

SATISFACTION WITH WHEELCHAIR PRESCRIPTION AND FUNCTIONAL MOBILITY OF CLIENTS WITH SPINAL CORD INJURY

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A research report submitted to the Faculty of Health Sciences, School of Therapeutic Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Occupational Therapy

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Declaration

I, Nadine Wolf, hereby declare that this thesis is my own work. It is being submitted for the degree of Master of Science in Occupational Therapy of the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Nadine Wolf

_____ Day of _____, 2015.

Dedication

I dedicate my research report to my family, friends and colleagues, for providing me with continued support and encouragement.

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I would like to thank the following people for their assistance and support throughout:

- Denise Franzsen and Lebogang Maseko, for being excellent supervisors
- My colleagues at Rita Henn and Partners, for their continuous assistance and support
- The participants that agreed to partake in this study

Plagiarism Declaration



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Abstract

There is limited research in South Africa as to whether wheelchairs prescribed to clients with spinal cord injury (SCI), especially in the private hospitals, are appropriate. Previous literature has provided evidence into the negative impact an inappropriately prescribed wheelchair has on a client with SCI and thus the need for in-depth assessments and sufficient knowledge regarding the different types of wheelchairs and biomechanical properties are of utmost importance for therapists prescribing wheelchairs. Various studies in other countries have also emphasised the importance of client involvement, client satisfaction as well as the importance of being functionally mobile in the wheelchair in order to achieve a satisfactory quality of life. Due to the limited research available in South Africa with regards to wheelchair prescription a relevant topic for this current study could be formed and thus the aim of the study was to investigate whether the level of involvement of the clients with SCI in a private hospital in Johannesburg in the wheelchair prescription process and the type of wheelchair prescribed is related to their level of satisfaction with the prescribed wheelchair and how this satisfaction is associated with their functional mobility in the wheelchair. The study was a descriptive non-experimental correlational research design consisting of 40 participants. The results showed that over 87.98% of the participants had a high level of satisfaction with their wheelchair prescriptions while 84.82% were functionally mobile in their wheelchairs. There was a significant difference between the type of wheelchair prescribed and the participants' overall functioning in the wheelchair: the rigid frame wheelchair yielded a higher level of functioning in clients with SCI compared to the folding frame wheelchair, and is thus a better wheelchair to prescribe for this population group. Furthermore, the results also showed that the greater the involvement of participants in wheelchair prescription, the higher the satisfaction levels, indicating the importance for occupational therapists to be client-centred in their prescription of wheelchairs for clients with SCI.

Overall, the study showed that the participants at Netcare Rehabilitation Hospital, the private hospital used for the study, were provided with appropriately suitable wheelchairs and that the therapists at the hospital are cognisant of the evidence with regards to wheelchair prescription.

Table of Contents

Declaration	i
Dedication	ii
Acknowledgments	iii
Plagiarism Declaration	iv
Abstract.....	v
Table of Contents	vi
List of Photographs	x
List of Tables.....	xi
List of Figures.....	xii
Operational Definitions	xiii
Abbreviations	xiv
CHAPTER 1 - Introduction.....	1
1.1 Introduction to Study	1
1.2 Statement of the Problem	2
1.3 Purpose of the Study.....	3
1.3 Aim of the Study	3
1.4 Study Objectives	3
1. 5 Justification for the Study	4
1.6 Summary of Chapter	4
CHAPTER 2 – Literature Review	6
2.1 Introduction	6
2.2 Importance of wheelchairs in occupational performance and quality of life	6
2.3 Consequences of inappropriate wheelchair prescription.....	8
2.3.1 Inappropriate wheelchair prescription leads to wheelchair abandonment.....	9
2.3.2 Inappropriate wheelchair prescription leads to low self-esteem.....	9
2.3.3 Inappropriate wheelchair prescription as a result of environmental constraints	9
2.3.4 Inappropriate wheelchair prescription leads to physical complications	10

2.4 Appropriate wheelchair prescription.....	11
2.4.1 Types of wheelchairs and biomechanical properties	12
2.4.1.1 Folding frame wheelchair.....	13
2.4.1.2 Rigid frame wheelchair	13
2.4.2 Funding.....	17
2.4.3 Outcome measures used to determine an appropriate wheelchair	18
2.4.3.1 Functioning Everyday with a Wheelchair Questionnaire (FEW- Q)	19
2.4.3.2 Wheelchair Outcome Measure (WhOM)	19
2.4.3.3 Wheelchair Users Functional Assessment (WUFA)	20
2.4.3.4 The Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0)	20
2.5 Importance of wheelchair satisfaction during the wheelchair prescription	22
2.6 Current problems with prescribing appropriate wheelchairs in South Africa.....	23
2.7 Summary of Chapter	24
CHAPTER 3 – Research Methodology	25
3.1 Research Design.....	25
3. 2 Population	25
3. 3 Type of Sampling	26
3. 4 Measurement Tools.....	26
3.4.1 Demographic Questionnaire (Appendix A)	26
3.4. 2 Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) 2.0 (Appendix B)	27
3.4.3 Wheelchair Users Functional Assessment (WUFA) (Appendix C)	27
3. 5 Research Procedure.....	28
3.5.1 Piloting of the video angles	28
3.5.2 Data Collection	32
3.6 Data Analysis	34
3.7 Ethics	35
3.8 Summary of Chapter	35
CHAPTER 4: RESULTS	37

4.1 Introduction	37
4.2 Demographical Information.....	37
4.2.1 Demographic Data	37
4.2.2 Medical History	37
4.3 Wheelchair use and prescription	38
4.3.1 Duration of wheelchair use and involvement in prescription	38
4.3.2 Seating assessment, cushion prescription and modifications to wheelchair	38
4.3.3 Funding.....	39
4.3.4 Types of wheelchairs	40
4.3.5 Type of wheelchair, demographic and other wheelchair prescription factors	40
4.4 Satisfaction with wheelchair prescription.....	41
4.4.1 Satisfaction with wheelchair	41
4.4.2 Level of satisfaction with the wheelchair and involvement in the prescription of the wheelchair.....	43
4.4.3 Type of wheelchair prescribed and satisfaction with the wheelchair	45
4.4.4 Most important factors to consider during wheelchair prescription	45
4.5 Functional assessment in prescribed wheelchair.....	46
4.5.1 Functional assessment scores - Wheelchair Users Functional Assessment	46
4.5.2 Involvement in the prescription of the wheelchair and functional assessment	48
4.5.3 Influence of type of wheelchair prescribed on functional assessment.....	49
4.6 Association between the satisfaction levels and the functional mobility of the prescribed wheelchairs.....	52
4.6.1 Association of demographics data, medical history and wheelchair prescription factors	52
4.6.2 Associations between demographic data, medical history and wheelchair prescription factors and Wheelchair Users Functional Assessment	52
4.6.3 Associations between demographic data, medical history and wheelchair prescription factors and Quebec User Evaluation of Satisfaction with Assistive Technology	53

