	Colour Range	Size Range	Price	Functional Attribute	Aesthetic Attribute	Expressive Attribute
Country		Blouse Pant Skirt Dress Top Sleepwear Underwear			SML XL 2XL				Peter Pan Collar Yoke Gathers Pocket Contemporary Styling
Company Background									

Figure 3.8. Clothing precedent analysis form.

Precedent analysis of clothing yielded results categorized according to garment adaptations for tops, trousers, and jackets, as well as items for bathing. These data provided an effective way of mapping the domain of clothing for people who have health-related disability. Product displays in catalogues/websites highlighted "what is given priority or salience and what is not" (Bell, 2004, p. 23), providing me with the essential apparel themes on which to focus. This analysis enabled a listing of specific attribute features and their associated benefit to the wearer. So while precedent analysis is typically used as a precursor to design, garment creation was not part of this phase of the research; I simply wanted to understand the range of products available that may not necessarily have been known to patients and their therapists.

Precedent-based research focused on collecting examples of adapted clothing in the marketplace. Banks (2001) defines adapted clothing as garments that have been designed to facilitate patients and caregivers in the ADL of dressing. These modifications are based on need and may be made to existing clothing by the end user or prior to manufacture by the designer during the initial design stage. Various ways of discovering these adapted clothing involved perusing websites and catalogues, looking at journal articles (favouring the most recent articles

but also looking at some archived materials). Table 3.2 shows a summary of the consulted sources.

Table 3.2

Summary of Sources Used for Precedent-Based Analysis

Source	Quantity	Detail
Books	6	– Chase, R. W., & Quinn, M. D. (2003) – Hoffman, A. M. (1979) – Kernaleguen, A. (1978) – Pompelli, J. (1998) – Thornton, N. (1990) – Watkins, S. M. (1995)
Journal articles	9	– Çivitci, Ş. (2004) – Huck, J., & Bonhotal, B. H. (1997) – Kratz, G., et al. (1997) – Mann, W. C., et al. (2005) – Nevala, N., Holopainen, J., Kinnunen, O., & Hänninen, O. (2003) – Reich, N., & Otten, P. (1991) – Rosenblad-Wallin, E., & Karlsson, M. (1986) – Sau-Fun, N., Chi-Leung, H., & Lai-Fan, W. (2011) – Sperling, L., & Karlsson, M. (1989)
Websites	8	Australia (2) – www.assistedwear.com.au – www.petalbackclothing.com.au Canada (2) – www.izadaptive.com – www.silverts.com U.S.A. (4) – www.buckandbuck.com – www.dignitybydesign.com – www.ez-go.com – www.ronwear.com

In addition to searching for existing precedents, specific garments were sourced and used as probes during interviews with patients, therapists, and care workers (n=33). The clothing probes included: two women's blouses with magnetic buttons and a top with a dolman style sleeve, a youth's athletic jacket with a magnetic zipper, a pair of men's trousers with dual waistbands and built-in underwear, a unisex terrycloth poncho, and a hair turban (see Figure 3.9). These garments offered conceptual solutions to some of the problems highlighted during patient observations.

Probes, particularly what are considered "cultural probes" (see for example Gaver, Boucher, Pennington, & Walker, 2004; Mattlemaki, 2005) are often used in design research to get at specific issues related to design problems. Clothing probes were shown to participants toward the end of the interview. I asked participants to examine the garments (e.g., fasten the magnetic buttons) and this prompted conversation and elicited opinions and suggestions for design improvement. The clothing probes were not perfect solutions for the problems observed with patients in RT. The motivation behind incorporating the clothing probes into the interview protocol was not to evaluate their effectiveness but rather to employ them as a means to provoke discussion, to garner opinions (feeling, attitudes), and to invite participants to suggest design solutions (Portigal, 2013). As such, including precedent-based research and using existing garments to probe opinion and discussion during Phase 3 added significant value to the research design. Most importantly, this phase brought clothing directly into the discussions by providing tangible examples of how clothing could be part of a patient's recovery process. Results of this phase of inquiry are presented in the discussion chapter.

Phase 4: Patient interviews. Patient participants were given an information sheet and consent form immediately after observation of their ADL assessment with an OT/OTA in Phase 1 (field observation) or after their morning and evening routines with their PSW. This provided me with an opportunity to discuss details of the study, to answer questions, and to request an interview. Most patients who consented to an ADL observation followed through with an interview. Patients who were not interviewed had been discharged early due to an influenza outbreak that resulted in an 8-day quarantine that prevented me from entering the RT unit at the hospital.

Interview questions were semi-structured to provide insight into patients' lived experience of their illness, hospitalization, changed functional abilities, and relationship with clothing. Interviews were audio recorded and began with specific questions related to age, occupation, family status, health condition leading to RT, and admission date to hospital. Patient perspectives on clothing were then explored through wardrobe inventories, with questions focusing on the range of clothing they brought to RT (basic items worn on a daily basis, favourite clothes, and garments that were unsuitable) as well as their needs along the clothing taskscape. Notes were jotted during the interviews. Garment artifacts were used as probes to prompt and expand discussion during the last part of the interview (see Figure 3.9).

Figure 3.9. Clothing artifact probes: (1) terry cloth poncho for bathing; (2) athletic jacket with magnetic zipper; (3) adaptive pants; (4) hair turban; (5) dolman top; (6) two blouses with different types of magnetic fasteners.

I showed clothing probes to patients and asked their opinions. Patient participants' responses indicated their viewpoints on certain concepts (e.g., integrating underwear into a trouser) and allowed me to gauge receptivity of particular design features, and also prompted further

discussion regarding patients' underlying conditions or problems these garment artifacts had been designed to mediate. I took photographs after discussions with patients had ended, typically including closet interiors (see Figure 3.10), bedside storage, sleeping and bathroom environments, as well as mobility devices. Footwear was a common concern shared during interviews, which prompted me to take photographs of the shoes and slippers that patients were wearing.

Figure 3.10. Photographs of a patient's closet, clothing, and footwear.

Patient interviews revealed further information about the use scenario and especially the intimate relationship people have with their clothing. To begin, this phase allowed patients to speak freely to the researcher without their therapists or care workers present. They were able to chat about the kinds of clothes they wore before hospitalization, the things that seemed to be working best in RT, and the losses they felt in terms of independence, clothes preference related to style/identity, and the possible stigma related to certain kinds of clothing. Each of their perceptions illuminated their individual functional capabilities, personal preferences, and wishes/desires. The accumulated perceptions of the 15 patient participants also provided further information towards better understanding the clothing taskscape of people in hospital rehabilitation programs.

Phase 5: Interviews with OTs/OTAs, PTs/PTAs, and PSWs. Interviews with therapists and care workers were scheduled as the last phase of my field work, after field observations and after gaining a solid understanding of patient perspectives. My observations completed prior to Phase 5 had allowed me to refine questions for therapists and caregivers. As the final phase, my

opinions during Phases 1 to 4 remained unhampered by those of therapists and care workers. This final phase allowed the research data to be triangulated more readily and allowed me to approach interviews with therapists with a higher level of knowledge about how clothing is handled in the hospital rehabilitation setting. Interviews were audio recorded and notes were jotted. Questions for PSWs queried their experience in the field, where they had completed their education/training, their reasons for choosing the profession, and a description of their typical work day. All of the PSWs (n=4) were full time and working exclusively in the ACTIVE RT unit. The *Rehabilitation Program* pamphlet provided to patients (see Appendix A-I) when they arrived on the RT unit was reviewed with a request to identify omissions or suggest improvements. Interview discussions sought participants' perspectives on the ideal conditions that might allow them to work more effectively. PSWs were asked about the clothing items they struggled most with when dressing patients. Additionally, the aforementioned clothing probes (Figure 3.9) were used to stimulate opinions about clothing interventions as a means of supporting people through the recovery process.

Therapy providers (PTs, OTAs, PTs, PTAs) also shared insights about patient clothing needs. Interviews were conducted with all full-time OTs (n=4), PTs (n=3), OTAs/PTAs (n=4) and one part-time OTA/PTA working in the ACTIVE RT unit as well as two full-time OTs and one OTA/PTA from the SLOW RT unit. Interviews began with questions related to therapists' experience, educational training, motivation to choose the profession, and typical workday activities. Again, the patient information pamphlet was reviewed. Interview questions revolved around therapists' clothing and footwear recommendations to patients and queried the types of garments that people struggled most with. I also inquired about their knowledge of adaptive clothing labels and/or retailers as well as the best time to introduce compensatory clothing options. The last phase of the interview discussion centred on suggested areas in which designers should focus, therapists' organizational strategies, and identification of patient behaviours that contribute to their success while in RT.

Compensation

Spending close to 3 months in the RT unit allowed me to know all the staff and most of the patients. Although it was evident that the therapists and PSWs were quite busy each day, all of the full-time staff consented to an interview with me. A thank-you note was provided to each participant along with an assortment of chocolates or a $5 coffee shop gift card. Given the

additional contribution of the support workers through observations and/or interviews, compensation also included a tube of hand cream, a useful item given their frequent hand washing. The OTs received hand cream and a $15 coffee shop gift card. Toward the end of the project, a communal thank-you card and two trays of pastries were provided to the nursing staff and PSWs during their weekly huddle meeting as well as to therapists in the RT office.

Summary of Data Collection Framework

Multiple methods of inquiry were used in this study in a comprehensive, detailed, and structured way. The study was designed to learn about a targeted group of people's needs along the clothing taskscape while in RT in order to create design recommendations that address the wide range of patient abilities and inabilities. Given the complexity of the design problem, data collection utilized observations of therapists and care workers with patients (n=46) as well as interviews with patients (n=15) and the stakeholder groups (n=19) involved in their care. All full time staff working in the ACTIVE RT unit and most working in the SLOW unit participated in an interview. This provided me with a comprehensive view of the design problem. The research design involved a material culture approach that was human centred and artifact focused, using ethnographically oriented methods to examine the problem from a variety of angles. Table 3.3 summarizes the methods and corresponding guiding questions for each phase of inquiry.

Data Analysis

Data Types and Management

According to Bernard (2006), data management is the beginning of the data analysis process and is exceptionally important toward validating research. In this digital age, data management often is perceived as a simple process, yet when dealing with a large data set such as the one generated in this study, the value of good data management cannot be underestimated. As such, I categorized and sorted the data types (summarized in Table 3.4) and determined a management system. In order to begin the data analysis process and maintain an audit trail, hard copies of all data and resource materials associated with the research study were catalogued in a large binder and categorized as follows: (a) ethics documents, (b) signed consent forms, (c) patient observation forms and field notes, (d) interview field notes, (e) resource documents from the hospital, (f) photographs, (g) fieldwork activity log, (h) receipts, and (i) clothing precedent analysis charts. The participant log was filed in the front cover inside pocket. As such, the resulting data types from this study encompass text (i.e., written notes, log), images (i.e., photos, sketches), and audio recordings (i.e., interviews with therapists and patients).

Table 3.3

Summary of Methods and Guiding Approaches to Inquiry

Phase	Method	Detail	Guiding approaches to inquiry
1	Observation & go-along interviews	Watch OTs/OTAs & PTs/PTAs working with patients in hospital during RT sessions. Understand the dressing taskscape, specifically the environment/garment/person interface. See what people DO.	– What is the range of functional limitations in people enrolled in hospital rehabilitation programs? – How do OTs/OTAs train people to return to independent dressing? – How do adaptive dressing methods and use of assistive devices promote independent dressing? – What types of clothing and footwear are patients wearing? – Do patients use or wear specialized functional clothing? If yes, where have patients purchased these garments? – What are the connections/disconnections happening between people and their clothing? How do these able/disable?
2		Watch PSWs during their early morning and early evening routines as they care for patients.	– How do PSWs assist people across the clothing taskscape (shopping, selection, don/doff, toileting, bathing, eating, exercising, sleeping, laundering and storing)? – What clothing attributes assist independent dressing? – How does clothing support and/or enhance personal self-image after a disabling event? – What clothing interventions might help people across the clothing taskscape.
3	Precedent analysis Visual content analysis	Clothing probes Review specialized literature, websites and print catalogues of ready-to-wear retailers that focus on clothing designed for people with functional limitations and disability.	– What is currently available to purchase/on the market that supports or assists people with functional limitations? What design detailing is present in these garments (e.g., closures, fasteners, silhouettes, fabrics)? – What are the functional, expressive and aesthetic (FEA) attributes in clothing designed for people with functional limitations and disability? – Which garment concepts might be used as artifact probes to engage stakeholder opinion during interviews?
4	Interviews	Patients	– What types of clothing and footwear are patients wearing? – Do patients use or wear specialized functional clothing? If yes, where have patients purchased these garments? – What are patient needs across the clothing taskscape (selection, don/doff, toileting, care and storage). – How does clothing support and/or enhance self-image after a disabling event?
5		OTs/OTAs, PTs/PTAs & PSWs Request patient stories of success, adaptation and challenges related to rehabilitation and a return to dressing independently.	– What clothing attributes assist independent dressing? – What are the demands of the use environment while exercising? – How does clothing support and/or enhance personal self-image after a disabling event? – What clothing interventions might help people across the clothing taskscape?

Table 3.4

Types of Research Data Collected

Data type	Quantity
Photographs	178
Observational notes and sketches	54 pages
Interview field notes	79 pages
Log notes	28 pages
Hospital resource documents	68 pages
Audio recordings	960 minutes
Interview transcripts	
– PTs	25 pages
– PSWs	47 pages
– OTA/PTAs	60 pages
– OTs	90 pages
– Patients	166 pages

All patient observations forms, field notes, and interview notes were scanned and saved as pdf files according to the assigned participant number and grouped within folders according to data type. Digital audio recordings of interviews and accompanying photographs were saved according to participant number on a laptop computer. Audio-recorded interviews were emailed to a professional service for transcription. Interviews were transcribed verbatim and afterwards verified line by line with the corresponding audio file to check for accuracy and to clarify inaudible segments; the verified interviews were saved in a folder labeled "checked transcripts." Additional editing and formatting were done to prepare the transcripts for analysis. In order to ease reading of the transcripts, this included removal of repetitive conversational segments in which the interviewer validated participant statements. Individual transcripts were then formatted into three columns in landscape orientation on legal-size pages (two pages of transcription positioned in the first two columns followed by a blank column for note taking during analysis), with the clothing taskscape graphic inserted into the page header (see sample in Figure 3.11). Once this was done, transcripts were saved again in a new folder labeled "ready to print transcripts." Two back-up USB sticks were created to safeguard all data files and stored in separate locations.

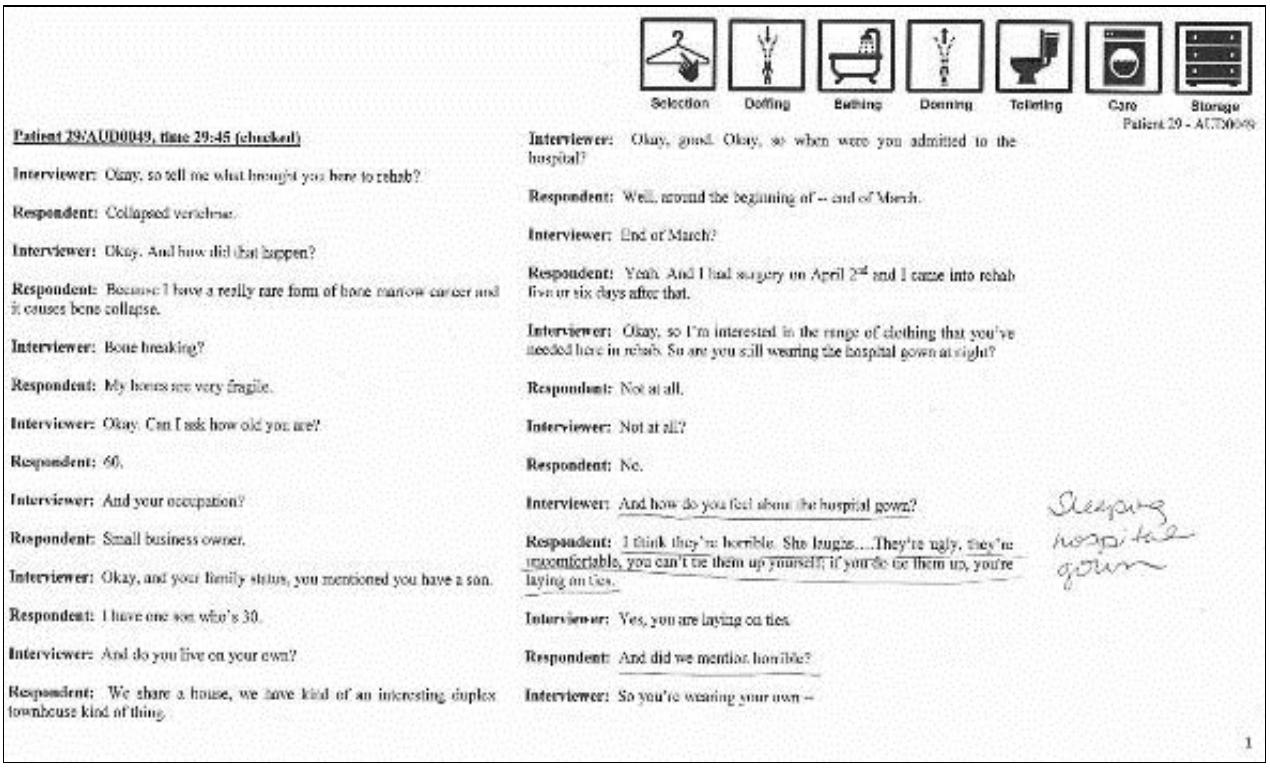


Figure 3.11. Patient 29 transcript (ready to print format).

Identifying the data types and managing data was a significant beginning to the data analysis process. This permitted me to take stock of the research but also allowed me to engage with the materials by checking for accuracy, ensuring that these were ready for detailed analysis.

Detailed Iterative Data Analysis

A detailed iterative data analysis process was made possible through the data management. Because all of the materials were well organized, I was able to design a cohesive analysis program in which I could immediately and readily look closely at the data I had collected. To begin, hard copies of all digital data were printed and grouped according to category. These included patient observation forms and field notes, interview field notes and transcripts, resource documents from the hospital, photographs, and the daily fieldwork activity log. Transcripts were further subdivided according to participant group: patients, OTs, PTs, OTAs/PTAs, and PSWs. Photographs were grouped in two locations; first matched according to patient files and then compiled with all like items together (e.g., footwear). This lead naturally to data reduction and the potential to engage in an iterative process of analysis.

Data Analysis Procedure

Having spent almost 3 months in the hospital RT unit, I had accumulated an expansive data set that required "systematic searching" (Spencer et al., 2003, p. 199) to determine common themes related to patients' clothing needs. The iterative data analysis process involved five distinct yet interconnected parts: Iteration I sought to ensure the data was accurate; Iteration II looked for key words and phrases in the transcripts; Iteration III looked through all the materials following the clothing taskscape chart; Iteration IV grouped participants' significant quotations; and Iteration V cross-referenced the themes and subthemes and looked for disagreers. The following list summarizes the five-step iterative data analysis process:

I. Familiarization:
   - Verify accuracy of transcripts.

II. Initial review of transcripts:
   - Write open codes based on key words (myself and a colleague)
   - Underline key text passages and assign taskscape category label.
   - Identify subthemes within taskscape categories (e.g., dressing methods, problem garments, body movements).
   - Modify taskscape framework to include missing activities: eating, sleeping, and exercising.

III. Second review of transcripts, observation and interview field notes, hospital documents and fieldwork log:
   - Compare, discuss and verify codes with my colleague.
   - Complete a one-page summary chart for each participant, using the modified taskscape framework.
   - Write a memo for each participant.
   - Compile a one-page summary per participant group using the modified taskscape framework.

IV. Quote summaries grouped according to issue (e.g., bra, underwear, hospital gown, socks/shoes, words associated with the term struggling).

V. Index of themes, subthemes and points according to the taskscape framework. Develop axial codes to identify relationships between open codes. The index was compiled using the summary charts created in Iteration III and elaborated to include context, relationships between themes, and participant feelings.

Data Reduction and Analysis

Data familiarization was initiated in Iteration I through my preliminary review of transcripts for accuracy verification as mentioned previously; transcripts were verified line by line with the corresponding audio files, and inaudible segments were clarified by re-listening to the audio file and reviewing my field notes. Formal analysis was intensified during subsequent reading of the transcripts in Iteration II, which imparted a general sense of the information. Initially, a list of keywords was compiled; some were "in vivo concepts" (Spencer et al., 2003, p. 203) derived from the terminology used by the participants, and others were based on the taskscape framework elements. At this point, it became evident that patients interacted with their clothes during other activities, including shopping, eating, sleeping, and exercising, and thus these were added to the taskscape framework used in my analysis (see Figure 3.11). At this time, I began cross-sectional coding utilizing the taskscape categories. Specific text segments were underlined in red pen and annotated with the corresponding taskscape framework element (e.g., shopping, dressing).

In Iteration III, each transcript was read, taskscape activities and key words were jotted. This process was also completed by a colleague. Key words formed the basis of preliminary codes. Results were compared, discussed and verified. Following this, a one-page, multiple-column summary chart was created and completed for each participant, showing the revised taskscape framework elements. At this point, donning and doffing were separated. Specific points from each participant transcript were itemized while also reviewing my observation and interview field notes, documents obtained from the hospital (i.e., Occupational Therapy Toolkit), as well as my fieldwork activity log. Transcript page numbers for each relevant point were noted and applicable quotes identified using an asterisk. In addition, a memo was created for each participant, which afforded me a place to jot relevant points, questions, and insights (see sample memo in Figure 3.12).

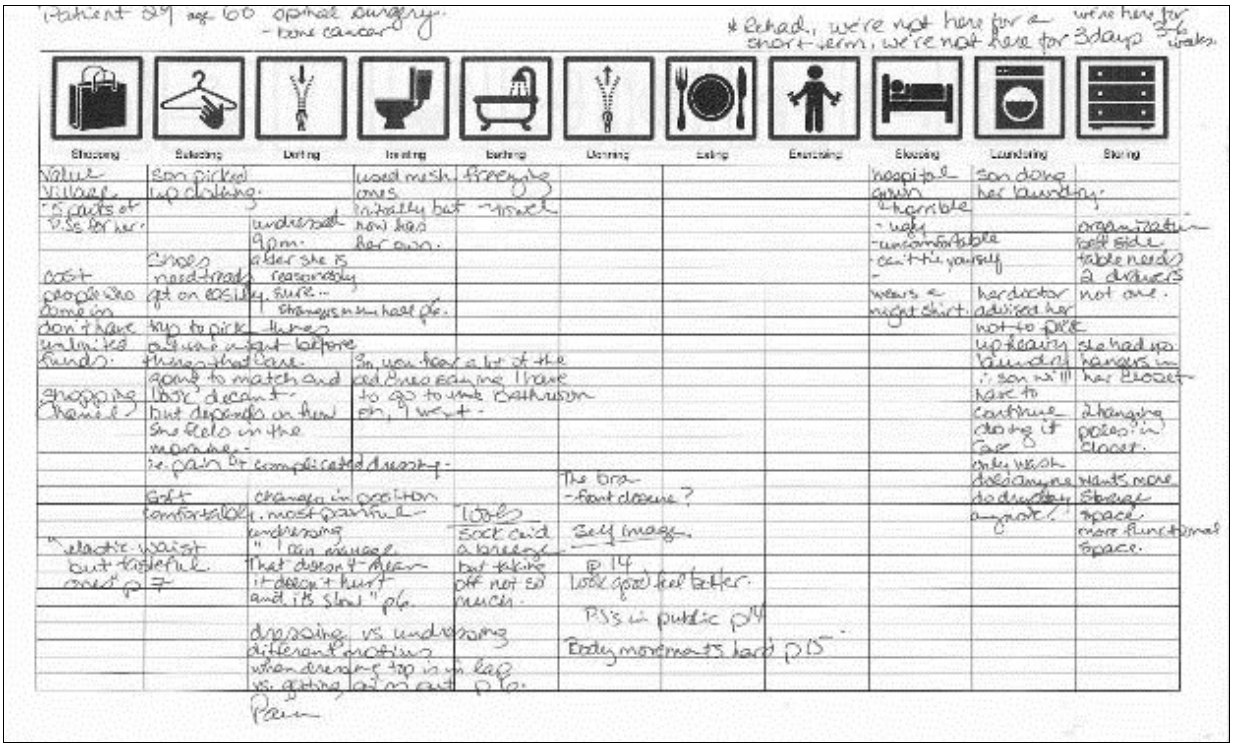


Figure 3.12. Patient 29 memo.

A summary chart was then created for each participant group and at this point I reordered and modified the taskscape icons. Since shopping occurred only when patients did not have the right clothing in their existing wardrobes, it was repositioned after selection and given that patients did not differentiate specifically between donning and doffing, these taskscape activities were collapsed into one category: dressing. This summarization according to individual participants and groups clarified emerging subthemes within the taskscape framework, highlighting common issues and differences among the groups. An example is included in Figure 3.13.

In Iteration IV, participant quotes pertaining to common issues were compiled. Five additional charts were created to focus attention on the bra, underwear, the hospital gown, as well as socks and shoes. The last chart focused on the language used by participants, specifically corresponding to the word "struggle" and its associated synonyms ("frustrating," "hard," etc.).

For Iteration V, the condensed assortment of charts were used to create an index using the taskscape framework with additional categories that included functional, expressive, and aesthetic clothing attributes (Lamb & Kallal, 1992), as well as context, feelings, and relationships between taskscape elements, providing me with an outline to begin drafting the research results.

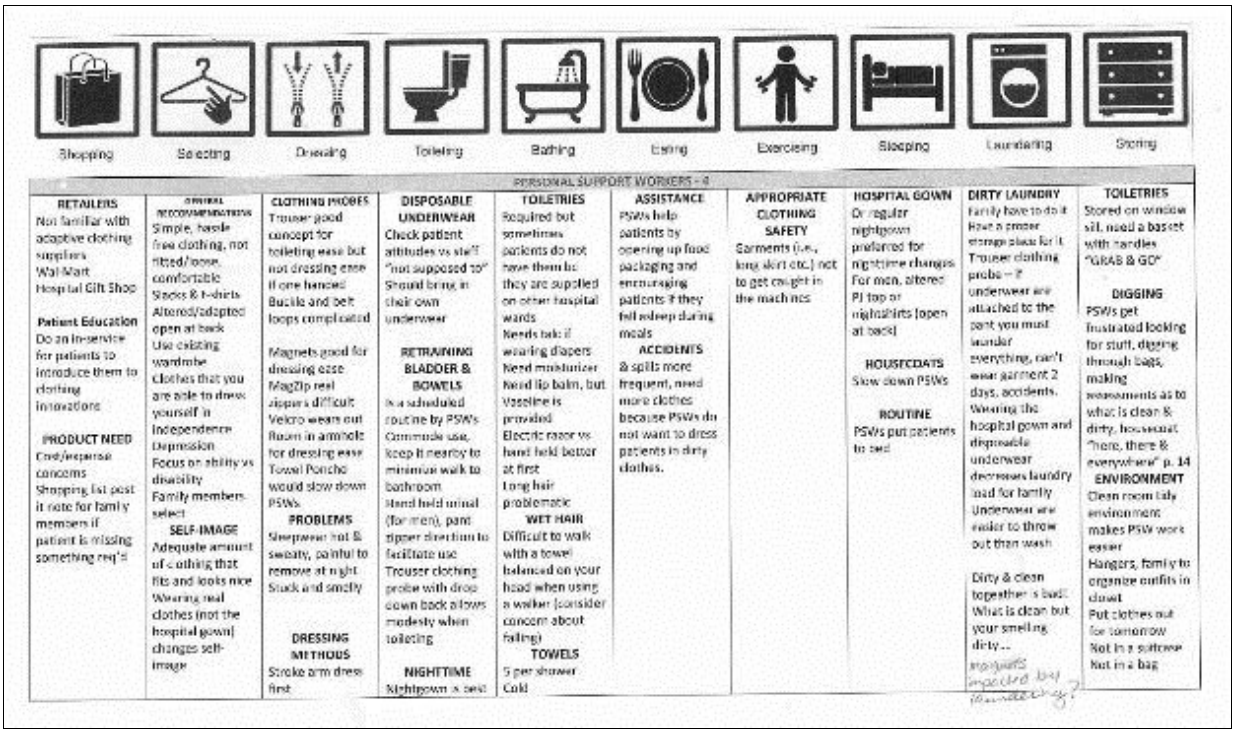


Figure 3.13. PSW transcript summary.

Chapter Summary

The methodology outlined in this chapter supported my investigation of a very specialized situation: one in which a targeted group of people had suffered a disabling event that required enrolment into a hospital RT program and limited their ability to act competently within the clothing taskscape. Because of the intimate nature of clothing, it is clear that clothing is not simply fabric manipulated by a few strategically placed seams; rather, it has infinite capacities to "mediate relationships between the self and others" (Keane, 2005, p. 200). The following chapter will focus on study results, elaborating on these individuals' relationship with clothing and the impact of temporary or chronic functional limitations on people in RT.

CHAPTER FOUR: RESULTS

This chapter presents the results of fieldwork at the ACTIVE rehab unit in the hospital. Chapter 5 focuses on analysis and discussion of the results. The key to designing better products, enviroments, and services depends heavily upon an understanding of the people involved (Merholz, Schauer, Verba, & Wilkens, 2008). The information presented in this chapter aims to expand our understanding of people and their clothing needs by providing a glimpse into the complexity of their lives while in hospital rehabilitation therapy (RT). The purpose of this study was to determine the factors along the clothing taskscape that impacted people's functional limitations and self-image in order to better inform design. Ingold's (1993) concept of taskscape inspired my examination of people's clothing needs within the RT context. Ingold defined tasks as "any practical operation carried out by a skilled agent in an environment as part of his or her normal business of life," and taskscape as "an array of inter-related activities" (p. 158). The research setting included patients living in hospital. The RT unit became their home away from home, a place to sleep, eat, and work at rehabilitating their bodies with assisstance from therapists and care workers. The clothing taskscape revolved around 10 central activities: selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing. In order to examine the inter-relationship between these activities, data collection included observations of patients working with their therapists and care workers, followed by interviews. Data collection focused on individuals' multiple interactions within their clothing environment (taskscape) with particular emphasis on the person's body abilities, the person/garment interface as well as the interface between the person and artifacts within the RT environment.

Dressing—that is, the act of donning clothing in which to do therapy—was not a simple task but rather one action required within a series of activities. For instance, selecting a pair of trousers to wear on a particular morning was the first task performed within a sequence of tasks required to dress. The succession of dressing tasks was embedded in and ultimately influenced other tasks within the array of activities that comprised a patient's daily routine. In order to systematically review people's interactions within the RT environment, observational and interview data were thematically analyzed to conceptualize and operationalize the clothing taskscape, which included selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing. This chapter presents the range of taskscape activities with rich description in order to expand understanding of the hospital RT context. Consideration of

people's preferences, constraints, motivations, behaviours, and capabilities related to associated rehab tasks, as well as meanings assigned to the completion of those tasks, underpin the design of more effective products such as clothing and footwear as well as services and environments. The order in which taskscape activities are discussed below follows the chronological rhythm of the typical day for patients in RT.

A Day in Rehab

The following list of activities illustrates a typical day in RT for one of the patients participating in this study:

> I wake up around 5:00 or 6:00 and then I wait for a personal support worker to come and clean me, get me dressed. Breakfast at 8:00. Between 9:00-10:00, I have speech therapy and I have noticed such a difference. It's amazing. Your tongue is the strongest muscle in our body. And whatever this is, my diagnosis has not been confirmed, it really affected my speech. …
>
> 10:00-11:00 I have a break and it was often a coffee and cookie break with George who I met through recreational therapy. …
>
> 11:00-12:00 I have my physiotherapy and I WORK MY BUTT OFF, especially after my stitches came out. I said OK, once my stitches came out that's it, I have to work hard; my pain is managed. I am good to go; that was the motivation.
>
> So 12:00-1:00 is lunch. 1:00-2:00 is recreational therapy, where right now we are playing Scrabble. You can really do anything to take your mind off. … I enjoy the camaraderie with other patients.
>
> 2:00-3:00 is occupational therapy … so I say to people, it is like a job, like don't bug me from 9:00-3:00. I have a job. Before I was not in this mind frame, and I met so many of my friends and family and I did not do my therapies and did not think of it like that. So at some point I thought, "What am I doing, this is not a hotel? This is a hospital, I have to get out of here." A light bulb came on, and ever since, I'm like, no … I need to get better so I have been really pushing. My upper body is stronger now; I can do my transfers. I could do so much before ICU [Intensive Care Unit], but I lost so much muscle.
>
> Anyways … 5:00-6:00 is dinner. But before and after dinner we can do whatever we want, so I try to do extra work. I have hand weights that I do while watching TV. I have stress balls, putty, my ankle rocker. I try to do more than just sitting … and doing nothing, because I am realizing … time is valuable, I need to get out of here. I need to get out of here, for my son, for me. … There is a waiting list [to get into rehab], like it is not just me.
>
> So that is my schedule for the day. Before I used to stay up sooo late at night, now because I put all my energy into my therapy, by 7:30 I am *ahhhhhhhh* [tired, exhausted] … and I get ready for bed. (Patient 9)

Patient 9's description of a typical day in RT can be categorized into various tasks that comprise the clothing taskscape. The following sections detail the range of activities and tasks that relate to apparel, footwear, and related items while a patient is in RT in order to identify the factors that impact their functional limitations and self-image.

Selection

The Selection segment of the clothing taskscape centred on the decisions involving patients' apparel-related choices. During their stay in RT, patients compiled a transitional wardrobe related to, but different from their wardrobe at home. Clothing items were selected from existing home wardrobes, other items needed to be selected and purchased to augment the rehabilitation wardrobe and clothing items were selected for daily wear while in RT. While selection tasks were fairly straightforward, patients' choices influenced a number of other activities within the clothing taskscape. This section describes the context of the use scenario and how clothing was selected and integrated into patients' routines while in RT. This section also discusses recommended clothing and footwear selection criteria, as well as the link between clothing and self-image.

Patients typically arrived to the hospital RT unit on a stretcher, wearing their hospital gown. The first matter of business was to assess their mobility and get them ready for therapy. Patients were required to change out of the hospital gown and into their own everyday clothing.

As a rule, personal support workers (PSWs) greeted patients and situated them in their hospital room. The care worker assigned to the patient would initiate a discussion to orient him or her to the RT floor. As the following care worker described,

> First of all, I explain what rehab is … because a lot of times, people come here and they don't know what the expectations are. They think they're just coming here to, like, kind of lay in bed again like they were downstairs. So, when a patient comes to our floor, I say, we are basically like a home environment. You are here to get out of bed, to get dressed and we're here to motivate you and teach you how to do the things you need to know so that you're able to take care of yourself at home. So now, just like in your home environment, you're going to need all of your personal belongings, everything from bathing to dressing, to toileting, hygiene, everything. (PSW 34)

It was important that patients had the right types of clothing and footwear as this facilitated dressing independence and prepared them to participate in RT.

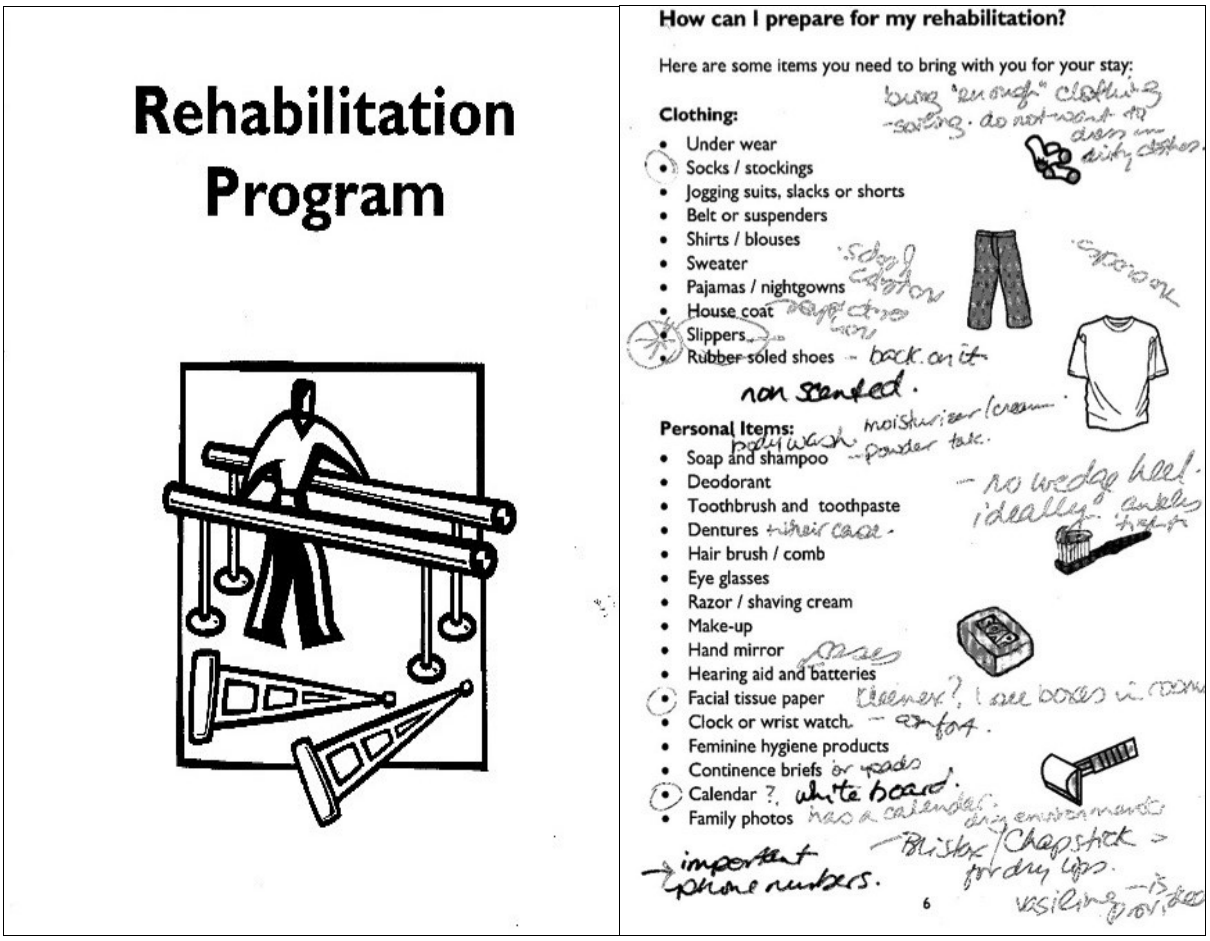


Figure 4.1. Rehabilitation program pamphlet. This was provided to patients upon admission to the rehab program. Handwritten notes were jotted by the researcher during interviews.

Selection From Home Wardrobes

The selection of clothing was one constraint experienced by patients in RT. Few patients were able to select their own clothing from their home wardrobe, having been admitted to hospital unexpectedly due to some health event (e.g., stroke or broken hip from a fall), with only the clothes they wore at the time of their arrival. Once patients became medically stable, they were transferred directly from their acute care unit within the hospital to the rehabilitation floor. Because patients were unable to return home, the selection of clothing, footwear, and toiletries they needed during their stay in RT was delegated to a family member (either a spouse, son, or daughter) or sometimes a friend. The hospital provided a pamphlet to orient patients to RT, which offered guidance on what to bring in terms of clothing, footwear, and personal items (see Figure 4.1).

Clothing Selection and Routine

A physiotherapist (PT) would be the next person to meet with patients in order to assess their mobility. At this time, patients were again advised about mealtimes, the daily therapy schedule, and the items required during their stay in RT. The concept of clothing and routine was utilized as a way to transition patients from illness to wellness; that is, to help them look and start to feel normal. A PT explained it this way:

> I will say at least 90% of patients, once they move to rehab, they look tenfold better the second day than they did the first day. They are back into their regular clothes. They are out of the hospital garment; they themselves now do not feel like they are a sick person because you created routine for them; they are expected to go to the dining room for their meals, they have therapy sessions which occupy them through the majority of the day, giving them short periods of rest throughout. At night, they change into their pajamas, we expect them to brush their teeth, comb their hair, and do the activities that they used to do at home. So they are bound to look better and also feel better. Basically, you're medically stable as soon as they're on rehab. And that's what we try to preach to them. (PT 20)

Some patients were able to provide their family members with a detailed list of required items along with instructions on where to find them at home. Other patients delegated clothing selection to family members who in turn simply chose the required clothes, shoes, and personal items based on their understanding of what was itemized in the *Rehabilitation Program* pamphlet (Figure 4.1) and/or discussed with hospital staff. Some family members accomplished this task more successfully than others. One woman described: "I had to go quickly to the hospital. My husband took a very random combination [of clothes]. One colour, another colour—but nothing coordinated. This week, I brought my clothes for Monday, Tuesday, for every day" (Patient 16).

Daily Clothing Selection

The notion of having an outfit for each day was ideal, one of the patients I interviewed (Patient 1) discussed the organizational strategy devised by her daughter which included hanging her clothing in matched sets, with trousers and T-shirts on the same hanger (as shown in Figure 4.2). This patient also had two hoody-style jackets in neutral colours that coordinated with her assortment of trousers and T-shirts. Using such a simple method of organization streamlines the clothing selection process for patients and the PSWs who assist with dressing and saves valuable time, as described by this care worker:

> If a patient is capable enough to get into their closet and get their stuff, whatever they

> want to wear the next day [helps us] because it's a problem in the morning. Sometimes we're standing there and everything we pick, they say: "no, I don't want that, no I don't want that"… and we spend so much time trying to choose something for them to wear. (PSW 26)

While having one's clothing arranged in matched sets helped with selecting what to wear, this task was not simple. One patient attempted to choose her clothes for the next day:

> I have an idea the night before, I try and pick things that are going to match and look decent. But the final decision is in the morning; how do I feel? If I am in a lot of pain and I picked something that's a little more complicated, then I probably will change my mind. I was thinner before I went on 6 weeks of bed rest, so now all of my clothes are tight. (Patient 29)

Figure 4.2. Patient's closet. This patient's closet had clothing hung up in matched sets (trousers are hung under a coordinating T-shirt) which eased the selection process.

Although patients did not have complete control over their clothing selection, having clothes that fit properly and were organized in matched sets eased dressing decisions, for themselves and their care workers.

Garment and Footwear Selection Criteria

Therapists and care workers all recommended that people bring clothing from their existing wardrobe to RT so that they could practice with their own apparel. As explained by an occupational therapist (OT), "you want to teach them how to redress into things that they're going to go back to" (OT 12). However, this recommendation was tempered by various other detailed suggestions, because for exercise "you don't really want them to have jeans on, and that might be typically what they wear at home, right?" (OT 14). One of the occupational therapy assistants (OTAs) elaborated: "It's all about simplicity—the number one goal is for patients to be able to put their clothing on as independently as possible" (OTA 31). Thus, each request for clothing was further qualified with this description: "comfortable clothes you can exercise in" (OT 14). Certain clothing features facilitated independent dressing. Generic suggestions included trousers with an elastic waistband and wider legs (without elastic at the ankle), as well as over-the-head tops (without buttons) that were roomy in the armhole area.

The OTs recognized that they were "not necessarily teaching them how to put their normal clothing on" (OT 12), but emphasized to patients that comfortable clothes were needed to participate in daily therapy and exercise. Thoughtful garment selection was critical to structure the process of relearning how to dress, as one of the OTs explained: "Initially, we'll make things a little bit easier in practice. … I don't want to put them in a situation where we're just going to fail at everything right away" (OT 13). Other OTs agreed, stating "I don't start with everything right away because it's overwhelming. They have to learn some of the basic dressing strategies and I'll start with the very basic" (OT 14) with the overall goal of "working them up to their typical dress" (OT 33). Thus, the strategic selection of clothing worn in RT contributed to patient success when dressing.

Footwear selection also was emphasized. Most patients had mobility issues and fall prevention was of critical importance. In addition to compromised mobility, many patients were also experiencing swelling in their feet which added another set of constraints to the selection of footwear. Shoes needed to be supportive, with a back, good heel, and rubber sole with treads. Patient 8 explained that rubber soles were needed because patients were encouraged to shuffle their feet to move themselves along in the wheelchair. Running shoes generally fit within the required criteria; shoes with hook and loop tape tab closures (more commonly known as Velcro) were easier to put on as compared to shoes with laces, although elastic laces could be substituted

for traditional ones. Unacceptable footwear included flip-flop sandals, clogs, ballerina-style slippers, or socks worn alone (see Figure 4.3). As one therapist suggested,

> We often tell patients to buy shoes with Velcro. And we just say to go to Wal-Mart, or some other cheaper store because they don't want to spend too much money on running shoes with Velcro because hopefully they won't be wearing them too long. (OTA 17)

Although slippers were itemized in the *Rehabilitation Program* pamphlet (Figure 4.1), their usage was questioned by one of the OTs:

> Definitely not slippers. … People often bring slippers and flip-flops and I tell them, no, you need a non-skid rubber-soled shoe, because if they are getting up to go to the bathroom, they need secure footing and there is not enough support [in a slipper]. We're trying to decrease risk of falls; slippers have no place in the hospital. … A slip-on shoe would be better than slippers; I don't think that is a good thing to have on the list at all. (OT 27)

Figure 4.3. Prohibited footwear. Such footwear included sandals and ballerina-style slippers as well as clogs, and socks worn alone.

Loose-fitting clothing was advocated by patients, care workers, and therapists. Generally, loose clothing is easier to don and doff as compared to form-fitting garments. Dressing a patient with limited mobility was challenging, and care workers did not want to cause discomfort and pain. Observations of patients in RT highlighted other ways of dealing with stroke. A patient who had experienced a severe stroke had her paralyzed arm taped (to hold it in the shoulder joint so that the tendons and ligaments would not stretch) and supported in an arm sling. This condition is painful, as one PSW explained:

> For stroke patients, their shoulders are in severe pain, you know, the OTs put [Kinesio] tape on, so their arm isn't pulled out the joint. So, if I'm having to move their shoulder

> and arm to get tight clothing on, that's going to cause them pain—but a lot of family don't know this. So, they need to be educated. (PSW 34)

One patient shared her thoughts on yoga pants:

> From the influence of the personal support workers I now have loose clothes. Before I liked yoga pants but my whole body was in pain; if you touched me, I was in pain. In looking back, why did I have yoga pants? So I finally bought these nice, loose-fitting clothes. As I said before, I never wear stuff like this. … Even casual, this is not my casual … even then I can get it looser. This is much better for [the PSWs] to pull down and not hurt me … they do not want to hurt me obviously. Every time with my yoga pants they were struggling. (Patient 9)

As demonstrated by the comments made by this care worker and patient, loose clothing eased the dressing maneuvers and caused patients less pain.

Lounge Dress

Although not recommended for exercise therapy, a number of patients and therapists advocated wearing a dress because of its ease in donning, doffing, and toileting. One patient described the reasoning behind her garment preference:

> I find pants difficult; I mean, as my legs are getting worse, it's very hard to move my legs easily. So I mostly wear these lounge dresses. I bought five of them, in five different colours, from the Shopping Channel. They are very comfortable to wear instead of pants. Pants are not at all that comfortable. Unless, of course, they are jogging pants with an elastic waist and made of stretchy fabric. Maybe somebody who is stronger could wear pants, but I'm not strong anymore. (Patient 11)

Another patient described her "lounger dress":

> It has a round neck and it's just about—actually it's down to here [just above the ankle]. It's got lace bands around the sleeve. So it's feminine, it just goes over the head and is easy to put on, easy to get it off. I liked the style of it and the fabric of it [polyester] and that it was easy to get it on and off. I've been getting them for years until recently; they are not available anymore. I mean, they don't look like a nighty; I can put them on and still get away with walking up the hall without looking like I've got a nighty on. I'd have no reason [to change] because I was so comfortable in what I was wearing and I wouldn't bother changing unless I was going out or had an appointment. (Patient 5)

Beyond the ease of dressing, some women chose dresses because they were also easier to toilet in, as explained by this PT:

> Obviously, we tell some of our female patients, who can't really pull their pants down, that they just wear gowns, those muumuu gowns or whatever once they're at home because they're easier. Many were already wearing them before they came in. Now,

> while they are in the hospital, we are the ones asking them to wear pants, which they may have never worn in their lives, right? So, often they will return back to wearing something like that to allow and make it easier for them to do the toileting piece. Some of them wouldn't even wear undergarments when they are at home, because then, there is nothing to pull down and have to bend down to bring back up. (PT 20)

In order to ease the dressing process, clothing preferences ultimately included loose fitting garments, as well as the dress (for female patients) for the ease it afforded when toileting.

Therapeutic Effects of Clothing

Clothing selection provided therapeutic effects and served as a means for patients to motivate themselves and, unintentionally, others around them. The way that patients looked and felt was represented by their appearance. One of the OTs described clothing's effect on recovery: "I think it definitely can be a good motivator for people; they feel better if they are wearing the style of clothing which they are used to" (OT 15). The aspiration to look good in order to feel better was echoed by a patient: "I want to be me again. Maybe not the real me, but … the new me. A pinch of the new me. To have clothing, something that is cute, that will make me feel good. That will make me feel that I am still who I was" (Patient 10). This feel-good effect of clothing extended beyond patients' self-assessment, as illustrated by one patient speaking about another in rehab:

> There's one lady, I think she must have gone home this weekend. Oh my gosh, she's so well-turned out and I said this to her, and she said, "I do all my shopping on the Shopping Channel because I can't go out any more." She buys all these beautiful clothes and she comes to therapy. She just boosts my spirits looking at her. And it lifts her spirit, and she feels good. Because I can tell, she's had a stroke. (Patient 29)

But one patient found it difficult to put any effort into her appearance:

> In terms of dressing up I don't care right now, I have no desire. Actually it's funny, I shouldn't say that. I am ready, I thought of lipstick recently, things like that. I want to shave my legs, but I cannot yet because I am on blood thinners. So I am thinking like that and I find that healthy, I want to do my hair nice. I want to start looking good, but in terms of clothing yet, I have no … I do not know why … I just have no … I think it's because of practicality, I just CANNOT right now, I can't even bend to put shoes on or socks. … I think that is maybe why. (Patient 9)

Patients had to select clothing from the assortment brought to them by their family caregivers and this influenced their ability to achieve a positive self-image. A number of PSWs emphasized the need for adequate clothing, meaning the quantity of clothes was sufficient so that

they did not have to dress people in soiled clothing and that the clothes had "good form … something they could easily get on" (PSW 34). Some patients felt it was difficult to make clothing choices based on what they had available:

> I miss the variety, because I am a terrible person getting dressed. If it's not fitting me well, I'd take it off, and put it into the hamper. I'd put clothes on, and then sometimes take them off, because they have to sit comfortable. The clothing I have here is limited, so I have to make do. (Patient 7)

Another patient mentioned:

> I don't have a lot of clothes here either. So I keep washing. … My sister bought these and they were all from Joe Fresh; I looooove Joe Fresh [laughter]. Thank goodness, because it's affordable, and it's simple and you can keep washing it. I have maybe four pairs … of everything … well, shirts I have more. But, I do not plan to keep these, after this. When this is done, I don't want to remember, I don't want to, not because of the clothes … just the memories. (Patient 9)

Fabric and styling were also important, as this patient commented:

> I look forward to never wearing pajama bottoms in public again. I will probably go with my friends shopping and get some easier to put on casual black slacks and capris. But they won't look like pajamas. That's just so totally archaic. (Patient 29)

There was a general resistance to wearing clothing during the day that looked like sleepwear: "I have pajama pants but I do not … feel like pajamas during the day. These are kind of like pajamas. … I feel like I have not changed" (Patient 9). Clothing selection options in the transitional RT wardrobe were limited and this proved to be another constraint for patients and their care workers.

Feelings Evoked by Mirrors

Typically, when individuals select their clothes, they will don a garment or outfit and then look in the mirror to check their image. However, mirrors reminded people that their illness had changed their appearance. Feelings about how they looked varied from indifferent acceptance—as indicated by this patient: "I am not tempted to peek [in the mirror] too often" (Patient 2)—to evident distress, as indicated by another patient: "In therapy, I ask them to turn the mirror around. … My whole body has changed, there are bones sticking out … and my neck, it freaks me out right now" (Patient 9). Patient 10 said: "Look at me; would you like to see something like this in your mirror?" Regardless of the reason that patients were in RT, mirrors provided visual evidence that their appearance had changed and for some this had a negative impact on their self-image.

Summary of Selection Phase

An examination of the Selection phase of the clothing taskscape revealed a number of factors. Patients assembled a transitional wardrobe while in RT. Clothing and daily living routines were integrated into therapy to help people feel like themselves again. That being said, this was not a simple transition because people were dealing with the new reality of their individual health situation which included pain and anxiety connected to the sudden onset of disability. This, in turn, had a cumulative effect on people's dressing performance and maintenance of their appearance which necessitated assistance from therapists, care workers, and family caregivers.

Patients seldom had control of their wardrobe selection. While in RT, clothing selection criteria were linked to ease in dressing and required an adequate supply of comfortable trousers with elastic waistbands and over-the-head tops as well as loose, garments that did not have the appearance of sleepwear. Some clothing items from patients' home wardrobes were suitable for RT, however, a few participants expressed resistance about wearing their transitional RT wardrobe once they were home again. Footwear was an important factor in reducing the possibility of falls. A supportive, non-skid sole was recommended. Coordinated outfits, organized into matched sets hung in the closet, made the selection process easier. Dresses were a go-to solution because of their ease in donning, doffing, and toileting but were problematic when exercising and thus seemed better suited to the home environment than to RT. Mirrors provided some patients with unwanted reminders of their changed appearance. Certain patients used clothing as a way to motivate themselves and this served to inspire those around them. Given patients' changed physical abilities, existing wardrobes might not be practical while in RT, which prompted the next phase of analysis in the clothing taskscape—shopping.

Shopping

Although therapists recommended that patients bring in clothing from their existing wardrobes, some people did not have adequate clothes suited specifically to RT, particularly due to people's current physical capabilities, which made it necessary to go shopping. This section reports participants' perceptions of product need, whether it be for clothing or footwear, and the

incurred costs related to the sudden onset of disability. Results also highlight where people shopped and who did the shopping, as well as the challenges and barriers they encountered.

Transient Product Need

Many patients spoke about their extensive wardrobes; as one patient said, "I haven't bought too much because last year I went shopping a lot. And this year, maybe I have to use all those clothes" (Patient 16). Such statements were not made exclusively by the female participants in this study; one of the male patients noted, "I've got so many shirts that we haven't bought any for ages … they're plaid, striped, and all sorts of colours" (Patient 8). The latter patient was in RT due to a stroke, and when I inquired if he would be able to manipulate the shirts' buttons and button holes, he replied: "initially, no … but I think when I go home I will" (Patient 8). Several patients reported that they had many clothes and they thus were hesitant to purchase new ones, even if their existing clothes were not suited for their current abilities.

Therapists, care workers, and patients alike frequently mentioned the prohibitive cost of new clothing. Clothing might have been a luxury item on a patient's priority matrix because other things were more necessary. One of the OTs reminded me that the onset of sudden disability often was accompanied by a loss of income:

> So, there is a lot of anxiety around, you know, "what am I going to do?" … Mortgage payments, bills, you know, if they're young especially. And still having to put kids through university, things like that. They are very much aware of their current expenses as well as future ones; they might need a wheelchair or a walker or a bath chair. All that stuff starts to add up. (OT 14)

Since the need for and use of new clothing could be temporary, some patients were reluctant to purchase new items. So many things were in flux; people typically lost weight when hospitalized and needed smaller clothing sizes, others on bed rest gained weight. Most patients in RT had swollen feet, but that too was a temporary condition as one of the OTs reminded me:

> The hip patients, that's the group that has a lot of swelling after surgery and movement restrictions, right? A couple of months from now, they will have healed and they won't need different shoes and dressing tools. (OT 12)

Hook and loop tape would help people fasten their shoes while in RT but as one patient stated, "I figured I'm not going to be here that long. I wouldn't wear them if I'm at home. So what's the point?" (Patient 8). Patients questioned the need for new clothes and footwear because they

expected to regain their health and return to their former size.

Personal Shoppers and Retailers

Shopping is an integral part of daily life (McCracken, 1988). However, purchasing something while in RT becomes complicated. Once people were admitted to RT, they needed clothing or footwear to do their therapy; however, they were unable to shop for themselves and had to rely on others to perform this task, creating another constraint for patients. Patients reported recruiting their husbands, wives, sons, daughters, sisters, nieces, friends, and neighbours to do their shopping. Some of the assigned personal shoppers were better suited to this job than others. Sometimes shopping tasks were not accomplished in a timely manner, as one patient explained to me: "I have my clothes, my house is full of clothes … and when I came here, for the first 3 weeks, maybe even more, I was in a diaper and a housecoat. If my son is too long shopping, I cannot change that" (Patient 10).

The aforementioned group of assigned personal shoppers purchased required items from a variety of retailers, including: Wal-Mart, Giant Tiger, Joe Fresh, Sears (catalogue), Costco, and the Shopping Channel Network. One person reported getting clothing that had been purchased from a Value Village second-hand store. The commonality among these retailers is that most offer readily available, serviceable, inexpensive products. One of the therapists discussed the need for patients to purchase new shoes:

> A lot of our patients can't afford an expensive running shoe. Wal-Mart sells these ones that are $14 to $16; they are an okay solution because they do the trick for their stay in rehab. They have Velcro on them and they tend to be a bit wider fit, so that when [patients'] feet are swollen, you can slip it on. Once you have done your rehab stay, you can comfortably throw them out and then invest in a better pair of shoes. (PT 20)

Figure 4.4 shows running shoes with hook and loop tape currently available at Wal-Mart. This shoe facilitated dressing independence and provided a measure of comfort for those patients whose feet were swollen.

Figure 4.4. Shoes with hook and loop tape from Wal-Mart (cost $19.94).

Shopping Barriers

Patients encountered other shopping barriers in addition to relying on others to do their purchasing. Rehab stays were relatively brief, and any required clothing, footwear, or personal items were needed immediately. Shopping at brick-and-mortar retailers was impossible for patients. Online or catalogue shopping also was not a viable option for patients who were not Internet savvy, and catalogue shopping had associated shipping wait times and extra fees.

Shopping for patients was a complex activity. The initial barrier encountered was a lack of knowledge on the part of the caregivers assigned to shopping tasks about the range of clothing attributes that would best suit the needs of the patient in RT. The *Rehabilitation Program* pamphlet (Figure 4.1) and care workers' conversations with patients provided only basic recommendations; that is, to look for loose clothing, trousers with elastic at the waist, and shoes with hook and loop tape. One of the care workers discussed the need to educate family members: "Your family member has had a stroke; sore shoulders is one of the severe side effects of stroke. That is why we request that you purchase clothing that is larger or has been adapted" (PSW 34). The same care worker also suggested in-service sessions for staff and patients so they could become familiar with "different kinds of shirts that they can try on overtop. If they are struggling to dress and see someone struggling, I tell them they will be OK" (PSW 34).

The most obvious constraint was patients' inability to try things on to confirm comfort, fit, and styling preferences because they were in hospital and unable to shop. This was especially problematic with footwear. As highlighted in the Selection component of the clothing taskscape,

because feet were swollen and body movements limited, people needed shoes that were wider across the top of the foot and/or in a different size than they normally wore. A therapist offered her shopping solution to this problem: "When I send [family members] to buy shoes, I trace the patient's foot" (OT 15). Other personal shoppers purchased multiple shoes in different sizes and then returned whatever was not needed. As one patient said, "Shoes are important for the feet. Go look, there are three pairs of running shoes inside my closet. My son brought me different pairs. They are still all new" (Patient 10). Consequently, the assigned shopper was required to both purchase and return items, while managing receipts and reimbursement—a simple task made complicated.

Summary of Shopping Phase

Patients' relationship with clothing was magnified within RT. Patients' inability to dress independently adds another layer to how they feel about being disabled. As such, patients' relationships with their clothing necessitated a re-evaluation of their wardrobe and this prompted the purchase of new items. An examination of the Shopping phase of the clothing taskscape highlighted a number of concerns. Patients had little control or input into the kinds of clothing and footwear purchased because shopping was delegated to a family member or friend who may not have the knowledge about the range of clothing attributes that would support dressing ease and independence. In addition, new clothing and footwear could not be tried on before purchase, which necessitated buying multiple sizes and then returning surplus items, all time-consuming activities for already burdened caregivers. New items were needed immediately but their use might be temporary, which prompted concern over associated expenses. Once adequate and appropriate clothing was on hand, people had to confront their feelings about their changed physical abilities and relearn how to dress, a process reported in the next section of the clothing taskscape.

Dressing

Putting on and taking off clothing requires balance, flexibility, and various synchronized movements. These are naturally linked to how the body is able to move, which is based on a person's physical condition. Obviously, the range of movements needed to dress can be challenging for people in RT because they are recovering from illness, injury, or surgery.

Dressing oneself is considered a critical activity of daily living; anything that prevents independent dressing, or impedes a person's ability to do so with ease, elicits different feelings. An inability to dress creates feelings of frustration and a need for assistance from caregivers. A return to dressing independently after illness or disability invokes dignity and feelings of normalcy.

While donning and doffing clothing involve different maneuvers, many of the research participants in this study referred to dressing in a generic way, sometimes discussing the act of putting clothing on and at other times its removal. Although dressing actions were initially recorded in my observation forms and field notes separately as donning and doffing, and categorized as such for clarity during the initial phase of analysis, the results are combined and reported together. The participants did not view dressing/undressing as different but rather perceived them as entwined activities (which I define here simply as "dressing").

The following contextual information about dressing is organized into sections. The first section describes body abilities, motions, and dressing positions, followed by illustrations of dressing tools and an explanation of their use. The second section identifies dressing methods used in RT and highlights the range of clothing attributes that influence independent dressing, concluding with an examination of particularly problematic garments.

Body Abilities, Motions, and Dressing Positions

Unsurprisingly, observations of ADL sessions with therapists revealed that people in RT had varied differences in their range of abilities and body motions. OTs scheduled ADL sessions with patients shortly after their arrival to RT (within 2 or 3 days) to assess their self-care abilities and develop a therapy plan. These sessions were scheduled in the morning; patients woke up, toileted, doffed their sleepwear, washed at the sink side or in the shower, dried themselves, donned their clothing, and completed personal grooming activities. This routine could take close to 60 minutes, requiring rest periods throughout the process and leaving many patients fatigued.

Regardless of patients' specific health conditions, observations of ADL sessions highlighted common movement restrictions. These included restricted range of arm motion, balance issues, prohibited bending or twisting, and limbs that were partially or fully nonfunctional with limited or no movement. Body motions were often accompanied by pain, as stated by one patient: "I can manage dressing, but that doesn't mean it doesn't hurt … and it's slow" (Patient 29).

All patients used a mobility device—a cane, walker, or wheelchair to help with balance and while these devices provided aid, they also made other activities more complicated. Balance was one of the most important factors required to successfully accomplish dressing maneuvers. Patients recovering from stroke sometimes experience dizziness or double vision, and this impeded their proprioception or knowing where their body was in space. One strategy to combat balance problems was to dress while lying down in bed; as one of the OTs described: "If their balance isn't good and standing isn't quite there yet, then I suggest they try to put their pants on in bed. They have the full support of their trunk and they can just bring their legs up and do it; a lot of people have success that way" (OT 13). See Appendix B-I for an illustration of this procedure that facilitates dressing for people who are experiencing issues with their balance.

Lowering the body from a standing to a sitting position and then raising again from sitting to standing were movements that required engagement of multiple muscle groups in the core and body joints, which often caused pain and discomfort. This maneuver was not possible for some people without assistance, thus the arms on a chair or commode as well as rails alongside the hospital bed and grab bars positioned near the toilet and in the shower helped patients with this movement. However, in the patients' hospital bathroom there were no grab bars by the sink, which prompted some patients to raise themselves from their wheelchair by grasping the gooseneck faucet, a maneuver prohibited by the therapists and a clear deficiency in the design of the bathroom.

Bending down and bending forward—for example, when a patient was putting on trousers, socks, and shoes—was also problematic, especially for those with balance issues. These maneuvers, as well as others, were prohibited for patients recovering from hip surgery, necessitating the use of reaching tools:

> Somebody who's had a hip replacement has hip precautions, meaning no bending, and not bringing your knees up. If your pants fall down at the toilet, it's an inconvenience because you've got to sit down again. It is difficult and painful to transfer up and down. (OT 14)

Figure 4.5 provides illustrations of hip restrictions. The reason for the prohibition of certain movements was to ensure the hip joint healed in the correct position, and during the recovery process it was important to protect the patient from falls and other potential injuries.

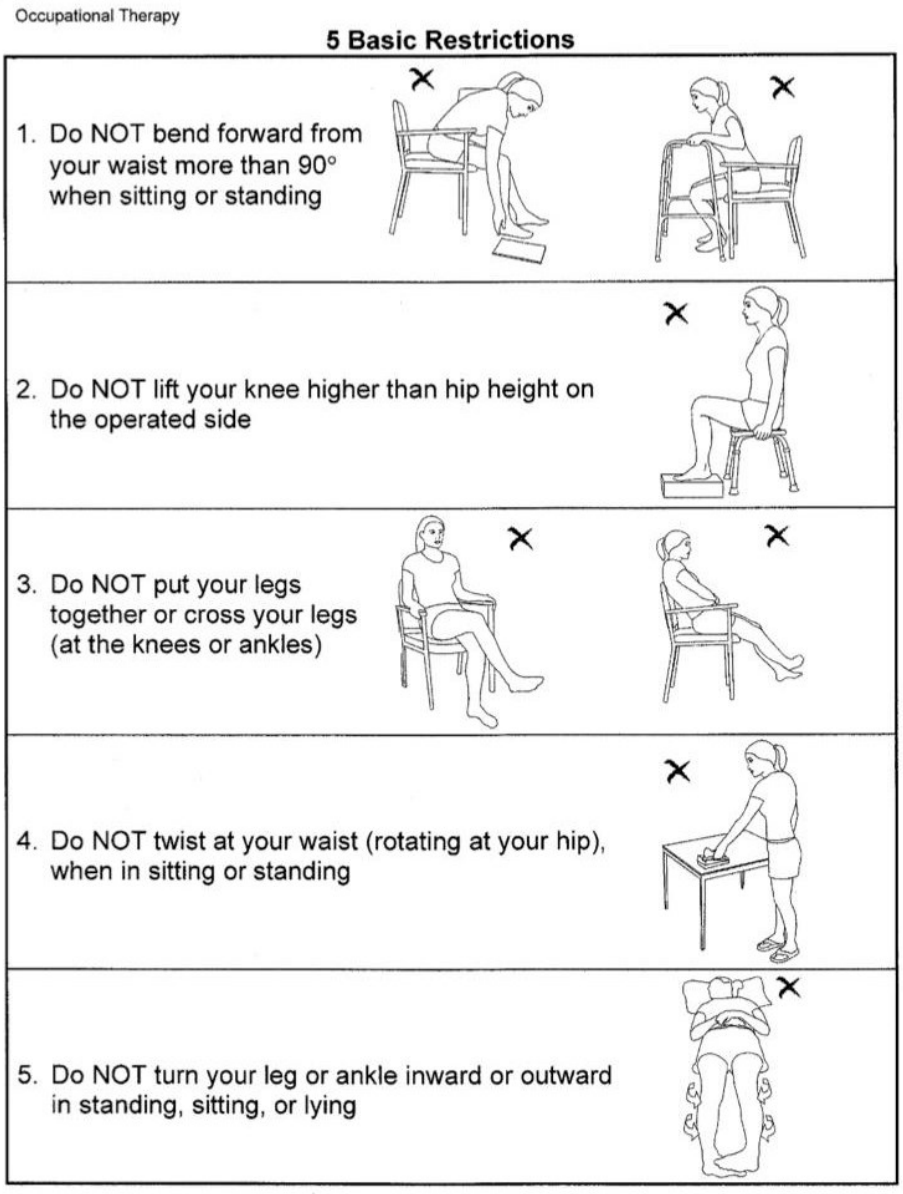


Figure 4.5. Hip restrictions.[9]

Another body motion limitation included reaching the arms behind the body. This, of course, had the biggest consequence for women, since fastening a bra typically required stretching towards their back. Additionally, some patients with limitations in dexterity and fine motor skills had trouble manipulating fasteners such as buttons and zippers. As well, although it seems obvious, many dressing actions require the use of two hands. Hemiparesis, or the paralysis

[9] Image © Cheryl Hall LLC. This and other reproductions from the hospital's *Occupational Therapy Toolkit* used with permission.

of one side of the body, also made the donning and doffing of clothing much more complicated. An OTA said,

> People struggle to get their pants up, especially if they are stroke [patients] and their one arm isn't working as well or is not functional at all. I do find that it makes it quite difficult for them to get up to standing, to balance and to try to get the pants up over top of their bum. (OTA 19)

Dressing Tools

Dressing tools (as shown in Figure 4.6) are an integral part of the dressing environment for patients while they are in RT. Patients learned how to use various tools and were expected to be compliant about integrating them into their dressing practice. The most common tools used by patients in RT included the reacher, sock-aid, and long-handled shoehorn. Other tools were used as needed: a simple clothes peg, the pant clip, the Bra Angel®, and least frequently, the dressing stick. While tools provide some level of assistance when dressing, it was still challenging for the majority of the patients observed. As a therapist highlighted, "a long-handle shoehorn is really helpful sometimes; it is long and it's a bit awkward. Patients have a difficult time trying to maneuver and figure out how to use the shoehorn in the shoe" (OTA 19).

Another therapist discussed the sock-aid tool:

> Sock-aids are not the easiest things to teach a stroke patient. I also work on Slow Stream (the other rehab stream in the hospital); the patients there are far worse than the patients here. So basically you can queue them; I could give a patient a sock-aid and show them how to do it and in the next minute they're putting it on their hand, because they have cognitive as well as physical limitations. (OTA 21)

Still another therapist emphasized that "you have to have the strength in your hands to put the sock on the sock-aid before you can get it on your foot" (OTA 28). It is impossible to position a sock onto the sock-aid using only one hand. A patient with full use of both her hands indicated "putting socks on is a breeze, with the sock putter-on-er, but taking them off, not so much. I have to use the toe of one foot to kind of push off the sock from the other foot, so generally, off is harder" (Patient 29). Observation of patients in the RT environment highlighted the required motions and associated challenges encountered dressing and undressing while using tools.

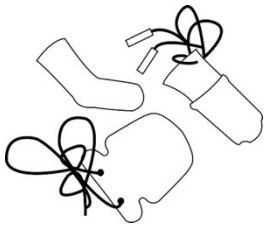
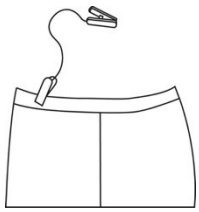
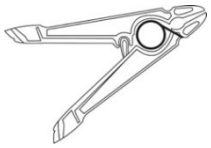
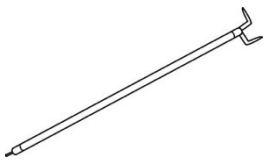
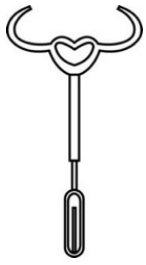
	**Long-Handled Shoehorn** This tool facilitates donning of shoes. The wide end is used to ease the heel into the back of shoe. Hook end may be used to reach and pull shoes to the desired location or inserted into a loop at the back of the shoe.
	**Reacher** Bending beyond a 90 degree angle to reach the feet is difficult and prohibited for those recovering from hip surgery. Pulling the lever near the handle activates the lever at the end of the tool allowing a patient to grasp an item and pull it closer without bending.
	**Flexible and Hard Sock Aids** Sock aids are used to open up a sock to make it easier to put on. These tools are for people who are unable to reach down to their feet, usually due to prescribed hip restrictions. The use of this tool is quite tricky. Patients are asked to position the sock aid in their lap, gather the sock over the form, hold on to the sock-aid handles, then place the sock aid on the floor, insert toes, lift heel, and pull to transfer the sock onto the foot. Socks require some spandex in order to stretch over the sock aid; longer socks work better than shorter ones. Appendix B-II illustrates this method.
	**Pant Clip** This is a simple handmade tool made from two plastic clothes pegs and a length of cording. Patients are asked to put their shirt on first, attach one clip to the shirt hem, then while seated, don their trousers by pulling them over the knees and attach the clip to the waistband before standing up. The pant clip anchors the trouser to the shirt hem, preventing their pants from falling down to the floor.
	**Plastic Clothes Peg** A plastic clothes peg may also be used to clip one end of a bra to a trouser waistband in order to grasp the other end and fasten the hooks. See Appendix B-III for an illustration of this method.
	**Dressing Stick** This tool facilitates dressing for those with a limited range of motion. The end with the two hooks may be used to maneuver the back neck of a garment over the head or across the back to insert the arm. It may also be used with trousers. This tool was not commonly used in rehab. See Appendix B-IV for an illustration of this method.
	**Bra Angel®** The purpose of this tool is to secure one end of a bra in order to fasten it with the use of one hand. The tool hangs around the front of the neck, the chin is placed on the heart-shaped piece, one side of the bra is secured into the clamp at the base of the tool to hold it in place. The wearer is then able to pull the alternate side of the bra around the back of the body to fasten the bra hooks and eyes together. If donning a back closure bra, it must be twisted around to the back of the body, following this, the arms are inserted into the shoulder straps.

Figure 4.6. Illustrations of commonly used tools and an explanation of their use.

Familiar Tools

Consistent with learning new tasks, familiarity of procedures and tools make it much easier for people to learn. As such, being familiar with use of a specific tool impacted dressing success, a concept described here:

> Some patients have been using a long-handled shoehorn at home for a while and, when they have a specific one that they're used to, they know how it works. So, often if they're struggling with ours, and they mention that they have one, I suggest that their family bring it in and then we label it. Later on as they get more advanced, usually the physio department will ask them to bring in their own personal walker so they can get used to using it again, to kind of retrain themselves on that one rather than getting familiar with how ours works, walking with ours and then when they go home to something completely different. (OTA 19)

Repeated practice was another key factor that influenced dressing with ease: "We had a patient once who was very arthritic and she used a dressing stick basically to dress her whole body; it was amazing, the techniques she had developed. We tend not to use them here very frequently, but occasionally we do" (OTA 22).

Dressing Principles

Dressing methods provided a way to compensate for body and ability limitations. OTs taught patients how to return to dressing with lessons that focused on six guiding principles. The first foundational principle was to always dress the weak side of the body first and undress it last. This is explained by an OT: "Because the weak side has less movement, then the second arm or leg [when dressing] always has to do more work" (OT 13). The second principle was to dress while seated; this preserved a patient's energy because it minimized up and down movements, as one therapist described: "sitting down as much as possible, even if their balance is good, sitting in the shower and sitting to get dressed, just uses less energy" (OT 13). In one seated dressing procedure, people would sit to don underwear and pull it up over their knees, donning trousers afterwards (also pulling up over the knees). Once these interim dressing activities were completed, they stood to pull both garments up to the waist at once. Alternatively, patients could remain seated and shift from one side of their buttocks to the other in order to pull up the garments. See Appendix B-V for an illustration of this method.

The third principle was to remember to "hook" the trouser leg at the knee joint or the sleeve at the elbow joint when dressing. Any body joint may act as a hook; bending a knee or elbow while dressing anchors a garment and prevents it from falling off. An OTA noted, "I always make sure they pass the sleeve hem over the elbow when they're donning their shirt because, if that comes out as they don their top, then it is hard for them; if it falls off they have

to start over" (OTA 22). The activities required for patients to get their clothes on and off required a great deal of physical effort, having to complete multiple movement repetitions to achieve dressing success was exhausting. An OT recounted a comment from one of her patients: "I remember one thing this patient said to me, she was capable of being more independent with dressing but it was exhausting. So that is part of the issue, building up their endurance" (OT 14). Given that patients in RT were already dealing with fatigue and physical limitations, such exertion while dressing depleted their energy levels and consequently, impacted their ability to enjoy other meaningful activities during the remainder of the day.

The fourth principle was "threading," which involved moving the arm through a sleeve or the foot through the trouser leg. Such movement was dependent on the strength and functioning of one side of the body as compared to the other, and many dressing methods were modified to require use of one hand. For example, stroke patients may experience paralysis on one side of the body, which made it challenging to get their affected limb into the appropriate clothing segment. Thus, when donning trousers, patients would use their functioning arm to lift their weak leg and cross it over the functioning leg so that the calf was on the knee; the pant leg would be donned over the foot of the weak leg and then pulled up over the knee. See Appendix B-VI for an illustration of this position. As one therapist noted,

> Some patients do not have the ability to dorsi flex or plantar flex their foot[10]; they're flat on the floor trying to get their foot up to thread the pant leg on. So sometimes, I'll have them angle their foot on the end of the wheelchair foot plate. This way their foot is hanging off the foot plate to get the initial hook in. Being able to maneuver with the pants and lift the leg at the same time if there's no movement there, that's a hard combination for people to do if one side of their body is weak or paralyzed. (OTA 22)

If donning a top or blouse with sleeves, the weak hand would be lifted and positioned into the armhole using the functional hand, and then grasped at the wrist to pull the arm through (see Appendix B-VII). The garment silhouette could be a constraint, specifically the circumference of the sleeve wrist; if narrow, it impacted the effort required to successfully execute this maneuver.

Garment orientation also influenced the success of threading a limb into the appropriate clothing part. For instance, when dressing the upper body, a T-shirt would be placed in the lap in such a way so that patients could see the three holes for the head and arms. The colour of the garment might influence dressing success in this regard, as suggested by this therapist: "They

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[10] Plantar and dorsal flexion refer to movement of the foot from the ankle joint. Plantar flexion describes the foot bending downward from the ankle joint; dorsal flexion describes bending the foot upwards.

might get confused as to where they should insert their arms and head. If the inside is perhaps a different colour then it would be easier to differentiate" (OTA 31). The proper orientation was more difficult with pants, because there are only two holes. The trouble with pants is

> threading [the legs] through, because they're always twisting them around and then it's on backwards or it's on the wrong leg. Generally we just put our legs through right? I'll put their pants on their lap and by the time they've reached down, they're twisting them and now the trouser is out of the right orientation. It would be helpful if everything had a certain type of label in front and back that they could see. (OTA 21)

Garments that got twisted back to front made it necessary for patients to doff clothing and then dress again, causing frustration, fatigue, and pain.

The fifth principle involved reducing reaching distances while bending, as when putting on socks and shoes. To reduce the distance required to reach the feet, one leg was crossed over the other at the knee, thus effectively raising the foot to knee level. Alternatively, the foot was positioned closer to the body by putting it on a step stool, as illustrated in Appendix B-VIII. One of the therapists described a method for donning pants that reduced the reach distance and opened the waistband into a circular form to ease threading of patients' feet into pant legs:

> It's so simple, just a piece of twill tape and two safety pins. Pin each end of the tape at the side front waist [where the waist dart would be]. Throw the trousers on the floor with the tape around the wrists; this will hold the waistband open in a circle. They can use the tapes to pull up their pants, once they are up to the knees, they can then just reach and pull them up. With those other loops stitched into the side seam, the pants are not held open. (OTA 28)

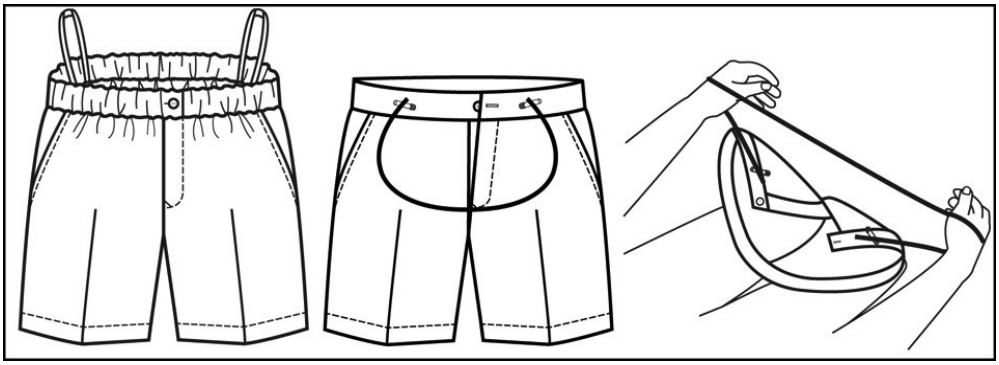

Figure 4.7. Hanger loops. Hanger loops stitched into the side seam reduce reach distances; however, using a length of twill tape pinned to the front waistband reduced the reach distance and opened the waistline into an oval to ease dressing.

The sixth principle prioritized garment sequencing and the avoidance of donning and doffing clothing over existing garment layers wherever possible. "It's the friction between the fabrics, one over the other, it's that second layer that's most difficult to put on. So they might have the ability to put it on, but once they start layering, they can have difficulties" (OT 14). Patients

were instructed to put socks on after donning their pants and likewise to remove their socks prior to disrobing. A patient discussed her favourite polar fleece jacket, which had a small mandarin collar, centre front zipper, and two pockets; what was unusual was that the sleeves of this jacket were lined and this prevented her arms from "sticking" (Patient 5). The slippery lining fabric eliminated fabric friction, requiring less effort, making it easier for her to dress and undress.

Clothing Attributes and Independent Dressing

In considering clothing as environment, it became evident that certain garment attributes either hindered or helped patients dress independently. Sometimes, traditional ways of dressing or wearing certain garments were adapted.

To begin, fasteners were problematic. OTs used dressing boards (shown in Appendix E) to practice the use of various fasteners with patients; however, mere practice may not help patients because it is difficult for people to manipulate buttons and buttonholes with one hand. Although the buttoning tool was patented in 1867[11] and its modern counterpart is a common occupational therapy tool, I did not observe its use during my fieldwork or hear about it in interviews with patients and therapists. See Figure 4.8 for an illustration of a buttoning tool, and Appendix B-XI for the sequencing of steps required to use a buttonhook. Although a buttonhook facilitates the fastening of buttons its use is complicated and given the effort required, some patients opt to avoid garments with buttons and buttonholes and wear pullover tops as recommended by OTs and PSWs.