4.6.4 Correlations between Quebec User Evaluation of Satisfaction with Assistive Technology and Wheelchair Users Functional Assessment.....	53
4.6.5 Correlations within the Quebec User Evaluation of Satisfaction with Assistive Technology and Wheelchair Users Functional Assessment.....	53
4. 7 Summary of Chapter	53
CHAPTER 5 DISCUSSION.....	55
5.1 Introduction	55
5.2 Participant demographics and medical history.....	55
5.3 Wheelchair prescription	56
5.4 Factors to consider when prescribing wheelchairs.....	62
5. 5 Satisfaction with wheelchair prescription	63
5.6 Functional mobility in the wheelchair	65
5.7 Association between satisfaction levels and functional mobility in the wheelchair	67
5.8 Limitations to the study.....	68
5.9 Implications for practice in occupational therapy.....	70
5.10 Summary of Chapter	72
CHAPTER 6 CONCLUSION	73
6.1 Summary of research and results.....	73
6.2 Recommendations for future studies	75
REFERENCES	77
APPENDICES.....	85
Appendix A: Demographic Questionnaire.....	85
Appendix B: QUEST 2.0.....	87
Appendix C: Wheelchair Users Functional Assessment (WUFA).....	91
Appendix D: Ethical Clearance	93
Appendix E: Hospital and Therapy Permission Letter and Written Consent.....	94
Appendix F: Permission to use the QUEST 2.0	101
Appendix G: Participant Information Sheet.....	102
Plagiarism Report.....	106

List of Photographs

Photograph 3.1 Crossing Street: Front Angle	29
Photograph 3.2 Crossing Street: Side Angle	29
Photograph 3.3 Crossing Street: Video tracking participant.....	30
Photograph 3.4 Crossing Street: Video tracking participant.....	30
Photograph 3.5 Toilet transfers: Front Angle	30
Photograph 3.6 Uneven terrain at start: Side Angle.....	31
Photograph 3.7 Uneven terrain at middle: Side Angle	31
Photograph 3.8 Uneven terrain at end: Side Angle.....	31
Photograph 3.9 Set-up for the task of Tight Spaces	33
Photograph 3.10 Low curb	33
Photograph 3.11 High curb.....	34

List of Tables

Table 3.1 Inclusion and exclusion criteria for Study Population	26
Table 3.2 Video angles for recoding tasks for the Wheelchair Users Functional Assessment	32
Table 4.1 Demographic Data of participants (n=40).....	37
Table 4.2 Level of spinal cord injury (n=40)	37
Table 4.3 Duration of wheelchair use (n=40)	38
Table 4.4 Seating assessment, cushion prescription and modifications to wheelchair (n=40).....	39
Table 4.5 Funding of wheelchairs (n=40).....	39
Table 4.6 Type of wheelchairs.....	40
Table 4.7 Mean scores on the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) according to involvement in prescription (n=40)	44
Table 4.8 Mean scores on the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST-2) according to wheelchair type (n=40)	45
Table 4.9 Mean scores on the Wheelchair Users Functional Assessment and the level of involvement in wheelchair prescription.....	48
Table 4.10 Wheelchair Users Functional Assessment scores for rigid and folding frame wheelchairs (n=40)	49
Table 4.11 Mean Scores and Standard Deviations for the Wheelchair Users Functional Assessment for the different wheelchair brands.....	49
Table 4.12 p-values for each WUFA domain	50
Table 4.13 Table of correlations	52

List of Figures

Figure 4.1 Percentage of participants involved in wheelchair prescription (n=40).....	38
Figure 4.2 Level of satisfaction with the wheelchair (n=40)	41
Figure 4.3 Level of satisfaction with wheelchair services (n=29)	42
Figure 4.4 Total satisfaction scores on the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) (n=40).....	43
Figure 4.5 Important factors to consider during wheelchair prescription (n=40).....	46
Figure 4.6 Level of independence on Wheelchair Users Functional Assessment (n=40)	47
Figure 4.7 Mean values on the Wheelchair Users Functional Assessment the task of door management (n=40)	51
Figure 4.8 Mean values on the Wheelchair Users Functional Assessment the task of floor transfers (n=40)	51

Operational Definitions

Functional mobility — Moving from one position or place to another (during performance of everyday activities), such as in-bed mobility, wheelchair mobility, and transfers (e.g., wheelchair, bed, car, tub, toilet, tub/shower, chair, floor). Includes functional ambulation and transporting objects. (1)

Spinal cord injury — results interruption of motor and sensory pathways at the site of the lesion. It results in absent sensation and/or paralysis of muscular activity below the level of injury. (2)

Abbreviations

ASIA	American Spinal Injury Association
ANOVA	Analysis of variance
BRICS	Brazil, Russia, India, China and South Africa
CEO	Chief Executive Officer
FEW- Q	Functioning Everyday with a Wheelchair Questionnaire
HPCSA	Health Professions Council of South Africa
ICF	International Classification of Function
OTT	occupational therapy technician
QUEST 2.0	Quebec User Evaluation of Satisfaction with assistive Technology
RMA	Rand Mutual Assurance
SCI	spinal cord injury
UN	United Nations
US	United States
WCA	Workmen's Compensation
WHO	World Health Organisation
WhOM	Wheelchair Outcome Measure
WUFA	Wheelchair Users Functional Assessment

CHAPTER 1 - Introduction

1.1 Introduction to Study

Wheelchairs are the most common assistive devices used by clients following a spinal cord injury (SCI) (3). A SCI results in paralysis of motor activity and absence of sensation below the level of the injury due to an interruption of the sensory and motor pathways at the level of the lesion (2). If a wheelchair is prescribed appropriately, it allows the client with SCI to participate in society (4). As part of the rehabilitation team involved in the assessment and prescription of a wheelchair, occupational therapists consider not only the client's abilities but also their current occupational performance needs, the available wheelchair technology and a detailed description of the environment in which the wheelchair will be used (5). These factors all play a role in facilitating the client's participation in all aspects of everyday activities (5).