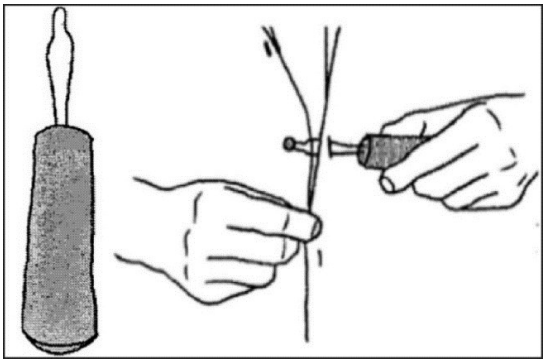

Figure 4.8. Buttonhook tool. A buttonhook tool aids in fastening a button into a buttonhole. See Appendix B-XI for an illustration of use.[12]

[11] U.S. Patent 65615, June 11, 1867, obtained by William H. Shurtleff.
[12] © Cheryl Hall LLC. Used with permission.

A patient in this study described how she dealt with the buttons and buttonholes on her pajamas; she simply left them done up and donned the garment over her head. One of the therapists described a solution she had devised for her mother:

> She couldn't do the buttons up anymore, so I sewed them all shut leaving only the top two or three buttons open and I put snaps behind them, which she could still do. That way she did not have to deal with the whole thing. (OTA 28)

The size, location, and colour of the garment fasteners also impacted dressing success. One of the therapists confirmed: "the smaller the button, the more difficult it is for them to don. Velcro would be a lot easier in many cases" (OTA 31). One patient specifically mentioned the size of the buttonhole:

> Some things have a lot of buttons and the holes are too tight. I've bought things like that and regretted it when I got it home because the hole was too small for the button and it needs to be made bigger for the buttons to go through. (Patient 5)

The location of the fastener also impacted success, as described by the same patient:

> I'm having a problem with these things here [she points to the hospital bracelets on her wrist]. I had a particular top and it was driving me nuts because I couldn't get [the sleeve cuff] done up and I couldn't get it undone. Oh, to hell with it! (Patient 5)

In addition to the size and location of the fastener, colour contrast was also important; as one therapist noted:

> Our older ladies have a lot of trouble seeing the bra hooks. I know the hooks are the colour of the bra but maybe they shouldn't be. [The hook and eye are] very small and they're very hard to see. A lot of times, they get the bra around and they're perfectly able to do it, but they can't see where the hooks go. (OT 12).

Given that clothing is worn over a bra, and that hook and eye fasteners are mostly concealed, (depending on which set of eyes are used to fasten it for the correct fit), it is not necessary to colour match the hook and eye fasteners to the shell fabric of the bra.

Any other type of fastener that required two hands to operate, such as separating zippers and drawstrings or ties, created problems for patients. While hook and loop tape was mentioned frequently as an alternative fastener, its use presents a different set of problems. Hook and loop tape must be fastened during laundering to prevent the hook side from connecting with other garments and causing fabric abrasion, which is especially important with knit garments that may snag more easily than those that are woven. Lint from other garments in the laundry load accumulates on the hook side of the fastener, impeding its fastening ability over time. Finally, a

pinch and grasp maneuver (the physical movement needed to pull the hook tape away from the loop portion) is difficult for some patients in RT who may not have the needed strength or dexterity in their hands. This therapist described a solution: “With the elderly population, we have a lot of arthritic people. I’ve seen this little loop on work pants, they can insert their thumb and pull up” (OTA 21; see Figure 4.9).

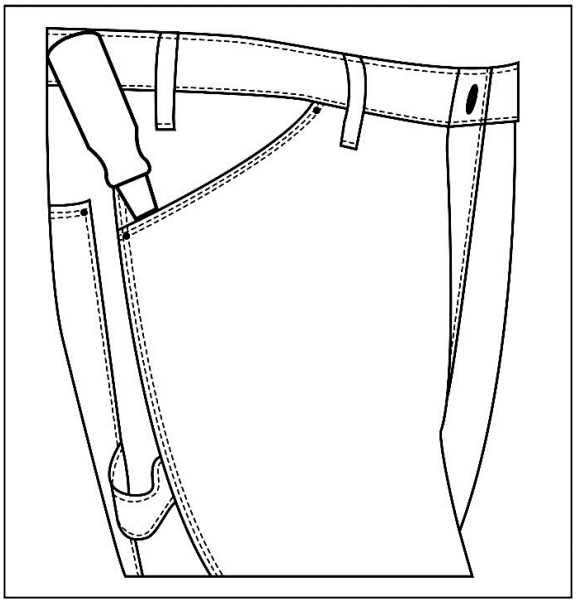

Figure 4.9. Loop in the side seam of work pants. While this is typically used to carry a hammer, one therapist observed that placing your thumb in the loop aids the process of donning trousers.

The Bra

Most women begin to wear a bra in their teenage years. Bras support the breasts and not wearing one invites social conundrums such as breast movement and nipples that rub against the fabric and show through the garment. These factors all impact a woman’s physical and psychological comfort. Wearing a bra was important to some patients and for others it wasn’t. One patient commented, “A couple of the nurses said to me, you know a lot of ladies don't wear bras in here, and I said yes, but I would like to not have the ‘girls’ on my toes when I go home” (Patient 29). Another patient stated frankly, “I stopped wearing a bra maybe last year, it was an additional bother so I quit it” (Patient 2). Without question, participants identified the bra as the most problematic garment, and 23 of the 33 people interviewed were critical about this item. Figure 4.10 illustrates the range of participants’ comments and concerns about the bra derived from the field data.

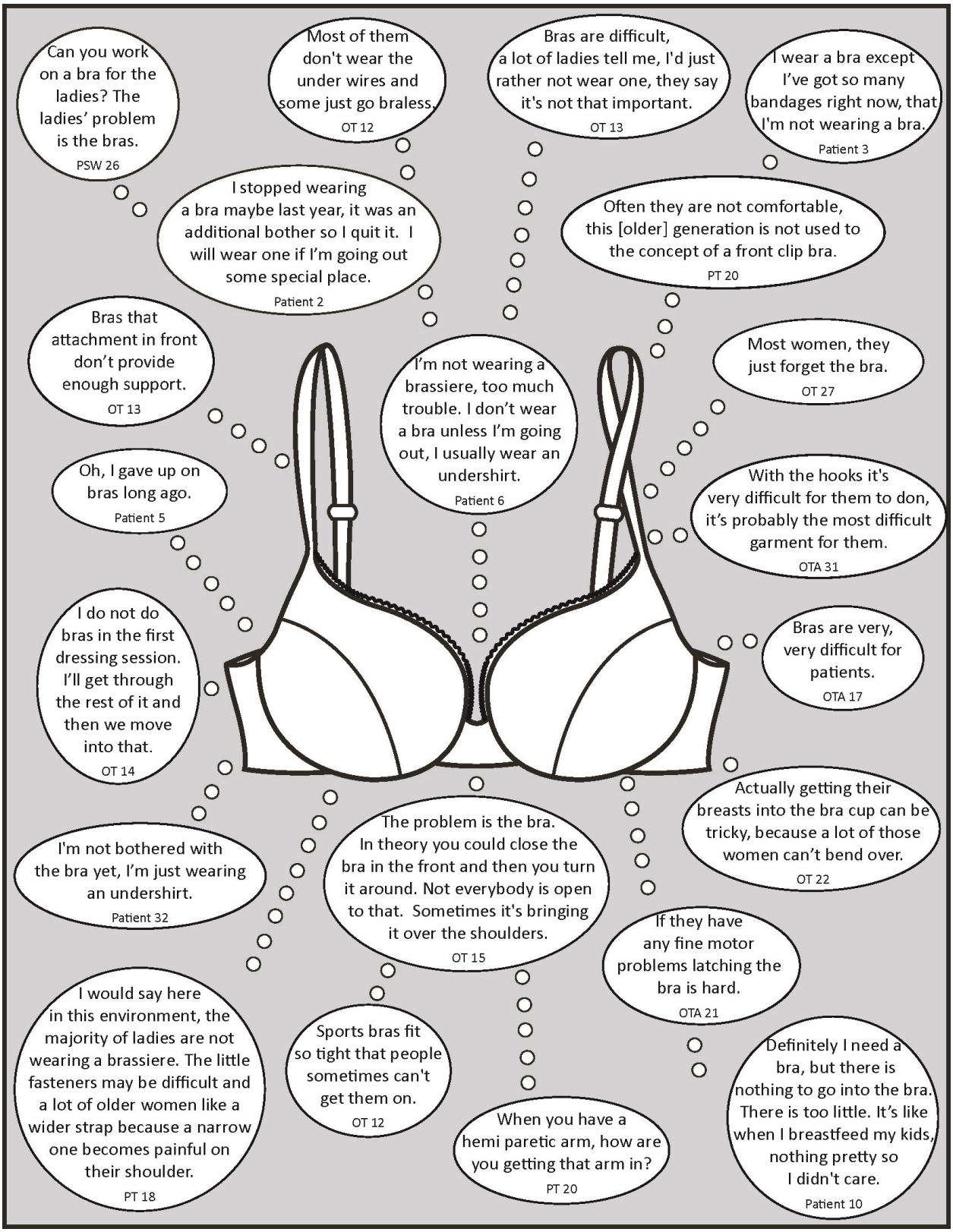

Figure 4.10. Participants' comments about the bra.

Most bras fasten up at the back and many include underwire in the lower edge of the cup. Participants voiced concern about comfort while wearing the bra as well problematic maneuvers to don it. Reaching behind to fasten the back was difficult and underwire bra styles were described as uncomfortable. Therapists suggested that patients consider an alternative style—the sports bra. This type of bra is designed specifically for exercise and there are a variety of designs available. Generally, sports bras are elasticized and are donned over the head, have wider shoulder straps, and do not include underwire in the cup. While sports bras offered a viable alternative to traditional back closure bras, they could be too tight for some women to put on. An interesting dressing tip in the Occupational Therapy Toolkit (Appendix B-IX) suggested adaptation of the bra by removing the hook and eye closure and replacing it with a small segment of elastic so that the wearer could simply put the bra on over the head. Front closure styles were often mentioned, but donning these bra styles required less familiar dressing maneuvers, as identified by this therapist: "Sometimes they need help to pull it around to the other shoulder, they may get it on, but then the strap gets lost behind and they can't reach it" (OTA 19). Other patients complained that bra straps fell off their shoulders or dug into their body. This may be due to the weight loss or gain that many patients experienced during their hospital stay, causing their existing bras to be incorrectly sized and thus not fit properly. Alternatively, shoulder straps may have not stayed in place because patients did not have shoulder symmetry due to weakness or paralysis on one side of the body.

Different dressing methods were certainly required for patients to don and doff the bra. OTs suggested that the bra be put on backwards, latched in front, and then twisted around to the back. This method highlighted the need for colour contrast between the hook fasteners and the bra fabric to improve visibility and the likelihood of aligning the hooks and eyes. Also, it is essential that the skin be dry when this maneuver is done since it is difficult to twist the bra front to back when the skin is damp. Alternatively, the bra could be latched closed and put over the head like a T-shirt. Those who had the use of one hand only encountered more difficulties with this maneuver and needed to use tools like the Bra Angel® or a clothes peg (as illustrated in Figure 4.6). For many women, the effort required to don bras simply outweighed the benefit of wearing them, and thus many older women stopped wearing a bra completely and adopted a camisole or undershirt with a shelf bra, neither of which provided the necessary breast support.

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Socks and Shoes

Shoes are not garments in the traditional sense, but they are required items (like socks) that people wear with their clothing. Given the challenges that people have with dressing their lower extremities, socks and shoes, as one therapist said, "kind of go hand-in-hand; patients have difficulty with them" (OTA 31). Figure 4.11 illustrates the range of participants' comments and concerns about shoes and socks derived from the field data. Another therapist stated: "[Patients'] feet just don't fit into their shoes and that's a big issue" (PT 20). Much like other parts of the body, patients experienced changes in their feet. Swollen feet were a common occurrence while in RT, which impacted the fit of patients' shoes. In most cases this was a temporary condition; however, shoes were critical for patient safety and mobility. Appropriate footwear was mandatory, especially during exercise therapy. As identified in the Selection segment of the clothing taskscape, many types of shoes that might have better accommodated larger swollen feet were prohibited. Patients recognized the need for a wider shoe, and favoured styles with zippers, buckles, hook and loop tape, or elastic inserts to be able to adjust the width across the foot.

As with bras, some people did not wear socks because of the difficulty in donning/doffing them. Part of the energy expenditure to don socks and shoes involved the use of tools (e.g., reacher, sock-aid, long-handled shoehorn), though socks with spandex eased dressing when using the sock-aid. During an ADL assessment, I observed a stroke patient labouring to get his socks on (he told the therapist that he "just had 6 lovely weeks in Florida with no socks"). The OT insisted the lesson on socks was a necessary part of his therapy. The patient was exhausted and expressed that he would ask his wife to take his socks home so that he would not have to repeat the lesson (Patient 8).

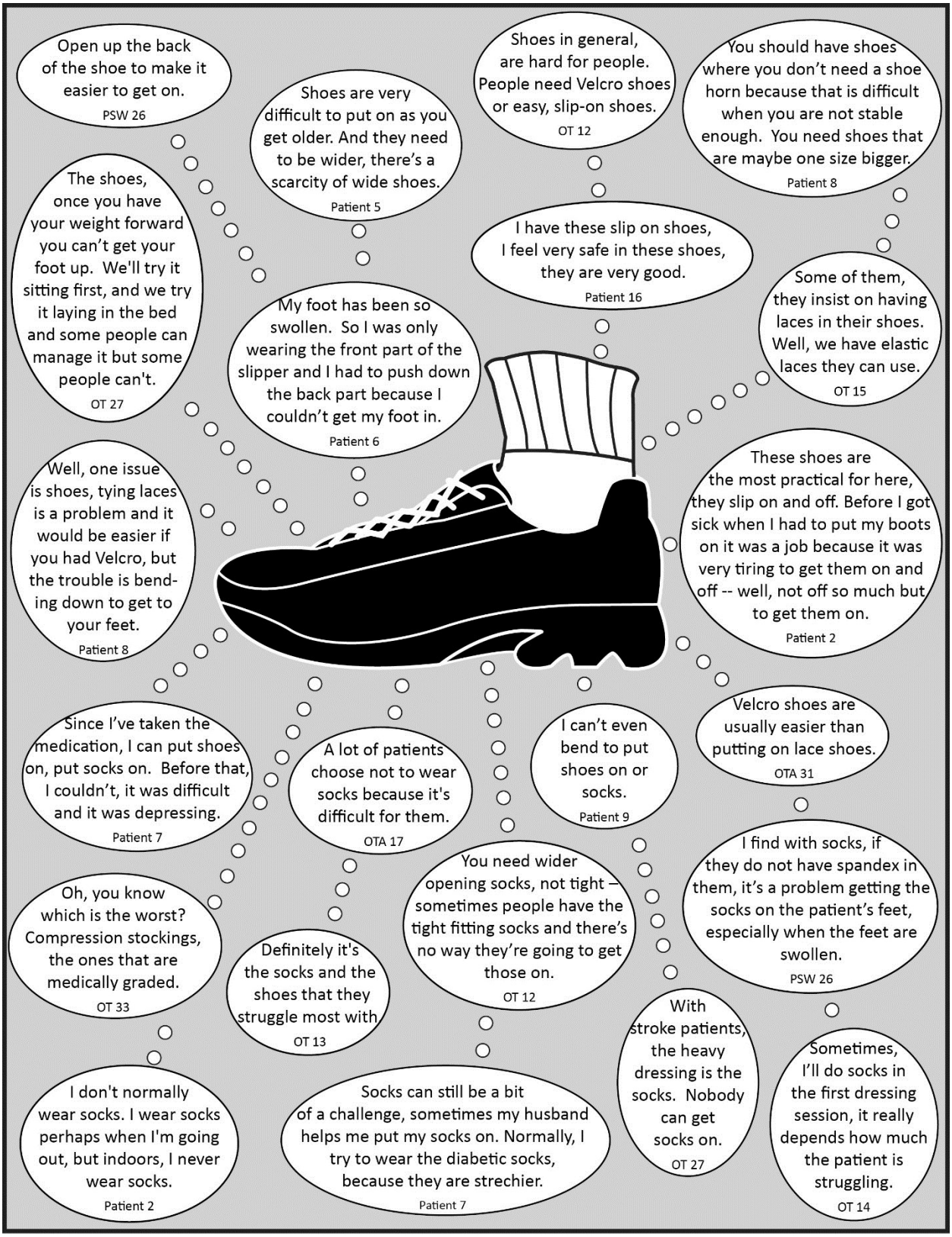

Figure 4.11. Participants' comments about socks and shoes.

Shoes had challenges similar to socks, but while socks might be optional, shoes were essential for traction and to protect the feet. Tight shoes (due to swollen feet) were difficult to get on and off. Use of a shoehorn helped ease the heel into the shoe; however, when dressing in the seated position, with one leg crossed over the alternate leg to reduce reach distances, a simple design detail (a loop tab at the back of a shoe, as shown in Figure 4.12a) greatly facilitated the donning and doffing of shoes. The hook end of the shoehorn could be used in the loop when reaching from a distance but more importantly, the loop tab could be grasped easily with the fingers to put the heel into the shoe and likewise grasped to remove the shoe, thus eliminating the need for a shoehorn.

Figure 4.12. Features that facilitate donning of shoes. Details included (a) a loop tab at the back of heel; (b) regular and coil elastic shoelaces, utilizing a lace pattern that can be manipulated with one hand; and (c) speed laces secured with a barrel cord lock.

For patients who preferred to use their existing running shoes, therapists were able to insert elastic laces, which remained semi-permanently tied. Because the elastic stretched, the shoe could be slipped on without unfastening the laces. For stroke patients with hemiparesis, shoelaces could be tied in a specific pattern and secured in a bow, using only one hand. A more detailed illustration of this tying method is included in Appendix B-X. Other options included use of a barrel cord lock (as shown in Figure 4.12c); pressing a spring-loaded button allowed shoelaces to pass through, and once released it locked the laces in position.

Summary of Dressing Phase

Observation and discussion of dressing maneuvers with participants revealed a comprehensive assortment of factors to consider. Dressing ease is intimately linked to body

abilities. Constraints included restricted body movements, use of mobility devices, hemiparesis, reduced range of motion, and an inability to maintain balance, as well as limited strength and endurance, which together impacted people's dressing performance. Dressing positions and use of dressing tools made donning and doffing clothing possible but also made these processes more complicated. Dressing and undressing was often painful, and clothing size and silhouette, fastener type, size, colour, and location all influenced dressing ability. In sum, people in RT exerted tremendous effort when donning and doffing bras, socks, shoes and trousers, which are all potential areas for product development.

Toileting

Toileting is a series of activities that involve preparing for normal bodily elimination functions such as urinating and defecating. These activities can be categorized into tasks that are linked to different times of the day and night when various clothes are worn. What are ordinarily straightforward activities that people take for granted become complex when people are ill or recovering from surgery. While in hospital acute care situations, many people are unable to get out of bed to toilet regularly and may be catheterized[13] and/or wear a diaper. Alternatively, toileting may include using a bedpan or hand-held urinal. Once in RT, recovery includes transitioning back to conventional toileting, which typically involves wearing hospital-supplied disposable mesh underwear with an incontinence pad, or using a commode chair, all interim measures geared toward the ultimate goal of recovering the ability to use a conventional toilet.

Although toileting involves donning and doffing activities, it was viewed as distinct within the clothing taskscape because it required the partial removal of clothes, which sometimes occurred with a sense of urgency, followed by redressing. In order to better understand the relationship between clothing and ability, it is necessary to become familiar with the complexities of toileting. This section begins with descriptions of the range of body movements needed for conventional toileting as well as the array of other choices available such as diapers, incontinence pads, and disposable underwear. Successful toileting routines were also impacted

[13] A catheter is a thin tube inserted into the urethra to collect urine in a bag external to the body.

by time of day or night, as well as by garment styling and fabrication.

Body Movements

Toileting methods for men and women require similar and different body maneuvers. Some toileting activities require getting into the sitting position; when doing so people must partially remove garments worn on their lower body (i.e., pants and underwear), ease their body down to the toilet seat, reach for toilet paper, wipe in front or partially twist and wipe behind, bend and reach for garments, stand, and then pull up their clothing. Male anatomy allows some toileting functions to be performed while standing, which involves a different sequence of movements and balance. Beyond the position required, other factors besides clothing impact a person's toileting ability, including pain, ability or inability to balance, arm function, use of a mobility device, and hip restrictions. For instance, when transferring from a standing to a sitting position, a squat maneuver is required that involves using many muscle groups in unison. This movement, followed by raising the body from sitting to standing, is often accompanied by varying levels of discomfort and pain.

Other movements required for toileting are problematic for different reasons. Patients in RT have compromised mobility and may have issues with their balance; the risk of falling is increased when transferring from their mobility device to the toilet and back again. People recovering from hip surgery are prohibited from twisting and bending beyond a 90º angle, which necessitates the use of reaching tools to grasp items beyond their approved range of motion, a necessary maneuver when underwear and trousers are around the ankles. Stroke patients may have hemiparesis and limited functioning of an arm, which may or may not be their dominant hand, making it difficult to push down and pull up a waistband. Understanding the physicality of movement and the sequencing of activities required to toilet, in addition to the variables that may impact performance, is necessary before considering how clothing might ease the process. As one PT stated, "toileting the way they always used to do it doesn't work anymore" (PT 18).

Toileting Options

Diapers are a common toileting option when in hospital. There was a general assumption among some patients that incontinence is an acceptable condition when in hospital, as explained by one OT: "A lot of our patients are still using diapers when they get [to rehab]. When they become comfortable putting a diaper on, they think that's the way it is supposed to go while you're in hospital" (OT 13). This behaviour has serious consequences, as ongoing use of a diaper

disrupts brain/body signaling:

> If people just go in the diaper, their bladder and bowel gives up, you have to relearn how to hold it. I often talk to patients about trying not to use a diaper or pad because they don't want to lose the bladder control; that's a big issue for older people. (OT 12)

While in acute care it is easier for patients and staff to use a diaper than to toilet in the conventional way. Providing assistance for patients to toilet can be a labour-intensive endeavour. Upon arrival to RT, patient mobility is evaluated and patients are classified as a one-person or two-person assist. Regardless of their health condition, maintaining as much toileting control as possible was crucial. One patient who was experiencing partial paralysis shared her thoughts:

> There is one thing I have never quit on and that is not doing anything in a diaper, because I have the ability not to. I have that control. Don't get me wrong, I wore the diaper just in case. I would hold it all day because I did not want to bother anybody. Some nurses, or whomever was here caring for me, would say, "just go in the diaper." No, I was adamant; take me to the washroom, or give me the bedpan. I was in pain, and even though I was so ill, it was important to me. (Patient 9)

Maintenance of toileting competencies was an important issue for patients and therapists, thus considering how clothing might ease performance of toileting activities is critical for patients in RT.

Wearing Incontinence Pads—Just in Case

Incontinence pads, used with disposable mesh underwear, were an alternative to the diaper. These were relatively new products, as described by an OT: "We didn't use to have these until a few years ago. Before that, it was diapers or nothing. So, the manager at the time did some research and brought in two different types of pads and the disposable underwear" (OT 14). These products helped patients transition back to their normal underwear, by providing some security during the bowel/bladder retraining phase. A number of patients informed me that they wore an incontinence pad, "just in case" (Patient 1). Comfort and correct positioning of pads were issues, as one of the therapists elaborated: "We have two different types of pads; one is quite bulky and some patients don't like it. They find it gets bunched up and it gets in their way" (OTA 19). Communicating the appropriate placement of the pad was also difficult, as this patient noted: "When they are doing it, it is hard to tell [the PSWs] the correct position; they just want to do it fast, fast, fast" (Patient 9).

The peace of mind provided by wearing the pad was critical because patients were not sure how long it might take for staff to respond to their toileting requests. One of the therapists

explained, “Sometimes, it’s urgency. They have an urge to go and if someone doesn’t come to assist them quickly, because they’re busy, then the patient will be nervous that they’re going to have an accident, which is emotionally quite traumatizing” (OTA 19). Unfamiliarity about toilet facilities also prompted the use of incontinence products, as one patient explained: “When I’m at home I would just wear my own underwear because I have reasonable access to the toilet. If I was going out for an extended day, say 5 or 6 hours, for lunch or something, I would wear a Depends®” (Patient 6).

Disposable Underwear

The hospital supplied disposable mesh underwear, which patients really liked. The disposable underwear had the appearance of conventional underwear yet functioned like a diaper when an incontinence pad was attached. These one-size-fits-all[14] unisex underwear were seamlessly knit (except for one small seam at the crotch) in a boy-cut style which was slightly longer on the leg, as shown in Figure 4.13. The knit fabric was extremely stretchy and made of 90% polyester and 10% spandex fibres. As one patient explained, “they’re comfortable, easy to put on and take off; my own [underwear] are much tighter” (Patient 11). Another patient explained why she liked them: “I find the mesh underwear here so handy, I do not wreck my own. I have thongs which are really not practical here. These are just so easy, you can cut them off. I have new ones every day. I like that actually” (Patient 9).

Figure 4.13. Disposable mesh underwear supplied by the hospital.

While therapists and care workers agreed that patients preferred the disposable underwear

[14] Covidien Wings™ Incontinence Knit Pants, available in Youth, Small, Medium, Large, and Extra Large sizes. Colour-coded stripes in the waistband were used for size identification. Only one size was stocked at the hospital. Although rated for 20 washes, the knit pants were used as a disposable item. See: http://www.medtronic.com/covidien/products/incontinence

and that their use eased the dressing process, they felt conflicted about what they perceived to be expected supply and entitled use: "We're supposed to be encouraging people to bring in their own because of the costs [to provide the disposable underwear]" (OT 12). Another therapist flatly stated:

> I feel like those disposable underwear are really utilized too much by our patients. … I sometimes wonder if it's something patients don't like to be sent home with their spouse or children, especially if that person doesn't normally do their laundry. When you're in hospital, you're on lots of medications and there's lots of accidents that happen, so with the disposable underwear it is just easier. (OTA 22)

A care worker shared her thoughts:

> People don't use their own underwear here much. I hear the patients say, "it's more convenient, it is easier for me to throw them out than to wash my underpants." But they should be bringing their own underwear from home; we're not supposed to supply those for every day. But if families don't bring them in, what are you going to do? (PSW 34)

Through my observations and discussions with participants, it was noted that patients in RT preferred the disposable underwear and that as they regained their health and ability, it was customary for them to transitioned back to wearing their own underwear before leaving the hospital.

Underwear Preferences

While patients prioritized easy donning and doffing of their underwear, they also discussed other preferences. The friction between different fabrics was a concern: "I got my daughter to get me underwear that was a bigger size, so that I was able to pull them on with no problem. The problem is getting the slacks pulled up, because I have cotton underwear on" (Patient 32). A similar experience was voiced by another patient: "The cotton ones are nice, they're cozy, but I find that when you pull up your trousers it can be difficult at times. You need something that is a little silkier" (Patient 6). Comfort was also important, and was influenced by the style of the underwear, as discussed by this patient who was in a wheelchair:

> The fact that you are sitting, it's much better if the leg band is not elastic, if it has a softer band. It needs to give with your body because you don't want to be sitting with elastic that's digging into you all day. Those little boy shorts are a good style. (Patient 6)

For this patient, it was important that functional and aesthetic attributes be considered:

> Sometimes, especially we women when we get a little bit older, we don't have full control; we leak a little. So you need to have that material that has a bit of absorbency, like a small pad for the periods, built into the underwear. It should not be a Grandma type

> of underwear, it needs to be cutesy, a little lace, a little teeny-weeny flower, fun colours or something that makes it "oh I think that is cute." (Patient 10)

Patients identified a number of important design attributes for underwear. The underwear's size and material impacted ease in dressing, and leg styling influenced comfort, especially when seated. Suggestions included fashionable laces, prints, and attractive fabric choices that incorporated additional absorbency.

Toileting Routines

One central approach to retraining toileting abilities involved scheduling and consciously timing bathroom visits during the day and at night. Adapting the home environment was also important. An OT suggested that patients "time their bathroom stops, making sure they go a little bit more often and if they have a two-storey home with the only bathroom upstairs, then I talk about whether a commode on the main floor might be helpful" (OT 13). A patient (who was an amputee) discussed the nighttime strategies she employed:

> I set the alarm, one for 3:00 and one for 7:00. I have a commode at home, it's in my bedroom. I have it right smack up against the side of the bed. I slide over to use the commode and I have my toilet tissue there and then I go back to bed, roll over back to sleep. In the morning when I am going to the bathroom, I would just take the pail and empty it myself. (Patient 6)

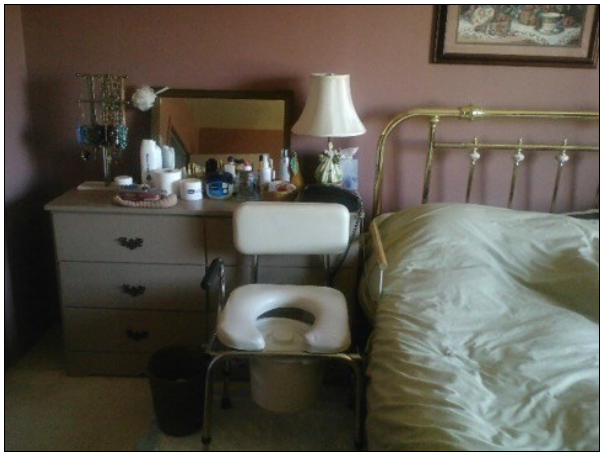

Figure 4.14. Furniture layout in a patient's bedroom at home.

On the rehab unit, toileting was also scheduled. Hospital care workers were scheduled during specific shifts; four were on hand between 7:00-3:00, with each PSW assisting eight patients. As discussed in more detail in the Exercising section, red and green stickers were

assigned to patients based on their mobility competencies and this impacted their independence.

Figure 4.15. Red and green stickers on mobility devices.

Toileting typically involved a one- or two-person assist and sometimes only basic supervision that involved simply watching the patient. During the day, care workers prompted patients to go to the toilet, encouraging their bladder and bowel to adapt back to a predictable elimination schedule. One of the care workers described her approach:

> We offer. Some patients will not ask because they think they are bothering us. And some time, even when you ask, they may say, "oh no, I am fine." So, I will suggest, I think it's a good practice to empty the bladder before they eat. I put the person on the toilet, and as soon as I put them on, I hear … [she laughs]. I would say, see, I told you! (PSW 26)

During the night, patients would use a call bell to ring for assistance when they needed to toilet. Toileting options that allowed patients to remain in bed were easier for care workers and patients alike. While doffing clothing to use a urinal or bedpan eliminated the need to transfer patients from their bed to their walker, don their shoes, use the toilet, and then reverse the process to return to bed, their use required a different sequence of maneuvers and soiling the bed linens and sleepwear was a concern. Alternatively, patients would use a commode chair, which had arm rests and wheels and was not as low as a conventional toilet (see Figure 4.16). These features benefited patients in a number of ways. First, the chair's arm rests allowed patients to ease themselves into a seated position and push off when standing. Second, the ergonomic design allowed the chair to be positioned above a conventional toilet, which facilitated use. The height of the chair also meant that patients did not have to squat as deeply when sitting and this caused less pain and discomfort during transfers. And lastly, the mobility of the chair eliminated a number of transfers because the

commode chair alone was used to transport patients over short distances to the bathroom, thus eliminating in some cases the need for the wheelchair or walker as well as the donning of shoes.

Figure 4.16. Hospital commode chair. This could be rolled into position above a conventional toilet.

Garment Preferences

Patients, care workers, and therapists identified garment attributes that eased or hindered toileting. For nighttime, the hospital gown or adapted sleepwear that was open along the back was best for staff ease and patient comfort. According to care workers, "Sometimes at night I have to change them, if they have an accident, it goes right under the body (PSW 30); "for someone who really has mobility limitations, the hospital gowns are best" (PSW 34).

Certain garments enabled or disabled toileting abilities. The dress was mentioned as a clothing solution by female patients and therapists alike (Patient 5, Patient 11, PT 20). It was easy to don and doff and concealed the absence of underwear, eliminating the motions required to undress and redress when toileting. "Sometimes patients have difficulty getting the underwear up; they will pull up but they're actually pulling the pants and they're not pulling up the underwear first" (OTA 19). One patient emphasized that even prior to her hospitalization she purchased garment styles with regard to ease in toileting, with specific avoidance of one-piece jumpsuits: "I don't want garments that take me long [to undress], especially for the bathroom and stuff. I don't wear one-piece jumpers because you're going to be in trouble if you really have to go" (Patient 7). The sequence of tasks required to doff a traditional men's trouser impacted toileting abilities, as described by this therapist:

> My father had dementia, and he had trouble with incontinence; there was absolutely no way that he could make it to the washroom in time if he had to undo the belt, undo the fly, and everything else. So he started wearing track pants. But when you go out to a dinner or special occasion, track pants don't go well with a suit jacket. (PT 18)

Summary of Toileting Phase

Examining the toileting phase of the clothing taskscape uncovered many factors that have the potential to inform design. As with dressing, movement restrictions, use of mobility devices, hemiparesis, reduced range of motion, the inability to maintain balance, and reduced strength and endurance impacted people's toileting abilities. Observations of most ADL assessments showed that the physical movements needed to toilet were difficult and sometimes painful. In addition, toileting was seldom conventional and more often required assistance and supervision from care workers and the use of unfamiliar equipment including a commode chair, hand-held urinal or bedpan, as well as toileting supplies such as diapers, pads, and disposable underwear. The complexity of dealing with a mobility device while balancing and doing clothing maneuvers to doff pants and underwear "in time" was a challenging undertaking that differed between men and women. Toileting procedures were also different when performed during the daytime as compared to the nighttime. Wearing diapers or an incontinence pad had a psychological impact on people. While the benefits of disposable underwear for patients included a reduction of laundry for their family as well as increased dignity, staff were concerned about associated costs to the hospital. Fabric types as well as underwear and clothing styles impacted patients' abilities to independently toilet with ease.

Bathing

Bathing at the sink side or in the shower, which also included grooming, is another integral activity of daily living. ADL sessions were opportunities for OTs to observe and evaluate patients' ability to do their self-care tasks. These assessments sometimes took place in the ADL suite, a space on the rehab floor designed to simulate a home-like environment, much like a small apartment with a layout that included a full kitchen, bedroom, and bathroom.

This section describes patient experiences doing bathing and grooming tasks associated with self-care. While in RT, bathing was defined as washing the body at the sink side or in the

shower. Grooming included all the other personal self-care activities: shaving, combing and styling one's hair, applying moisturizer and make-up, as well as brushing teeth. One patient described the importance of these activities: "I have to look in the mirror, I like to have my hair and my nails done. I make sure my clothes are well coordinated. I make myself shine; I do this to feel well for myself" (Patient 16).

Roach-Higgins and Eicher (1992) define dress as "an assemblage of modifications of the body and/or supplements to the body" (p. 1). Body modifications include most of the activities traditionally defined as grooming and body supplements include enclosures (like a towel). While bathing and grooming were not initially included in the clothing taskscape, it became evident during the observation phase that people were doffing clothing during this activity, and interacting with textile materials (towels and washcloths) and thus the tasks associated with bathing became integrated into the analysis framework.

Sink Side

Sink-side bathing was frequent and performed every morning and evening in conjunction with doffing and donning fresh sleepwear. Bathing at sink side was also relatively private, as patients did not have to leave their hospital room. Keeping in mind the mobility and balance issues that most patients in RT were experiencing, assistance or supervision from a care worker was often required when bathing. Patients would wash while seated in their wheelchair, keeping a towel in their lap, working from "top to tail," cleaning their upper body using a warm, sudsy washcloth. Lower body hygiene was more complicated; people needed to transfer to a standing position to adequately clean their genital areas. Grooming activities followed. From a physical standpoint, bathing and grooming were a demanding sequence of activities, which sometimes required rest breaks and often left people fatigued.

When considering the sequencing of tasks needed to bathe, a number of OTs and PSWs highlighted design deficiencies regarding the physical layout of the bathroom, which included: placement of grab bars and the paper towel dispenser, as well as the general lack of storage spaces for personal toiletries, clothing, and the patient's mobility device. Dressing occurred after bathing, but there were no hooks in the bathroom to hang clothes. Grab bars were positioned near the toilet, however there were not any near the sink. One patient reached for the gooseneck water faucet to aid pulling herself up to wash, a maneuver that was forbidden by her therapist OT 15. OTs 12 and 14 thought the paper-towel dispenser was not positioned close enough to the sink; drying wet

hands resulted in water drops along the floor, creating a potential slipping hazard. OT 14 recommended that patients keep a washcloth on the counter next to the sink to dry their hands. Therapists and care workers alike criticized the lack of space to store toiletries either on the counter or on a shelf dedicated to each patient occupying the room. One of the PSWs described a scenario about toothbrush confusion:

> There are no shelves in the bathroom, but each bathroom has two patients; you have one person here and another person there. So okay, whose toothbrush is this? You're brushing somebody's teeth—oh, it's not that one, they're not labelled. It's just not good, not good. You need a shelf that is labeled, Bed 1, Bed 2. (PSW 30)

Figure 4.17. Deficiencies in bathroom design in the rehab environment. Bathrooms lacked grab bars near the sink to assist patients when standing to wash their genitals. Shelving and counter space for patients' toiletries were lacking. The paper-towel dispenser was installed too far away from the sink; water droplets on the floor created a slick surface and fall hazard.

Although these aspects as discussed do not directly relate to clothing, they do inform design. The hospital was newly built and constructed to meet the most current version of the building code. Thus grab bars were installed near the toilet and the sink and counter designed to accommodate a wheelchair. However, patients in RT were not in their wheelchairs permanently, they needed to stand when doing personal hygiene at the sink side. Although the design of the bathroom met the building code, it clearly did not meet the needs of people in RT (Malkin, 1992) as demonstrated through the clothing taskscape.

Shower Room

In order to empathize with the patient experience while washing their bodies it is important to understand the activities inherent within the bathing context. Showers were scheduled in the morning, twice per week. The RT unit had four shower suites, in addition to the ADL suite, to accommodate bathing the 32 patients on the floor. Most patients required assistance or supervision when bathing. Each shower suite was designed to allow a commode chair to be rolled directly into the shower, so that the person might transfer to a flip-down bench seat attached to the wall. Two of the suites were designed with right-sided grab bars in the shower/toilet areas and two had left-sided grab bars to better accommodate the hemiparesis that typically affected patients with stroke. The ADL suite had a traditional tub/shower set up and the OTs/OTAs booked it when doing ADL assessments.

Making the trek to any of these shower facilities required patients to don footwear and consider their body coverage in the hospital gown (i.e., wear a robe/housecoat or additional hospital gown over top). Modesty was an issue, as patients had to leave the relatively private space of their hospital room wearing their sleepwear and traverse down the hall to the communal shower suite, with clean clothing and toiletries in tow. Again, keeping in mind that patients were using some kind of mobility device, carrying the necessary items was difficult, as emphasized by one of the OTs: "The four-wheeled walkers have a seat and basket and are so much more functional" (OT 12). Regardless of whether a patient was in a wheelchair, walker, or using a cane, their carrying capacity (toiletry caddy or pockets) was important. A simple pocket would make a difference, as one patient explained:

> I have my soap in a container. The other day, as we prepared for my shower, [the PSWs] were saying, "where is this, where is that, your soap?" Oh my God, I do not want to lose that soap, where am I going to get soap, and then I have to ask another person to buy me a plastic case … it is stressful. So the more I can organize/carry and the more that I can be independent, the better. (Patient 9)

Sometimes, a disposable cardboard washbasin, a paper based product that holds water (see Figure 4.34) was placed on the patient's lap while sitting on a commode chair or wheelchair to transport toiletries. Bathing was done using a hand-held shower nozzle on a flexible hose, while seated on the flip-down bench seat. Therapists emphasized the need for organization and encouraged patients to group toiletries into a caddy. This "grab and go" methodology was also

endorsed by two of the care workers (PSW 26, PSW 30). Undressing in the shower required the organized doffing of clothes, with one therapist cautioning patients not to discard garments onto the floor because bending over to pick things up was extremely difficult. It is important to note that there were no hooks or shelves near the shower stall to facilitate this or the storage of towels needed upon exiting the shower. Each patient typically required four to six towels and two washcloths during their shower. Towels were relatively small, measuring 22 x 42 inches.

Figure 4.18. Bathroom in the ADL suite. This set up included a traditional tub, hand held shower nozzle and a bench seat.

Figure 4.19. Towel hanging on the shower room door. Towels were relatively small (22 x 42 inches) towel hooks were positioned to be accessible from a wheelchair.

The shower suite design on the RT floor likely matched all of the other bathing spaces in the hospital; one of the OTs commented on this:

> I was in the shower room and I was thinking, they never put shelves in the shower to put shampoo and soap [there was a dispenser of generic liquid soap attached to the shower wall], so that people who are more independent could wash themselves. (OT 12)

Figure 4.20. Roll-in shower stall with flip-down bench seat. Shelving was lacking for patients to store their own shampoo, conditioner, body wash, and towels, all items that therapists were teaching them how to use for independent self-care.

Thus, as illustrated with sink side bathing, the shower design included grad bars and a flip-down bench seat as required in the building code, however the shower layout was deficient. Patients in RT were learning strategies to be self-sufficient and needed shelves for their toiletries and clothes.