However, in instances where the wheelchair prescription is inappropriate and the wheelchair does not meet the user's needs, community reintegration and quality of life can be negatively affected (6). Poor wheelchair prescription often results in disuse and abandonment of the wheelchair and may therefore prevent the client from becoming independent in their personal management and survival skills, enjoying an active recreational life as well as affecting their return to work (7).

Apart from impacting on activities of daily living and quality of life, poor wheelchair prescription may also have physical and psychological implications for the client with SCI. The physical implications resulting from poor sitting include postural deformity, increased risk for pressure sores, pain and discomfort (8). Psychological implications such as poor self-concept and self-esteem are common as society continues to struggle in its understanding of people with disability and generally does not know how to act when encountering someone in a wheelchair(3). This highlights the importance of enhancing mental wellbeing, which is often forgotten during the prescription of a wheelchair (3).

In private hospitals, clients with all types of SCIs commonly receive an assessment to facilitate appropriate wheelchair prescription (9). During these assessments, therapists need to take on a client-centred approach by taking clients' interests and needs into account when exploring a suitable wheelchair for them (9). The assessment needs to revolve around the International Classification of Function (ICF) framework in that it is important to consider impairments, activity demands, participation, environmental barriers and resources and the personal factors such as the client's level of motivation

and personality (10)(11). These assessments should be accompanied by seating assessments (12). In addition, therapists involved in wheelchair prescription require an in-depth knowledge of the different wheelchairs available as well as of the different suppliers providing wheelchairs (13). In this way an adequate wheelchair service that will ensure an appropriate wheelchair that will suit the needs of the client, thus facilitating an improved quality of life, is being provided (12).

In recent years, wheelchair technology and seating options to prevent physical deformities and increase psychosocial well-being have advanced to such an extent that the selection of an appropriate wheelchair has become more difficult (14). Research has shown however that despite the more complicated prescription process, the advancement in technology has fostered a more client-centred approach in that the client's needs are now able to be identified better and addressed to a greater extent than previously (12) (14).

Regardless of these new advances in wheelchair technology and seating options, as well as improved disability rights that allow clients with SCI the right to an appropriate wheelchair, it is becoming increasingly difficult to fund wheelchairs that suit the needs of individual clients (15). Not only in developing countries is appropriate wheelchair prescription a problem; the United States (US), for example, is faced with challenges involving health insurers(15). Health insurers in the US and medical aids in numerous countries are demanding more and more evidence to support the need for appropriate wheelchairs; thus there is an increased demand for outcome measures to be used in order to motivate for an appropriate wheelchair (16). There have also been significant budget cuts in respect of wheelchairs, thus many clients in need of specialised wheelchairs are often not provided one due to limited funding (14). As a result clients are left dissatisfied with their wheelchairs, feel limited by them and are ultimately at risk of abandoning their wheelchairs as they feel they do not meet their needs (17). This appears to be a problem in some developing countries as well.

Evidence has shown the importance of appropriate wheelchair prescription for clients with SCI, with alarming consequences for failure to complete the appropriate process. South Africa has limited data regarding appropriate wheelchair prescription as a whole, thus necessitating further research.

1.2 Statement of the Problem

Appropriate wheelchair prescription involves an in-depth assessment of the client in which client involvement is important (11). Numerous studies abroad state the

importance of involving clients in wheelchair prescription as this has been found to not only yield a higher level of satisfaction, but also increased participation in tasks as well as an improved quality of life (18)(19). Unfortunately, in South Africa there is little evidence about the involvement of clients in the wheelchair prescription, whether clients are satisfied with the prescription and whether clients are able to use their specific type of wheelchair functionally in everyday tasks. Since there is a high level of wheelchair abandonment in other countries such as the US, Canada and China when a client's wheelchair does not fit their needs (3)(18)(20), it is important to determine whether wheelchairs are prescribed appropriately in private hospitals in South Africa in an effort to avoid abandonment and a poor quality of life in clients with SCI.

1.3 Purpose of the Study

The purpose of the study was to determine whether clients with SCI are being prescribed an appropriate wheelchair in a private hospital in South Africa, whether clients felt that they were involved in their wheelchair prescription, whether they were satisfied and if they were able to be functionally mobile in the wheelchair that they have been prescribed. The results of this study provide occupational therapists with more insight into the type of wheelchairs more suitable for their clients with SCI and the effect that the type of wheelchair has on the client's functional level. The results also confirm the need to involve clients in wheelchair prescription as this has shown to yield a higher level of satisfaction.

1.3 Aim of the Study

The aim of this research was to investigate whether the level of involvement of the clients with SCI in a private hospital in Johannesburg in the wheelchair prescription process and the type of wheelchair prescribed is related to their level of satisfaction with the prescribed wheelchair and how this satisfaction is associated with their functional mobility in the wheelchair.

1.4 Study Objectives

1. To investigate the prescription of wheelchairs for clients with SCI in a private hospital and whether the type of wheelchair prescribed and clients' level of involvement influences their satisfaction with their wheelchair and functional mobility in the wheelchair.

2. To investigate satisfaction levels of clients with SCI in a private hospital with the prescribed wheelchair.
3. To investigate the functional mobility of clients with SCI in a private hospital in their prescribed wheelchair.
4. To investigate if there is an association between the satisfaction levels and the functional mobility of clients with SCI in a private hospital with the use of their prescribed wheelchair in daily life.

1.5 Justification for the Study

Literature indicates that in many developing countries, including South Africa, the most common wheelchair prescribed for clients with SCI is the folding frame wheelchair (21). Since this wheelchair is not usually indicated for clients with SCI, it was beneficial to determine what types of wheelchairs are being prescribed in a private hospital in South Africa as no previous research exists. Determining the client's level of satisfaction with their wheelchair provides insight into whether occupational therapists are being client-centred and acknowledging the client's interests and needs. If areas of dissatisfaction were identified through the study, occupational therapists would then be able to work on these areas in order to facilitate appropriate wheelchair prescription. Comparing mobility among the different types of wheelchairs allows occupational therapists to make more informed decisions as to which wheelchairs are more suitable for clients with SCI. Through this study, an increased awareness for the need to have sufficient knowledge regarding the types of wheelchairs becomes apparent as the study provides evidence as to how the type of wheelchair influences a client's functioning in the wheelchair. Finally, appropriate wheelchair prescription has shown to be more cost-effective if considered from the beginning.