Having patients use their own toiletry products was important because the activity of using them was viewed as therapy. For example, OTs considered the motions involved in washing one's hair as an exercise routine. To accomplish this task, a sequence of activities needed to be completed. This included: opening the bottle to squeeze out the shampoo, putting it

on one's head, lathering the hair, rinsing, and then repeating those steps to apply conditioner, followed by a final rinse, drying, combing, and styling.

Other considerations for one-handed methods were recommended in the OT Toolkit, including use of toiletries packaged with a hand pump, an electric toothbrush and razor, a terrycloth robe in lieu of bath towels to aid in drying oneself after a shower, and use of small hand towels to dry the body due to their reduced weight and ease of manipulation as compared to large towels (see Appendix B-XIII).

Comfort

Although bathing was physically tiring, it was a comfort to be washed and clean, as one patient declared leaving the shower room with a quick glance in the mirror: "I feel human" (Patient 1). Another patient taking a long, hot shower uttered, "I just love the water" (Patient 7). To capture that feeling between scheduled showers, one person confessed:

> I shouldn't tell you this … I know we should not have perfume[15], but just one spray and I feel fresh. We have two showers per week, it is dignity … it is something I have to keep. And nobody has complained yet, so I figure it is not too strong. Because I cannot shave yet … I am aware that I am a lot more hairy and I am very cognizant of smells. People around me probably are not so concerned. Even though I am sick, maybe it is wrong, maybe I am too focused on appearance, maybe I should not care as much. But I do. (Patient 9)

Thermal comfort was another important consideration within the shower environment. Since water conducts heat more rapidly than air, the human body becomes chilled more easily when wet. Patients, care workers, and therapists acknowledged that patients felt uncomfortably cold in the shower spaces as they dried their bodies. Being cold distracted patients and their attention needed to be focused on their activity. Safety was a priority, but wet surfaces increased the likelihood of slipping and falling. It was difficult to move using a walker while balancing towel-wrapped wet hair. Care was taken not to put wet hands on the handles of the walker in case they slipped off. At least four to six towels were used to dry patients; the damp towels were then positioned under the patient's body while seated or on the shower floor under the patient's feet to provide a more secure surface.

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[15] The Reactivation Program Client & Family Information Handbook (p. 2) advised clients and their families that the Reactivation unit was a fragrance-free environment.

Feelings

The simple act of bathing allowed patients to feel better but also exhausted them. The bathing process was uncomfortable for patients because the shower suites were cool. Personal modesty had to be temporarily suspended, because assistance, or at the very least supervision, was required during bathing; thus, a private activity became public. An ADL assessment consisting of bathing and dressing would be the occupational therapy session for the patient that day. Sometimes patients would need to rest afterwards. The importance of increasing patient competence to independently do their self-care was critical to both the therapists and patients themselves, as described by this OT:

> Previously, patients were here in rehab longer. I would have them do an ADL session twice a week for improved carryover. I've had patients who cried at the end of their ADL session because they were now able to do these activities independently. They are so appreciative because they had seen their improvement over the course of rehab, where initially they required so much help. So now we're trying to get people through the program quicker. … When I could spend the time, patients could see their improved ability to get in and out of the tub and sit at the side of the bed and dress themselves. There is a history to it because the person has been doing those activities since they were 5 years old. To resume that level of independence, there's a sense of self-gratification to it. But we don't get to spend that kind of time on it anymore. (OT 27)

Summary of Bathing Phase

Bathing is typically associated with an absence of clothing. However, this activity was included in the clothing taskscape because people were doffing hospital gowns or pajamas and then enclosing their wet, cold body with a relatively small towel while balancing another towel around their wet hair. As with dressing and toileting, people were performing bathing activities with assistance or supervision from a care worker and also dealing with movement restrictions, use of mobility devices, hemiparesis, and reduced range of motion, balancing abilities, strength, and endurance. While sink-side bathing was relatively private, showering was limited to twice per week and required ambulation through public hospital spaces while carrying toiletries and clothing to a communal bathing room. The placement of grab bars, shelving, and clothes hooks impacted the performance of bathing tasks. Thermal discomfort was a distraction. Based on this evidence, opportunities exist to improve the bathing experience for patients in RT.

Eating

Eating also was not considered initially as part of the clothing taskscape, but this activity emerged as an important theme during data analysis. In order to appreciate the importance of clothing, it is necessary to understand the clothing context during mealtimes, and particularly the impact that certain eating tasks have on clothing. In the case of eating in the RT environment, I observed food spilled on the fronts of blouses or dropped on the laps of trousers which stained clothing for the rest of the day and thus affected patients' dignity and sense of selves. As such, eating is most definitely part of the clothing taskscape.

Patients in RT ate their meals together in a common dining room; breakfast was served at 8:00 a.m., lunch at 12:00 p.m., and dinner at 5:00 p.m. A nurse supervised patients during meals, PSWs transported patients needing assistance to and from the dining room, and typically, a few care workers remained on duty to assist patients during meals. The dining room was set up with tables of four, seating was assigned, and trays of food were labeled according to patient. Plastic cutlery was packaged, beverages were in sealed containers, and food was served on china plates.

Figure 4.21. Patients' dining room table. Patients ate in groups of four and were assigned to specific dining room tables. Meals were served on china plates with a thermal cover, cutlery, and with disposable food/beverage packaging.

Clothing and Mealtimes

Eating, like dressing, was an integral component of therapy. Patients were expected to be up, toileted, bathed, groomed, and dressed for meals. Keeping in mind that care workers started their shift at 7:00 a.m. and were responsible for eight patients, mornings, as one care worker described, "are very, very hectic" (PSW 34).

Mealtimes were an essential part of daily routines and one of the social highlights of the day, as one patient emphasized: "meals are about the only thing to look forward to" (Patient 3). Patients would not consider going to breakfast in their sleepwear; during my observation sessions with PSWs I noted that one patient insisted: "I can't go out there like this" (Patient 11) and proceeded to put her lipstick on, pencil in her eyebrows, and don her wig. Another patient shared the importance of being up, dressed, and groomed in time for breakfast:

> The other day I was very upset, because our world is so small right now, it is one floor, it is important for me and everyone to go to the dining hall because that is really our social time. If they do not get me ready by 8 o'clock for breakfast and I miss it, then I eat from a tray here in my room. That is a little bit upsetting start to the day. You want to see everybody if you have nice people at your table; if you don't, it doesn't matter [she laughs]. (Patient 9)

Meals were social occasions for patients in RT and preparing for meals (dressing, grooming) had therapeutic value.

Eating Ability

The ability to eat independently varied according to the reason patients had been admitted to RT in the first place. People recovering from a stroke often had use of one hand only, which may not have been their dominant hand and this impacted their ability to open food and cutlery packaging. Stroke may have also impacted their ability to swallow or open their mouth symmetrically. To accommodate this condition, liquids were thickened and eaten with a spoon to reduce the likelihood of choking. Some patients were capable of feeding themselves, but others needed assistance; sometimes this involved simply opening up their meal packaging and occasionally more assistance was required, as described by one of the care workers:

> Some people might kind of, doze-off a little bit on their meals. So you will go, talk to them—tap the person on the shoulder, take a spoon, put in one or two at the mouth to get him stimulated more or less. (PSW 26)

For patients in RT, eating was messy and sometimes required assistance from care workers.

Adequate Clothing

While in RT, it was understood that people had limited wardrobe choices and that clothing could not be washed regularly. Many patients reported trying to wear their trousers 2 days in a row and thus were careful while eating and tried to keep their clothing clean and presentable. As such, blue terrycloth bibs were on hand to protect patients' clothing, but spills were inevitable. While I did not inquire about patients' opinions regarding bib use, one may theorize that it was something that impacted their pride and dignity. Wearing soiled clothing was an issue, as one person described:

> I had for 3 days, a T-shirt and a pair of pants. One had a stain of a piece of pudding that had fallen down or something on the blouse. And then unfortunately, I had a pancake and they gave me syrup and it fell on my pants. (Patient 10)

Given the likelihood of patients dropping food on themselves while eating, care workers emphasized the need to have adequate clothing on hand. One PSW elaborated on this:

> If they have accidents or they spill things, you don't want to put dirty things back on, and lots of times we've had to put gowns on them and they don't want that. They see everybody else sitting in regular clothes, right, so they want to be in street clothes. (PSW 34)

Summary of Eating Phase

Eating activities emerged as an unexpected addition to the clothing taskscape during data analysis. Eating was a social event and patients appreciated mealtimes in the dining room. Factors related to patients' physical abilities negotiating with food packaging and disposable cutlery, in addition to the performance of maneuvers required to independently feed themselves, influenced the likelihood of soiling and staining their clothing. Although blue terrycloth bibs were provided by the hospital and worn by patients, their protection was limited. Clothing became soiled which reinforced the need for patients to have adequate clothing during their stay in RT.

Exercising

Exercising was an integral part of both physio- and occupational therapy in the RT environment. One of the overarching rehabilitation concepts advocated that patients exercise because it was viewed as medicine that would aid patients' recovery, and all types of activity

were deemed to be therapeutic. Patients were encouraged to exercise beyond their regularly scheduled daily sessions. While the passage of time was a factor in healing a patient's body, recovery depended on the remediation of muscles through movement, specifically through strengthening exercises and prescribed activities. This section of the results reports on the exercise context of the RT environment, how patients spent their day, patient attitudes, the incentives that therapists used to motivate them, clothing and footwear attributes, and exercises that enhanced toileting.

Motivation and Incentives

Motivation and incentives are necessary components of RT. As one therapist explained,

> Occupational therapy is really … about meaningful activity. We're taught that if you can take an activity that is meaningful to the client, that's how you're going to get them to buy in and have more success because they want to be able to do it and the drive is there. But finding the activity that would be meaningful at this point when they just had this [disabling] event, they often don't see that yet. (OT 13)

Upon arrival to RT, the PT assessed a patient's abilities, strength, and general mobility. After assessment, it seemed that virtually every patient required some type of assistive mobility aid, which resulted in the assignment of a wheelchair, walker, or cane. A system of green, yellow, and red stickers communicated the levels of assistance that patients required to operate their mobility aids. The assigned stickers impacted patients' independence, and indicated whether they were able to go to the bathroom by themselves or even to open their closet and choose their clothing. Progressing through the ranks—from red to green—was an incentive system for patients. Patients were excited to be more independent: "You see, this is my first. … I just got a green sticker today, it was red and so everybody had to do everything for me" (Patient 32).

The ability to walk was an important part of a patient's "priority matrix" of goals while in RT (OT 27). Sometimes getting the patient to "buy in" to doing all that was required to achieve that goal was a challenge (OT 13). One patient approached her exercise doubting that it would make any difference: "I will be here until I can walk up the steps, which I think will never happen" (Patient 11). Others approached therapy with fortitude; as one patient said, "I am determined to live, I am determined to walk. … My Mom died at 91, my grandmother died at 93. I'm 73. And I used to say, if I want one thing I don't mind genes from my mom and my grandmother, because they walked forever until they passed away" (Patient 10). That fierce determination needed to be harnessed while patients were exercising and relearning the tasks associated with dressing.

Figure 4.22. Cane with a red sticker on the base.

Figure 4.23. Stairs in the physio gym.

Patient Attitudes

Patients' attitudes influenced their success. Therapists continually tried to motivate patients; as one OT explained,

> When you get the patients who understand the idea of occupational therapy in terms of using your daily activities and your meaningful activities to rehabilitate yourself, I find those patients who buy in to that idea get better, faster, unlike what, a lot of them end up doing, thinking just the exercise and the … practice of a skill is what's going to help and not necessarily the activity itself. They kind of think, "oh, well I can let somebody else help me get dressed, I just want my arm to work better"; then they seem to not get as good as fast. (OT 13)

Weekend passes were utilized to influence the way patients thought about their exercise and occupational therapy sessions because it allowed patients to practice all the techniques they were learning in RT within their home environment and self-evaluate their success. Patients believed the purpose of RT was recovery, which in their minds was equivalent to the way they were prior to their disabling health event. One OT explained her perception of the typical patient mindset:

> They still think that in rehab they're just supposed to get better and they aren't really yet able to accept the fact that, they need to change how they are doing things, right? … They assume that "when I get home and I have my own set up I'll be able to do it the way I used to do it."… I think they have to go home and that's why we introduced the weekend passes, so they could try and do things the way they were doing them, for them to realize, "okay, this might not be working for me anymore and I'm more readily willing to listen to what the OT is telling me." (OT 13)

Exercise to Enhance Toileting Abilities

As discussed earlier, toileting abilities were critical to patient independence and dignity. While the ease of doffing clothing was an important factor while toileting, mastery of certain body movements was essential. Exercises that simulated the body motions required when toileting were practiced in physio as described here by a physiotherapist:

> We start progressing to independent mobility in the bathroom. So we will assess things like how are they opening the door to the bathroom, how they're getting into the bathroom and then we will practice with the saskapole and will tie a piece of theraband around their waist to stimulate a trouser waistband and then practice trying to pull the elastic band down the length of their leg, so that they can bend and pretend that they're pulling down pants, sit down and then once they're standing again trying to pull that elastic band up. … Also to lean on to the saskapole to try to reach back, as they would when wiping. So we'll incorporate things like that in our session and then let the OTs know. (PT 20)

Figure 4.24. Saskapole in the rehab gym. This was used to simulate the reach and twist movements required when toileting.

Exercise Clothing and Footwear

Although appropriate clothing and footwear attributes were discussed in the Selection segment of the clothing taskscape, additional aspects of clothing came to light with regards to exercise. Patients did not change into specific exercise clothes when doing their physiotherapy, the way most people do when they go and exercise at the gym. Since patients in RT were deconditioned due to illness, injury, or surgery, the lightest forms of exercise required a significant exertion. The kinds of exercises in which people were engaged included walking, using the stepping machine, sitting on a stationary bike, and lifting hand-held weights. During my observation of therapy sessions, perspiration was evident when patients were engaged in even minimal exercise activities. Given that patients had two scheduled showers per week with sink-side bathing daily, clothing and perspiration odours were an expected outcome of exercise, another factor supporting the need for adequate clothing.

Patients needed the right kind of clothing to do their exercises effectively. As one therapist said,

> We ask their family to bring in clothes, because we have them on the new steps and on the beds and we want them to be covered, to be able to do their exercises. They need appropriate footwear making sure that it has rubber sole and heel coverage in the back of it so that their foot doesn't slip off. (PT 20)

So, wearing trousers was critical to patients' ability to do their exercises as prescribed. Yet

consideration needed to be given to cultural aspects of clothing. In some instances women did not wear trousers and did not own garments that would be considered suitable for exercise. As one care worker pointed out, safety was an issue because skirts or dresses potentially could "get caught into the machine while exercising" (PSW 30). Some men regularly wore dress pants and they too did not own exercise gear.

Figure 4.25. Exercise machines in the physio gym.

Figure 4.26. Weights and resistance bands in the physio gym.

Although some clothing items were deemed more appropriate for exercise than others, therapists were sensitive to patients' clothing preferences. One physiotherapist indicated that

> most of the time people are really flexible when they come to rehab. They know the intention of rehab, they know they're in the western culture, they are in North America. If we ask for pants, family members tend to automatically bring them. There will be the odd patient I've run across where you know, which is culturally they're not comfortable wearing pants, like "no way I'm not wearing pants," which is fine. Then we just cover them up with a sheet. When they are on the bike, we just drape a sheet over them. So it's not that we can't do it and we do, do it. (PT 20)

Patients who insisted on wearing skirts and dresses rather than trousers were uncommon, as explained by another therapist:

> When somebody is lying on a bed doing exercises, we drape them with a sheet to maintain their dignity. The funny thing though is not when we do that because they are more like the exception than the rule. Then usually the patient will ask their family member to just buy them one pair of trousers so that they fit in with the rest of the group and they don't feel that a fuss is made over them. (PT 18)

The importance of wearing a bra surfaced during discussion of appropriate clothing for exercise. Brassieres support and secure the breasts against the chest wall, an important factor during body movements associated with exercise that becomes more critical with large breasts. The difficulties in fastening a bra have been highlighted earlier, and are further explained by this OT:

> There are some ladies who are so well-endowed that they need the support of a bra … they're used to wearing those thicker band bra straps … and then they can't—they just don't have the dexterity to sort of clasp it together. … So then they were wearing their bra really loose, and you see the bra is like sitting up, way up here on their back and I just know that because my hand is on their back when I'm walking with them, so I can feel that the bra straps are close to their neck. It's because they had to put it on so loose and then they're so well-endowed that things are sort of falling forward. So many of our ladies they don't even bother with the bra. But then you know, sometimes people don't think. They will lift up their shirts to fix their pants because they like wearing the pants really high and then it's like, "oh, you're showing; we've got to cover up." (OT 20)

Summary of Exercising Phase

Exercising was a primary activity in RT and thus was a logical component to include in the clothing taskscape. Patients participated in physiotherapy every day from Monday through Friday. Looking at patients' exercise routines highlighted consideration of additional factors. The right garments and footwear enabled them to do their exercises safely and effectively. That is not to say female patients were unable to do their exercise therapy in a skirt, but care needed to be

taken regarding their safety on the exercise equipment and it meant that therapists had to drape them with a sheet when they were exercising while lying on the beds to preserve their dignity. For some female patients, bras were also a necessary aspect of dignity. Perspiration was a natural consequence of exercise and clothing needed to be absorbent and adequate in supply so that people did not need to worry about body odour. Being successful in physiotherapy meant the achievement of goals—green stickers provided patients with independence, and weekend passes allowed them to practice their skills in familiar home environments. Exercise was work for patients in RT, and a hard day's work meant they were fatigued at the end of the day and ready for a good night's rest, thus the next phase of analysis in the clothing taskscape is sleeping.

Sleeping

Evening routines while in RT involved distinct interactions with clothing. At some point after dinner, patients habitually changed out of the clothing they had worn during the day into their sleepwear. Patients were able to choose from a variety of garments to wear in the evening and for sleeping; these included the hospital gown and the patient's own nightgown or pajamas, housecoat, and slippers. This section of the results reports on patients' evening routines, bedtime rituals, sleepwear preferences, as well as patient and staff opinions about the hospital gown.

Evening Routines

Evening routines varied among patients. Dinner was completed by 6:00 p.m. and some patients would have visitors in the evening; others would want to retire to bed early and thus changed into their sleepwear right after dinner. The act of doffing their daytime clothing and donning their sleepwear signaled an end to their day and a time to relax. As one patient explained, "At night I cannot wait to take everything off. … I am not sure if it is pressure, there is such a comfort" (Patient 9), while another noted, "When I put my pjs on I relax more. That's why I do it so early" (Patient 3). Others had modesty concerns and waited until visiting hours were over at 9:00 p.m. because they wanted to be "reasonably sure that there's not going to be a lot of strangers walking up and down the hall" (Patient 29).

Some patients had nightly bedtime rituals with their family caregivers, as described by one patient who was speaking about her husband:

> He brings me new pajamas, I put on my pajamas and he puts me in bed and puts my socks on—I don't like socks for sleep okay? But he says, "you have to put socks on because you are going to be cold" [she laughs]. Okay, he put me to bed—the socks and that's it. (Patient 16)

Doffing clothing and donning sleepwear was part of patients' evening routines.

Sleepwear Preferences

Patients' descriptions of preferred sleepwear revolved around issues related to ease of movement while in bed. For those who were wearing their own sleepwear, comfort was key. Descriptions of comfort were impacted by: the garment silhouette as well as the hand and thermal properties of the fabric. In terms of silhouette or the cut of the garment, whether patients preferred nightgowns or pajamas was a matter of personal choice. Ease of movement while in bed was discussed as a comfort indicator for both types of sleepwear. Those who preferred nightgowns liked their ease of wear, with one woman explaining "I like a nighty, the same kind of a thing as my lounger [dress] and the short sleeves, not too long, the sleeves. And then, a nice flow to it so it's not tight when I'm lying in bed" (Patient 5). Yet another mentioned "I don't think I've worn pajamas in 50 years. I always found them a nuisance, every time I rolled over, my pajamas curled up" (Patient 6). Yet some people expressed similar reasons for their preference for pajamas; as one patient stated: "I prefer pants and T-shirts because I move too much in bed and when it's only one piece, it's around my neck. Pajamas are more comfortable" (Patient 16). Another person said that she liked pajamas "because I find a nightgown so constricting" (Patient 1). One patient replied "I sleep the way I was born" (Patient 8) meaning that no sleepwear at all provided the ultimate comfort in bed. As such, no one garment traditionally worn as sleepwear was deemed to be best or more appropriate in ordinary life, but in the section I discuss what is most applicable when sleeping in a RT environment.

Hospital Gown

Although patients discussed their at-home sleepwear preferences, the majority of patients wore the hospital gown at night while they were in RT. This is based on my observations of evening routines as well as interview responses from care workers and therapists. Regardless of the reason for sleepwear choices, many people had strong opinions about the hospital gown. One patient shared the following viewpoint:

> I've been wearing the hospital gown. But, I'm not very happy with that! One thing, I mean, it's really not very practical because you get … your bum showing in the back of you. So,

> you have to watch there's nobody looking through the door kind of a thing in the middle of the night if you want to go to the bathroom. I mean, all these years and they have the same old nightgown, really, you know, with the gap in the back. And you have trouble doing up the top here too [she points to the ties at the back neck]. That you got to have good arms to—it's all wrong somehow. It should be down here, down the front, yeah. (Patient 5).

Another shared her sentiment: "I think they're horrible [she laughs] … they're ugly, they're uncomfortable, you can't tie them up yourself; and if you do tie them up, you're laying on ties" (Patient 29). The way that fabric felt against the skin was another source of concern: "I don't like the hospital gown because the fabric is, you know, it's very hard. I prefer maybe one that is soft" (Patient 16). Thermal comfort was another concern; one patient said, "those gowns are cold" (Patient 3).

The hospital gown also served double duty as a housecoat or robe: "You have to wear two if you are leaving the room, one at the back and one at the front, because otherwise people are looking at you … so we end up wearing two" (Patient 11). One patient liked the hospital gown because it was the least painful thing to wear at night:

> I like their gown because it is easy, I can't handle things on my back, when I lie down I leave it open. Even those ties, I cannot even have it tied, within an hour it will dig into my back, oh the pain … because I have nerve pain I cannot feel it right away, so painful. So I just have it open nice in the back. In the beginning, I wouldn't mind something nicer looking, like my own [sleepwear]; this is very ugly, it would be nice to have one or two of my own. I wouldn't mind to pay for something like that. (Patient 9)

As explained earlier in the analysis of the clothing taskscape, toileting at night had its own set of challenges, which were exasperated by patient mobility limitations, thus sleeping and toileting activities were entwined. Patients needing to toilet at night called care workers for assistance. Nighttime toileting often involved use of a hand-held urinal or bedpan, which minimized movement from bed and increased the likelihood of returning to sleep. However, these methods of toileting contributed to an increased propensity for accidents. The types of garments worn while sleeping influenced the successful use of urinals/bedpans. One of the therapists suggested that the hospital gown was easier for patient care: "Most of the time they wear gowns because it's also the staffing who changes it for the patient" (OTA 31). As described in more detail in the subsequent Laundering section, patients viewed laundry as a burden for their family caregivers and wearing the hospital gown reduced the amount of dirty clothing. In addition, patients' dignity relating to the control of their bodily functions was safeguarded, because all evidence of toileting accidents were whisked away to the hospital's laundry facilities.

Summary of Sleeping Phase

Sleeping was an activity that included in the clothing taskscape that uncovered relevant factors to inform design. Patients arrived to RT from other acute care floors in the hospital, wearing their hospital gowns, only to be advised that they were medically stable and needed to now wear their own clothing, because as one physiotherapist declared, "if you wear your pajamas during the day you kind of feel sick" (PT 18), which supports the belief that clothing impacted the way people felt and behaved in RT. Patients had personal sleepwear preferences. Often, for practical reasons, patients chose to revert back to their "sick" status at night by donning the hospital gown to sleep in. Observation and discussion of nighttime routines revealed a love/hate relationship with the hospital gown. Patients questioned its aesthetic and functional attributes yet most wore the hospital gown to sleep in. This may have reduced the laundry responsibilities for their family caregivers and eased staff activities around nighttime toileting. As patients approached their discharge date, many returned to wearing their own sleepwear.

Laundering

Clothing care is a series of activities that include laundering, dry cleaning, ironing, and a consideration of soiling propensity; that is, thinking about a garment's performance during use and care. People's use and care of their clothing while in RT differed from their normal routines at home. Doing laundry is one of many rather mundane and habitual chores in everyday life. It is taken for granted that clothing will become soiled through daily wear, that it will be washed, folded, hung up, and put away. This rather simple sequence of activities became complicated in RT and no doubt would be complex for similar and different reasons once patients returned home. This section of the results reports on the importance of adequate clothing and patients' wardrobe options, their opinions on garment care, and strategies for laundry management. The advantages of hospital-supplied garments as well as the challenges people encountered doing laundry as therapy and at home are also discussed.

Wardrobe Options

As outlined earlier in the Selection segment of the clothing taskscape, most people in RT wore a limited number of garments from their existing wardrobe. The clothing within their daily

wear rotation was reduced because of the need for garments with specific design attributes (for instance, trousers with elastic waistbands, and easy-to-don tops without buttons and button holes). These needs varied based on the unique set of circumstances that brought the person into RT in the first place. Further complicating the logistics of a limited wardrobe was the reality that clothing became more easily soiled while eating, due to body/health changes and associated disability, that at times limited patients' ability to feed themselves independently, as well as to open food packaging and eat with the disposable plastic utensils used in the hospital's dining room. In addition, people's toileting competencies may have been compromised while on acute care units in hospital, or temporarily altered by medication and the inevitable assortment of stool softeners and laxatives used to combat the bowel inactivity that is a normal consequence of recovering from surgery or illness. So it is reasonable to say that people in RT have fewer of the right clothes to wear and that they will become soiled more easily.

Garment Care

Soiled clothing must be washed or dry cleaned. Kaldoph (2013) describes care as the "treatment required to maintain a textile product's original appearance and cleanliness" (p. 22). For many people, garment care requirements influence the kinds of clothes that are purchased and worn on a daily basis. Certainly, these are important factors for people managing their own dirty laundry and become more critical when others were responsible for this task. Colour was a consideration in terms of laundering; one patient emphasized that she chose "light colours, colours that do not run … when it is washed it doesn't look discoloured, like the colour is gone; light is light" (Patient 11).

In their normal day-to-day lives before RT, patients considered care requirements prior to buying clothes—as one remarked, "only washing, yeah, does anyone do dry cleaning anymore?" (Patient 29)—and another who informed me "anything that says dry cleaning, no way … always has been that way for me" (Patient 3). Ease of garment care was important to people: "I have things that are easy to look after. Now, you can just put them in the washing machine and they are easy to look after, and they are easy to dry. I don't have fancy things that you have to send to the cleaners all the time" (Patient 5).

Laundry Management

Soiled clothing is made clean again by laundering; however, this becomes another complication while staying in RT. My query to a patient as to how she was handling her laundry

was answered this way: "Well, I have not taken anything for laundry as yet, it's still here. So I don't know. … I'm going to have to get somebody to do it, take it to wash it and bring it back" (Patient 11). According to the *Rehabilitation Program* pamphlet provided to those staying in RT, laundry was the responsibility of patients' family members. However, not all patients had family nearby, which necessitated asking someone else to do this task—a friend or neighbour or, in the case of one patient, her former mother-in-law. Although the RT unit had a laundry room to wash bedding used on physio treatment tables and wheelchair cushion covers, the potential use of these facilities by patients was not well publicized. However, in certain circumstances, with a bit of negotiation with their care worker, patients could use the rehab's facility to do their laundry. But as described by this OT,

> We tend not to encourage that, because then everybody would be using it for that purpose and most of them don't have any soap and it's another cost that the hospital doesn't want to take on. And we petty cash that out when we're practicing doing laundry as part of their occupational therapy but to just have soap readily available for everyone, it's just not in the budget. (OT 13)

With family caregivers being responsible for laundry, the frequency of their visiting schedule determined the quantity of clothes that needed to be at the ready. One patient described her experience as follows:

> Clothes are really important. … I'm telling you because I've been through a lot here. For 3 days I wore a stained T-shirt and a pair of pants. Those pants were washed within 7 days. (Patient 10)

In my discussions with care workers, the need for adequate clothing was emphasized. For those patients who had their family caregivers visiting once a week, more clothes were needed than those who had family visiting twice a week, keeping in mind that clothing away being laundered reduced the already limited wardrobe to which patients had access.

Clean and Dirty

Perhaps the most contentious issue encountered was the management of dirty laundry. Multiple people handled dirty laundry (patients, family caregivers, care workers), which necessitated a system for sorting and storage.

Given that dressing was an arduous task, the mixing up of clean and dirty clothing had unpleasant consequences for patients and PSWs alike. One patient regularly employed the sniff test:

> I have to be the judge in terms of smell. Sometimes I am foggy with my medication. The personal support workers dress me, sometimes they are about to put it on and sometimes they do put it on and … [sniff, sniff], "Oh my God, these have to be taken off." (Patient 9)

One of the PSWs stressed the importance of a designated place for dirty laundry:

> Because dirty and clean together, when you go into a closet, you're smelling dirty and then, clean, okay, so what is clean? My hand is going down into their overnight bag, so you're thinking it's clean, no, but it's dirty, right? So you want to be organized in that fashion. (PSW 30)

A simple solution was evident in some patients' wardrobe closets; a sturdy plastic reusable grocery bag was utilized, positioned at the bottom of the closet or hanging on an inside hook on the back wall of the closet. This became a clear and visible repository for dirty laundry, serving a dual purpose; when full, it could be unobtrusively carried out of the hospital for laundering.

Hospital-Supplied Garments

Hospital gowns, drawstring pajamas, and disposable mesh underwear were supplied to patients while in RT. Most patients wore these garments to alleviate the laundry burden on family caregivers, as was illustrated in this patient's response to my query as to why she wore a hospital gown rather than her own sleepwear:

> Well, it just happened. They didn't give me a choice so—it's not the most comfortable. But … I guess since I have to wear a diaper, it's the most practical thing; rather than … wearing pjs and getting them wet and then having my daughter do the laundry. (Patient 2)

Men had the option of wearing hospital-issue pajamas, but would also choose to wear the hospital gown because of issues related to nighttime toileting, as the wife of a patient explained to me: "I guess that he was having a problem with his urinating and using the urinals and everything would be wet. So it's better if he's using the gown and, you know, they can come and change him at night" (Patient 25).[16]

Dirty underwear is tangible evidence of "accidents" that were described as "emotionally quite traumatizing" by one of the therapists (OTA 19). The following patient discussed the problems she had with laundry:

> Well this is what we do: I put the dirty laundry in this bag and my daughter is going to

[16] This quote was from a spouse speaking on behalf of a stroke patient who had difficulty speaking.

> take it, but I have washed my own undies here, because I thought I can do that in warm water and I have soap. I rinsed them well, but that's where I ran into trouble. I thought I could put them on a hanger to dry, but I don't have any hangers. I just got my green sticker today; it was red, so everybody had to do everything. I washed those this morning, even though I shouldn't have but I wanted to do my underwear. (Patient 32)

Summary of Laundering Phase

Laundering activities exposed a number of critical factors within the clothing taskscape. Patients needed an adequate supply of garments in their rotation of clothing. Patients wore one set of clothing during the day. While in RT, the soiling of clothing was likely to happen during toileting, exercising, and eating. Managing dirty laundry was a source of concern for patients, family caregivers, and PSWs. On site laundry facilities might alleviate some of the clothing challenges experienced by people. Hospital supplied garments, such as the hospital gown and disposable underwear, were used extensively by patients as a way to decrease laundering responsibilities for family caregivers.

Storing

Initially, storage was conceptualized within the clothing taskscape as the ways that clean clothing was kept when it was not being worn: either folded flat or hung on a hanger in a closet. However, during data collection it became clear that patients needed to store other useful items in addition to clothing—extra things like toiletries to groom themselves, personal electronics to communicate with family members, or reading materials to pass the time while in hospital. It became evident that storage, selection, and laundry were unmistakably linked within the clothing taskscape. The way that clothing was stored impacted easy access to what might be selected for wearing. As discussed previously in the Laundering section, dirty clothing that was mixed up with clean items was distasteful for both care workers and patients. To fully understand the day-to-day experience of individuals in RT, it is necessary to step back and view their lived environment while in hospital, essentially their home away from home. This section of the results begins with a description of the personal physical spaces that patients inhabited and the storage spaces they utilized. Organizational strategies while in hospital and at home are highlighted.

The Physical Space

The Active Rehab Unit had 32 beds arranged in 17 rooms; 11 of these were semi-private with two patients per room, two rooms housed three patients each, and four rooms were private. Thus, the majority of patients in RT shared a room. Each semi-private room contained two hospital beds placed against one wall, divided by a drape on an overhead I-Beam track. The end of the room had wall-to-wall windows, which let in an expanse of natural light. Mesh roller blinds hung on the windows and, when lowered, permitted a view of the outside landscape while at the same time diffusing direct sunlight. Each patient was allocated exactly the same furniture: a chair for visitors, a wardrobe-style closet, a bedside cabinet, and a portable tray table. At the threshold of the door to the hospital room was a sink with foot-controlled water faucet and a paper-towel dispenser, which facilitated hand washing, a practice necessary for hygiene and germ control. The communal bathroom was equipped with a sink, mirror, toilet, and often a commode. All patients had their own clothing, grooming toiletries and equipment, personal items, as well as a wheelchair and/or walker and an assortment of dressing tools. As such, there were a number of items that needed to be stored for each patient.

Figure 4.27. Hospital room.

Figure 4.28. Patients' bathroom. Two patients use this bathroom; there are no shelves in the bathroom and there is minimal counter space to leave personal toiletries.

Organization

So while the space, as I have described, formed patients' homes away from home, there were key differences between their hospital living spaces and their real homes. While their hospital room was a much smaller space than their home environment, there was a fundamental assortment of things that people needed to function. As one patient expressed, "we're not here for a short term, we're not here for 3 days; we're here for 3 to 6 weeks" (Patient 29). Thus, it was reasonable for people to accumulate stuff that needed to be accessible not only to themselves but also to others, either family caregivers or their care workers. One of the overarching themes in the data analyzed was the need to keep stuff organized, not only for the patient but also the care worker. Tidy spaces, with items in their place promoted a sense of control; as one patient stated, "I guess you'd noticed this morning. … I'm very meticulous and … I like things in order; I feel unorganized here" (Patient 7). An inability to find things was frustrating both for patients and PSWs as was expressed by this participant:

> So the care workers would ask, "what are you wearing today?" All my clothes were in bags everywhere. I do not know where people put anything, because I am in bed paralyzed. Even when I was in the wheelchair, I did not have the energy or understand the need to organize. It's amazing how you can only take so much, now I can do more,

> take more. … Everyone was getting frustrated, my stuff was all in a bag; "where is your stuff?" Fair enough! It is all over the place. (Patient 9)

Care workers also experienced frustration when they encountered disorganized environments, as described by this care worker:

> I really don't like to walk into a room to find it untidy. That's one of my— … but what I would love to see is that, everything is there for you to work with. Their clothes are there, their shoes are there and I can work quickly, everything I need is there. (PSW 30)

Working under time constraints in the morning, the storage and organization of patients' belongings (i.e., clothing) impacted care workers' ability to provide effective care.

Storage Spaces

Patients needed functional storage for larger items such as their suitcases, clothing, and shoes; smaller items like socks and underwear; and personal items like hearing aids or dentures, toiletries, cell phones, iPad tablets, and wallets. Patients used intended storage spaces such as the closet, bedside cabinet, and bathroom counter, and improvised use of other areas such as the windowsill. Over the course of the day, people moved around the RT unit, going down the hall for their showers, to the dining room for meals, and to the various gyms for therapy, and storage was required to carry things from place to place. For example, toiletries were stored in a cardboard disposable washbasin on the way to the shower room, terrycloth bibs for mealtimes were stored in bags attached to wheelchairs, and personal items such as cell phones and money were carried in garment pockets. Some patients had supplementary storage that was specifically created for them by their friends or family members. For example, a friend of one patient purchased a plastic cabinet and labeled the drawers to facilitate the categorization and storage of clean clothing (see Figure 4.29).

Wardrobe closets had a single short pole that was positioned high within the closet (60 inches high) with a shelf above and a partial shelf below as well as a hook on the back wall. Most often closets contained an unmatched assortment of plastic and wire hangers, and sometimes no hangers at all (as was the case for two of the 14 patients I interviewed). While closets were compact in size, they still afforded storage space for clean clothes, dirty laundry, footwear, and sometimes an overnight bag or suitcase (see Figure 4.30).

Figure 4.29. Plastic drawer cabinet. Supplementary storage needs were met with this plastic drawer cabinet. Labels to identify contents were fixed to the drawers. This simple solution guided family caregivers when putting clean laundry away and allowed care workers to find what they needed when dressing the patient.

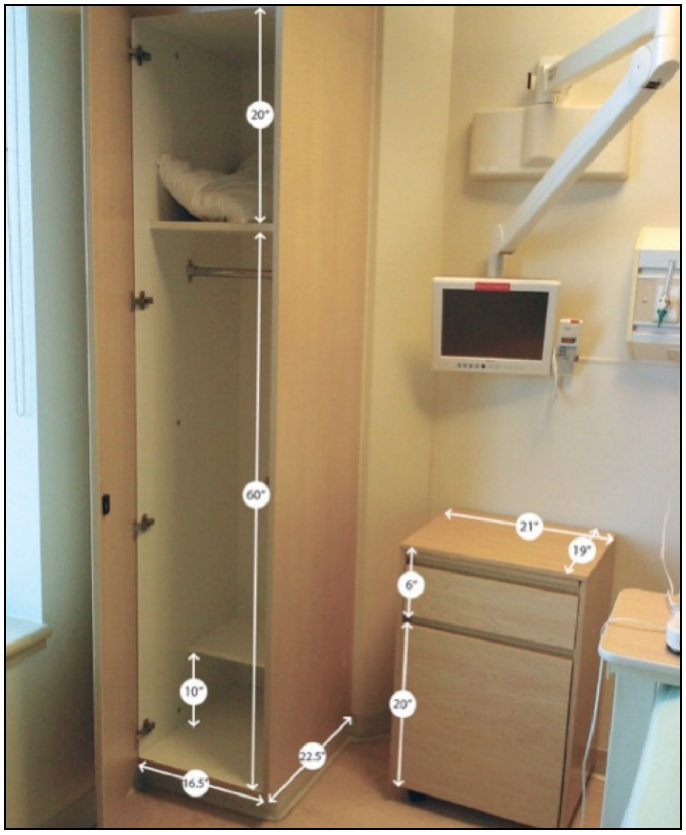

Figure 4.30. Patients' wardrobe closet and bedside cabinet. This was the space allotted to each patient to store all of their personal belongings.

The bedside cabinet had an extendable surface with a drawer below, as well as two shelves. This allowed for storage of personal items, folded underwear, socks and clothing, as well as toiletries. The bathroom counter had minimal space, offering only temporary storage for toiletries and grooming items. The windowsill became a makeshift storage area for flower arrangements, shoes, toiletries, and other personal items.

Organizational Strategies

The OTs emphasized strategies designed to help people be organized, with recognition that the RT environment was not home, and that when patients returned home, things would be different. Being organized promoted patients' independence, self-sufficiency, and an overall sense of control. Suggestions for organization included limiting the assortment of toiletries used and setting up their environment for optimal functioning as illustrated by the following OT:

> Sometimes I get them a little container. I use one of the cardboard washbasins so that they can keep their toiletries organized. Some people come with a huge amount of things; like, family members will bring in three different shampoos and five different creams and it's like a pharmaceutical company in their drawers. I suggest going through and looking at what they actually use and sending the rest home. Because otherwise, it can be overwhelming … you want to pare down, you want to keep it organized, have your products that you take to the shower, have the ones you need at the sink side. (OT 14)

Figure 4.31. Wheelchair storage bag. A bag bolted onto the back of the wheelchair allowed for storage of personal items, bibs needed at mealtime, and wheelchair foot rests.

Figure 4.32. Windowsill storage area. Windowsills were used as overflow storage areas.

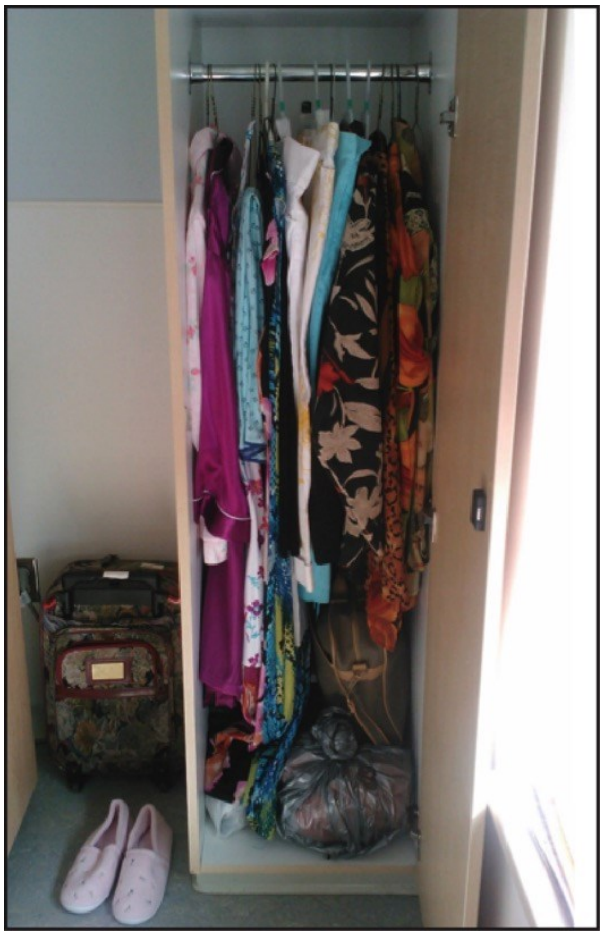

Figure 4.33. Patient's closet. The closet contained clothing and a bag of dirty laundry. Her luggage and slippers were stored between the closet and bedside cabinet.

Figure 4.34. Disposable washbasin used to transport toiletries to shower.

Home Adaptations

Patients used weekend passes as a means to transition back to their home environment. Interview discussions focused on how their storage spaces were set up at home. The following organizational strategies involved improved storage and easy access. Suggestions included the removal of the closet door for easier access, while another person eliminated the dresser altogether because the drawers were too heavy and difficult to operate from her wheelchair; she had a closet design company create a unit that included hanging storage and shelving with open bins to store folded items (see Figure 3.35). Others mentioned installing wire basket drawers in their closet, in lieu of a larger dresser. To optimize the use of functional space, one person installed two poles in the closet, one set above the other, to allow seasonal clothing to be rotated to a less accessible location (see Figure 4.36). A divided bag for shoes was hung on the back of the bedroom door and dressing tools were hung on the closet door (see Figure 4.37).

In order to have a better understanding of organizational strategies and storage capabilities within the home environment, I conducted a follow-up interview with one of the participants while she was at home on a weekend pass.

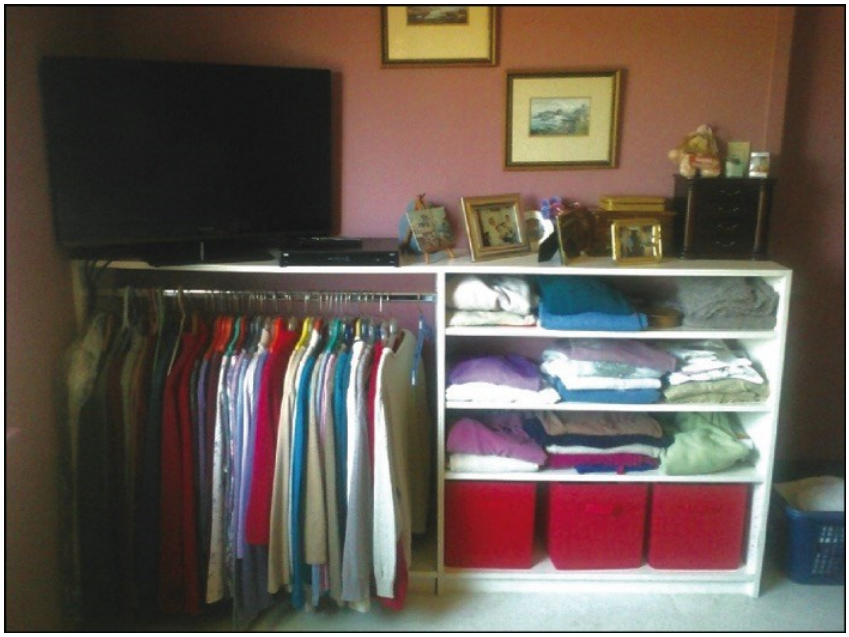

Figure 4.35. Patient's custom storage unit. She had difficulty operating heavy dresser drawers from her wheelchair and had this storage unit made by a local closet design company. It included hanging storage, shelves for folded items, as well as fabric bins for underwear and socks. A laundry basket was placed beside the unit. Her TV, family photographs, and other home décor accessories were arranged on the top shelf.

Figure 4.36. Participant's closet in her bedroom at home. The closet featured two poles for hanging clothes (out-of-season clothes were moved to the upper pole) and shelving. Dressing tools were hung on the closet doors. A reaching tool is hung on the door handle and the long-handled shoehorn is hung on a portable external hook positioned over the upper edge of the closet door on the right side.

Figure 4.37. Shoe storage hung on the back of patient's bedroom door.

Summary of Storing Phase

Exploring the range of storing activities within the clothing taskscape brought specific factors to light. While in RT, patients lived in rooms that were shared with another person for up to a month or more, with each person requiring a basic assortment of clothing, toiletries, and personal items to function. In addition, patients also required dressing tools and mobility devices (sometimes both a walker and wheelchair), yet as observed and derived from interviews with participants, functional storage in RT spaces were minimal. In the home environment, the size, location, and weight of dresser drawers and closet doors could deter easy access. Clothing and toiletries needed to be accessible to patients, family caregivers, and PSWs as this eased clothing selection and storage. Dealing with the constraints of limited space and time to provide dressing assistance was stressful and frustrating, especially if belongings were unorganized. Care workers, therapists, and patients valued an orderly environment and offered strategies for organization at home and while in RT.

Chapter Summary

Human ecology has always advocated the examination of relationships between people and their environments (Westney et al., 1988). While the clothing taskscape provided a way to

examine these relationships, it remained a complex undertaking. The clothing taskscape included 10 activities in which patients in RT participated, namely: selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing. Each of these distinct activities comprised an array of tasks in isolation and in combination with other activities that occurred in different environments within the RT unit (i.e., hospital room, bathroom, gym). Patients admitted to hospital RT programs were coping with their own new reality, a life that had changed in a moment due to a stroke or a fall, and a body that now included some form of disability. While in RT, they were trying to heal their bodies and adapt to a new and different living environment with their changed physical abilities. In order to function successfully, they had to effectively negotiate the gaps between themselves and their environments (Nagi, 1991). Since clothing is worn on the body, it creates a near environment, one that is closest to the self. The clothing taskscape provided opportunities to look for relationships between taskscape activities as well as gaps in places that might otherwise not have been considered. The clothing taskscape also revealed factors that deserve consideration in order to better understand the patient experience in RT and to inform the design of clothing, footwear, services, and environments. These factors may be categorized as being connected to body abilities, clothing and footwear attributes, as well as the RT environment. The mediation of these gaps was contingent upon actions geared to patients' ability to adapt, as is evident by their participation in exercise therapy to heal and strengthen their bodies or by learning new dressing methods to compensate for changed physical abilities and redesigning the clothing environment to improve dressing competencies (Kirsh, 1996). The next chapter discusses the issues and the design possibilities highlighted through an analysis of the clothing taskscape for rehabilitation patients.

CHAPTER FIVE: DISCUSSION

This research was embarked upon for a number of reasons; firstly, to conceptualize and operationalize the clothing taskscape, and secondly to determine the factors along the clothing taskscape that impacted patients' functional abilities and self-image while in hospital rehabilitation programs in order to inform design. The previous chapter elaborated on the context of each of the 10 activities that comprised the clothing taskscape—selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing—which in turn highlighted the many factors that impacted patients' functional abilities and self-image. Such factors were categorized as being physically and emotionally connected to the body/person, and also connected to the rehabilitation therapy (RT) environment as well as to clothing and footwear attributes. Although patients were admitted to RT for a variety of reasons, they all were coping with recent disability and associated physical limitations and mobility restrictions. Thus, the interface between patients' physical capabilities, the RT environment, and their existing clothing and footwear was in flux. This chapter begins with an overview of the clothing taskscape and elaborates how this theory provides a way to systematically and holistically view and analyze the use scenario. Following this, I unpack the factors that impact patients' functional abilities and self-image through analysis and discussion of the relationships between patients, their environment, as well as their clothing and footwear and, in so doing, make design recommendations that are relevant to patients in RT.

Interrelationships Within the Clothing Taskscape

A primary aim of this research was to conceptualize and operationalize the clothing taskscape. In order to accomplish this, ethnographically oriented methods (observation and interviews) were used along with taskscape theory (Ingold, 1993; Kirsh, 1996) to create the clothing taskscape as a means to better inform design (Crabtree et al., 2012). The previous chapter provided rich description of the research results, outlining the clothing use scenario situated within specific activities, and sensitizing designers to the environment and needs of people admitted to hospital RT after a disabling event. While the theoretical underpinnings of the clothing taskscape were initially inspired by Ingold's (1993) seminal work, parallel methodologies were found in the domain of consumer research, specifically through consumer journey mapping. In order to better understand how people interact with particular products and services, consumer journey mapping is used to chart individuals' tasks and activities along a path

in order to analyze and better understand their experience (Martin & Hanington, 2012). The user journey is embedded within experience mapping in that it documents people's "interactions across channels, touchpoints, time and space" (Adaptive Path, 2013, p. 16). Thus, this research followed people along their patient journey through hospital RT, from admission to discharge, examining their interactions with clothing and footwear. This study began with a general conceptual framework of activities within the clothing taskscape that was grounded upon my experience as a designer and maker. Engaging in fieldwork and observing the real circumstances of clothing use in hospital RT with people who were recently disabled provided an environment to test the clothing taskscape and to more deeply conceptualize the theory. In this way, the clothing taskscape theory was verified and further refined by the participants; this promoted a better understanding of the context of wearing, donning, and doffing clothes in the RT environment as well as the meanings people associated with those activities.

The clothing taskscape is human centred and evolved based on what patients in RT were "doing, thinking and feeling" (Adaptive Path, 2013, p. 9) in relation to their clothing and their ability to dress. The 10 coloured icons that encircle the human figure shown in Figure 5.1 represent the range of activities people engaged in while in RT: selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing. Each activity was further deconstructed into mini taskscapes, specific tasks and behaviours that were then examined either in isolation or combined with other associated activities (Kirsh, 1996). For example, bathing activities were either performed in the patient's room at the bathroom sink or down the hall' in the communal shower. Regardless of the location, people would doff sleepwear, wash and dry their body and then don clean clothing. As described in detail in the results section, the tasks associated with each of these activities were performed differently depending on the bathing location. Each activity had its own mini taskscape; for example, when bathing in the communal shower room, dressing into clean clothing involved carrying garments while ambulating with assistance from a walker or wheelchair, storing clothing in the shower room, and then after washing and drying their body, donning multiple garments (bra, underwear, pants, top, socks and shoes). The problematic issues within the bathing taskscape became evident: modesty concerns while walking to the communal shower room, problems related to carrying clothing and toiletries while negotiating with a wheelchair or walker, storage of clothes in the shower room, and thermal comfort and safety issues while patient's bodies were wet.

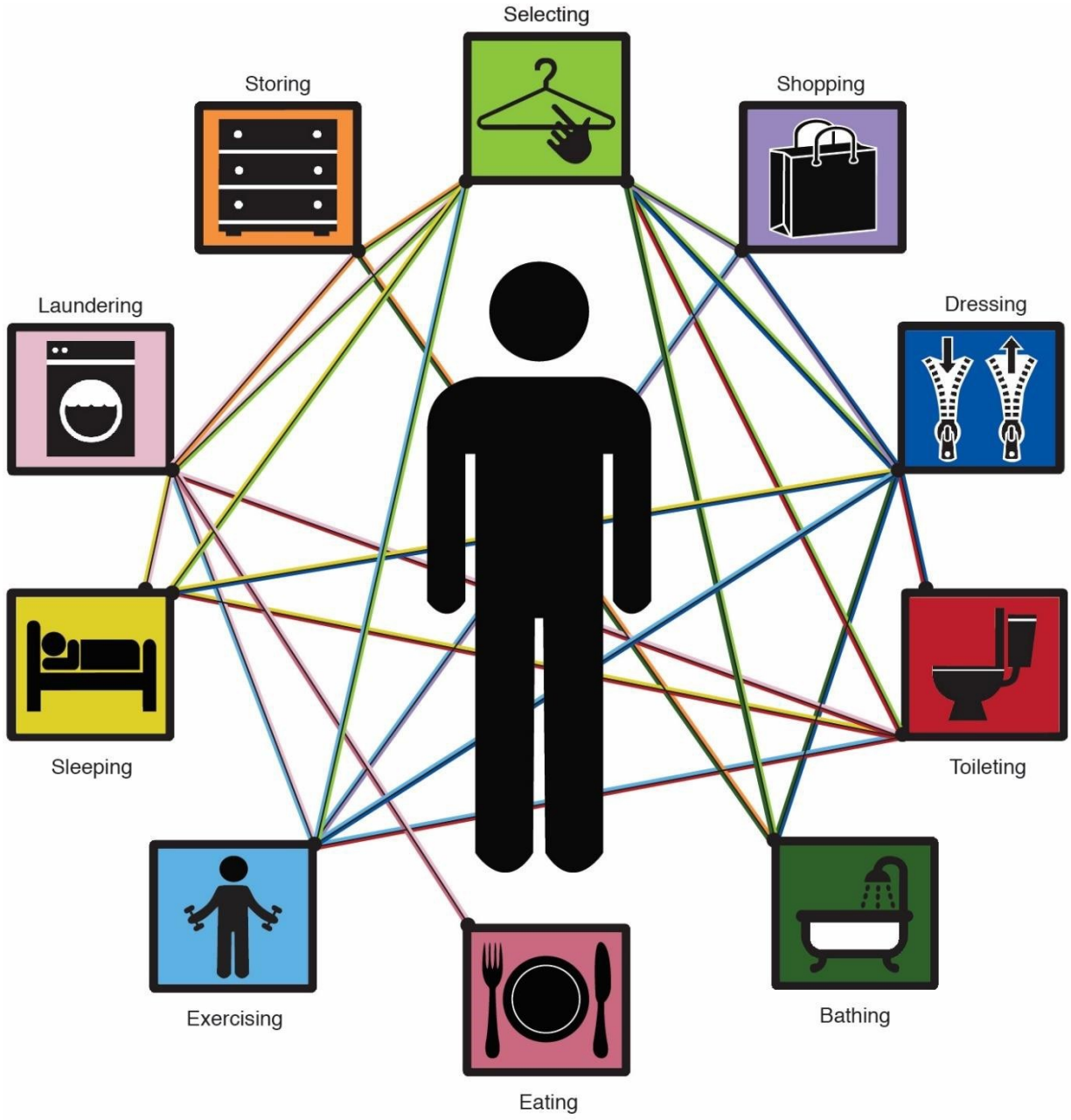

Figure 5.1. The clothing taskscape.

Simply asking people about their bathing experience would not have revealed the wealth of information provided by examining all the activities and tasks associated with bathing while in RT. Thus, the clothing taskscape provided both macro and micro views on the complex relationships that people have with the items they wear. Observations of people in RT allowed me to identify where and when specific clothing items were worn and removed, as well as the problems patients encountered and the feelings they experienced during clothing-related

activities. The lines connecting the activity icons shown in Figure 5.1 represent the causal relationships between the various tasks. Looking effectively at how tasks were accomplished required an understanding of patients' physical capabilities linked to an assessment of the hospital's built environment, which included mobility devices, dressing tools, and other required equipment (e.g., for toileting this might include a commode chair, urinal, bedpan, or diaper) and how these considerations influenced patients' interactions with their clothing and footwear.

Some tasks had an effect on other tasks. For instance, as shown in the results chapter, selecting a specific garment to wear for the day impacted dressing and toileting, both for the patient as well as the PSWs assisting with those activities. If appropriate clothing was not available, personal shoppers had to be recruited. Clothing choices also influenced patients' ability to exercise safely and whether or not physiotherapists needed to adapt their prescribed exercise routines. The sleepwear selected by a patient impacted bathing and nighttime toileting. Choosing to wear the hospital-supplied gown and disposable underwear impacted laundering frequency, a task for which family members were responsible. The reliable selection of clean clothing required thoughtful and organized storage methods. Thus, the range of user groups expanded beyond patients to include care workers, therapists, and family caregivers, with each group expressing similar and divergent needs. Viewing the use scenario through the lens of the clothing taskscape revealed relationships between tasks and, most importantly, disconnects that ultimately provide opportunities for design improvement. The clothing taskscape developed through this research study included the tasks accomplished while patients were in RT, that is to say, their clothing journey was viewed during a specific time and place. It is expected that their clothing taskscape will change after discharge from hospital, when they are at home. As one therapist stated,

> It is such a sheltered environment here, this is not real life. There is no judgment, we don't say you should be wearing a brassiere. In this environment it is no big deal, but I think that when people go home or go out in the community, to the shopping mall and so on, they would feel self-conscious about how they are dressed as compared to the rest of the world. (OT 18)

This highlights a new task: the disposal of clothing—either clothes people may no longer be able to wear or those purchased specifically for RT which they no longer wish to wear. In reality, there are many other activities and related tasks that one might consider in relation to a

person's clothing taskscape; it is different for everyone and it may vary on a daily, weekly, and yearly basis. While some of the depicted tasks are universal and could be incorporated into any clothing taskscape, others may be eliminated, and different tasks may need to be added. It is important to note that this research elaborates upon the clothing taskscape through the data collected in a hospital RT program; however, through these data, and my extensive experiences of designing apparel, the clothing taskscape may be used in other settings. While this is beyond the scope of this research, it is conceivable that the clothing taskscape could be customized and easily adapted. This would require an assessment of activities within the use scenario of a specific environment to identify relevant tasks in order to add them to the clothing taskscape.

The 10 activities across the taskscape show us that people's relationship with clothing is far from simple. It does not matter what type of clothing we are designing, be it ready-to-wear or functional apparel; thinking through and applying the clothing taskscape to the use scenario allows us to shift our perceptions and capture interactions not readily connected to clothing. Clothing is typically taken for granted, yet using the clothing taskscape revealed that what seemed like trivial and mundane factors discussed by participants were key to a better understanding of the use scenario as well as people's expectations and desires. Areas where disconnection and concern occurred provided places to begin to problematize clothing design, and thus highlighted opportunities for innovation. As such, the clothing taskscape goes beyond simply listing garment attributes; it also reveals the connection points between people's behaviours and values, information that is critical to understanding the design problem.

Agar (1986) suggests that in research "hypotheses, measurement, samples and instruments are the wrong guidelines. Instead, you need to learn about a world you don't understand by encountering it firsthand and making some sense out of it" (p. 12). My education and training are grounded in clothing research and design, and I began my fieldwork with scant first-hand knowledge of disability and rehabilitation in a health care setting. Patient interactions along the clothing taskscape were complex and included different stakeholders and artifacts. These factors in isolation were grouped into categories: the body, the environment, and clothing/footwear attributes, but the way that these factors intertwined provide the most valuable insights (see Figure 5.2). The following sections discuss what I learned during my fieldwork and how it might inform design.

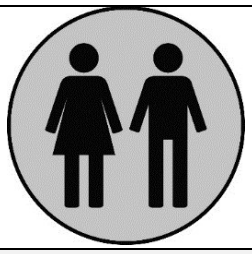	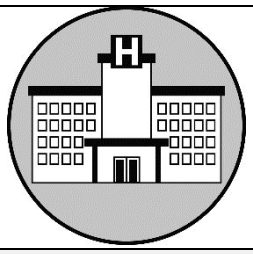	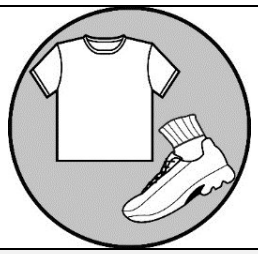
The Body/The Person	**Environment**	**Clothing & Footwear Attributes**
Physical Use both hands Hemiparesis Weakness Range of motion Mobility Restrictions bending/twisting Synchronized movements Strength Endurance Swelling Weight gain/loss Cognitive ability Balance Urgency Perspiration Body odour Pain **Emotional** In control Independent Capable Safe Stressed Frustrated Embarrassed Emotional Anxious Dignified Modest	**Mobility Equipment** Wheelchair Walker Cane Red/yellow/green sticker **Dressing Tools** Reacher Sock Aid Long handle shoe horn Foot stool **Toileting Equipment** Daytime/nighttime Diaper/pad Disposable underwear Commode Hand held urinal Bedpan Conventional toilet **Bathroom/Shower Room** Grab bars Bench seat Toiletries packaging **Dining Room** Food packaging Cutlery packaging **Home** Weekend pass Size & weight of closet door Size & weight of dresser drawer	**Clothing** Matched outfits Adequate clothing for stay in RT Comfortable Suitable for exercise Cost to purchase Transient need Size & silhouette Fit Styling (unlike PJs) Pockets Elastic waist trousers Wrist & ankle unhindered Sleeve & leg circumference Over the head tops No buttons & buttonholes Deep armhole **Fabric** Stretch Hand (comfort & friction) Fibre content Thermal comfort Absorbency Weave Easy care procedures **Fasteners** Colour Size Position Type **Footwear** Supportive Non-skid sole Adjustable across foot Loop tab at heel

*Figure 5.2. S*ummary of factors that impact functional limitations and self-image of patients in rehabilitation therapy.

The Body: Physical and Emotional Factors

Understanding people in context is critical in order to accurately identify a design problem, thus I begin by summarizing my understanding of the physical capabilities of patients in RT as they participated in activities within their clothing taskscape. The patients I observed and interviewed at the hospital's Active Rehab unit were coping with the sudden onset of disability and associated physical changes that impacted their ability to accomplish basic daily tasks. This autonomy was important to people, as illustrated in the previous chapter with a comment made by OT 27 regarding bathing: "I've had patients who cried at the end of their ADL session because they were now able to do these activities independently." Other common taken-for-granted activities include choosing the clothes one wishes to wear; dressing and toileting on their own; as well as feeding oneself without making a mess. An inability to perform these activities in the usual manner impacted some patients more than others, but to some degree this included anxious feelings about changes in their health as well as embarrassment about the loss of ability to independently care for themselves.

Observations of patients working with therapists and care workers (n=46) highlighted that dressing and toileting activities were more easily accomplished if patients were able to use both hands and perform synchronized movements like bending down and forward. For patients who were weak or simply deconditioned due to illness, injury, disease, or surgery, dressing and self-care activities could be painful. Most patients experienced swelling and weight gain or loss, which impacted the fit and comfort of their regular clothing and footwear. Many patients were dealing with incontinence, an expected consequence of being hospitalized. In addition to incontinence, perspiration during exercise therapy created self-consciousness about body odour. The majority of patients in RT were unable to walk or needed assistance to walk and had limited strength and endurance. Some patients were prohibited from bending or twisting maneuvers, and others experienced hemiparesis, an inability to balance and/or a reduced range of motion. These ways of being as I have described them were not the same for all patients in RT. Some patients had more functional capabilities than others; it depended on the reason for admission into RT and where they were along their course of therapy. Rehabilitation and healing occurred over time, but even with intense therapy, not all patients would regain their former levels of functioning and independence. The clothing taskscape provided a deeper understanding of patients' physical capabilities and emotional states, which allowed me to build empathy. This knowledge is a necessary prerequisite to begin the design process.

Environmental Factors

To further round out the design problem it was necessary to become familiar with the RT environment in hospital, as this contributed to patients' self-image as well as their ability to function. For clarity, I have grouped environmental factors into their own category; however, it is important to note that these factors were closely linked to the physical and emotional factors attributed to the body/the person. Patients in hospital RT lived in an environment that included the use of mobility devices, toileting equipment, and dressing tools. Given that most patients in RT were unable to walk, they used wheelchairs, walkers, and canes. With time and therapy, the ability to walk improved but upon admission to RT it was not uncommon for patients to be assigned both a wheelchair and a walker, and use of either of these mobility devices depended on the time of day and the activity being performed. Operating mobility devices required full, moderate, or minimal supervision from care workers, depending on the patient's physical ability. Supervision requirements were communicated to staff using a system of red, yellow, and green stickers placed on the mobility device. While wheelchairs, walkers, and canes enabled patients while ambulating from place to place, there were moments when their mobility device had to be partially released; for instance, when standing up from a seated position on a toilet and trying to pull up their underwear and trousers, this maneuver caused concern about falling. Dressing tools such as reachers, sock-aids, and long-handled shoehorns were regularly employed as a means to compensate for body limitations and while these tools aided patients when donning clothing and footwear, tools were not helpful while doffing. Body limitations and the use of tools required that dressing methods be modified. OTs taught patients new methods that were founded on six guiding dressing principles, including: dressing the weak side first and undressing it last; dressing while seated; hooking and threading limbs into clothing; reducing reach distances; and considering garment friction when dressing by sequencing clothing items, that is to don socks after trousers. More energy would be exerted by a person who had a sock on their foot when moving their leg through the trouser leg; conversely, removing one's sock prior to doffing trousers eased dressing maneuvers. Thus, while tools and methods enabled patients, dressing took longer than normal. Tools and dressing methods were unfamiliar and initially awkward, thus adding another layer of complexity to the completion of tasks.

Conventional toileting initially was not possible for patients in RT, and thus this task necessitated an assortment of equipment, which included a commode chair, hand-held urinal, bedpan, diaper, disposable underwear, and incontinence pads. The way that patients toileted

differed according to daytime and nighttime. The hospital built environment included grab bars and bench seats in the shower and bathroom and this influenced bathing and grooming activities. Patients' interactions with towels and the packaging of their toiletries required new approaches. Likewise, patients encountered disposable cutlery and food packaging during mealtimes, which combined with their changed body abilities impacted eating and increased the likelihood of soiling their clothing. Weekend passes were a way for patients to apply newly learned methods in their home environment. This involved interactions with furniture that differed from those used while in RT; for instance, the weight of closet doors and dresser drawers had to be considered when selecting or storing clothing. Observations of all the activities along the clothing taskscape helped me understand how patients with changed body capabilities operated within the hospital environment, be it with their mobility devices, toileting equipment, adapted dressing methods and tools, all of which influenced their interactions when dressing, specifically the person/garment/footwear interface.

The person/environment fit is an important one, especially in RT. Lawton and Simon (1968) equate body ability with competence and acknowledge that pressure exerted from specific environmental characteristics on an individual impacts a person's ability to function. Nagi (1991) advocated that circumventing disability demands mediating the gaps that occur between personal capability and the environment. Within RT, these gaps were negotiated in a number of ways. Patients participated in physio-occupational, speech, and recreational therapy sessions with the aim to remediate their physical abilities and capacity for self-care. Physiotherapists (PTs) taught patients exercises that would support the maneuvers to toilet. Occupational therapists (OTs) taught patients adapted dressing methods that were congruent with their physical abilities. The built environment in the hospital included necessary supports (e.g., grab bars and bench seats in the shower) as well as standard equipment such as commode chairs and dressing tools. What was notably absent was any substantial modification of the clothing environment.

The following section begins with a discussion of the need for matched sets of the right clothing in order to ease dressing as well as the therapeutic value such clothes provided to patients. It then outlines clothing details related to silhouette, pockets, fabric, and fastener attributes as well as visual clues to aid garment orientation, as these factors warrant consideration when designing clothing that better suits the needs of patients in RT. The subsequent section addresses problem garments which include socks and shoes, trousers, as well as underwear and brassieres. The final section focuses on the requirements for educational resources, followed by a chapter summary.

Strategic Wardrobe Selection

Clothing has been described as a portable environment (Watkins, 1984) and as such was another important influence on the functional limitations and self-image of patients in RT. Observations along the clothing taskscape provided insights into the person/garment interface during activities. As shown in Figure 5.1 the selection of clothing and footwear had a significant impact on other activities, namely shopping, dressing, toileting, bathing, exercising, sleeping, laundering, and storing as well as the mini taskscapes inherent within each activity. Interviews with multiple stakeholders in the RT environment encompassing patients, therapists, and care workers (n=34) provided clothing and footwear recommendations. The interview protocol included specific garments that were used as probes, a methodology that is well established in design research (Gaver et al., 2004; Mattlemaki, 2005). Clothing probes were sourced based on my assessment of design features that incorporated potential remedies to some of the problems identified during the observation phase of data collection, which included: magnetic fasteners (buttons and zipper), a top with dolman style sleeves, trousers with dual waistbands and built-in underwear, as well as a terrycloth poncho and hair turban (see Figure 3.9). Incorporating clothing probes into the interview protocol provided participants with tangible clothing ideas so that I might garner their opinions (feelings, values, attitudes), and more importantly, provoke discussions about other relevant solutions, thus adding to my understanding of the crucial design criteria required for people in RT.

Matched Sets of the Right Clothes

The *Rehabilitation Program* pamphlet (see Figure 4.1) listed the basic items patients required for their stay in RT. Therapists and care workers advocated that patients bring clothing from their existing wardrobes, specifically trousers with elastic waistbands and pullover tops. These garments were generically described as comfortable clothes in which to exercise. However, neither the pamphlet nor the conversations with therapists and care workers provided enough detailed information regarding clothing selection and how it should be organized for patients in RT.

A simple but effective strategy for clothing selection was demonstrated by the daughter of Patient 1 (see chapter 4, Figure 4.2). This patient's closet was organized with matched sets of clothes (trouser and T-shirt on the same hanger), with one outfit for each day. Her closet included two jackets that coordinated with all the outfits. It was evident that matched sets of clothes were important to some, as demonstrated by Patient 16 when she described with distaste

the random and uncoordinated assortment of clothing her husband had initially brought her. Patient 29 emphasized the value of aesthetic features; she desired clothes that "matched and looked decent," that were "tasteful" and not reminiscent of pajama styling.

Care workers also endorsed this organizational strategy. As indicated by personal support workers (PSWs) 26 and 30, clothes that were hung together in matched sets allowed them to "grab and go," which eased the time constraints under which they were working. Mornings on the RT unit were very hectic, and therefore organized, matched sets of clothes that eased the selection process also reduced PSWs' stress levels as they assisted patients with dressing in order to get to them to the dining room for breakfast on time.

Therapeutic Effects of Clothing

For patients in RT, information gathered during the research process suggested that clothing had a therapeutic effect. As soon as patients arrived to RT they were reminded that they were medically stable and advised to wear their own regular clothes, rather than the hospital gown. As well, patients were informed of the meal schedule and instructed to be dressed to eat their meals in the dining room. Clothing had symbolic implications for patients in RT as they moved from wearing the hospital gown back to their own clothing. Eco (1979) identified that clothing was a code; the clothes people choose to wear convey messages. Adam and Galinsky (2012) coined the term "enclothed cognition" to describe how symbolic clothing attributes are manifested with the physical act of wearing specific garments. Although patients initially did not choose their clothing, they were told *not* to wear the hospital gown, and this was part of the behavioural shift that therapists integrated into their practice. PT 20 emphasized the improvement of a patient's appearance on Day 2 of their RT stay, when dressed in their own clothing and participating in a daily routine. OT 15 and PT 18 endorsed the psychological benefit of clothes, emphasizing that people felt a sense of normalcy wearing their own things.

Thus it seemed that clothing was used as a means to shift patients' thoughts through their behaviour. Dressing and routine propelled patients toward their "restored self" (Charmaz, 1987, p. 287). Patient 9 described her transition toward her "restored self," outlining that dressing was initially such an effort when she arrived in RT but she viewed her recent thoughts about putting lipstick on and shaving her legs as positive signs of her recovery. Patient 10 suggested that she could adapt to new, different clothing that was better suited to her current abilities; as long as the clothes were fashionable, she would be happy in them. Patient 29 described how uplifted she felt seeing a stroke patient dressed well during therapy.

Although wearing their own clothing had therapeutic effects for patients, garment selection needed to be strategic. PSW 34 emphasized that patients needed the *right kind* of clothing. While the sections following will further define the clothing attributes best suited for patients in RT, dressing independence was of paramount importance overall. As OT 12 stressed, simple styles fostered dressing ease, an opinion that was echoed by OTA 31. OT 13 suggested that clothing selection needed to be strategic, as rehab clothes were not necessarily "normal" everyday clothes. As advocated by OTs 33 and 14, dressing lessons in RT began with the simplest clothing styles. More complicated clothing would be introduced gradually so as not to overwhelm the patient.

The return to dressing in their own regular wardrobe was an integral part of patients' self-image, as described by this patient:

> I love my clothes, I really do. I feel pretty, I feel sexy, I feel so comfortable. I miss that. I miss the different fabrics I wore, and the styles and the colours. I am worried; when I go back home, will my clothes fit me? Can I wear heels one day? Will I be able to walk in heels? I had no idea clothes played such an important role. And I think, it is not just for me. I know when my son looks at me, I want him to know that I am not a slob as a mom; I want him to be proud. (Patient 9)

Thus, a matched set of the right clothes was a functional attribute, in that it fostered independent dressing but additionally it also impacted a patient's self-image. Research findings by Fletcher-Smith (2011) had previously confirmed the importance of dressing independence for patients with stroke. The results from this study support that finding. Regardless of the diagnosed disability, when the ability to dress oneself is limited or lost, the reliance on others to perform this very intimate and fundamental task impacts one's sense of self (Charmaz, 1987; Corbin & Strauss, 1987) and triggers two very different trajectories that define people's interactions with their clothing and environment. An inability to dress oneself increases the burden of care; conversely, resuming dressing and other activities of daily living after a disabling event promotes a sense of normalcy.

Clothing Silhouette, Fabrics, and Fasteners

Functional apparel design requires a deep understanding of how people operate within the environments they inhabit. The clothing taskscape provided the lens through which to examine tasks and related activities within the RT environment and people's interactions with clothing and footwear. I began by looking at the person/garment interface in order to determine which factors impacted people's functional limitations. The medical rehabilitation literature highlighted

dressing difficulties, especially with the lower extremities (Christie et al., 2011; Mann et al., 2005). Other research logically identified stroke and the degree of hemiparesis as primary mitigating factors (Walker & Lincoln, 1990, 1991). However, these studies focused on people's dressing abilities from medical rehabilitation perspectives without considering clothing as an influential component within patients' therapeutic environment and specifically how the design of clothing might affect patients' abilities and their dressing performances. The information obtained through field observations and interviews with patients, therapists, and care workers suggests that solutions to dressing difficulties were embedded in a variety of different domains. Dressing performance was dependent on several factors: individuals' body abilities, movement restrictions, and pain levels, as well as environmental factors, and the need to use tools to get dressed, equipment to toilet, and mobility devices to get around. The following section identifies factors that influence the person/garment interface when dressing.

Silhouette attributes. Selection of the right clothing demanded consideration of several factors, including attributes related to garment silhouette, fabric, and fasteners and the ways that a person's body and limbs interfaced with a garment. The clothing silhouette impacted patient success following the dressing methodologies taught by the OTs. For instance, it was important that the overall silhouette be loose rather than tight. As well, the design of sleeve wrists and pant legs could not include a cuff or elastic, as this hindered prescribed dressing methods that employed hooking and then threading the foot or hand into the appropriate garment part. The shape of the trouser leg, particularly if it was narrow, could hinder dressing, as discussed by this therapist:

> Sometimes, patients' families bring in a really fitted, skinny leg pant. If the patient has a bit of swelling going on, it makes it quite difficult to put the pants on. And I end up doing a lot more work needing to assist a bit more than if they had a bit of a wider leg on. (OTA 19)

Dressing requires threading motions using the limb (e.g., the wearer's arm must be threaded into a sleeve). As such, threading initially requires hooking or inserting the limb into the sleeve or pant leg and, if necessary, grasping it from the opposite end and pulling it through the garment opening, an impossible maneuver if the garment wrist or ankle circumference is too narrow. Just as threading a needle is more difficult with a small hole, guiding the leg through a fitted, tapered trouser leg was challenging, thus as a general principle, armholes as well as sleeve and leg openings must be wide enough to accommodate a hand reaching in to grasp the limb and, most importantly, not impeded by elastic or buttons and button holes. Sleeve silhouettes were

discussed in detail with reference to two of the clothing probes used in my interviews—a blouse and a dolman style top.

The silhouette of the sleeve is a particularly important factor when dressing. As documented by other clothing researchers, armholes that are cut close to the limb (i.e., high-cut armholes) are problematic and suggested improvements include sleeve types that do not reach close to the underarm, such as drop shoulder, raglan, or dolman styles (Kernaleguen, 1978; Pompelli, 1998; Thornton, 1990; Turnbull & Ruston, 1985). One of the clothing probes utilized during participant interviews featured a dolman sleeve (see Figure 5.3). A dolman style integrates the sleeve into the bodice, and thus is very roomy through the armhole area, which greatly eases dressing maneuvers. I designed this dolman top for breast cancer survivors with lymphedema, a condition that causes swelling in the arm on the affected side, limiting movement and dexterity, conditions similar to those experienced by some patients in RT. The advantage of the dolman sleeve was highlighted by a therapist: "That looks like it could be beneficial to stroke patients; their arm is bent when they're trying to slide it through, it gives a little more elbow room in order to try and put the hand in" (OTA 31). Comments from care workers included: "this is fabulous for stroke patients" (PSW 26), and "it looks normal, that's cute … for people who have had a stroke, it's very hard; the stroke arm is the one going first, so that would be really great" (PSW 30). As such, we can assert that designers could improve apparel products targeted to patients in RT by focusing on a wide armhole.

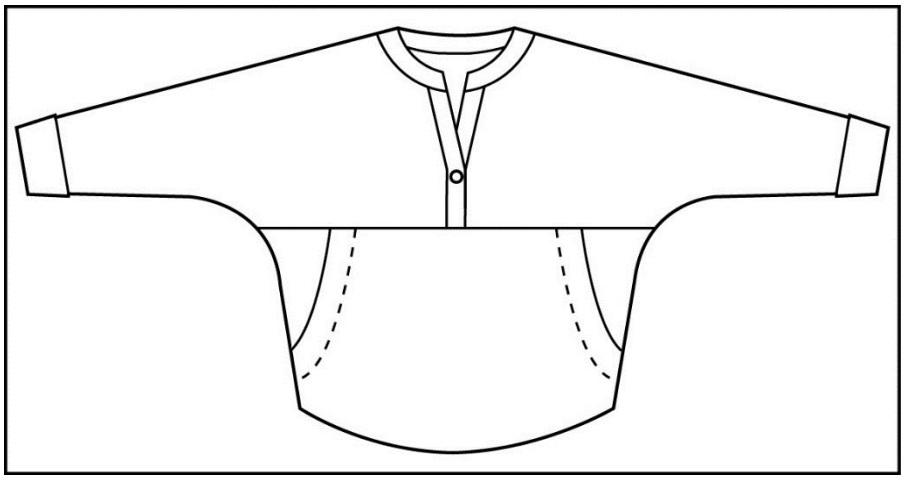

Figure 5.3. Dolman style top with kangaroo pocket. This garment was designed by Tullio-Pow et al. (2008) for women with lymphedema. The design facilitated dressing ease and support of a weak arm.

Another blouse I designed for women with lymphedema was utilized as a clothing probe to discuss the importance of sleeve silhouette. The blouse shown in Figure 5.4 featured a dropped shoulder with a deep armhole and ¾-length sleeve with a stylized cuff. This style incorporated a cuff that was devoid of buttons and button holes, a feature that would ease hooking and threading the arm into the sleeve.

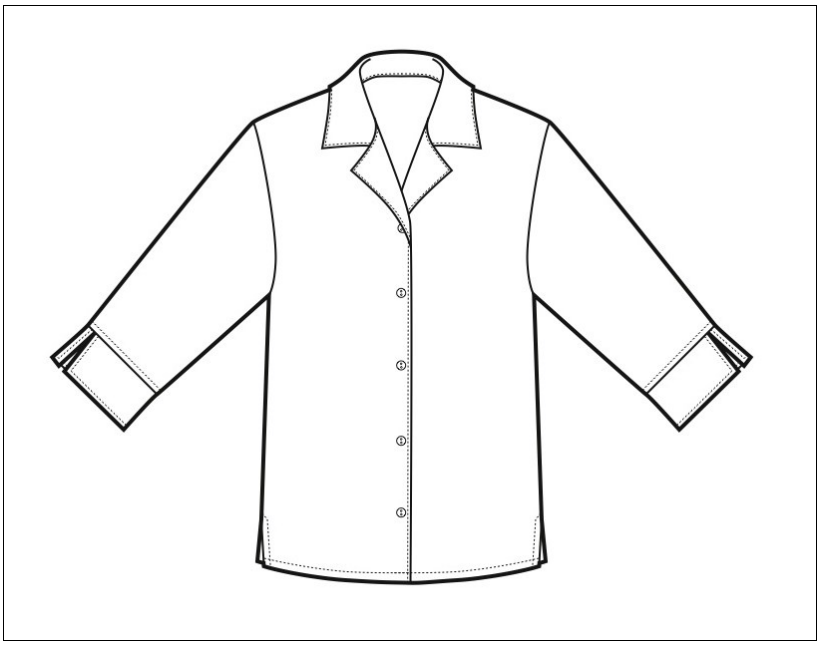

Figure 5.4. Blouse style with magnetic fasteners, dropped shoulder, deep armhole, ¾-length sleeves, and adapted cuff. This clothing probe was designed Tullio-Pow et al., (2008) for women with lymphedema.

Previous studies on adaptive clothing have suggested the use of elastic thread on the button positioned on a sleeve cuff (Chase & Quinn, 2003; Kernaleguen, 1978), to allow the cuff to stretch as the hand moved through the sleeve. Given that the elastic thread would eliminate the need to fasten and unfasten the button and buttonhole, this solution might have helped Patient 5 who complained about her ability to do this task. However, as observed with other patients in RT who learned dressing methods, an elastic threaded button on a cuff would be problematic when hooking and threading. A redesign of the sleeve and cuff to provide an unhindered wrist, as with the blouse style shown in Figure 5.4, might be considered a preferred solution.