1.6 Summary of Chapter

The importance of appropriate wheelchair prescription in various countries is evident but little research has been found as to whether clients with SCI in South Africa are provided with appropriate wheelchairs. It is known that folding frame wheelchairs are commonly prescribed in public hospitals in South Africa yet it is unclear as to what types of wheelchairs are provided in a private hospital in South Africa (21). Numerous research in other countries have also emphasised the importance of client involvement, client satisfaction as well as the importance of being functionally mobile in the wheelchair provided in order to achieve a satisfactory quality of life (18)(22). Since

there is limited research in South Africa in general with regards to appropriate wheelchair prescription, the need to explore these factors becomes apparent.

CHAPTER 2 – Literature Review

2.1 Introduction

This chapter will review wheelchairs and their biomechanical properties as well as the importance of appropriate wheelchair prescription and the factors affecting this. Research on the satisfaction with wheelchairs and the outcome measures used to assess this will be considered.

2.2 Importance of wheelchairs in occupational performance and quality of life

Spinal Cord Injury is followed by enormous life changes and risks (3). Medical complications and remaining impairment restrict mobility which often leaves a client with SCI with low motivation and reduced independence in mobility (13)(23). This in turn affects their participation and independence in activities of daily living (3). For this reason, it is vital that clients with SCI receive wheelchairs in order to promote independence and the return to pre-morbid activities as far as possible (3). It is essential that wheelchairs are chosen carefully, taking into account aspects such as the clients' environment, physical and psychological needs as well as the clients' individual preferences in order to promote a satisfactory quality of life (3) (7).

For a client with SCI, losing their ability to mobilise themselves independently becomes the greatest burden with which they are faced (13). To overcome this great burden, a wheelchair is almost always required (13). A wheelchair provides the client with a means to engage in previous occupations such as going back to work, engaging in recreational activities such as adapted sports or to allow for community reintegration such as going to the shops or church (13). Without a wheelchair, the client's quality of life can become severely compromised (24). Despite its usefulness, a wheelchair that is not well suited for clients' needs or environment in which they are expected to mobilise themselves in can restrict function rather than facilitate it (13). A wheelchair, especially for a client with SCI, needs to be more than just a means of transport, i.e. moving from one place to another but also a device that assists in promoting quality of life (24). It should allow for return to work, social interaction and restore a client's self-esteem among other things (20).

Community participation, i.e. being an active family member or community member, has been shown to be very important in gaining a satisfactory quality of life (18). Research has found that wheelchairs that are adequately fitted for clients with SCI

allow them to propel themselves faster and more efficiently; this in turn is directly correlated to their participation in community activities (25). The more efficiently clients with SCI can push their wheelchair the more likely they will socialise with other members of society and the more willing they are to go to various community places (25). In a study by Cooper, Ferretti, Oyster, Kelleher and Cooper (2011), significant positive correlations were found between the participants' ability to propel their wheelchair and their socialisation with community members ($r=0.77$)(25). They explained their findings by suggesting that if clients are able to access their desired community resources at a more efficient speed they would be more willing to access these resources as it would not provide such a challenge for them (25). An appropriate wheelchair and a wheelchair that was considered easy to push were factors that contributed to more efficient and effective propulsion (25). The researchers indicated some limitations to their study in that their sample size only consisted of 16 participants, which is very small, and consisted of mainly males, hence their conclusions could not be generalised to the whole SCI population (25). Further research into this would therefore need to be carried out in order to generate more substantial and reliable results.

Another study by Chan and Chan (2007) reiterated that better quality of life was associated with engagement in leisure activities and being able to socialise effectively (18). Similar to the previous study, they too stated that clients' ability to use their wheelchairs efficiently correlated with recreational and social activities and a better quality of life (18). They did however also find that external factors such as friends, colleagues and social activities within the community were more important in contributing to quality of life and revealed stronger associations with quality of life than the wheelchair did, even if the client had a SCI (18). A reason for this was that clients with paraplegia experienced fewer challenges in their environment and were able to overcome barriers eventually (18). Despite their sample size being slightly larger than the previous study, it was still relatively small and the researchers also commented on requiring a bigger study sample for further research to be conducted (18). Their results are interesting and need to be considered as wheelchair satisfaction is usually perceived to be an important aspect in the prescription of a wheelchair. However, wheelchair satisfaction was found to be less important in this study than social participation.

In another study positive experiences and a better quality of life was noticed among clients who had suitable wheelchairs that allowed for easy use and good fit; hence appropriate wheelchair prescription was found to be an important factor in improving

quality of life and satisfaction (26). In this study a larger sample size was used as compared to the other two studies (32 participants), creating more statistically significant results. The participants in the larger study were asked about their perceived quality of life and the results showed that improved quality of life and psychosocial benefits were noted through participation in sports (27). These positive experiences were particularly noted among clients who had suitable wheelchairs that allowed easy use and good fit (28).

Another aspect that has been shown to influence quality of life in clients with SCI is return to work after they sustained their injury (29). Clients with SCI who have returned to work have reported better health, a greater sense of wellbeing, less use of health services and better ability to make friends than clients with SCI who do not return to work (29). There are numerous factors that influence return to work, namely age, level of injury as well as the level of wheelchair skills (29) (30). In a study by Van Velzen, Van Leeuwen, De Groot, Van Der Woude, Faber and Post (2012), it was found that wheelchair skills had a definite correlation with return to work in clients with SCI and that wheelchair skill in itself was influenced by the environment, physical skill and the actual quality, design and fit of the wheelchair (29)(31). Hence an appropriately suited wheelchair is of importance in returning to work, thereby promoting improved quality of life.

It becomes evident that in all areas of life, an appropriate wheelchair that allows for easy and efficient use is of importance to achieve better quality of life. However what happens if a wheelchair is not appropriately prescribed?

2.3 Consequences of inappropriate wheelchair prescription

Studies have found that if a wheelchair is poorly suited for a client's needs, it affected his/her activity participation and participation in daily life tasks, aspects which are of concern in all occupational therapy outcomes (11). An incorrect wheelchair was shown to not only inhibit the ability of clients with SCI to reach their goals, but also decreases their health and results in more costs due to complications (8) (11).

Mukherjee and Samanta (2005) found that one third of their study population abandoned their prescribed wheelchairs as their wheelchair was unsuitable and debilitated the participants further rather than improving their independence (17). Wheelchairs were found to be abandoned due to various reasons which will be explored further.

2.3.1 Inappropriate wheelchair prescription leads to wheelchair abandonment

A recent study has shown that 31% of clients using wheelchairs abandoned their wheelchairs as it did not meet their specific needs (16)(20)(32). The primary causes for abandonment of the wheelchairs in clients with SCI was the lack of client involvement in wheelchair prescription, the lack of concern for their lifestyles to which they were returning, and the lack of consideration of the clients' preferences. (20)(24). Again due to the small sample size, the study cannot be generalised and so research with a larger number of participants is recommended (32). In addition a distinction between private and public hospitals was not provided in the study which the researchers suggested could be another factor to be considered in a future study (32).