The size and silhouette of the garment influenced the ease with which dressing was accomplished. Clothing that had a loose rather than tight fit afforded dressing, for both the

patient and the care worker. Given that the range of body movements required to dress could be painful, as observed during ADL sessions with therapists and patients (n=15), clothes that were easier to don and doff encouraged dressing independence, and caused patients less pain; this was important of course to patients but also to care workers who provided dressing assistance. The circumference of the garment silhouette in the body, neckline, armhole, sleeve wrist, or pant leg therefore become important design considerations.

Fabric attributes. Fabric is an essential component of clothing and deserves special consideration along the clothing taskscape. For example, fibre content and fabric weave will influence how a fabric wrinkles, soils, shows soiling, releases stains, and retains odours (Kadolph, 2013), all of which have obvious connections to toileting, laundering, and storing tasks. In addition, as I discussed in Chapter 4 and will elaborate in the next section, fabric friction also impacted tasks related to donning and doffing.

There were numerous patient interactions with clothing and other textiles within the activities included in the clothing taskscape, which highlighted fabric attributes that aided or hindered comfort and dressing. Fabric friction impacted the success of two dressing methods. The first dressing method advocated by therapists and care workers was to dress the weak side first and to undress it last. As explained by OT 13, once a limb has been donned into a garment it was more difficult to dress the other limb, and fabric friction influenced the achievement of dressing success.

As discussed by Patients 1, 5, 6, and 32 as well as OT 14, the smoothness of fabric and how it slipped over another layer of clothing was important. Patients described being aware of fabric friction when donning trousers over underwear, when donning jackets, or when turning over in bed, referring to how sleepwear interacted with sheets. This latter factor had been noted in research by Turnbull and Ruston (1985), who emphasized that sleepwear should be fabricated in smooth, slippery fabrics to ease movement while in bed.

The sequence of donning and doffing garments to eliminate fabric friction may not typically be altered when dressing; it is only logical to don underwear before trousers. However, as pointed out by OT 14, socks should be donned after trousers and likewise doffed prior to trousers. During my observation of an ADL session with Patient 5, she showed me her polar fleece jacket which was partially lined along the upper back and sleeves, and discussed how wonderful this jacket was in that it did not “stick” to her clothing. This seemingly small detail, the friction of one fabric layer in relation to another, surfaced as an important factor that influenced dressing ease and movement in bed, especially combined with changed body capabilities and use of dressing tools

and equipment. Fabrics made with bulky spun yarns create rough fabrics while those that are made with filament yarns in a satin weave will be smoother (Kadolph, 2013). Fabrics that slid more easily over another layer made dressing and undressing easier. This presented a conundrum because smooth, slippery fabrics do not offer as much thermal comfort, which was also important to patients in the hospital environment. Thus fibre choice and weave structure of textiles should inform apparel products developed for patients in RT.

Fastener attributes. It has long been established that fasteners are a critical component when designing clothing that supports independent dressing (Dallas & White, 1982; Huck & Bonhotal, 1997; Sperling & Karlsson, 1989). The findings in my research include problems associated with conventionally used garment fasteners (i.e., buttons and zippers). While in RT, the ability to deal with fasteners was connected to body abilities—specifically the functioning of one hand and the limitations of the other hand when performing dressing tasks. The range of garment fasteners referred to in discussions with participants or observed on patient clothing in RT included ties (as on the back neck of the hospital gown or as a drawstring waistband), buttons and buttonholes, metal press studs, hook and loop tape, hook and eyes (as on a bra), a trouser hook and slide with a one-way fly-front zipper, as well as a separating zipper (see Figure 5.5). The clothing taskscape afforded looking at fasteners in conjunction with body ability, garment silhouette, and prescribed dressing methods. The fastener type, colour, size, and position all influenced patient success while dressing. Selection of fasteners is another critical criterion when creating clothing for patients in RT.

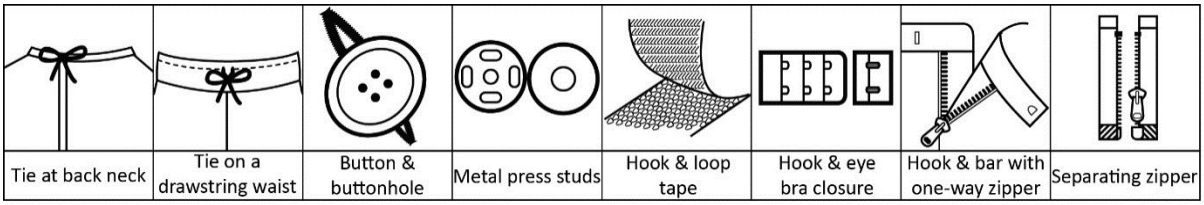

Figure 5.5. Fastener types.

Ties were the primary fastener on the hospital gown. Patient 5 explained her frustration trying to fasten the ties at the centre back: "you've got to have good arms—it's all wrong somehow." When shadowing care workers during their morning and evening routines, I observed the PSWs regularly tying and untying hospital gowns. During my observation of ADL sessions, I also observed OTs untying patients' hospital gowns. Using ties as fasteners certainly does not foster independent dressing.

Ties may also be used as a waistband fastener. Patient 1 wore a trouser with an elastic waistband that was combined with a drawstring; when I observed her dressing, I noted that she simply tucked the loose ends of the drawstring into the waistband. I also observed a drawstring waistband on a traditional cultural trouser and underwear worn by an East Indian patient. She was in RT recovering from a stroke and due to hemiparesis, she was unable to don or doff her trouser and underwear because of the drawstring waistband.

As with drawstrings, patients devised work-around solutions to buttons and buttonholes. Upon arrival to RT, patients were initially advised to bring in pullovers, without buttons and buttonholes; however, some patients still used garments with button fasteners. OTA 31 confirmed that smaller buttons were more difficult to fasten than larger ones. Patient 3 advised that she left the buttons on her pajamas done up and simply donned the garment over her head. OTA 28 had adapted garments with buttons by sewing them all shut except for the top few. The top two buttons were then re-stitched on top of their corresponding buttonholes; the male component of a metal press stud was stitched underneath, and the female component of the metal press stud was stitched in the location of the original button.

Two blouse styles with different magnetic buttons were used as clothing probes with participants to stimulate more discussion about fasteners. Magnetic fasteners are relatively new innovations. Chase and Quinn (2003) identified magnets as potential garment fasteners, but they have not been used widely in clothing; instead they are commonly integrated into the design of accessories (i.e., purses, jewelry clasps). As shown in Figure 5.6, Magnet style A featured male and female shaped components similar to a metal press stud. This fastener was stitched in by hand, allowing manufactured, ready-to-wear clothing to be adapted. With a regular button stitched on top of its corresponding buttonhole, the magnetic fastener was concealed. Magnet B included flat magnetic discs that were each enclosed in an envelope of plastic. This fastener was machine stitched between the facing and the shell fabric, creating a hidden button placket closure. This allowed for flexibility to lap the garment right over left, as in traditional women's wear or, for those stroke patients without the use of their right hand, the magnets also worked when the garment was lapped left over right.

The magnetic button fasteners garnered excitement from participant groups. Patient 7 was in RT recovering from a stroke, but she also had rheumatoid arthritis. She commented, "that's really nice … no one could tell." OTA 31 remarked, "that's a really nice invention, I've actually

never seen them." Some participants voiced concerns; PT 35 and OTA 28 inquired about the strength of the magnet, questioning if it was strong enough to remain securely closed during wear, while PSW 30 asked if laundering would impact magnetic strength. Based on feedback provided by participants, magnetic button fasteners would aid dressing ease for patients in RT.

Magnet A – included male- and female-shaped components similar to a metal press stud. This fastener was stitched in by hand, allowing ready-to-wear clothing to be adapted. With a regular button stitched on top of the buttonhole, this alternative fastener remained concealed.

Magnet B – included positive and negative flat magnetic discs were each enclosed in an envelope of plastic. This fastener was stitched between the facing and the shell fabric. This allowed for flexibility to lap the garment right over left, as in traditional women's wear, or for those stroke patients without the use of their right hand, the magnets also worked when the garment was lapped left over right. This blouse style was part of the IZ Adaptive collection (www.izcollection.com).

Figure 5.6. Magnetic fastener styles.

A magnetic separating zipper is an additional product innovation, promoted as being operational with one hand. This zipper was invented by an occupational therapist, her son (an engineer), and a neighbour (a mechanical engineer and designer). At the time of my fieldwork, the only way to obtain this newly patented zipper was to purchase an athletic jacket from Under Armour (licensed to hold the exclusive rights to this zipper) in order to integrate it into interview discussions. However, individual zippers may now be purchased from www.dnsdesignsllc.com.

Participants operated the zipper, expressing both skepticism and enthusiasm; OT 33 confirmed "zippers are really hard to do with one hand." While the MagZip® initially was somewhat tricky to operate, one of the OTs identified a critical finger position that facilitated the successful operation of this zipper using one hand. Once joined, placing the middle finger on the base provided enough stability to then pull the zipper up with one hand. Although the zipper was operational with one hand and therefore of benefit to the RT patient population that often has reduced abilities in one arm, the narrow sleeve silhouette on the Under Armour jacket rendered threading the arm through the sleeve impossible and thus presented dressing challenges. Discussion with therapists, care workers, and patients suggest that this zipper has the potential to impact dressing performance for people in RT; however, clothing that utilizes this innovative zipper technology must also incorporate a loose garment silhouette and consider including a sleeve circumference that supports hooking and threading.

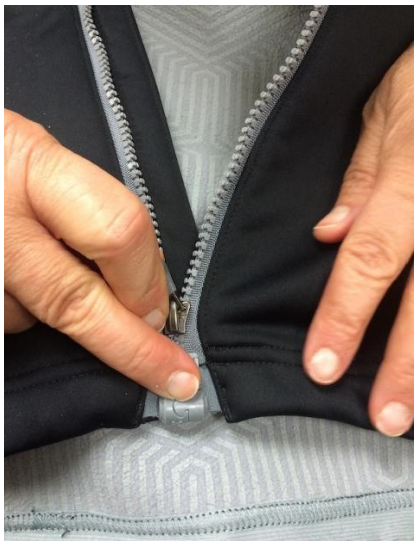

Figure 5.7. MagZip®. This newly patented zipper technology incorporates a magnetic base to facilitate alignment of both sides of a separating zipper.

The size, colour, and location of the fastener contributed to the difficulties some women experienced when fastening their brassieres, as discussed by OT 12 who suggested that some of her patients could don their bra using specific dressing methodologies and could physically fasten bra hooks *if* they could see them. She suggested bra fasteners be a contrast colour to the shell fabric of the brassiere and larger than those traditionally used. This, in conjunction with other suggestions for the bra, will be discussed in more detail in the category dedicated to problem garments.

Hook and loop tape was the fastener of choice for shoes, according to therapists and care workers. This was also the fastener used on many of the clothing precedents analyzed prior to my fieldwork. However, as mentioned by OTA 21, the elderly and arthritic patients she dealt with had issues with the grip strength required to separate hook and loop tape. Although hook and loop tape is a widely promoted alternative fastener, other types of fasteners such as the magnetic ones offer much potential to ease dressing performance for patients in RT.

Visual Cues to Aid Garment Orientation

Donning clothing correctly could be challenging for some patients in RT. Observations of ADL sessions with OTs highlighted prescribed dressing methods with specific guidance as to how to thread a limb into clothing. Given that the great majority of people in RT were using mobility devices to address issues of balance when standing up, dressing was accomplished while sitting or lying down. This required specific orientation of the garment on the lap, which could obscure garment perception as shown in Figure 5.8 that illustrates Step 2 of Donning a pullover garment from Appendix B-VII.

Dressing success, with clothes donned properly, required that garments be correctly oriented prior to inserting the head or limbs into corresponding garment segments (neckline, sleeve, or pant leg). As shown in Figure 5.8, when a garment is positioned in the lap, the visual cues such as the depth of the front neck or a label and the centre back are less easily discerned. Clothing that became twisted ended up being donned backwards with serious consequences that required patients to doff the garment and then redress, activities that invoked frustration, caused fatigue, and trigged pain in the process.

Figure 5.8. Donning a pullover garment.[17]

While donning tops (with three holes—one for the head and each arm) tended to be easier than bottoms (that had only two holes, one for each leg), distinguishing clear, visual cues would ease the dressing process. OTA 31 suggested the use of different colours to distinguish the inside and the outside of clothing as a way to aid garment orientation. OTA 21 emphasized how easy it was for patients in RT to twist trousers around. She recommended that distinct labels be included to clearly identify the garment front from the back in order to orient trousers in the right position prior to donning.

Pockets

Within the RT environment, pockets had to serve dual purposes. On a universal level, the majority of patients in RT used a mobility device and this compromised their ability to carry items. When using a walker, both hands were required to be positioned on the arms, and as OT 12 pointed out, "how are you going to get your cup of tea from the counter to the table?" While pockets would clearly not help with the latter task, this example highlights the challenges of carrying anything when using a mobility device. Some clothing researchers have suggested that a bag be attached to the walker or wheelchair (Hoffman, 1979; Kernaleguen 1978). Thinking about garment pockets might provide solutions to the challenges encountered by patients carrying items from place to place. However, the patient does not always use the same type of mobility

[17] © Cheryl Hall LLC. Used with permission.

device; sometimes it may be a walker and at other times a wheelchair. When seated in a wheelchair certain areas of the body were not easily accessible, as pointed out to me by Patient 10. She could not access the side-seam pocket in her trousers. Pockets are not only used to carry things; in RT, pockets also enable independence. As described by Patient 9 when telling me a story about her lost bar of soap, "the more I can carry, the more that I can be independent. … [I can be responsible] for what I need to take with me."

A pocket may also serve a second purpose—as a support for a weak arm. During ADL assessments with OTs, I observed two patients with stroke who had acute hemiparesis in their arm. These individuals required a sling which complicated the bathing and dressing processes as described in the results section. For those with less severe arm weakness, occasional support of the arm may be needed. The dolman top clothing probe also included a kangaroo pocket. This specific pocket and its benefit to the wearer were highlighted in Kernaleguen's (1978) seminal text on clothing for special needs. OTA 31 suggested changing the style line of the pocket to include two rows, so that patients could use the upper or lower portion of the pocket to support their arm at the appropriate level. OTA 28 agreed with this suggestion but cautioned that the weight of the arm in the garment pulling the back neck forward be considered. Thus, it would appear that integrating pockets into garments for people using mobility devices could increase functioning and independence.

Addressing Problem Garments

The clothing taskscape mapped patients' experiences with their clothing while in hospital RT, from admission to discharge. This provided an opportunity to understand the context of wearing, donning, and doffing clothes, which in turn illuminated problem areas that can be addressed by designers incorporating functional attributes to better enable patients in RT. In addition to thematic analysis, I tracked specific key words in participants' transcripts—challenging, difficult, frustrating, hard, and struggle—within the context of dressing. This analysis highlighted problem garments, namely socks, shoes, trousers, and brassieres, as shown in Table 5.1.

These specific garments epitomized the gaps between patients' functional abilities, their environment, and specific garment or footwear attributes. In other words, neither the garment or footwear nor the onset of sudden disability were solely responsible for underlying problems people encountered, as highlighted by this patient's response about his shoes: "tying laces is a problem … but the real trouble is bending down to get to them" (Patient 8).

Table 5.1

Key Words in Context Regarding Problem Garments and Activities

Challenging	Difficult	Frustrating	Hard	Struggle
Bra III	Bra II	Buttons	Bra II	Buttons
Buttons	Dressing II	Mixed clean/ dirty laundry	Buttons II	Coat
Coat		Dressing	Buckles	Dressing
Socks II			Dressing III	Using dressing tools
Shoes			Using dressing tools II	Socks
Trousers III			Socks	Shoes II
Zippers			Compression stockings	Trousers
			Trousers II	
			Zippers	

Socks and Shoes

Challenges related to socks and shoes were highlighted when therapists, care workers, and patients I interviewed were asked about the garments that were most problematic for people in RT. As succinctly expressed by OT 13, "Definitely, it's the socks and the shoes that they struggle most with." This opinion was echoed by OTs 12 and 27, OTAs 17, 22, and 31, as well as Patients 2 and 5. People in RT might experience an inability to reach their feet due to any number of reasons: restricted range of arm motion because of contracted limbs, hemiparesis, and an inability to balance while reaching forward, or prohibited twisting/bending maneuvers. Since donning and doffing socks and shoes required bending down and forward, patients in RT used reaching tools and the sock-aid. As discussed by Patients 8 and 32, OT 33, and OTA 19 and 21, the use of tools further complicated body movement and dressing tasks. According to OT 13 and OTA 28, specific physical abilities (dexterity, bilateral strength) were needed to stretch a sock over the sock-aid. Use of the sock-aid was eased if socks were stretchy. OT 12, OTA 19, and Patient 7 discussed the need for wider opening socks. PSW 26 advocated the use of socks with spandex to increase the stretch of the sock. While fibre content would certainly influence the

amount of stretch, so would the architecture of the knit stitch. The data collected did not clarify the specific sock style requirements that optimized use of the sock-aid. OT 12 mentioned that "the little shorty socks … were a bit tricky" and that longer ones worked better with the sock-aid. Given that socks come in a variety of lengths, it is not evident what style is best for use with a sock-aid. Both Patient 2 and OTA 17 mentioned that socks were sometimes not worn at all due to the difficulties in donning and doffing them. Thus, consideration of sock dressing ease and use of the sock-aid in reference with sock styling, yarn fibre content, and knit stitch specifications would be logical areas for further investigation.

PTs and OTs (n=9) were unified in their recommendations regarding footwear with one exception. Shoes needed to be supportive with a rubber sole and treads for exercise therapy and most importantly, for fall prevention. For this reason, OT 27 was adamant: "Slippers have no place in the hospital." Although slippers were listed on the *Rehabilitation Program* pamphlet, OT 27 insisted that slippers did not offer patients secure footing and suggested a slip-on shoe (one without fasteners, as shown in Figure 5.9) would be better; this shoe style was also advocated by OT 12 because it was easy to don.

Figure 5.9. A slip-on shoe.

Patient 16 mentioned that she felt "safe" in her slip-on shoes and that she would purchase another pair in a different colour upon discharge from RT. The problem with slip-on shoes was that there was no adjustment across the top of the foot and many patients in RT experienced swelling. Given that swelling in the feet was such a common occurrence and shoes with a wider width and/or

those that provided some adjustment across the top of the foot in the way of hook and loop tape, elastic laces or panels, and zippers were beneficial to patients. The standard recommendation as discussed by OTs 12, 15, 27, and 33, OTAs 17 and 31, and PSW 26 was to advise patients "to buy shoes with Velcro" (OTA 17). Shoes with laces were problematic when bending and tying in the usual way or if a patient had hemiparesis. While shoelaces were more difficult than hook and loop tape, as mentioned by PSW 26, shoes could be adapted with elastic laces using a one-handed tying pattern, as discussed by OTs 15 and 33.

Although complicated to use, tools facilitated donning of socks and shoes but could not be used when doffing them. Rethinking how to eliminate the use of tools deserves consideration. For example, PSW 26 mentioned that patients often pushed the back of their shoe down to get their foot in and suggested opening up the heel of the shoe, so that a shoehorn was not needed. Ready-to-wear footwear styles sometimes incorporate zippers along the back seam of the heel; could this design feature be exploited for shoes worn by the rehab population? A promising style attribute, a large loop at the back heel, was observed on a patient's running shoe (shown in Figure 4.12 a). When donning shoe, this patient followed the dressing procedure taught by the OTs and crossed her leg over the alternate knee to reduce reach distances. The loop at the back of the heel allowed her to use her fingers to ease the shoe on and off her foot, rather than depend on using the shoehorn. This loop facilitates the reduction of reach distances and also provides an easy place to grasp with a reacher or hook end of the shoehorn. The inherent functionality of the loop merits consideration on all types of footwear, and could also be adapted to work on either side of a sock (see Figure 5.10 a). In fact, Kernaleguen (1978) incorporated a loop into a front-closure bra, underwear, and socks to aid independent dressing.

Footwear attributes included supportive shoes with a rubber sole and treads. Patients had difficulties donning and doffing their socks and shoes. Viable solutions to the challenges encountered were proposed by therapists, care workers, and patients. Suggestions included ways to accommodate adjustability across the width of the shoe and opening up the back of the shoe and integrating a loop into the back of the heel to eliminate the need to use a shoehorn. Sock design attributes needed to maximize stretch through consideration of yarn fibre content and stitch type as well as length in order to ease use of the sock-aid.

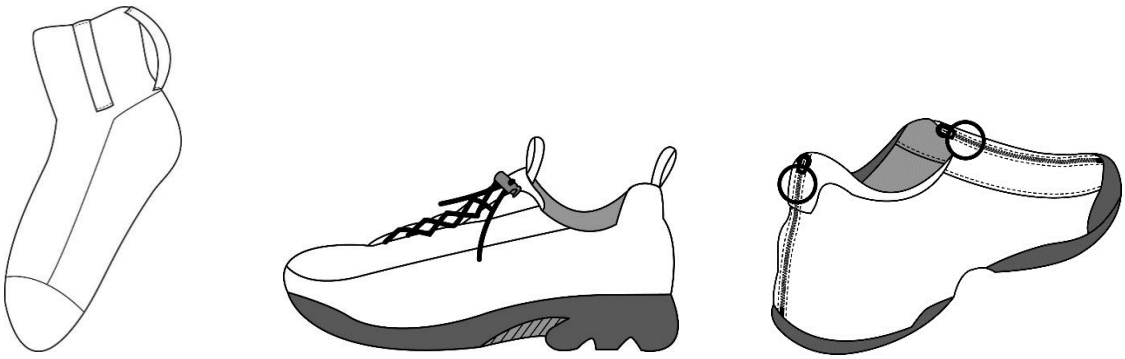

Figure 5.10. Improved shoe and sock design. Illustrated here are participant's suggestions to improve shoe and sock design, specifically the use of loops (A, B) and opening up the back of the heel (C) to ease dressing and possibly to eliminate the use of tools like the shoehorn or sock-aid.

Trousers

Lower body dressing was generally viewed as more problematic than upper body dressing (Christie et al., 2011; Mann et al., 2005). While tops, socks, and shoes could be donned and doffed only once per day, toileting needs required patients to partially don and doff underwear and trousers many times each day. Thus, trousers and underwear were categorized as problem garments. Underwear will be discussed in more detail in the following section. Dressing complexity was evident with trousers because of the person/environment/garment interface. Some patients had an inability to balance while reaching forward, prohibited twisting/bending maneuvers, and/or hemiparesis. When trousers were down around the ankles during toileting, patients experienced the same problems as with socks and shoes; that is, difficulty reaching the feet and, in some cases, the need to use dressing tools. In addition, relinquishing support of the mobility device that most patients in RT used in order to reach, grasp, and pull or push a trousers and underwear to or from the body was risky and patients were cautious of falling.

In RT, toileting tasks could be accomplished in multiple ways. However, all methods required that clothing be partially doffed and then donned again. This involved a complex sequence of actions and interfaces between the garment and the body (i.e., manipulating waistband fasteners; grasping the trouser and underwear to lower garments over the bum; reaching, grasping, and pulling to don them again). A dual waistband facilitates toileting without undressing, a design feature identified by Kernaleguen (1978) almost 40 years ago; this design allows "the front or seat of the pants to be dropped separately so that the rest of the garment is

held up in place and does not fall to the floor" (p. 28). This partial removal helps address donning and doffing trousers and, as we shall see, similar issues with underwear identified in the research findings.

A modern trouser equipped with this design feature (shown in Figure 5.11) was used as a clothing probe with participant groups. This trouser style was created by Sally Aydon, a nurse entrepreneur, to solve the problems associated with patient toileting (see www.assistedwear.com). This trouser design featured dual waistbands with a drop back panel, built-in underwear, and an invisible zipper that operated from the top down to close the fly. Aydon and I met to discuss this design. She explained that it was created for immobile patients who needed a hoist to lift them from the bed or wheelchair to the toilet (Personal communication, August 2, 2015). The position of the hoist equipment prevented the care worker from standing in front of the person, thus creating difficulties accessing patients' trousers to doff them in order to toilet. She also highlighted that her trouser design provided an aspect of dignity for both the care worker and the patient. She described that when doffing and donning traditional trousers, the care worker would need to stand and bend in front of the patient, putting their face in close proximity to the genital area. This discomfort was eliminated when wearing this dual waistband trouser.

Figure 5.11. Trouser designed by Sally Aydon (www.assistedwear.com). This trouser features dual waistbands, built-in underwear, and an invisible zipper that operates from the top down to close the fly.

This menswear trouser also integrated a number of other design features that considered dressing methods taught by OTs, namely to reduce reach distances and eliminate fabric friction with associated benefits to the wearer. Firstly, a men's traditional underwear brief was attached inside the trouser along the waistband. Since underwear and trousers were combined in one garment, the problems associated with fabric friction when dressing and undressing were eliminated. These trousers had an elastic waist and were made from a woven polyester fabric with some stretch, which facilitated dressing. The front crotch seam included an invisible zipper that operated upwards from the crotch to the waist to open, the opposite direction of a conventional fly front zipper. When the zipper was open, the zipper head was near the waist, the elastic waistband kept both sides of the trouser in place, facilitating the use of a hand-held urinal and this decreased the likelihood of soiling oneself or getting snagged on the zipper head. The back pant panel extended beyond each of the side seams, to clip together with a side release buckle (as typically used in luggage) aligned at centre front between two belt loops. When unfastened, the back pant dropped to allow toileting without disrobing. Thus, the problematic maneuver of lowering one's trousers and underwear prior to sitting on the toilet was eliminated and the reach needed when redressing was greatly reduced. This feature also allowed the wearer a measure of modesty when toileting under the supervision of care workers.

This clothing probe was particularly effective at bringing people's values to light, specifically around underwear, personal hygiene, and modesty. In addition to the garment attributes included in this trouser, further critique informs the improvement of this trouser design. Participants appreciated the novelty of the trouser/underwear combination. One therapist said "it is reminiscent of 1930s underwear; there's definitely some usefulness to the idea" (PT 35), while another suggested: "I think one of the pro features is that it's all-in-one. There is simplicity in this particular garment" (OTA 31). It was also viewed from a safety perspective: "when you're toileting, it's just one piece to pull down. If there are balance issues, they're not risking falling twice to pull up two different garments. It would be a bit easier" (OTA 19).

Concerns surfaced about the built-in underwear: "one of the cons could be if there is one little bit of soil or stain, there go the whole pants, right? If the underwear were somehow removable, like Velcroed or something, you could have one pair of pants with multiple underwear inserts" (OTA 31). A patient also stated, "Wow! … BUT, I'm a [cleanliness] fanatic and the whole thing would have to be washed each day" (Patient 32). Other concerns focused on the functionality and aesthetics of the invisible zipper because the pull tab was very small and

potentially difficult to grasp. In addition, it hung at an awkward position near the base of the crotch. It is also important to note that the side release buckles on either side of centre front required two hands to fasten and unfasten the trousers. As well, the buckles needed to be threaded through the belt loops, a problematic maneuver for those with dexterity issues or weakness in one arm. The attached underwear was a traditional men's brief with the overlap opening at the front. This was viewed as problematic by one of the therapists: "to me the underwear shaping doesn't make sense. You try to make it easier to get in but you made it harder on the inside to get the penis out" (OTA 28). The same therapist added: "It's over designed, they just took a regular pair of underwear, cut them, and sewed them in; the overlap is not needed. That's a lot of maneuvering to get your bits out to pee." This trouser was initially designed for use by a care worker helping a patient toilet with the use of a hoist. However, with a few adaptations, this trouser would work for patients in RT. Combining trousers and underwear to allow one dressing maneuver has value, however, patients voiced hygiene and laundering frequency concerns about the permanent attachment of the underwear. As suggested by OTA 31, underwear inserts could be detachable and changed daily. The underwear styling could be simplified as the front overlap of a traditional men's brief is not required. Changing the underwear styling might also allow this to be a unisex garment. The fastener and belt loops would need to be redesigned to better accommodate patients with hemiparesis.

This trouser style eased dressing and toileting tasks by considering the dressing methods taught by OTs within the trouser design. In RT, clothing has multiple users during dressing and toileting activities. This highlights the need to approach design from multiple perspectives; that is, to consider all of the users: the patients who want to dress themselves independently as well as the care workers who provide assistance. As demonstrated by this trouser design and the suggested modifications, although these sets of user needs may seem to be divergent, they may be brought together to create a more universal design that has appeal to a wider range of users. For a complete list of design criteria for men's trousers derived from this research, see Appendix G.

Underwear and Brassieres

Data collected also revealed challenges around the donning and doffing of brassieres and underwear. For most people, traditional social conventions include the wearing of undergarments, yet some patients opted not to do so, likely given the tremendous effort required when dressing. The following sections focus on underwear and brassieres with an emphasis on problems related to these garments and suggested solutions.

Disposable underwear. The disposable underwear used at the hospital (see Figure 4.13) functioned as an unexpected clothing probe. Reasons as to why patients so enthusiastically adopted wearing the disposable briefs are entwined with dressing, toileting, and laundering activities in the clothing taskscape as well as their functional and expressive attributes. The disposable briefs were seamless and made from a very stretchy knit fabric, without elastic around the legs. The stretch of the knit fabric that the disposable brief was made from was mentioned by Patients 2, 6, 9, 11, and 29. These attributes (seamless, stretch, and without elastic along the leg) provided comfort for the wearer and eased the donning and doffing. As explained by OT 14, the disposable briefs were inexpensive and worked in conjunction with incontinence products.

Soiled underwear was a concern for patients in RT. Thus, wearing the disposable briefs functioned on multiple levels. As mentioned by OTs 12 and 14, patients appreciated the peace of mind provided by wearing these briefs with an incontinence pad. OTA 19 described patients' nervousness about feeling an urgent need to toilet and not receiving assistance from a care worker quickly enough, as well as the emotional trauma experienced after having an accident. Patients felt "comfortable and safe" with the disposable briefs (OTA 19). Wearing the disposable briefs reduced laundry duties for family caregivers and provided dignity to the patient. Being able to throw soiled disposable underwear away made a complex situation simpler.

An analysis of the attributes of the hospital-supplied disposable briefs and patients' behaviours and feelings wearing them inform design. Combining the functional features of the hospital disposable brief with aesthetic attributes—that is to say, incorporating fashionable colours and prints as well as lace or other design details that women value and expect to have in their underwear, as suggested by Patient 10—is worth considering. For an underwear distributor, this would increase the appeal of the generic underwear style used in RT. In addition, fabricating underwear from silky fibres would reduce fabric friction and ease the donning and doffing of trousers over top of underwear. Given that these briefs were disposable, sustainability is a concern. However, nylon and polyester are extensively recycled and a viable system of disposal and replacement could be contemplated.

Brassieres. The brassiere was also identified as a problem garment that most women did not wear while in RT (OTs 12, 13, 15, 18, & 27; OTA 17; PSW 26; Patients 2, 3, 5, 10, & 32). The reasons for this behaviour included difficult body movements, problems with fasteners, and a lack of comfort. Solutions to the problems associated with the brassiere included alternate bra styles as well as the use of alternative dressing methods and tools (see Table 5.2).

Table 5.2

The Bra

Problem	Solution
• Unable to reach behind to fasten – Due to a restricted range of motion – Due to use of one hand only	• Use alternate dressing methods such as: – Fasten in front and twist bra around, slip shoulders into straps – Replace fastener with a segment of elastic, don bra over the head – Use a bra that fastens in the front – Use the Bra Angel – Use a clothes peg, attach to trouser, then fasten
• Can't see hook & eye fasteners	• Use larger hook & eye fasteners • Use fasteners that are colour contrasted to the shell fabric of the bra
• Dexterity can't manipulate the bra fastener	• Use an alternate fastener such as hook and loop tape or magnets
• Uncomfortable under wires in cup	• Wear bra styles that do not have under wires
• Uncomfortable straps • Straps fall off the shoulders	• Use wider straps, cushion the straps • Use a racer back style
• Sport bra styles too tight	• Use fabrics with more stretch • Wear a camisole with a shelf bra built in

While there are many bra styles on the market, the patients that I observed were wearing a back-closure brassiere. The participants that I interviewed also discussed back-closure bras. As with trousers, underwear, and socks, donning and doffing a brassiere required a sequence of body movements. OTA 31 and OTs 15, 19, and 22 mentioned the challenges patients had when inserting their arms into the straps, reaching behind to latch the hook and eye closure, adjusting the straps correctly on the shoulders, and positioning the breasts comfortably inside the bra cups. Patients in RT had reduced body abilities, hemiparesis, and restricted range of motion, flexibility, strength and dexterity, and/or lack of balance. Comfort issues included concerns about the shoulder straps digging in (PT 18) or falling off (Patient 9) and bra cup underwires (OT 12) as well as the overall constricting fit of the brassiere itself (OT 12). OTs 13 and 33 and OTA 21 suggested alternatives such as front-closing clasps, sports bras without fasteners, or camisoles

with a shelf bra, but these styles were not perfect solutions. Front- fastening bra closures are not widely available (see www.herroom.com, bra-fitting-advice). This bra style must fit perfectly because there is no adjustment flexibility as there is with the multiple rows of eyes used in a back-closure bra. As mentioned by Patient 16 and OT 13, some women find front-closure bras tricky to put on, as the clasps and dressing motions to don this bra style are unfamiliar. Sports bras typically incorporate a tight fit and this presented difficulties when donning over the head. OTA 21 suggested using a bra fabric with more flexibility and stretch. While some camisoles include a shelf bra, these provide minimal support and thus are not effective solutions for large-breasted women.

The gap in between body ability and the motions required to don and fasten a bra could be mediated by employing adapted dressing methods. OTs taught patients how to use tools like a simple clothes peg or the Bra Angel® (see dressing tools illustrated in Figure 4.6 in chapter 4) to wear their existing brassieres. However, there are opportunities for designers to create a bra that utilizes the suggestions put forward by participants in this study. Fasteners are a logical place to begin as these components were identified as difficult by OTs 12, 13, 15, and 22, OTAs 21 and 31, as well as Patient 16. Specific suggestions from OT 12 included using large-size hook and eye fasteners in a contrast colour to the shell fabric. Focusing on fastener innovations is paramount; for example, using magnetic fasteners designed by the Hing Ngai Company Ltd. specifically for this intended use (see Figure 5.12; see also http://www.hing-ngai.com for similar bra magnet styles). Canadian company La Vie en Rose has been producing a front-closure bra with a magnetic closure since 2009 (see www.lavieenrose.com); these bra styles appear to include underwire and the magnetic fastener is small and thus may not work for women in the rehab population.

Figure 5.12. Sample magnetic closures suitable for use in a bra.

Educational Resources

Patients, family caregivers, care workers, and therapists alike would benefit from educational resources beyond the two pamphlets supplied by the hospital (see Appendices A-I & A-II). Each of these documents provided a list of clothing items (e.g., jogging suit) and toiletries; however, specific critical information such as trousers without elastic at the ankle or a drawstring waist were details that were omitted. Most patients and medical staff understand that clothing must be ample and roomy in order to ease dressing but are less knowledgeable about the range of sleeve styles that have a more generous armhole (i.e., raglan, drop shoulder, dolman), and patients and family caregivers are unaware of magnetic fasteners and the importance of stretch in clothing fabrics and socks. Clothing designers would also benefit from knowing more about the person/environment/garment interface and how important it is to understand body movement, the dressing methods and dressing tools prescribed by OTs, as well as the range of garments with which patients have problems. While there are opportunities for designers to create apparel products that more effectively suit the needs of people in RT, many of the solutions discussed previously are currently available in the marketplace in some form. The problem is that patients, family caregivers, therapists, and care workers are unaware of this information. Clothing selection is paramount and must be strategic. Patients do not know which design features might ease their respective dressing problems and the range of specific clothing styles they should have while in RT. Therapists and care workers are not always familiar with new fastener innovations or where to guide patients to purchase garments in the adaptive clothing domain.

From a rehabilitation perspective, therapists worked with patients to close the gap between their ability and environment. Within the clothing environment, this was achieved through exercises that remediated patients' strength and through instruction of adapted dressing methods that compensated for ability limitations. While therapists readily employed tools as a compensatory measure, adapted clothing was not included in their initial approach. Therapists and patients alike wanted to stimulate the recovery of former abilities and using clothing from patients' existing wardrobes was the primary goal in achieving such recovery. Performing dressing actions was therapeutic and helped patients attain positive outcomes while working in conjunction with complementary therapies such as lifting hand-held weights and manipulating Theraputty to increase strength and dexterity. Some patients, however, might never return to their former ability levels, or they may need extensive recovery and strength training before resuming dressing with

their existing wardrobes. Table 5.3 presents a summary of design attributes. Integration of the clothing attributes discussed in this chapter would improve dressing performance.

Table 5.3

Summary of Functional and Symbolic Design Attributes

Item	Consideration
Clothing	– Matched sets – Styling that is not reminiscent of pajamas – Silhouette, armhole, circumference of sleeve, wrist, leg & ankle – Adjustable to accommodate weight loss or gain – Integrate a loop on trousers to ease dressing – Identification of garment front and back
Fabric	– Fibre and weave to reduce fabric friction – Fabrics with stretch – Easy care requirements – Considers finishes to eliminate odour and staining
Fasteners	– Eliminate ties – Magnetic fasteners – Fasteners that may be operated with one hand
Socks	– Sock style with use of sock-aid – Integrate stretch through yarn choice and stitch type – Integrate a loop
Shoes	– Supportive, non-skid sole – Adjustable across the top of the foot – Open up the back of the heel – Integrate a loop at the back heel
Trousers	– Combine detachable underwear and trouser – Dual waistbands
Underwear	– Fabric stretch – Fabric friction – Boy cut leg, no elastic
Brassieres	– Wider, cushioned shoulder straps – No underwire – Front closure – Alternative fasteners – Large hooks and eyes in a contrast colour – Fabric stretch

Chapter Summary

The clothing taskscape provides an effective lens to view the clothing environment. This chapter aimed to answer the research question using evidence unearthed during field research. One of its main foci was the importance of strategic wardrobe selection for patients in RT. The evidence suggested that matched sets of clothing eased selection for patients and care workers alike, and provided a therapeutic effect. I used clothing probes to highlight the gaps between a person's ability and how specific clothing details might mediate those gaps and improve functioning. Designers might well consider the following factors when designing clothing that promotes dressing independence: fabric choices that reduce friction; wider garment silhouette and circumference of sleeve wrists, pant legs, and necklines; use of magnetic fasteners; dual waistbands; inclusion of different types of pockets; the addition of loops for a variety of clothing items and shoes; and the placement of visual cues as a guide to garment orientation. These design features warrant integration into clothing styles in order to improve patient comfort when wearing clothing and, more importantly, to improve their abilities to dress independently. The section addressing problem garments—namely socks and shoes, trousers, underwear, and brassieres—identifies opportunities for product development. Given the psychological benefit of dressing independently, clothing could be employed as an additional compensatory measure in patients' recovery, providing a therapeutic benefit. This study highlights the need for patient, caregiver and therapist education as to what kinds of clothes are needed for those in RT. The entire rehabilitation process would benefit from patients and their family caregivers being better educated in order to streamline morning routines, clothing selection, and the management of soiled laundry.

CHAPTER SIX: CONCLUSIONS

All people wear clothes, but dressing is an activity that is taken for granted until the balance and synchronized movements required to do so are lost due to illness, injury, disease, or surgery. The sudden onset of disability impacts individuals' appearance and their ability to perform dressing activities. Patients in rehabilitation therapy (RT) rebuild strength and endurance and learn strategies to adapt their environment to optimize their chances for recovering some level of independence. A significant part of adapting the environment involves determining the most suitable clothing to wear while working toward improved performance in everyday living. Thus, from both a functional position and an aesthetic viewpoint, patients could benefit by having clothing designed with consideration to those needs.

This research centred on the development of the clothing taskscape as a means to assess the use scenario of patients in RT and in so doing, determine the factors that impacted their functional abilities and self-image in order to inform design. The Active Rehab unit in the hospital was an ideal setting to observe patients along their rehabilitation journey. Observations of ADL assessments with occupational therapists (OTs) and exercise sessions with physiotherapists (PTs) as well as morning and evening routines with personal support workers (PSWs) allowed me to become familiar with the clothing context and, in turn, to identify and analyze patient activities with specific attention to the person/garment interface. The range of activities that comprised the clothing taskscape included: selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing. Insights derived from observations of patients working with therapists and care workers guided the search for clothing precedents that epitomized potential solutions to the problems with which people in RT were contending. Specific garments were sourced and integrated into interviews with patients, therapists, and care workers. These clothing probes encouraged participants to discuss issues of concern and offer their opinions, to evaluate the garment attributes presented, and to suggest other viable solutions. These multiple phases of inquiry expanded my understanding of people's clothing needs, expectations, and aspirations in order to fully define the design problem. This in turn helped foster empathy for patients in RT, which is crucial to beginning the design process.

The process of assessing user needs is a complex undertaking. Several apparel researchers (Kallal et al., 2002; Lamb & Kallal, 1992; Orlando Yep, 1979; Rosenblad-Wallin, 1985; Stokes & Black, 2012; Watkins & Dunne, 2015) have formulated methodological

processes to approach the assessment of user needs in a systematic way. While these evaluation procedures may vary, all aim to define the design problem well. Because our environment influences optimal functioning (Lawton & Simon, 1968) and clothing is our near environment (Watkins, 1995), the design of clothing is a viable way for patients in RT to bridge the gaps between their abilities and their environments (Nagi, 1991). The greater part of the problem is to determine precisely what those gaps are in a comprehensive and holistic way that takes into account the multiple points of interaction between people and their clothing taskscape. Furthermore, the patients are not the only people affected by the available clothing options; family members and the health care team are directly affected by the time and effort it takes to negotiate both patient dressing and clothing care. Therefore, it is important to employ a reliable methodology to determine the shortcomings in the design process that fail to optimize the near environment for RT patients, and to improve the clothing options available. My research has shown that examining the problem from a clothing taskscape perspective revealed the reciprocal effect that clothing choice had on patient performance, functioning, and self-image.

The clothing taskscape was used to examine the clothing context and its meaning, mapping the use scenario to: expand understanding of the relationship between personal ability and the clothing environment; determine the clothing and footwear attributes that are needed to enhance functional abilities; and identify how clothing and dressing independence supports well-being and self-image in RT, in order to better inform design. Thus, the initial step in this research toward development of the clothing taskscape was to determine the specific characteristics of a clothing taskscape for people in a hospital RT program. In order to do so, I began observing patients in RT, looking through the lens of my preliminary and generic clothing taskscape, which included activities related to garment selection, donning, doffing, toileting, care, and storage. Using Kirsh's (1996) suggestion to focus on the "task environment" (p. 417), and Ingold's (1993) reminder that "every task takes its meaning from its position within an ensemble of tasks" (p. 158), I looked at all the ways that people interacted with their clothing, not only in isolation (i.e., dressing) but also within each of the tasks they engaged while enrolled in RT. Robb (2015) describes Ingold as a major theorist who does "deep theory" (p. 166) and highlights a problem, in that "to understand how artifacts actually work and how to interpret them, high level theory is not sufficient: we need to develop a complementary layer of applicable theory. By this I mean generalized models of how objects actually work, something which tells us about the nuts and

bolts of human-thing interactions" (p. 167). The evidence revealed in my research study suggests that the clothing taskscape is a practical application of Ingold's "high level theory" because it provides a framework to more holistically assess user needs for their clothing in the real-world. My examination of person–clothing interactions began the moment that individuals arrived on the rehab floor, on a stretcher in their hospital gown, and followed them through their daily routine; this, in effect, was their consumer journey map (Martin & Hanington, 2012).

By watching people, it became evident that in addition to clothing and footwear attributes there were other activities and artifacts specific to the RT setting that I had not contemplated; these included patients' physical capabilities, their use of mobility devices, dressing tools, and toileting equipment, as well as the built environment in hospital(s). Consequently, the clothing taskscape expanded beyond the generic activities I had initially considered to include shopping, bathing, eating, exercising, and sleeping, as illustrated in Figure 6.1(A). Given that participants did not specifically break down donning and doffing maneuvers, these activities were collapsed into one activity—dressing. Since all of the taskscape activities were grounded in action, the defining stages of the taskscape were identified as verbs; care became laundering and storage became storing.

Figure 6.1. Activities within the generic clothing taskscape and those within the rehab clothing taskscape. Activities within the generic clothing taskscape (A) included selection, doffing, donning, toileting, care, and storage; the activities in the final version of the rehab clothing taskscape (B) included selecting, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering, and storing.

While there are countless possible person/clothing interactions, the 10 icons shown in Figure 6.1(B) were the core activities for people in RT. However, keeping in mind Ingold's (1993) argument that "the activities that comprise the landscape are unending" and that "the landscape is never complete: neither 'built' nor 'unbuilt'" (p. 162), it is acknowledged that all patients' respective personal clothing taskscapes would change upon their discharge from

hospital. Once people returned to their home environments they would re-establish familiar routines that comprise different activities (e.g., social occasions with family and friends; going outside and needing to dress for weather conditions; resuming intimacy with their partner). In other words, the clothing taskscape is specific to the individual at a specific time and place, within the parameters of the intended function. Thus, the clothing taskscape may be customized for any situation; it involves observation and identification of the core activities performed with clothing within a specific environment.

The clothing taskscape is structured around people's interactions with clothing and are best assessed through observations of activities, defined as "high level goals" and tasks, defined as "an organized, cohesive set of operations directed toward a single, low-level goal" (Norman, 2013, p. 232). While in RT, core activities included selection, shopping, dressing, toileting, bathing, eating, exercising, sleeping, laundering and storing. Each of these core activities could be further categorized into mini taskscapes. For example, selection of clothing involved five distinct mini taskscapes: deciding what clothing was required for RT, bringing clothing to the hospital, purchasing needed items for the RT wardrobe, organizing clothing into wardrobe/drawers, and choosing garments to wear on a particular day. Mini taskscapes would then be broken down into tasks; for example, making decisions on the garments required for a patient's RT wardrobe would involve gathering information from OTs, PTs, PSWs, and from hospital pamphlets. Patients would then compile lists and provide descriptions/directions so that family members could assemble and pack required clothing and footwear and bring them to hospital. Items not in patient's current wardrobe would need to be purchased. All wardrobe items would then need to be organized (hung up, folded) and stored in the wardrobe or cabinet provided in the hospital room. At this point patients could choose items they wanted to wear on a particular day. Analysis of each of these mini taskscapes provides opportunities to inform design and to improve the patient experience.

Beyond looking at the interactions between the person and her or his clothing, it was also necessary to look at the interconnections between taskscape activities. As elaborated upon in the results section (and illustrated earlier in Figure 5.1), some tasks significantly influenced other tasks. The initial act of selecting a particular garment influenced patient performance in a wide domain of activities, including dressing, toileting, and bathing ease, the ability to exercise safely, and laundering demands. Keeping in mind that patients were only one group whose needs had to

be considered, care workers and therapists expressed similar but also divergent needs. Examining the use scenario through the lens of the clothing taskscape revealed gaps in satisfaction related to corresponding problem garments. Interviews with stakeholder groups in the RT setting revealed clothing suggestions, thus informing design and providing opportunities for product development, as illustrated in Table 5.2, The Bra.

Contributions

This study has offered a glimpse into the lives of people who have recently suffered a disabling event and thus sensitizes others to the rehabilitation context as it existed in the Active Rehab unit at the hospital, providing a greater awareness of the experiences of patients who were recovering from stroke, hip surgery, or general deconditioning. In addition, the evidence presented suggests how the use scenario may be viewed through the clothing taskscape in order to discern user needs corresponding to personal abilities and independent dressing, and in turn to better inform design. Developing the clothing taskscape theory and using it in the RT setting has implications for both theory and practice. Evidence from this research contributes to knowledge relevant to designers in general (especially for those who create ready-to wear fashion and functional apparel but also those who create built environments, such as architects and interior designers) as well as product developers and design studies educators in addition to patients and their family caregivers. It has the potential to contribute to patient-centred design and the therapeutic practice of OTs and PSWs. That is, although this work is focused on providing important information about inclusive clothing attributes predominantly for the benefit of designers, the information discussed here about the clothing taskscape may be of considerable interest to OTs, as they teach and reteach people how to handle their clothing after an injury or disabling situation, and also to PSWs as they provide aid to people with their daily dressing tasks. Because OTs focus on compensatory methods, functional clothing may be employed to help people dress independently just as assistive devices such as buttoners and reaching tools are used.

Design Methods and Education

This research has conceptualized and operationalized a theoretical framework to foster creative practice and thus is important to designers, product developers, and design educators. Friedman (2003) suggests that “In its most basic form, a theory is a model. It is an illustration describing how something works by showing its elements in relationship to one another” (p. 513). The clothing taskscape, as illustrated in Figure 5.1, shows the activities typically associated

with person/clothing interactions and how choices made in one domain impact other activities. Using both observations and interviews—sometimes concurrently and at other times in tandem—to examine clothing through this lens provides a more holistic approach to assessing the use scenario, be it clothing and other related products, services, or built environments. Previous studies in functional apparel design have used Orlando Yep's (1979) model to systematically follow a design process with emphasis on exploring the design situation and perceiving the problem structure. Other studies have employed the FEA model (Lamb & Kallal, 1992) to determine required design attributes for specific use situations and to evaluate apparel products created as interventions to mediate specialized needs. In order to systematically identify additional design criteria, Kallal et al. (2002) transformed the FEA model into the Apparel Product Appearance Factors model by merging functional, expressive, and aesthetic attributes with those related to forms, expression, and motions. Stokes and Black (2012) expanded upon the FEA model by including consideration of body, garment, and near environment. *All* of these models aim to aid in characterizing the design problem by identifying categories to stimulate discovery of design criteria. However, while it is critical to define the design problem well by knowing *what* to look for, and *how well* a design intervention works, use of the clothing taskscape expands the design process by employing a theoretical framework that highlights *how* to *look* at and assess the use scenario more holistically.

Observation of all activities where people interact with their clothing within a specific context are critical to taskscape development. However, some activities, such as toileting for example, do not lend themselves to participant observation, yet designers must still consider participant interactions with clothing while completing tasks associated with this endeavour. Each activity in the clothing taskscape may be further dissected into applicable mini taskscapes. As described in the results section, the toileting taskscape involved an array of equipment including hand-held urinals, bedpans, commode chairs, diapers, incontinence pads, and disposable underwear. The ways that patients completed toileting activities were distinctly different depending on which equipment was used, creating mini taskscapes. The clothing taskscape framework was tested in the RT environment and proved to be indispensable to the research design (Whetten, 1989). The value of the clothing taskscape will ultimately be proven when other researchers use it. Many of the activities in the clothing taskscape are generic, however specific activities may be added or deleted and thus be customized to any user group in

any setting. In so doing, the clothing taskscape "enables the designer to move from an endless succession of unique cased to broad explanatory principles that can help to solve many kinds of problems" (Friedman, 2003, p. 515). Thus the clothing taskscape is useful for designers, product developers, and design educators as a means to better assess user needs to create apparel and related products.

Design educators may fuel the transformation toward functional fashion and inclusive styling by reminding students of societal diversity and the need to apply their creative abilities to the creation of products and services that "enhance human abilities, help overcome human limitations … and foster user acceptance" (Rouse, 1991, p. 4). This research will inform an elective course ("Human-Centred Design") that I teach to undergraduate and graduate students. Many fashion students have a vision of design that values the haute couture, designer-dominated runway reality presented in Fashion Television (FT), a weekly half-hour show that ran for 23 years, hosted by Canadian icon Jeanne Beker[18]. However, other fashion entrepreneurs such as Izzy Camilleri[19] design for niche markets, creating stylish clothing collections for people with disabilities. Students study what is in a school's curriculum and also learn independently, hence it is vital to teach the next generation of designers how to apply their skills and talents to integrate functional design principles into apparel without sacrificing style.

Knowledge

This study has increased knowledge about inclusive clothing attributes and thus is important to fashion designers and product developers as well as people who have become disabled due to illness, injury, disease, or surgery and their family caregivers. Clothing design details that aid independent dressing have been documented within the activities embedded in the clothing taskscape while in RT. Some of these design details, like the dual waistband, were specialized. However, most were functional attributes commonly found in ready-to-wear clothing. The design attributes listed in Table 5.3 (i.e., related to the type of fastener and fabric used, garment silhouette, circumference of the wrist or ankle) seem trivial if viewed in isolation, but when all are considered and combined into a clothing design, they create a tipping point that

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[18] For more about FT, see http://www.fashiontelevision.com/show/theshow_about.aspx

[19] Camilleri created an extensive collection of clothing for people in wheelchairs (see http://www.izadaptive.com/) and more recently a women's collection for baby boomers (see http://www.reiastudio.com/miz-by-izzy-camilleri/)

would enable dressing and toileting independence for patients in RT and thus reduce the burden of care. Designers may incorporate the aforementioned design features into new product development. Alternatively, people with temporary or chronic disability and their family caregivers may search for these generic, universal attributes in ready-to-wear clothing. As such, this study has provided information that increases understanding of the range of functional limitations people encounter that necessitate the need for RT and how clothing might be used as a compensatory measure, to mediate and support specific populations.

My prior clothing research centred on the design of functional apparel and as such focused on the assessment of user needs with particular attention to functional, expressive, and aesthetic garment attributes. This research revealed knowledge about the RT environment of which I was previously unaware and consequently is important to other designers and product developers. Firstly, I gained a foundational understanding of the range of physical limitations experienced by patients who were in the Active Rehab unit of the hospital due to stroke, hip surgery, or general deconditioning. The majority of patients in RT used one or more mobility devices (wheelchair, walker, and/or cane) and were in therapy to regain their strength and endurance. Patients in RT had different health conditions, but generally their movement restrictions could be commonly categorized, including hemiparesis or weakness on one side of the body which impacted their ability to balance, their range of motion, and their ability to use both hands; other patients were prohibited from bending or twisting. All of these factors influenced their ability to perform the synchronized movements needed for dressing, toileting, and other self-care activities. Secondly, I learned how OTs taught patients to mediate such changes in body ability by using dressing tools and the six guiding dressing principles: to dress the weak side first and undress it last; to sit while dressing; to thread and then to hook their limbs into clothing; to reduce reach distances; and consider garment sequencing to reduce fabric friction. Thirdly, I gained first-hand knowledge of patients' daily routines while in hospital RT as well as the equipment they needed to function within the built environment. The interconnections between personal ability and performance in the clothing environment required looking at people's use of mobility aids (e.g., walker or wheelchair), adaptive dressing tools (e.g., reacher or sock-aid), and the different types of equipment used (e.g., for toileting this might include a commode chair, urinal, bedpan, or diaper). Within this context, the most inclusive design attributes of clothing and footwear became evident. Body abilities, dressing methods, the built

environment, and clothing (patients' near environment) were not examined in isolation but holistically through the lens of the clothing taskscape and this highlighted crucial aspects of the person/environment fit—that is, how patients' physical abilities were affected by environmental features which in turn influenced their functional limitations and their self-image.

Looking specifically at the person/garment interfaces within this context revealed ways to inform design. Many of the dressing problems identified previously in the results section occurred due to gaps between the person's functional abilities and specific garment attributes. The clothing taskscape provided opportunities to look for gaps in places that might not have been considered. For instance, bathing requires the doffing of clothing and drying the wet body with towels. However, this simple array of activities became complex when patients required the use of mobility devices. Solutions to the problems encountered by people were not simply defined; it was necessary to look at the combined influences between apparel and related textile products as well as the body restrictions to determine the underlying problems people encountered during activities such as dressing. Observations of ADL sessions were key in being able to see the gaps between the two, which would not have been evident through interviews alone.

The central aim of this research was to understand people's functional limitations to inform design. The evidence derived from the data suggest that clothing design features mediate functional abilities to enable independent dressing. A range of design criteria was revealed through this research and has been included in Table 5.3. Donning and doffing clothing revolved around the aforementioned six guiding dressing principles. Certain design features worked with these design principles; for example, fabric choice influenced garment friction, as did the attachment of underwear to trousers as in the clothing probe used during my interviews. Maneuvering the weak side of the body into clothing or threading a non-functional arm through a sleeve required consideration of the circumference of the wrist and depth of the armhole as well as adequate ease in the garment silhouette. Incorporating dual waistbands provided an effective way to reduce reach distances, as did the use of loops to aid pulling garments or footwear. Overall, designers need to consider: fabric choices that reduce friction; garment silhouette and circumference; magnetic fasteners; dual waistbands; pockets; loops; and visual clues as a guide to garment orientation in order to enhance comfort and improve independent dressing and toileting abilities.

In order to determine how clothing supports and/or enhances self-image during RT, data collection centred on identification of functional and symbolic clothing attributes. Clothing had symbolic implications; the hospital gown signified illness and regular day clothes were a symbol of normalcy. Simply donning regular clothing helped patients transition toward wellness. Matched sets of clothing were valued by patients. There was a link between looking good and feeling good for people in RT, as expressed by some of the participants in this study. While clothing needed to function within the continuum of patient abilities, one patient indicated that she did not want to look "sick or old" (Patient 29). Stylish clothing choices are important, while patients also needed pants that were comfortable and easy to don; they did not want to wear "those polyester things" (OTA 17) or trousers that looked like pajamas (Patients 9 & 29). Dressing independently brought patients a sense of control and dignity, and also invoked feelings of their "restored self" (Charmaz, 1987, p. 287). Dressing independence promoted a sense of normalcy and as therapy progressed, also allowed patients to gauge their recovery over time.

Descriptions of functional limitations in relation to clothing and prescribed dressing principles used by OTs build upon existing knowledge about the relationship between people and their clothing environment. The analysis of shopping barriers as well as toileting, dressing, laundering, and storing challenges while in RT, along with product design opportunities, will assist designers, manufacturers, marketers, and retailers in product development and help improve the creation of retail and in-hospital services. Specifically, the findings from this study will assist fashion designers, such as myself, to create functional garments that integrate self-help features.

Consideration of clothing as a compensatory measure warrants inclusion into educational programs for OTs, PTs, and PSWs. OTs are trained to use assistive dressing tools to adapt the environment in order to enhance patients' functional abilities. The data collected in this study have shown that clothing design and specific garment attributes can help individuals feel independent and capable, or to disable them and make them feel disempowered and incapable. Health care funding cuts have translated into shorter stays in RT, thus therapists have less time with patients. Therapists may benefit from knowing more about how clothing may be utilized as an assistive dressing device. Lawton (1977) identified the importance of considering human factors and product design almost 40 years ago, thus products like adaptive clothing may well "make the critical difference between independence and dependence among the marginally competent" (p. 282). Educating rehabilitation therapists and care workers is a viable strategy to achieve this goal.

Patient-Centred Care and Occupational Therapy Practice

Understanding the clothing taskscape of people admitted to in-patient RT programs may be of interest to hospital administrators and medical practitioners who value development of patient-centred policies. For example, it is clear that the redevelopment of education materials that provide information about specific clothing selection criteria (as listed in Table 5.3) would benefit patients and their caregivers and their efforts toward independent dressing to source the types of clothes most effective for RT. A retail sourcing guide would enable OTs, PTs, and PSWs to provide recommendations to patients as to where adaptive clothing might be purchased. In addition, the clothing recommendations in this study help OTs improve their therapeutic practice, as clothing with specific design attributes may become another assistive dressing device in toolkits used by OTs. This provides a foundational opportunity for collaboration between OTs and clothing designers to create and test interventions that allow people to dress with greater independence.

Limitations and Future Directions

This research used ethnographically oriented methods with the aim of translating the lived reality of patients in RT and their interactions with therapists and care workers through the lens of clothing in order to inform design. The clothing taskscape included core activities: selecting, shopping, dressing, toileting, eating, exercising, sleeping, laundering, and storing. Precedent analysis was used to source and evaluate clothing in the marketplace, and specific garments were purchased and used as probes during interviews with participants in order to invite dialogue and gauge receptivity to particular garment innovations.

It is important to note that any research design is limited by the researcher's approach, method, and analysis. Holston (2011) reminds us that "Design is not an exact science. It relies heavily on interpretations and insights gained from close observation of a subject and an environment" (p. 175). Given that this research used ethnographically oriented methods, certain factors may have limited the study.

From a demographic perspective, a more comprehensive examination of clothing needs in RT with respect to variables such as gender, cultural background, and age is recommended. To begin, observations of ADL assessments (n=14) with OTs were primarily with female patients; only two were male. In addition, although shadowing morning and evening routines with PSWs (n=20) included more male participants and the donning of sleepwear, these interactions were brief and did not include the gamut of taskscape activities observed during ADL assessments

with therapists. Future researchers might aim to capture the experiences of more male participants. ADL sessions included the doffing of sleepwear and the donning of clothing used specifically for RT, which eliminated a number of other clothing categories which merit further investigation. One of these categories was highlighted during my observation of a female participant of East Indian descent who was wearing traditional garments with a drawstring waistband that are common in her culture. Future research might focus on different ethnic groups in order to better understand the specific dressing challenges encountered within their experience of dressing and wearing clothing specific to their culture. The majority of patients enrolled in RT (n=30) were between the ages of 70 and 90 (n=20); only a few participants (n=3) were under the age of 40. The data suggested that participants' opinions regarding the importance of the bra were quite different between these two groups, thus further investigation into the importance of clothing and self-image to younger people as contrasted to older cohorts might be warranted.

Secondly, my proposed methodology initially included interviews with family caregivers, but my repeated attempts to recruit participants from this stakeholder group were ineffective. Patients I approached hesitated to ask their family members to participate, as if it was an additional burden. Caregivers whom I spoke with politely declined or simply did not follow up with me. One family caregiver, who initially considered my request and agreed to discuss it with her sister, later refused to participate due to the stress of dealing with her father's recent stroke and her mother's inability to live independently as well as the need to sell the family home. My request to discuss her father's clothing needs could not be considered given what she and her sister were already coping with. I was sensitive to these situations and amended my protocol to eliminate family caregivers. While I was able to validate findings by comparing observational data with interview responses between groups of participants (patients, therapists, and care workers), I had little success recruiting family caregivers to garner their opinions and this somewhat limited the study. However, this may be a direction for other researchers to pursue with participants after patient discharge, when the caregiver role would likely become more demanding.

Thirdly, this research took place at a specific place and time, in the ACTIVE RT program, a rehab stream with patients who had less complex medical issues. Data collection was scheduled over 3 months between February and April. Although this constituted the winter season in Ontario, Canada, my observations centred on ADL sessions with therapists and patients as well as routines with PSWs and thus focused on the clothing worn while in RT; that

is, comfortable, easy to don clothing suited for exercise and sleeping. I did not observe people's interactions with their regular daywear, special occasion outfits, or any kind of outerwear—specifically, winter coats, hats, and boots. During my interviews, two patients alluded to the difficulties they had donning coats and boots (Patients 9 and 2, respectively). As well, a therapist (PT 18) mentioned the need to think about special occasion wear for men with specific reference to redevelopment of the classic grey flannel trouser and how it might be adapted to ease toileting tasks. These dressing challenges deserve further investigation. It is logical to further contemplate these clothing categories with regards to the different environments, tasks, and activities to which patients would be returning. Also, I observed only one ADL session per patient; I did not compare their capabilities upon admission to RT with their abilities when discharged, nor did I observe their activities while on a weekend pass during enrollment in rehab. The interface between these different environments must also be considered with respect to patients' continued recovery, their improved abilities, and enhanced endurance. Future research might also focus on the evaluation of the clothing taskscape immediately after patients return home in order to capture the typical tasks and activities that make up their "real world" from daily, weekly, and annual perspectives.

Analysis and interpretation depend on the observer and the context (Hodder, 2003). Participants in this study were recruited from the ACTIVE rehab program, and they were recovering from stroke, hip surgery, or general deconditioning. This study did not include patients with dementia, acquired brain injury, or spinal cord injury. Responses from therapists and care workers indicated that the patients enrolled in the SLOW RT program were more complex, had more severe disabilities, and often had some cognitive impairment. Having captured the range of data in this research study on the multitude of ways that independent and assisted dressing may be made easier, it seems logical to compare and contrast the findings through a similar study with patients in the SLOW RT program to learn how people's clothing needs change when their abilities are more limited.

Clothing Innovation

My initial goal was to collect user needs within the context of RT, or simply put, to define the problem well in order to inform design. Logically, with the garment findings highlighted in this study, future research will involve co-designing apparel with OTs and patients, creating and field testing prototype garments, following along the complete design

process as outlined by Orlando Yep (1979). In keeping with Rouse (1991) and Norman (2013), it would be important to also consult with manufacturers and retailers to gather feedback from all potential stakeholders. What I am most excited about is putting the clothing taskscape theory to work with designers and design students who are working to assess the needs of people in other use scenarios and in other contexts with different groups of people to explore its effectiveness as a means of assessment.

In the realm of functional apparel design, the clothing taskscape identified a number of garment and footwear attributes that mediate dressing (see Table 5.3), as well as problems with socks and shoes, trousers, underwear, and brassieres. Participants also identified solutions to some of these problems (see suggestions for the bra listed in Table 5.2) which are well suited to integrate into new product development. My future design work would begin with tops, trousers, and jackets. One overarching requirement would be to think through these designs from a one-handed dressing perspective to better accommodate hemiparetic patients. While the blouse style shown in Figure 5.4 with magnet style A and the dolman top shown in Figure 5.3 have been field tested with female breast cancer survivors with lymphedema, these garments could be modified to incorporate the findings from this study; for example, using the flat magnet style B shown in Figure 5.4, large garment labels to more readily identify front and back, as well as fabrics that are shaded a different colour on the right and wrong side of the fabric to differentiate the inside from the outside. This would be considered in the design of men's shirts as well. The MagZip® also eased dressing into a garment with a separating zipper; thus design of a jacket with a sleeve that is mindful of the way an arm is threaded while dressing and fabricated in a material that minimizes fabric friction would be my next step. The men's trouser with the dual waistbands showed much promise to ease toileting activities and the deficiencies identified in this clothing probe would be easy to remedy. This would include elimination of the invisible zipper, and modification of the side release buckle and belt loops as well as the underwear attachment. This style could also be reinterpreted as pajama bottoms and as styling suitable for women.

The next phase of product innovation and development would be dependent on partnering with bra and shoe designers, as these are specialized products that require specific pattern drafting blocks, and use of materials and equipment that are different than those used to create ready-to-wear apparel. The evidence derived from this study provided viable leads to pursue: front closure brassieres without underwire cups; wide shoulder straps; and large hook and eye or

magnetic fasteners in a contrast colour to the shell material. Shoe designs need to prioritize a more generous or adjustable fit across the top of the shoe to accommodate swollen feet, and a back opening and loops to ease donning and doffing.

An additional area of design work would require liaising with the manufacturers of the disposable underwear used in the hospital. The underwear was enthusiastically accepted by patients, but questions remain regarding their life cycle beyond the manufacturer's warranty of 20 washes given that their fibre content is 90% polyester, 10% spandex (R. Kilgour [Medtronic sales representative], personal communication, April 8, 2016). Would recycling be feasible? Also, would it be possible to dye or print the knit fabric used in order to increase aesthetic appeal?

Conclusion

This research contextualized and operationalized the clothing taskscape to more holistically determine factors related to personal ability within the clothing environment, and their impact on functional limitations for people in hospital RT programs. Ultimately, this information provides recommendations to design apparel that is more inclusive in accommodating a wider range of dressing capability in order to address specific populations' needs. This thesis has identified the focus of my work within the realm of clothing design and specifically in functional apparel design. My work is situated within design studies and human ecology; both are interdisciplinary fields that utilize a range of approaches and methods. This research is human-centred at its core—the philosophy towards designing for specialized needs emphasizes defining, discovering, and evaluating design problems as deeply as possible. This approach to designing, referred to as "deep diving" by Kelley and Litman (2001), is time consuming and often done longitudinally, resulting in design recommendations that may be useful for more than just the specific problem being examined.

In closing, this research study has examined clothing within a very specialized situation—one in which people have suffered a disabling event that precipitated their enrolment into a hospital RT program and that has limited their ability to act competently within the clothing taskscape. This study has focused on individuals' relationship with clothing and the impact of temporary or chronic functional limitations on people due to illness, injury, disease, or surgery. The central aim of this work was to better understand the experiential relationships individuals have with their clothing, because as Moore (2012) aptly notes, "None of us deserves to come to a point in time where we can't do things we want to do, wish to do, dream to do because products and environments fail to meet our cognitive and physical abilities" (p. 9).

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Appendix A-I: Rehabilitation Guide

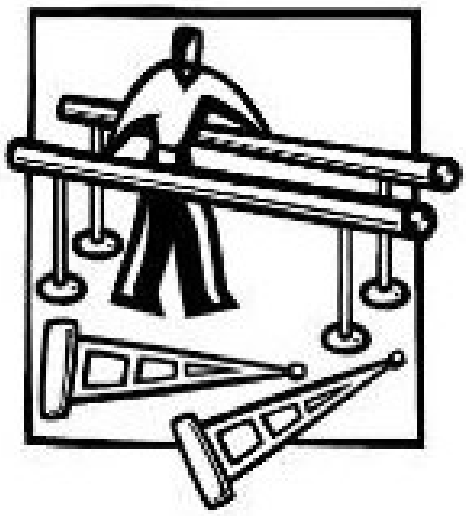
Hospital Visiting Hours:
11 a.m. to 9 p.m.

Although we encourage family members and friends to visit, please be advised that you will be busy participating in therapy sessions during the day.

We advise visitors to arrive after 2 p.m. on the Rehabilitation Units.

For the comfort of other patients, visitors are limited to 2-3 visitors at a time.
Visitors are to leave promptly at 9 p.m.; this allows patients to rest for therapy the next day.

Approved by: Rehabilitation Teams
Date: July 2010



Vision

"To be an elite provider of rehabilitation services within a diverse community committed to enhancing quality of life."

Mission

We are committed to serving individuals requiring rehabilitation due to injury, illness or disease. In the spirit of William Osler we believe "the best preparation for tomorrow is to do today's work superbly well."

We do this by:

- Providing innovative, individualized patient care
- Collaborating within a multidisciplinary team
- Advocating for patients
- Creating partnerships with individuals, families and communities
- Implementing current and effective treatments based on research, literature and available evidence
- Enthusiastically striving for improvement, encouraging life long learning and education

1

Notes

10

Active Rehabilitation:
More intensive treatment with a shorter length of stay

Reactivation/Slow Stream Rehabilitation:
Less intensive treatment with a longer length of stay

You will be admitted to the program that best serves your needs.

What is Rehabilitation?

Rehabilitation is an active, coordinated program that encourages you to regain your best possible level of independence.

Here is what it means:

Active: You and your family are expected to help develop treatment goals for your recovery with the guidance of your Health Care Team.

Coordinated: Our **Health Care Team** develops a plan just for you. This includes assessment, treatment and education.

Independence: You are to work towards completing daily activities of living with as little assistance as possible.

2

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Who will help me with my rehabilitation?

Depending on your specific needs, a number of different rehabilitation professionals may be involved in your care.

The following people may be a part of your **Health Care Team:**

Physician: looks after your medical needs.

Nurse (RN & RPN): provides your medication, assists with your medical needs, and helps with the planning and coordination of your rehabilitation.

Personal Support Worker (PSW): provides assistance with your daily care, and encourages you to be independent in your activities of daily living.

Clinical Nurse Educator: looks at the learning needs of staff and provides education and orientation to ensure safe and efficient patient care.

Pharmacist: monitors your medication therapy and provides information and counselling.

Physiotherapist (PT): teaches you to move about as safely and independently as possible.

Occupational Therapist (OT): helps you become more independent in every day activities such as dressing, meal preparation, work and hobbies.

Rehabilitation involves the work of many people helping you achieve your maximum level of independence.

Your commitment and participation are keys to success.

You are encouraged to ask your Health Care Team questions.

A few things to remember:

- You are expected to wear street clothes and sturdy, flat-soled shoes throughout the day.
- We suggest you attach personalized labels to all your personal items to prevent loss of these items.
- Your family is responsible for laundering your clothes.
- Keep only small amounts of money for your personal needs, and keep it in your room.

What happens upon discharge?

- It will be your responsibility to arrange for a ride on the morning of discharge by 10 a.m. You may wait in the patient lounge.
- A family member/friend will be expected to meet you on the rehab unit to escort you to the vehicle. A wheelchair will be available at the front lobby to assist you to the vehicle.
- You will receive a prescription for all the medications you have been taking during your rehab stay. You will need to make an appointment with your family doctor after discharge to review your medications and arrange for blood work if required.
- Your therapists will discuss the most appropriate options for further therapy and necessary equipment needs after discharge, and rental/purchase options.
- It will be your responsibility to make sure that you have all the equipment you need before you go home.

Occupational Therapy & Physiotherapy Assistant (OTA/PTA): provides occupational therapy and physiotherapy treatment under the direction of the Occupational Therapist and Physiotherapist.

Recreation Therapist: provides opportunities for leisure education and participation through group and individual programs.

Speech Language Pathologist (SLP): evaluates and treats communication and swallowing problems.

Communication Disorders Assistant (CDA): provides speech therapy under the direction of the Speech Language Pathologist.

Dietitian (RD): assesses your nutritional needs and helps plan a safe and healthy diet.

Social Worker: manages social, financial and emotional issues arising from your hospitalization.

Discharge Coordinator: reviews your discharge from the hospital and facilitates necessary alternative arrangements in a timely manner.

Clerical Associate: prepares your chart, transcribes the doctors' orders, and provides information to you and your family on unit resources.

Team Consultants

Community Care Access Centre Coordinator (CCAC): coordinates the delivery of any necessary care you may require after discharge. This may include personal care, physiotherapy, occupational therapy, speech language therapy and others as needed.

Multi-faith Chaplain: provides religious and spiritual support to you and your family.

What does rehabilitation involve?

- Your Health Care Team completes individualized assessments.
- You are expected to take an active role in completing your daily activities.
- You are expected to eat your meals in the dining room.
- Individual and/or group therapy sessions are scheduled Monday-Friday excluding holidays. On the **Active Rehabilitation** unit, physiotherapy, occupational therapy and recreation therapy may be offered on weekends. In addition, you may be requested to perform extra exercises or activities during off hours to supplement your scheduled therapy times.
- Family members are essential partners in the rehabilitation process. A family conference may be arranged if required. When necessary, one spokesperson should be appointed by the family (Power of Attorney) to help decide the best plan for you.
- The team may encourage you to go home for a day/weekend when you and your family are able. These trial visits help you practice newly learned skills and identify any potential concerns or questions before your discharge.
- The team ensures that you have all the necessary equipment and services required for leaving the hospital. Equipment from the hospital is available for you to borrow during passes.
- Your length of stay is dependent on your treatment plan, which will be discussed with you. An estimated discharge date will be established for you shortly after admission. Once determined, you will be notified of this date and a notice will be posted above your bed.

How can I prepare for my rehabilitation?

Here are some items you need to bring with you for your stay:

Clothing:

- Under wear
- Socks / stockings
- Jogging suits, slacks or shorts
- Belt or suspenders
- Shirts / blouses
- Sweater
- Pajamas / nightgowns
- House coat
- Slippers
- Rubber soled shoes

Personal Items:

- Soap and shampoo
- Deodorant
- Toothbrush and toothpaste
- Dentures
- Hair brush / comb
- Eye glasses
- Razor / shaving cream
- Make-up
- Hand mirror
- Hearing aid and batteries
- Facial tissue paper
- Clock or wrist watch
- Feminine hygiene products
- Continence briefs
- Calendar
- Family photos

Appendix A-II: Reactivation Program—Client & Family Information Handbook

Reactivation Program

Client & Family Information Handbook

Active Rehabilitation, more intensive treatment with a shorter length of stay

Reactivation/Slow Stream Rehabilitation, less intensive treatment with a longer length of stay

Our Vision…

"To be an elite provider of rehabilitation services within a diverse community committed to enhancing quality of life."

Our Mission…

We are committed to serving individuals requiring rehabilitation due to injury, illness or disease. In the spirit of William Osler we believe "the best preparation for tomorrow is to do today's work superbly well."

We do this by:

- Providing innovative, individualized patient care
- Collaborating within a multidisciplinary team
- Advocating for patients
- Creating partnerships with individuals, families and communities
- Implementing current, effective, evidence-based treatment strategies
- Enthusiastically striving for improvement, encouraging life-long learning and education.

If you have any concerns about your care, you should discuss these directly with your care team and/Resource Nurse or the Patient Care Manager. You may also contact the Patient Ombudsman.

Note: There is a Client's Rights and Responsibilities Pamphlet available located on the unit and Ombudsman's office.

NOTES

The Discharge Coordinator

- meets with you to review how you feel you were managing before admission and to discuss community supports you may have accessed in the past
- gives you information about community services available
- starts and updates applications for your next stage of care, as needed. (This may include Long Term Care or other Rehabilitation programs.)
- meets with you and your family to discuss and initiate community services and assist with your transition from hospital back into the community.

Spiritual & Religious Care

There are no formal worship services in the hospital but a chapel is available on the 2nd level of the south building.

Spiritual and Religious Care Staff

- provides religious and spiritual support to you and your family
- offers on-call chaplaincy services, 24 hours a day 7 days a week
- helps the team with multi-faith traditions

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Welcome! You Have Been Admitted To The Reactivation Unit!

To help with your transition to a new environment, this information booklet was prepared to answer some of the most common questions asked by our clients and families.

Scent

We would like to inform you that we are a fragrance free environment.

Smoking

Smoking is <u>not</u> allowed on any hospital properties including outdoor areas, parking structure or lots.

Visiting Hours

Visiting hours are from 11:00 a.m. until 9:00 p.m. daily. Each client may have two (2) visitors at a time. Staff may use their discretion to permit visiting outside of stated hours if the visit meets the needs of the client, does not disrupt care or treatment and is not disturbing to other clients. Please contact the Patient Care Unit to determine if an exception can be made.

Infection Control

This hospital needs to prevent the spread of illness. You can help by washing your hands when you enter the hospital and again when you leave. You should not visit the hospital when you are sick. Please check with staff before entering a client's room if you see an isolation sign posted. *Infection control rules must be followed or you may be asked to leave the unit.*

Parking

Monthly parking rates are available. Please check at the booth of the entry to the multilevel parking structure. Please speak with the Social Worker regarding the potential for reduced rates.

Television

You can rent your bedside television and internet services from Telexycom. Information about this service can be found at the team station.

2

Mealtimes

Please note that all patients are expected to have all their meals in the dining room daily. Meals are served at the following times:

- Breakfast - 8:30 a.m.
- Lunch - 12:30 p.m.
- Supper - 5:30 p.m.

Telephones

Every patient will be automatically billed $2.50 per day for telephone service at your bedside. If you are unable or not interested in this service you may contact the business office.

Banking

There are bank machines available in the main lobby and near entrance B.

Mail

Your mail is received at the team station. You may arrange to send mail out by speaking with the clerical associate at the team station. A Canada Post mailbox is located at the front entrance of the hospital.

Newspapers

Newspapers are available for purchase at the Gateway Convenience Store.

Laundry Services

There are currently no laundry services available on the unit. Family is responsible for regular washing of client laundry.

How Can Your Family Help?

- choose one person to speak with the care team.
- assist in directing your care.
- be active decision makers.
- provide the care team with information about you/your family.
- families are encouraged to take clients out on passes.
- provide a translation/communication poster if a person does not speak English.
- arrange transportation and an escort for personal outings.

– 3 –

The Dietitian

- looks at your nutritional needs
- checks if you are eating and drinking well (by mouth or by tube)
- shares any food concerns with the care team
- teaches you and your family about current diets and plans
- keeps track of your weight (gain or loss).

The Nutrition Technologist

- visits you for meal choices
- provides paper menu set for those unable to verbally choose their meals once ordered by the dietitian
- may visit for food service concerns as requested by you through the Dietitian
- lets the dietitian know about any dietary concerns.

– 12 –

The Speech Language Pathologist

- identifies and assesses communication and swallowing disorders
- checks for safety with food and fluid consistency
- teaches safe feeding and swallowing guidelines
- provides education to patients and families around swallowing and communication difficulties
- works closely with the communication disorders assistant

The Communicative Disorders Assistant

- works closely with Speech Language Pathologist
- provides individual and group communication therapy sessions
- provides supplementary materials and communication boards when appropriate

The Services Associate

- cleans and removes waste from your room and bathroom

Client Supplies

- all personal items must be labeled
- we are not responsible for lost items
- when supplies are needed, staff will leave a list of required items at the bedside or the family will be contacted.

The following supplies listed are not available at the hospital and should be supplied by you and your family.

Personal Articles

- bath gel and shampoo
- deodorant
- toothbrush and toothpaste
- dentures
- hair brush / comb
- eye glasses
- razor / shaving cream
- make-up
- hand mirror
- hearing aid and batteries
- facial tissue
- calendar
- family photos
- clock or wrist watch
- feminine hygiene products
- commence briefs

Clothing

- Under wear
- Socks / stockings
- Belt or suspenders
- Shirts / blouses
- Rubber soled shoes
- Sweater
- Pyjamas / nightgowns
- House coat
- Slippers
- Jogging suits, slacks or shorts

Members of the Care Team

The Care Team is made up of staff, client and family who work together through ongoing assessment, planning, implementation and evaluation in order to meet your individual needs and establish goals.

Goals will be made within the limits of client's medical condition, abilities and progress.

The Clerical Associate

- prepares your chart
- transcribes doctor's orders to your chart
- provides information to you and your family on unit resources.

The Doctor

- meets with you and your family to discuss your condition
- attends the meetings where your goals of care are reviewed
- consults with other care team members about how you are doing.

The Social Worker

- helps you and your family with your feelings about being in the hospital.
- provides counseling to help you cope with changes in your functional mobility, memory, not being able to drive etc
- speaks with your loved ones about how they are coping.
- provides information and assists with financial resources available and linking with appropriate community agencies
- provides education and information regarding stroke, heart attack, depression, falls prevention etc.
- arranges family conferences or linking to other team members.

The Chiropodist

- checks and treats your feet and toes for problems
- provides health teaching about foot sores
- does toe nail care every 1-2 months.