2.3.2 Inappropriate wheelchair prescription leads to low self-esteem

A poorly fitted wheelchair has been highly correlated with low self-esteem and a poor self-image (3)(21). Poor posture in the wheelchair makes the wheelchair user look even more disabled and exacerbates the fact that the person in the wheelchair looks different from others (3)(21). Hence the wheelchair needs to be aesthetically pleasing to the client (24). In a study done by Krantz, Persson, Lindgren and Bolin (2011), it was found that participants felt that the appearance, design and aesthetics of the wheelchair should be emphasised more as it enhanced their self-esteem and made them feel more confident (24). Despite there being definite evidence suggesting that appearance and design are important for clients requiring a wheelchair, prescribers often lack knowledge concerning the availability of wheelchairs and often do not consider user preference enough (24). Krantz et.al (2011) found that over 75% of the wheelchair prescribers did not view colour and design of wheelchairs as important factors to consider during wheelchair prescription, which contradicts the views of wheelchair users (24). Since self-esteem is a large contributor to well-being and quality of life it is a necessity that clients with SCI's are considered during the wheelchair prescription process (3).

Another critical problem in the prescription of wheelchairs is that the environment to which the client with SCI returns is not always recognised.

2.3.3 Inappropriate wheelchair prescription as a result of environmental constraints

In many developing countries, in which significant environmental limitations exist, wheelchairs have been found to be abandoned due to their incompatibility with the environment (17). Wheelchairs that have been prescribed without considering the client or his/her environment are often unable to withstand the terrain in the client's surroundings resulting in damage and thus abandonment (17). A study carried out in

Brazil (2009), found that clients with SCI were often faced with environmental barriers as public as well as private places were not suitable for clients with disabilities (33). These barriers included poor access to public transportation and poor access to buildings or sidewalks as the ramps were not suitable for wheelchairs (33). Faced with these barriers, wheelchair users become frustrated with their situation and, since little can be done to improve the public environment, may abandon their wheelchairs (17)(34).

2.3.4 Inappropriate wheelchair prescription leads to physical complications

Lastly, wheelchair abandonment has been strongly correlated with poor physical well-being as a result of an inappropriate wheelchair. The client's physical characteristics are of importance when prescribing a suitable wheelchair and therefore need to be taken into account (12). A SCI in itself often leads to complications such as spinal deformities, pressure sores or back and upper body pain, and the wheelchair should therefore aim to reduce such pain and not exacerbate it (12). It is important that the wheelchair, together with the cushion, provide equal weight-bearing on the ischial tuberosities (sitting bones) as uneven weight bearing results if there is insufficient postural support provided by the wheelchair (21)(35). This leads to an increase in pressure and sliding forces under the ischial tuberosities which in turn results in an increased risk of a pressure sore developing (21)(35). Poor postural support in the wheelchair has also been shown to compress internal organs making it difficult to breathe, for example, and may impede effective digestion (21). Poor posture also results in poor head position in space and may reduce effective social interaction (21). Poor positioning in the trunk will directly affect upper limb function making it more difficult for the wheelchair user to effectively propel the wheelchair and participate in daily life tasks (21)(35).

Numerous studies have shown that a client who does not have an appropriate wheelchair has an increased risk of developing such complications (12). In a survey conducted in the Western Cape for the World Health Organisation (WHO) (2009), 80 percent of wheelchair users surveyed required specific back support; however the survey showed that this was often disregarded (21). In addition the need for an appropriate pressure relieving cushion is also often ignored which may lead to an increased risk of developing a pressure sore (21). Analysing the clients' physical abilities and difficulties are thus of importance in prescribing a wheelchair.

Ultimately, the evidence emphasises the significance of involving the client with SCI in wheelchair prescription and the need to carry out in-depth assessments as poor

execution of these will lead to dissatisfaction with the wheelchair, wheelchair abandonment and a poor quality of life, which is not a desirable outcome for occupational therapists in the rehabilitation process of their clients.

2.4 Appropriate wheelchair prescription

Finding a wheelchair that suits a client's needs and environment is often a difficult task (13). However numerous guidelines are available to assist occupational therapists in the prescription and provision of a suitable wheelchair for clients with SCI. EnableNSW and Lifetime Care and Support Authority (2011), for example, developed guidelines in prescribing an appropriate wheelchair for clients with SCI (11). These guidelines focus on the ICF framework which was designed to provide health care professionals with a standard language in which health and health related issues are described (11). The ICF is a broad framework which does not only focus on disability (health conditions/impairment) but also emphasises the importance of the external environment (resources and barriers) and the implications personal factors (personality, age, gender, education level etc) have on a client (11). Occupational therapists draw on the ICF in order to remain holistic in their approach towards their clients. The same framework is thus also a beneficial tool to use during the prescription of a wheelchair as it forms part of the assessment of the client with SCI.

Most studies are in agreement that occupational therapists need to consider the following aspects during the prescription of an appropriate wheelchair:

- The client's age, size, weight and height;
- The client's disability and prognosis;
- The client's functional abilities;
- The client's preferences;
- Environmental demands;
- Types of wheelchairs available; and
- Funding. (13) (21) (36)

Since there are so many aspects that need to be considered, the occupational therapist is faced with a multi-dimensional challenge during wheelchair prescription (13).

Hence appropriate assessment of each aspect needs to take place in order to successfully address this challenge. The client should be assessed in a variety of settings within the hospital as well as at home and in their community if possible (11).

A physical assessment of the client should include: diagnosis, medical history, specific muscle strength, balance, muscle tone and spasm, endurance and range of motion assessments, body anthropometrics (weight, height, limb length, and symmetry), any complications (e.g. fixed deformities, ossification, hypotension), bowel and bladder function, cardiovascular, respiratory function and swallowing ability (11).

Behavioural considerations such as determining the client's level of motivation, his/her acceptability of the condition and his/her stage of acceptance influences the type of wheelchair best suited for the client (11). Careful assessment of these aspects is thus vital (11). A client that is not motivated to constantly propel his/her wheelchair, for example, will not benefit from a manual wheelchair and the possibility for a motorised wheelchair should then be considered.

Cognitive and perceptual assessments need to be considered if the client appears to have any cognitive or perceptual fallout as these factors will impact on the client's ability to mobilise him or herself in the wheelchair (11).

In addition, when following the ICF framework and the guidelines that were established to assist in wheelchair prescription, it is important to assess the environment to which the client with SCI will return. Wheelchairs need to suit the environment as the wheelchairs frame type, overall length, wheelbase, rear wheel and front castor size, as well as the wheelchair's stability, changes in accordance to the environment. These aspects will be explored further.

2.4.1 Types of wheelchairs and biomechanical properties

Recent statistics have indicated that access to wheelchairs is becoming an increasing challenge due to health insurances and medical aids implementing more and more budget cuts in order to save money (15). Unfortunately wheelchairs are becoming increasingly affected by this which results in wheelchair users not receiving the wheelchair they need (15). As a result of the advancements in wheelchair technology, it is becoming ever more difficult to choose a correct wheelchair for a client; hence therapists often face a daunting task (14) (15). The following paragraphs will outline the different types of wheelchairs and their biomechanical properties in order to demonstrate the complexity of wheelchair prescription. They will also outline the reason that clinicians trained in this field should be prescribing wheelchairs.

There are generally two types of wheelchairs: the folding frame and rigid frame wheelchair.

2.4.1.1 Folding frame wheelchair

The folding frame wheelchair is suitable for clients who are not active wheelchair users and is designed for clients who only require a wheelchair for short-term use, unlike clients with SCI who require the wheelchair for long-term use. The folding frame wheelchair has limitations as it is not easily propelled outdoors and also provides minimal postural support. The folding frame wheelchair has a short wheelbase making it difficult to propel over uneven and rough terrain. The overall length of the standard folding frame wheelchair is longer than a rigid frame wheelchair which makes it more difficult to manoeuvre indoors and in tighter spaces. Wheelchair propulsion is also made difficult since the rear wheel with which the client needs to push in order to mobilise him- or herself is located behind the client, forcing the client's shoulder into extension. This forces the trunk to move forwards resulting in poor posture. The development of secondary complications such as shoulder injuries and postural deformities is therefore higher for a client using a folding frame wheelchair. Since the wheelchair is not designed for active use, it breaks easily and replacement of such a chair is necessary much sooner than is the case with the rigid frame wheelchair. Unfortunately, since this wheelchair is the cheaper of the two types, it is the most widely used wheelchair in South Africa. (21)

2.4.1.2 Rigid frame wheelchair

The rigid frame wheelchair is considered the more active wheelchair and is favoured among clients with SCI (37). The rigid frame wheelchair has been shown to be more durable and stronger than the folding frame wheelchair (37). There are various types of rigid frame wheelchairs.

The ultra-light wheelchairs such as the Tilite, Quickie or Panthera wheelchairs have shown to preserve upper limb function due to the ease with which propulsion occurs (37)(38). These wheelchairs are made out of aluminium, carbon fibre or titanium, both materials lighter and stronger than steel (38). Aluminium can be painted in different colours depending on the client's preference which can make the wheelchair aesthetically more pleasing (37). Titanium, from which the Tilite wheelchairs from the US are made, is more expensive but has shown to be more durable, stronger and lighter than an aluminium or steel wheelchair (38), out of which a Custom-lite rigid frame wheelchair supplied by Chairman Industries in South Africa and a Rollability MK2/3 rigid frame wheelchair supplied by CE mobility in South Africa are made. It can also be made according to the client's needs. In a study done by Fitzgerald, Collins, Cooper, Tolerico, Kelleher, Hunt, Martin, Impink and Cooper (2005), it was found that more than 95 percent of veterans in the US who required a wheelchair for mobility used

the ultra-light wheelchairs (38) (39). Despite its cost, it is a favoured wheelchair among clients in the US as clients indicated that they had more energy and felt less tired using this wheelchair and thus they felt it more cost-effective (38). In another study carried out by Beekman, Miller-Porter and Schoneberger (1999) it was found that participants demonstrated better speed, travel distance and used less energy with ultra-light wheelchairs compared to other wheelchairs, which supports the study done by Fitzgerald et al.(26). They did however comment that they did not consider other variables that may have improved their wheelchair function such as the seat-to-wheel position, wheel camber and so further research incorporating these aspects would need to be considered in order to make more accurate conclusions (26). The study sample of 70 participants was, however, of adequate sample size, allowing for greater statistical power (26). Not only does the ultra-light wheelchair produce better function but it has also shown to be more durable which in the long term should be considered. Research in 2001 has shown that the ultra-light wheelchair's durability was 3.4 times longer than other rigid frame wheelchairs, thus being more cost-effective in the long run (37).

The great advantage of the rigid frame wheelchair is that it can be custom made to suit each client, thus taking the aspects which allows for appropriate wheelchair prescription into account.

Not only does the frame type and material of a wheelchair affect function but the way the wheelchair is configured will contribute to a wheelchair user's mobility (40). The specific wheelchair components are related to one another; hence a slight change in one component will affect other components (40). The different components affecting mobility will now be discussed:

Backrest height influences trunk support and affects the client's arm function. What this means is that a higher back support will provide more trunk stability but may limit the range at which the arms can move and vice versa, hence clients with SCI will need to be assessed carefully in order to determine the most effective backrest height for their function. Usually a higher backrest will be considered with a higher level of injury, while a lower backrest height will be considered for clients who have more trunk strength, i.e. a lower level of injury. (40)

The seat and backrest angle affects the wheelchair user's sitting balance and reaching ability, i.e. the more reclined the angle, the more secure the client will feel in the wheelchair, but the more difficult it will be for the client to lean forward to reach for something. Seat and backrest angle are therefore important in promoting function. (40)

The **positioning of the rear wheels** will also have a considerable effect on the client's ability to propel the wheelchair (40). The more stability the client requires, the more the rear wheels will be set back, which will in turn reduce the client's ability to push the wheelchair (40). Thus the rear wheel setting is client dependent. A more active wheelchair user requires less stability in order to manage more advanced wheelchair skills whereas a new wheelchair user who is more fearful and anxious of falling requires more stability, and the rear wheels will thus be set back (41).

The client's **seat height, push angle and push frequency** have been shown to affect each another. If the seat height is higher, a decreased load on the arms will be applied preventing overexertion on the arms whereas a lower seat height will result in easier pushing ability. Again the client will need to be consulted in determining the best option for the client. (40)

The **camber on the rear wheels** enhances manoeuvrability. The angle at which the cambers are positioned will affect wrist movement and will affect the wheelchair's turning circle (40). These adjustments need to be made to suit the client's needs and the environment to which the client will return. A client that needs to negotiate tighter spaces within his/her living environment will need a wheelchair where the turning circle is smaller and more efficient.