The Recreation Therapist

- looks at your lifestyle and abilities
- helps you find out the barriers that may stop you from enjoying life
- offers you leisure ideas for you self directed activities
- helps you know about your community and what is suitable for you upon discharge
- helps you to discover new things to do
- changes activities, when needed, so you can do them successfully
- facilitates therapeutic groups and individual sessions for intellectual stimulation, brain fitness and social connection
- arranges for volunteer visitors.

The Volunteers

- helps you if needed during mealtimes
- provides individual leisure activities as assigned by the Recreation Therapist.

The Registered Nurse and Registered Practical Nurse

- assists with your medical needs and handles concerns about your care
- works collaboratively with clients, families and team members to develop your individualized 24 hour plan of care
- gives medications and provides treatments
- provides health teaching.

The Personal Support Worker

- prepares and assists you with bathing, dressing, transfers, and toileting based on level of need
- helps you prepare for your therapy sessions
- supervises and assists you at mealtimes.

The Clinical Nurse Educator

- looks at the learning needs of staff and provides education and orientation to ensure safe and efficient patient care
- introduces new protocols and educates staff in changes in practice.

The Occupational Therapist

- looks at what type of seating and wheelchair/mobility equipment best meets your needs
- can assist you in applying for funding to buy needed equipment
- looks at how well you can do your care activities (eating, washing, and dressing) and teach you ways to improve your independence
- works with you to improve your abilities (i.e. self care, wheelchair mobility, cognition, hand function etc)
- improve upper body strength and functional mobility
- provides aids/splints to help position hands/feet
- provides education on energy conservation, relaxation and anxiety management.

The Occupational Therapy and Physiotherapy Assistant

- provides physiotherapy and occupational therapy treatment under the direction of the Physiotherapist and Occupational Therapist
- implements groups for physical and cognitive functions
- assists therapists in educating you.

The Physiotherapist

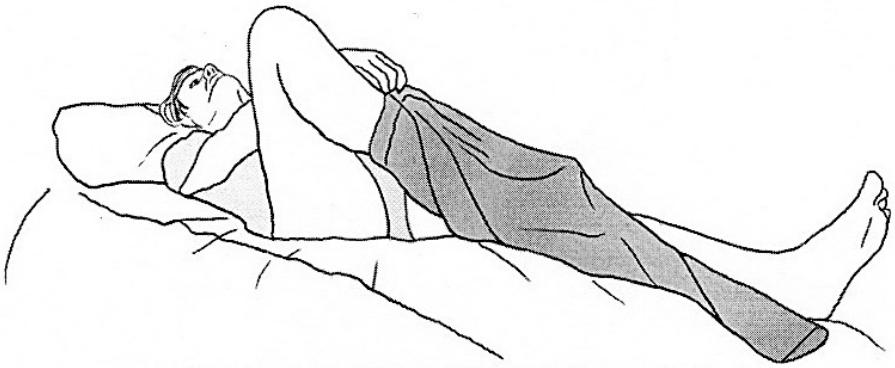
- offers education about your medical condition and the potential recovery of your abilities
- teaches you and your family about exercises, positioning and equipment
- works with you, your family and the care team in order to improve your physical abilities (i.e. moving about in bed, getting out of bed, walking, etc)
- offers a walking program and an exercise group, if appropriate
- provides modalities as needed (electrotherapy, thermotherapy or ultrasound)

The Pharmacist

- reviews your medication orders on an ongoing basis
- works with the care team to suggest the best medication for you
- helps the team by providing up-to-date information on your medications,
- is available to discuss questions you or your family may have prior to discharge.

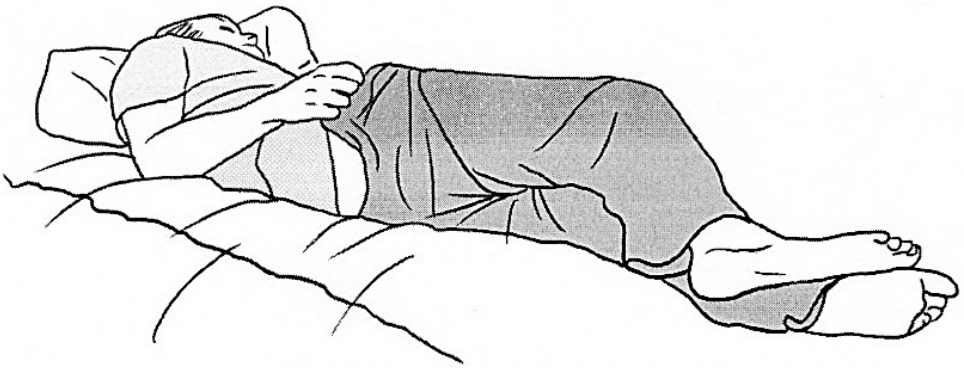
Appendix B-I: Dressing While Laying Down

Putting on and Removing Lower Body Clothing in Supine



1. Put the more affected leg into the pants first.

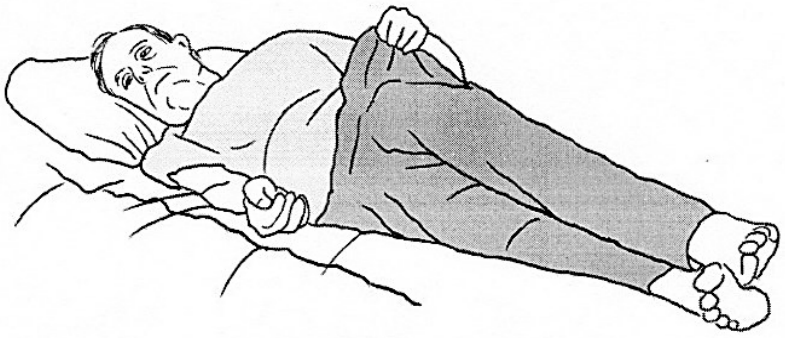
2. Put the less affected leg into the pants.



3. Log roll to one side and pull up the side of the pants.

1 of 2

Putting on and Removing Lower Body Clothing in Supine



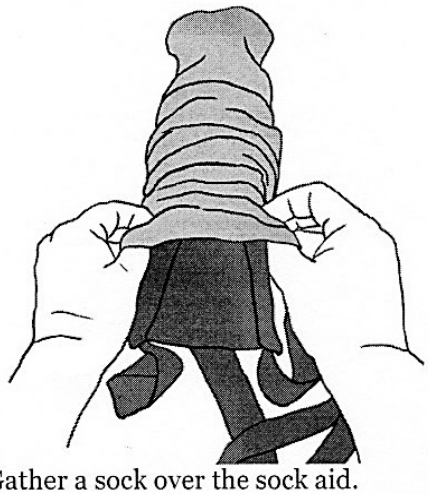
4. Log roll to the other side and pull up the side of the pants.

5. This method will also work for putting on socks and shoes.

Reverse these steps to remove your clothing.

Appendix B-II: Using the Sock-Aid & Shoehorn

Putting on and Removing Socks and Shoes Using Adaptive Equipment



1. Gather a sock over the sock aid.

2. Keeping a hold on the straps. Toss the sock aid to the floor.

3. Position the sock aid in front of your foot.

4. Start to pull the sock aid over your toes. Point your toes and lift your heel off the floor.

Putting on and Removing Socks and Shoes Using Adaptive Equipment

5. Pull the sock aid completely out, leaving your sock on your foot.

6. To remove your sock, use your dressing stick or reacher to hook the back of the sock and push it off.

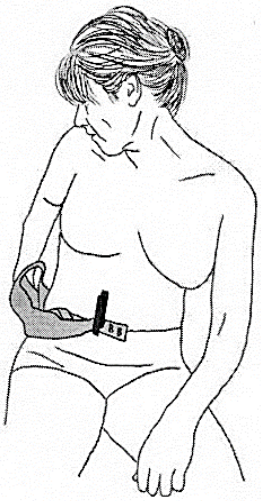
7. Wear slip-on shoes or replace the laces with elastic laces or Velcro closures. Use a long handled shoehorn to help you get your shoe on.

8. Remove your shoe using the dressing stick to push it off from the heel.

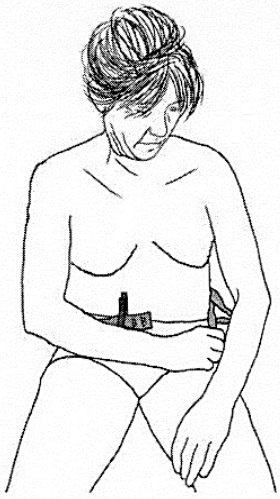
Appendix B-III: Using a Plastic Clothes Peg to Don a Bra

Putting On and Removing Bra
Using One-Handed Method - Left Side Affected

1. Using a clothespin, clip the "loop" side of your bra to your underwear.



2. Move the bra around your right side.

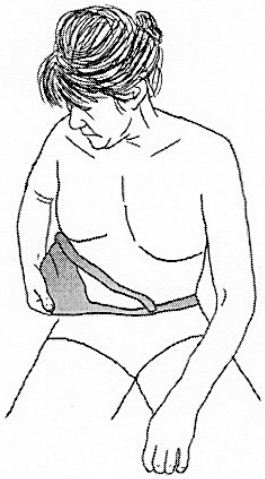


3. Reach back on your left side and pull the bra forward.

4. Hook the bra.

1 of 2

Putting On and Removing Bra
Using One-Handed Method - Left Side Affected



5. Remove clothespin and twist the bra around your waist.

6. Place your left hand into the shoulder strap.

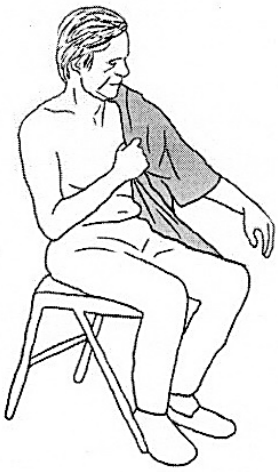
7. Pull the left shoulder strap up onto your shoulder.

8. Put your right arm into the other bra strap.

2 of 2

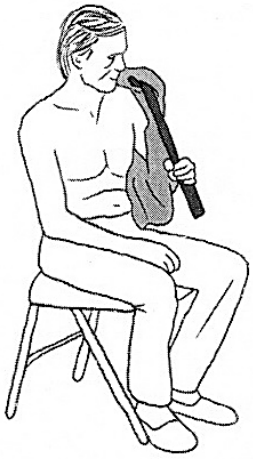
Appendix B-IV: Using a Dressing Stick

Putting on Open Front Garment Using a Dressing Stick

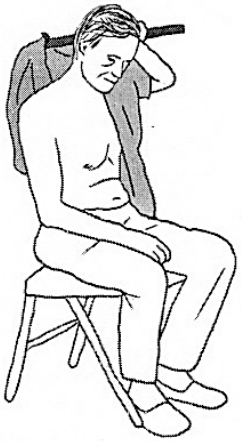


1. Place the less affected arm into the shirt first. Bring the shirt up to your shoulder.

2. Pull the collar forward, until you see the opposite side.



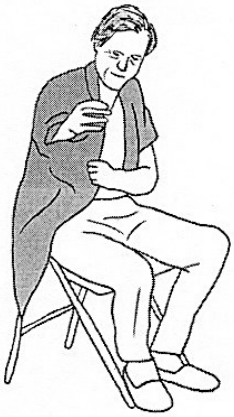
3. Hook the dressing stick at the collar.



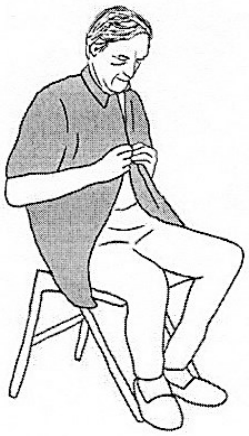
4. Using the dressing stick, move the shirt around your neck.

Putting on Open Front Garment Using a Dressing Stick

5. Pull the shirt forward over your more affected shoulder using the dressing stick.



6. Place your more affected arm into the shirtsleeve.



7. Adjust the shirt and fasten.

Appendix B-V: Removing Trousers

Putting on and Removing Lower Body Clothing
Method 2

1. Put on your pants and pull them up as far as possible while sitting.

2. Lean to the side and pull your pants up over your hip.

3. Lean to the other side and pull your pants up over your hip. Repeat leaning side to side until your pants are all the way up.

Appendix B-VI: Donning Trousers With Leg Crossed

Putting on Pants And Underwear
Using One-Handed Method - Left Side Affected

1. Cross your left leg over the right knee. Use a piece of non-slip drawer liner to keep your knees crossed. Place the left pants leg over your foot.

2. Pull the pants leg up your left leg, until you can see your foot.

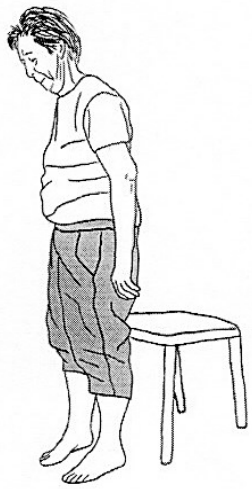
3. Place your right foot into the pants.

4. Pull the pants up as far as you can.

1 of 2

Putting on Pants And Underwear
Using One-Handed Method - Left Side Affected

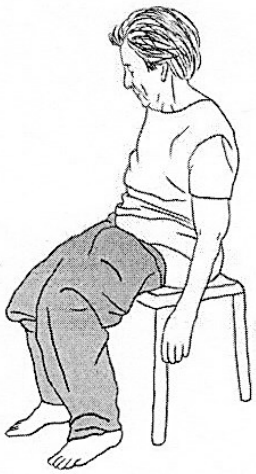
5. Pull the pant legs up over both knees. This will prevent them from falling down once you stand up.



6. Stand and pull up the pants. Fasten the pants after you sit back down.

An alternative to standing

5. Remain seated and lean side to side.



6. Work the pants up over your hips.

Appendix B-VII: Threading & Hooking the Arm

Putting on Pullover Garment
Using One-Handed Method - Right Side Affected

1. Position your shirt face down on your lap with the collar at your knees.

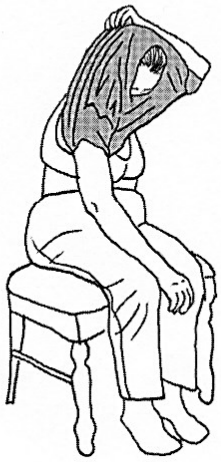
2. Gather the opening of the right shirtsleeve and place on your lap.

3. Lean forward and place your right arm into the sleeve opening.

4. Pull the sleeve up your arm and over your elbow.

Putting on Pullover Garment
Using One-Handed Method - Right Side Affected

5. Place your left arm into the left sleeve opening.



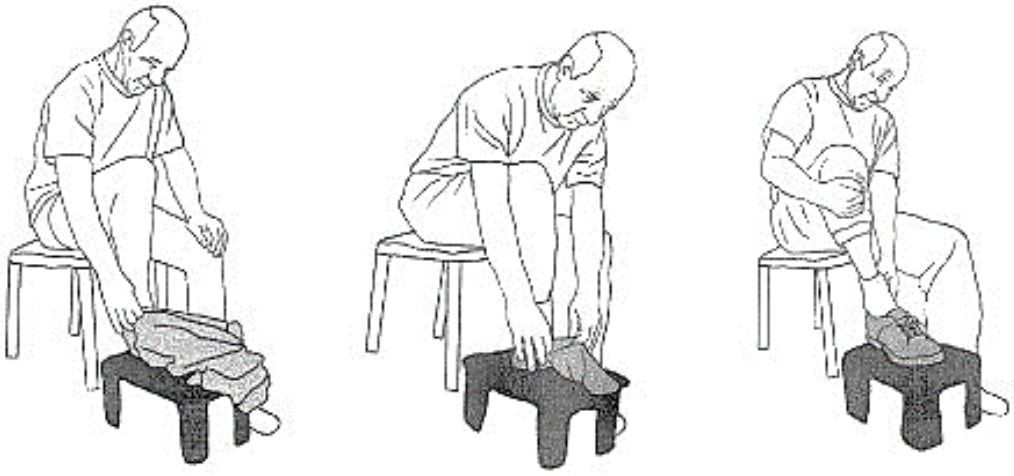
6. Grasp the fabric and pull the shirt over your head.

7. Push the shirt fabric over your right shoulder.

8. Adjust the shirt, pulling it down in the front and the back.

Appendix B-VIII: Reducing Reach Distances

Putting on and Removing Lower Body Clothing Using a Footstool



Using a footstool will bring your foot closer so you can put on your pants, underwear, socks and shoes.

Appendix B-IX: Dressing Tips

Dressing Tips

General Safety

- Sit to dress, preferably in an armchair located in the bedroom. Standing, sitting on the edge of the bed or sitting on the toilet while dressing, may result in losing your balance.
- Store items so they are easy to reach. Avoid storing items on the floor.
- Once clothes are removed, avoid leaving them on the floor.
- When using a walker, carry items using a walker basket or tray.
- Choose clothes that are easy to put on and take off.

Putting On and Removing a Shirt or Top

- There are several methods for putting on an open-front shirt or pullover top. Your therapist can show you the best way for your situation.
- The easiest way to take off either an open-front shirt or pullover top is to grasp the collar and pull it off over your head.

- If you have difficulty fastening buttons, use a buttonhook that is available from your local home heathcare store. Select pullover style tops or keep all the buttons fastened except the top two and put it on over your head.

Dressing Tips

Putting On and Removing a Bra

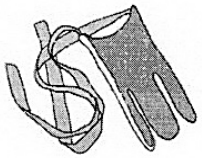
- Hook your bra in front then twist the bra around to the back.
- Instead of wearing a back closure bra, wear a sports bra that has no closure or wear a camisole.
- Replace the bra closure with elastic and put on overhead or wear a larger size that can be fastened and put on overhead.

Putting On and Removing Pants and Underwear

- There are several methods for putting on lower body clothing; your therapist can show you the best way for your situation.
- Sit in a sturdy armchair to put on and remove your pants and underwear.
- Minimize bending by crossing one leg over the other, propping your leg up on the bed, or using long handled equipment for pants and a sock aid for socks. If you have difficulty keeping your legs crossed, use a piece of non-slip drawer liner to secure your foot on the opposite knee.
- Putting the weaker or more limited leg in the pants first is easier.

Putting On and Removing Shoes and Socks

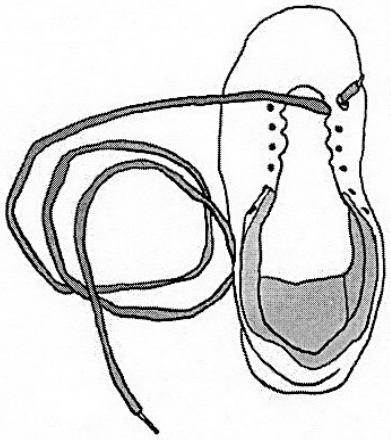
- Sit in a sturdy armchair to put on and remove your socks and shoes.
- Minimize bending by crossing one leg over the other, using a step stool or using a long handled shoehorn, dressing stick and sock aid.



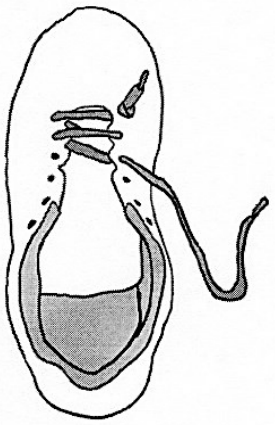
- If you have difficulty with tying the shoelaces, consider wearing slip-on shoes or replace the laces with elastic laces or Velcro closures
- Put on your pants before you put on your socks. Take off your socks before taking off your pants.

Appendix B-X: One-Handed Shoe Tying

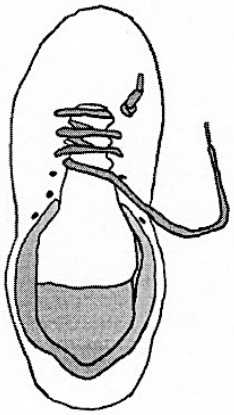
One Handed Shoe Tying - Left Side Affected
Preparing the Shoes



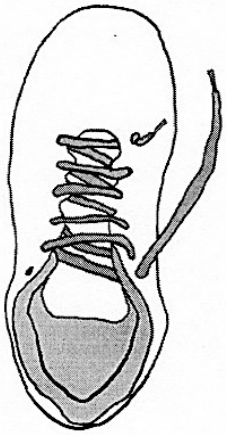
1. Place a knot at the end of the shoelace. Thread the shoelace through the last hole on the right side. Both shoes are prepared the same.



2. Lace the shoes by threading the left side from the top.

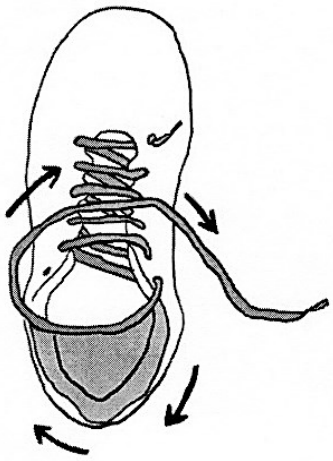


3. Thread the right side from underneath.

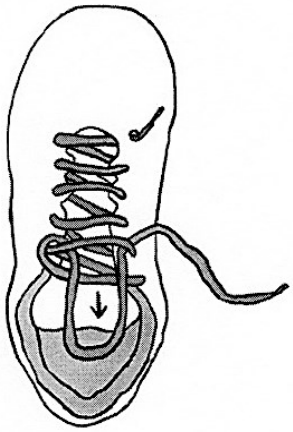


4. Continue threading the shoelace. End on the last hole on the right side.

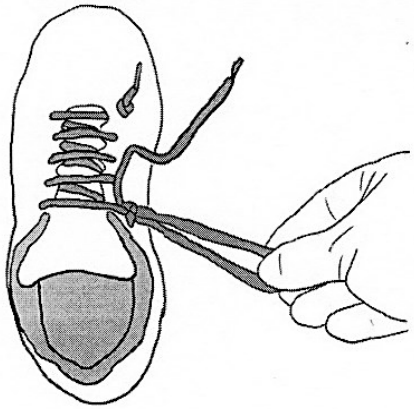
One Handed Shoe Tying - Left Side Affected
Tying the Shoes



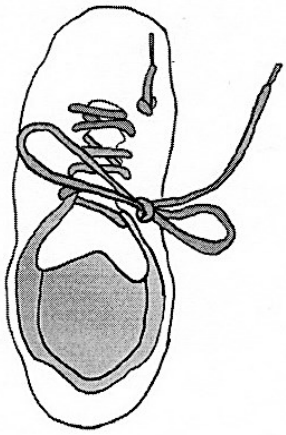
5. Holding onto the shoelace, loop it around to the left.



6. Push the loop up through the last shoelace crossover.



7. Pull the end of the loop to the right to tighten.

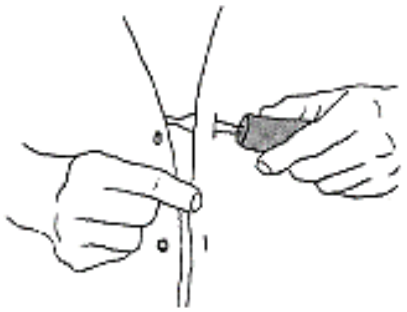


8. Insert the end of the shoelace into the knot to create a second loop.

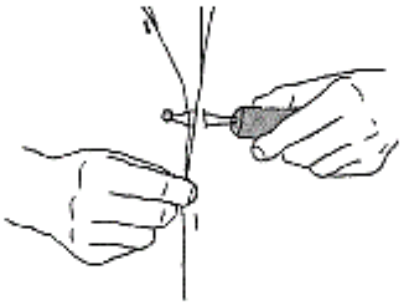
Appendix B-XI: Using a Buttonhook

Using a Buttonhook

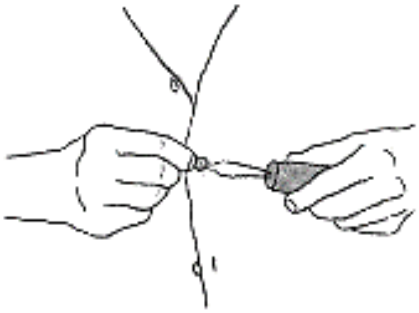
1. Insert the buttonhook through the buttonhole.



2. Hook the button with the end of the buttonhook.



3. Pull the button through the buttonhole.



Appendix B-XII: Energy Conservation With Meal and Home Management

Energy Conservation with Meal and Home Management

Remember to use proper breathing techniques.
Rest frequently and avoid overexertion.

Cooking

1. Prepare part of the meal ahead of time.
2. Use recipes that require short preparation time and little effort.
3. Gather all necessary items before beginning.
4. Sit to prepare the vegetables, mix ingredients and wash dishes.

After Meal Clean-up

1. Rest after meals before starting to clean up.
2. Use the garbage disposal. Empty trash frequently or have a family member do it.
3. Let dishes soak to eliminate scrubbing.
4. Let your dishes air dry.
5. Eat on paper plates several times a week.

Marketing and Meal Planning

1. Organize your shopping list to correspond with the layout of the grocery store.
2. Shop when the store is not busy.
3. Get help reaching for high and low items and for carrying heavy items.
4. Use the store's electric scooter to shop.
5. Ask the clerk to bag the groceries lightly and bag cold and frozen food together.
6. Make several trips to bring the groceries into the house, take the cold and frozen foods first, and after you have rested, return for the remainder.

Laundry

1. Sit to iron, sort clothes, pre-treat stains and fold laundry.
2. Transfer wet clothes into dryer a few items at a time.
3. Get help to fold large items such as sheets.

Housework

1. Divide up each room into smaller areas and tackle these sections.
2. Use long handled dusters and cleaning attachments.
3. Sit to dust.
4. Use a mop to clean up spills instead of bending over.
5. Pick up items off the floor using a reacher.
6. Use paper towels to eliminate extra laundry.
7. Break up chores over the whole week, doing a little each day.

Bed making

1. Make half the bed while you are still lying in it. Pull the top sheet and blanket up on one side and smooth out. Exit from the unmade side, which is easy to finish.

Appendix B-XIII: Energy Conservation With Self-Care Activities

Energy Conservation with Self Care Activities

Remember to use proper breathing techniques.
Rest frequently and avoid over exertion.

Eating

1. Eat six small meals a day instead of three big meals. This will cut down on the energy you need to chew and digest your food.
2. Eat slowly and completely chew your food.
3. Avoid gas-forming foods that bloat your abdomen and make it more difficult to breathe, such as peas, melons, turnips, onions, cauliflower, apples, corn, broccoli, cucumbers, cabbage, beans, and brussel sprouts.

Grooming

1. Sit to shave, comb your hair and brush your teeth.
2. Avoid aerosols and strong scents.
3. Wash your hair in the shower. Keep your elbows low and your chin tucked.
4. Support your elbows on the counter while grooming or shaving.
5. Use an electric toothbrush and an electric razor.

Bathing and Showering

1. Consider taking your shower in the evening to allow plenty of time.
2. Gather all the necessary items that you will need, including your clothes.
3. Use a bath chair in your shower.
4. Sit to undress, bathe, dry and dress.
5. Avoid over reaching. Use a long-handled brush to wash your back and feet.
6. Use a hand-held showerhead.
7. If your doctor has prescribed oxygen to be use during exercise, then use it when you take a shower.
8. Make certain your bathroom is well-ventilated.
9. Have a towel or robe near by. Consider using hand towels because they are not as heavy. Avoid the task of drying by putting on a terry cloth robe.
10. Use a shower caddy and soap on a rope or place soap in a nylon stocking and tie the stocking to the shower seat or soap dish.

Dressing

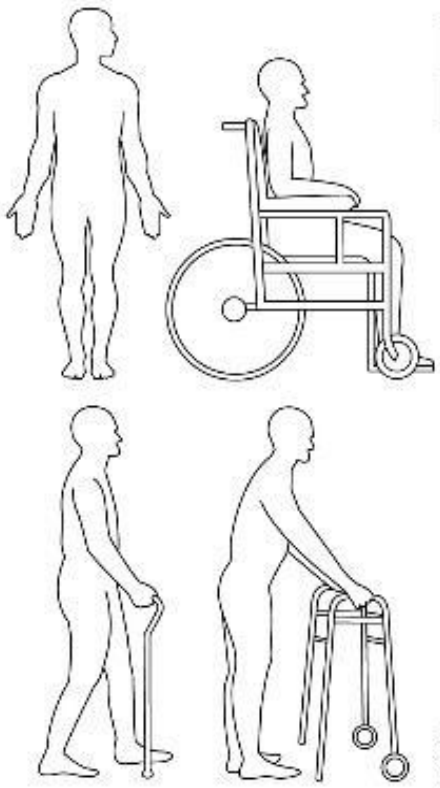
1. Before starting, gather all clothes, shoes, etc.
2. Sit to dress.
3. Minimize bending by crossing one leg over the other or use a step stool to put on socks, pants and shoes or use long-handled equipment.
4. Wear slip-on shoes; use a long-handled shoehorn.
5. Avoid restrictive clothes, tight socks, girdles, bras. Use suspenders if belts are too restricting.

Appendix C: OT/Participant Observation Record

OT/PARTICIPANT OBSERVATION RECORD

Date: **Participant #:**

Participant's History: _____



Challenges		OT Lesson	Tools
Garment	Fastener		
			Clothing Items
① with ease ② some difficulty ③ great difficulty			

Appendix D: Clothing Precedent Analysis Form

Company	Image	Product Range Men's Women's Outerwear Sleepwear Accessories Other							
Website		Garment Type Style #	Fabric Fibre	Colour Range	Size Range	Price	Functional Attribute	Aesthetic Attribute	Expressive Attribute
Country		Blouse Pant Skirt Dress Top Sleepwear Underwear			SML XL 2XL				Peter Pan Collar Yoke Gathers Pocket Contemporary Styling
Company Background									

Appendix E: Dressing Boards With Various Types of Fasteners

Appendix F: Interview Guides—Patients, Personal Support Workers, and Therapists

MAPPING THE CLOTHING TASKSCAPE: APPAREL NEEDS IN REHABILITATION THERAPY

INTERVIEW SCHEDULE (PEOPLE IN REHAB)

Date: _____ Participant: _____

REVIEW CONSENT FORM

INTRODUCTION

Getting dressed is a taken for granted activity until the balance and movements required to do so are reduced or lost due to illness, injury, disease, or surgery. I am a clothing designer and the purpose of this interview is to better understand your experiences related to clothing while in rehab. The information I collect in this study will be used in support of my PhD thesis.

- *Tell me about yourself and the events leading up to your enrolment in this rehab program.*
  - AGE
  - OCCUPATION
  - FAMILY STATUS
  - HEALTH CONDITION LEADING TO REHAB
  - WHEN ADMITTED TO HOSPITAL? TO REHAB FLOOR?

SELECTION, CARE, STORAGE

- *I am interested in the range of clothing needed while in rehab. Can we take an inventory of all the clothing and accessories you have with now?*
  - SLEEPWEAR
  - UNDERGARMENTS
  - SOCKS
  - TOPS
  - PANTS
  - SKIRTS
  - JACKETS/SWEATERS
  - FOOTWEAR
- *Is there anything else that you typically have here that is being laundered?*
- *Who does your laundry? When at home?*
- *How do you keep these clothes organized? (STORAGE) Who does your laundry?*
- *Did you pack these clothes to bring to rehab?*
- *How did you decide what to bring?*

- *Have you purchased anything new since in rehab? If yes, what? From where?*
- *Why did you purchase that? Are there any clothing items you wish you had?*
- *When do you decide what to wear for the day? What did you consider before deciding what to wear today? Is there a mirror in your room? Do you check your appearance?*

ACTUALLY GETTING DRESSED *(in rehab vs at home)*

- *Describe your typical day for me from the moment you wake up.*
- *When do you get dressed? Do you avoid/postpone getting dressed for any reason?*
- *How many outfits do your wear per day? (DAYTIME, EVENING, LOUNGEWEAR, SLEEPWEAR)*
- *Which garments are easiest to put on? Why? Most difficult? Why?*
- *Let's imagine you are out shopping. Describe a perfect outfit that you might buy. What do you look for in terms of garment cut, fabric, styling, fasteners, colour?*
- *What kinds of clothing to you avoid looking at or buying? (CLOSURES/FASTENERS, FABRICS, SILHOUETTES)*
- *Is there anything you need help with when dressing? What do you use to help you dress (tools)?*

UNDRESSING

- *When or how often do you get undressed during the day? Do you avoid/postpone undressing for any reason?*
- *Do you notice a difference when you are getting out of your clothing?*
- *What is the most difficult garment to get out of? Why?*
- *Does anyone help you get undressed? Do you use any assistive devices when undressing?*
- *Where do you put your soiled clothing that needs to be laundered? (CARE, STORAGE)*

TOILETING

- *How frequently do you visit the toilet? Do you ever avoid/postpone toileting because of clothing?*
- *Do you typically get up at night to go to the bathroom? How often?*
- *What are the clothing challenges you experience when going to the bathroom?*
- *Have you devised any solutions to overcome these challenges?*

SELF-IMAGE

- *How do the clothes that you have here in rehab compare to those you would normally wear at home?*
- *What do you miss having here in your rehab wardrobe that you have at home?*
- *What do you look forward to most when you get home with regards to your clothing?*
- *Have you considered any solutions that might be incorporated into a garment design?*

CLOTHING PROBES

- *Have a look at these garments. Tell me your thoughts about ….*

  1. *Dual waistband trouser*
  2. *Building underwear right into the garment*
  3. *Using magnetic button closures*
  4. *Dolman sleeve top*
  5. *Jacket with MagZip*
  6. *Towel poncho & Turban*

DEBRIEFING/CLOSING

- *Is there anything else that I did not ask you about that you would like to talk about now?*
- *If you could create a specific piece of clothing for your current lifestyle, what would it be? Could you describe it to me?*

MAPPING THE CLOTHING TASKSCAPE: APPAREL NEEDS IN REHABILITATION THERAPY

INTERVIEW SCHEDULE (PSWS)

Date: _____ **Participant:** _____

REVIEW CONSENT FORM

INTRODUCTION

Getting dressed is a taken for granted activity until the balance and movements required to do so are reduced or lost due to illness, injury, disease, or surgery. I am a clothing designer and the purpose of this interview is to better understand your experiences related to the kinds of clothing people need while in rehab. The information I collect in this study will be used in support of my PhD thesis.

- *Tell me about yourself.*
  - *How long have you worked as a PSW?*
  - *What motivated you to choose this profession?*
  - *Where did you do your training – EDUCATION?*
  - *Describe your typical work day (day or night shift?), start from the moment you start you shift...*
  - *Your work is very physical, have you ever injured yourself at work? If yes, how?*

SELECTION

This is the Rehabilitation Pamphlet provided by the hospital with a suggested list of items to bring to rehab. What would you personally recommend that patients have while they are here? How would you organize the stuff in their room?

- SLEEPWEAR
- UNDERGARMENTS (i.e., sports bra)
- SOCKS
- TOPS
- PANTS, SKIRTS, JACKETS/SWEATERS
- FOOTWEAR
- TOILETRIES (i.e., pump vs. squeeze dispenser for shampoo)
- DRESSING TOOLS (i.e., shoe horn)

- *If a patient does not have family nearby……, how is dirty laundry handled?*
- *Let's talk about the kinds of clothing that would make it easier for you to dress patients.*
- *Are there specific garment styles, or garment details that you suggest patients look for?*
- *Are there any clothing or accessories that patients have had here in rehab that were really good?*
- *Can you describe them to me?*
- *Are there any stores or manufacturers that you suggest?*

- *Are you familiar with Izzy Camilleri's line of adaptive clothing?* www.**izadaptive**.com
- How about Silverts adaptive clothing and footwear in Concord? http://www.silverts.com/
- *In your experience, what are the top three conditions that require functional clothing while in rehab?*
- *Tell me about the kinds of clothing items people find most challenging. When thinking about functional clothing - Where should designers start? Which garments are most in need of design improvements?*
- *Have you considered any solutions that might be incorporated into a garment design?*

CLOTHING PROBES

- *Have a look at these garments. Tell me your thoughts about ….*

  1. *Dual waistband trouser*
  2. *Building underwear right into the garment*
  3. *Using magnetic button closures*
  4. *Dolman sleeve top*
  5. *Jacket with MagZip*
  6. *Towel poncho & Turban*

- *Is there anything else that I did not ask you about that you would like to talk about now?*

MAPPING THE CLOTHING TASKSCAPE: APPAREL NEEDS IN REHABILITATION THERAPY

INTERVIEW SCHEDULE (OTS & OTAS, PTS & PTAS)

Date: _____ **Participant:** _____

REVIEW CONSENT FORM

INTRODUCTION

- *Getting dressed is a taken for granted activity until the balance and movements required to do so are reduced or lost due to illness, injury, disease, or surgery. I am a clothing designer and the purpose of this interview is to better understand your experiences related to the kinds of clothing people need while in rehab. The information I collect in this study will be used in support of my PhD thesis.*
- *Tell me about yourself:*
  - *How long have you worked as an OT/OTA/PT/PTA?*
  - *What motivated you to choose this profession?*
  - *Where did you do your training – EDUCATION?*
  - *Describe your typical work day, start from the moment you arrive...*
  - *Does it vary from the start of the week to the end?*

SELECTION

- *This is the Rehabilitation Pamphlet provided by the hospital with a suggested list of items to bring to rehab. What do you personally recommend that patients have while they are here?*
  - SLEEPWEAR
  - UNDERGARMENTS (i.e., sports bra)
  - SOCKS
  - TOPS
  - PANTS, SKIRTS, JACKETS/SWEATERS
  - FOOTWEAR
  - TOILETRIES (i.e., pump vs. squeeze dispenser for shampoo)
  - DRESSING TOOLS (i.e., shoe horn)
- *What about laundering dirty clothes, if a patient does not have family nearby……,*
- *I was wondering, what about the laundry machines on the RT floor?*
- *How do you carry laundry when you are using a walker?*
- *Are there specific garment styles, or garment details that you suggest patients look for?*
- *Are there any clothing or accessories that patients have had here in rehab that were really good? Can you describe them to me?*
- *Are there any stores or manufacturers that you suggest?*

- *Are you familiar with Izzy Camilleri's line of adaptive clothing? www.**izadaptive**.com*
- *How about Silverts adaptive clothing and footwear in Concord? http://www.silverts.com/*
- *In your experience, what are the top three conditions that require functional clothing while in rehab?*
- *Tell me about the kinds of clothing items people struggle most with. When thinking about functional clothing, where should designers start? Which garments are most in need of design improvements?*
- *Have you considered any solutions that might be incorporated into a garment design?*
- *What about tricks? What kinds of strategies do you recommend to patients? To help them be more organized? To help them conserve their energy? To help them maintain bladder control? To help them get better faster?*
- *In your opinion, should clothing be used as a compensatory measure? For instance, Is it OK to switch to magnetic closures or Velcro rather than manipulate buttons? At what point in recovery should adaptive clothing be integrated as a compensatory intervention?*
- *Have you considered any solutions that might be incorporated into a garment design?*

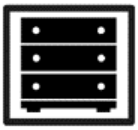
CLOTHING PROBES

- *Have a look at these garments. Tell me your thoughts about ….*
  1. *Dual waistband trouser*
  2. *Building underwear right into the garment*
  3. *Using magnetic button closures*
  4. *Dolman sleeve top*
  5. *Jacket with MagZip*
  6. *Towel poncho & Turban*

- *Can you tell me a story about patient success? How do you know a patient is doing well?*
- *Is there anything else that I did not ask you about that you would like to talk about now?*

Appendix G: Design Criteria—Trousers for Men in RT as Derived From Data Collection

Activity	Design Criteria
	– Elastic waistbands – Adjustable waistbands to accommodate weight loss/gain – Consider fasteners in terms of one handed dressing – Consider pant leg circumference, loose rather than tight – Ankle unhindered with cuff or elastic – Consider pocket placement when using a walker or wheelchair to facilitate carrying items – Styling must not resemble pajamas – Consider fabric in terms of hand, stretch, thermal comfort, garment friction – Consider fabric colour choices for maximum mix and match options (trouser & top)
	– Consider cost price point as need may be transient – Accessible as ready-to-wear at retail outlets
	– Styling must promote dressing independence – Consider one handed dressing when donning and doffing – Consider donning with dressing tools – Consider visual clues to aid garment orientation such as distinct identification of garment back and front, fabric coloration different on inside of garment as compared to outside – Incorporate underwear to reduce energy expenditure when donning and doffing
	– Consider donning with dressing tools – Consider doffing with urgency – Incorporate loops to reduce reach distances – Incorporate dual waistbands to reduce reach distances – Incorporate underwear to reduce energy expenditure when donning and doffing – Consider use with a hand held urinal, have fly zipper operate from the crotch up to waist – Consider use with diapers and incontinence pads – Consider fabric friction – Design opportunity, classic grey flannel trousers

	– No criteria developed from bathing activities
	– Consider fabrics with stain resistance
	– Consider fabrics with absorbency and odour control – Trouser silhouette must allow for mobility when exercising – Consider pant leg circumference regarding safety on exercise equipment
	– Do not use drawstring waistbands (as per current hospital supplied pajamas)
	– Consider fibre content in terms of garment care and serviceability (wrinkles, soiling, visibility of soiling, stain release, odour release) – Fabric choice should be easily laundered (no hand wash or dry clean)
	– Hang in matched sets (pant & top) to ease selection