Different types of **rear wheels** exist depending on the client's needs. The wheels have an impact on the mass and vibration transmission. Research regarding the influence of the wheels' weight is controversial. Some studies have indicated that mass plays a role in wheelchair propulsion whereas others have reported that weight of wheels has no effect on wheelchair propulsion. Wheels are commonly made out of plastic or steel. Newer wheels are made out of carbon fibre which has proved to reduce vibration transmission. This is of importance as a lot of vibration caused by the wheelchair has been shown to cause dizziness, nausea, fatigue and increased tone. There are also different tyre types: solid or pneumatic tyres. Solid tyres are still the preferred type as there is less risk of punctures and require less maintenance. Pneumatic tyres are more comfortable as they absorb more vibration. (40)

Caster wheels are important in that they influence rolling resistance, stability, turning and comfort (40). The smaller wheels increase rolling resistance making it easier to push indoors while the larger wheels allow for more efficient pushing over uneven terrain like sand (40). Determining the environment to which the client is going back is thus of utmost importance as clients living in rural areas will not benefit from castors that are small and difficult to push through uneven terrain.

Correct **foot positioning** in the wheelchair ensures comfort, stability and allows for even pressure distribution which is important in the prevention of pressure sores. Generally research has found if the feet are positioned in such a way that the knee angles range from 90 to 120 degrees, then appropriate pressure distribution results. (40)

Lastly, the **hand rim** design is important as it allows for comfortable and efficient wheelchair propulsion (40). In recent years, hand rims have become increasingly smaller in diameter; however, research has found that this creates reduced efficiency and more pressure on the hands during propulsion (40). Van der Linden, Valent, Veeger and van der Woude's results (1996) showed that a greater diameter in the tubing of the hand rims provided more efficient propulsion and less pressure on the hands which is supported by another study that reported that increased comfort was felt in hand rim surfaces that were wider (40) (42).

Once a wheelchair has been properly set up for the client with SCI according to the biomechanical properties that were discussed, an optimal cushion needs to be selected. Research has shown that a wheelchair cushion should always be prescribed in conjunction with the wheelchair and that they should be seen as one entity in order to ensure optimal seating in the wheelchair as this prevents secondary complications that often arise after SCI (13). In order to provide an optimal cushion and to ensure that the client is correctly seated in the wheelchair, many countries have opted to carry out specific seating clinics/assessments (30).

The first seating clinic was established at the Spinal Cord Unit in Norway in 2005 (30). Its main purpose was to provide the wheelchair user with knowledge on the pressure to which the skin of the seating area is exposed in order to prevent the occurrence of a pressure sore (30). The seating assessment is usually conducted by a team of therapists (occupational therapists and physiotherapists) in order to provide the wheelchair user with a holistic approach with regards to their seating problems and to discuss ways in which to reduce these problems by providing insight into seating habits, use of different cushions and wheelchairs (30). In a study done by Taule, Berfjord, Holsvik, Lunde, Stokke, Storlid, Sorheim and Rekand (2013), it was found that regular seating assessments along with education resulted in less frequent occurrence of secondary complications such as pressure sores and postural deformities (30). The study also found that the type of wheelchair had a definite impact on their seating pressure, indicating the extent to which wheelchair and cushion go hand in hand and why they need to be seen as one entity (30).

Since there are so many factors to consider during wheelchair prescription the need for clinicians to be properly trained in wheelchair prescription becomes more and more evident. Therapists need:

- to be efficient and thorough in their assessments of the client;
- to be knowledgeable about the type of wheelchairs that exist and the different suppliers that provide wheelchairs;
- to know about the biomechanical properties of the wheelchairs in order to adjust them appropriately for the client;
- to be able to teach the client adequate wheelchair skills so that the client can be functional in the wheelchair;
- to show the clients how to do basic repairs on their wheelchair; and
- to provide the clients with knowledge on what to do if the wheelchair needs to go in for repairs or servicing (13) (21) (22).

All these services need to be provided in order to ensure appropriate wheelchair prescription. Unfortunately this is not always the case. In one study that explored the prescriber's experience of active wheelchair provision in Sweden, the wheelchair prescribers reported that they felt that they lacked knowledge in the provision of an appropriate wheelchair (24). In another study in which the wheelchair users' satisfaction with service delivery was explored it was reported that the wheelchair users felt they had more knowledge regarding wheelchairs than their actual prescribers (43). These statistics are of concern as this greatly influences appropriate wheelchair provision and ultimately will affect the clients' quality of life.

Regardless of whether trained professionals are prescribing wheelchairs or not, there is another great challenge with which clients with SCI are faced when it comes to receiving an appropriate wheelchair. Latest research has suggested that the funding of wheelchairs is still a major concern in both developed and developing countries (3) (15) (16) (18).

2.4.2 Funding

In South Africa, clients with SCI who are in private hospitals either purchase their own wheelchair, have a medical aid that covers the cost of a wheelchair or receive their wheelchair through various sponsorship means, such as charity organisations as well as medical aids and through self-funding (44). This makes it difficult to acquire reliable statistics on whether appropriate wheelchairs are provided (44). Medical aids often do not dedicate a specific amount of funds for assistive devices and clients needing a

wheelchair are required to access their medical savings to cover the costs of an appropriate wheelchair (44).

In addition, research in the US indicates a new trend whereby rental equipment is preferred to wheelchairs being prescribed (15). This is alarming as it does not allow for proper customisation of the wheelchair which is necessary in order to accommodate for the clients' individual preferences and needs (15). Health insurers in the US have increasingly been cutting costs in respect of wheelchairs in order to save money (15). Another problem that has been found with health insurances is that the people responsible for approving or declining wheelchairs generally have very limited knowledge with regards to wheelchairs or clients with SCI (15). For this reason the wheelchairs necessary for the greatest well-being of the insured client are not approved. While there appear to be similarities experienced in South Africa, there is no substantial evidence to prove this.

2.4.3 Outcome measures used to determine an appropriate wheelchair

Funding agencies, i.e. charities, medical aids and insurance companies, are increasingly requiring reasons and motivations for the need for prescribed equipment and therefore the use of reliable outcome measures becomes more important (14)(45).

Occupational therapists are urged to use valid and reliable outcome measures in order to substantiate the need for their professional expertise and in order to objectively show the client's progress in therapy. Using objective measures allows for evidence-based practice to take place and has become a part of standard practice in many countries (46). Outcome measures also objectively substantiate progress and show what appropriate assistive devices can enhance function in everyday tasks to the medical aids/insurance companies (47). Medical aids and insurance companies are urging the use of more outcome measures so that they are able to see why they need to approve a certain number of treatment sessions or why they need to approve certain assistive devices (16).

The choice of such outcome measures is difficult as there are many from which to choose (14). When choosing an outcome measure, it is important to ensure that it is in line with the ICF framework so that activities, participation and the environment are included (14). In addition the appropriateness of a wheelchair is dependent on its impact on the client's function in everyday life (11).

A review of various outcome measures was conducted in 2008 in order to determine whether the outcome measures to date are applicable to determine appropriate wheelchair prescription and functional mobility in the wheelchair (14). In this study, five

measures were considered and 11 were included in the final review (14). The study done by Mortenson, Miller and Auger, 2008, concluded that the present outcome measures were still very new and that further investigation into wheelchair-specific outcome measures were needed in order to determine an appropriate wheelchair for a client with a SCI (14). However, the review did indicate that out of the 11 outcome measures reviewed, only three tools, i.e. the Functional Evaluation in a Wheelchair Questionnaire (FEW-Q), the Wheelchair Users Functional Assessment measure (WUFA) and the Wheelchair Outcome Measure (WhOM), specifically focused on activity and participation in line with the ICF (14). With all outcome measures, reliability was positively correlated; however validity of all outcome measures remains inconclusive due to insufficient research (11).

2.4.3.1 Functioning Everyday with a Wheelchair Questionnaire (FEW- Q)

The FEW– Q is a questionnaire that was developed to determine the client’s seating and mobility in the wheelchair (48). It was used to determine the client’s perspectives with regards to their functioning in the wheelchair (48). The FEW- Q includes involving body function, activity, participation as well as environment (48). It is measured on a six point scale (from 1=completely disagree to 6=completely agree) (14)(48)(49). Clients are questioned about their satisfaction regarding various wheelchair features: stability, durability, dependability, size, fit, postural support as well as their satisfaction with their ability to manage functional tasks (ability to reach for something at different heights, transfers, self-care, indoor mobility, outdoor mobility and public/private transportation) (49). The FEW- Q has yielded significant inter-rater reliability (ICC=0.86-0.99) (48). Content validity was also reported to be sufficient among wheelchair users; however construct validity was not reported (14). The administration time of the FEW- Q is approximately 15 minutes and it is easily available online (14). The disadvantage of this tool is that it does not include the type of wheelchair that is used by the client and is a highly subjective outcome measure (14)(49).

2.4.3.2 Wheelchair Outcome Measure (WhOM)

The WhOM was designed with the intention of improving clinical use by making the scoring simple and focused largely on wheelchairs and wheelchair seating (20). Its purpose was also to ask questions regarding participation of the client in everyday life as well as incorporate aspects of body structure and function (50). The WhOM is completed by the client and determines the level of satisfaction with performing an activity in a wheelchair, and thus measures performance subjectively (14). The intra-rater and inter-rater reliability of the WhOM is good (ICC=0.93 and ICC=0.91 respectively) (14). Content validity of the WhOM was measured among health

professionals and wheelchair users and was found to be good (14). Construct validity was established through comparing the WhOM with the Quebec User Evaluation With Assistive Technology (QUEST) and was found to have a correlation of 0.58 (14). The advantage of this type of tool is that it also focuses on the contribution of the type of wheelchair in carrying out activities. Other outcome measures do not do so (14).

2.4.3.3 Wheelchair Users Functional Assessment (WUFA)

The WUFA assesses the client's functional mobility in the wheelchair as well as their ability to access the community in the wheelchair (51). The test was developed with the objective of being easy to administer, score and applicable to a wide range of clients with SCI (52). The WUFA also assesses the client's actual functional mobility in the wheelchair, which provides more of an objective measure, contrary to the WhOM and FEW-Q which are both subjective. The test consists of thirteen items directly related to everyday functions. These include the following tasks: pushing through a tight space, uneven terrain, door management, street crossing, ramp, curb, bed transfer, toilet transfer, floor transfer, bathing, upper and lower dressing, reaching function and picking up objects/sweeping (51). Content validity was established through a panel of six physical therapists for the 13-item test (51)(52). Inter-rater as well as intra-rater reliability have shown to be adequate for the WUFA (51)(52). A high internal consistency (standardised coefficient $\alpha=0.96$) was also established for the WUFA (51)(52). Since this outcome measure allows for easy administration and scoring, and the fact that it is an objective measure that has shown to be reliable and valid, makes it a useful outcome measure to use.

2.4.3.4 The Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0)

The QUEST 2.0 measurement tool was developed to investigate the satisfaction of clients with SCI with regards to their prescribed wheelchair (53). The tool was designed to determine how satisfied the client is with different aspects of the assistive device they have been issued; it does not measure the client's performance with their assistive device (53). Studies have shown that measuring client's satisfaction with regards to their issued assistive device was a vital predictor for long-term use of that assistive device (54). Many therapists worldwide are of the same view that measuring a client's satisfaction with their assistive device, particularly their wheelchair, is important (54). An international content validation was done on the QUEST 2.0 and it was found that the test was sufficiently sampled according to the different dimensions of satisfaction with assistive devices (54). Content validity ranged from 0.5 to 0.9 (54). Inter-rater

reliability of the QUEST 2.0 was assessed and correlation coefficients were found to be 0.89, 0.76 and 0.91, which shows substantial reliability (4).

Despite the advantages of using an outcome measure to facilitate appropriate wheelchair prescription, numerous barriers have been reported which result in poor use of outcome measures. A study done by Swinkels, Van Peppen, Wittink, Custers, Beurskens (2011), showed that outcome measures are often too expensive and require specific resources that many hospitals/health care facilities do not have (47). They also found that therapists complained of outcome measures taking too long to administer and that they felt that they often did not know which measurement tools were appropriate (47). Many therapists also lacked knowledge on how to administer specific measurement tools (47).

It becomes evident that the many factors needing to be considered in order to make an appropriate wheelchair prescription and to provide the client with the best possible outcome in order to facilitate his/her reintegration into his/her life makes prescribing a wheelchair a challenge that requires considerable skill, experience and expertise on the part of the occupational therapist. Moreover, it is a client's right to expect and demand an appropriate wheelchair, even in developing countries such as South Africa.

In South Africa, specific guidelines developed by the National Department of Health (2003) need to be followed when prescribing a wheelchair (55). These guidelines were developed in line with the World Health Organisation (WHO) Wheelchair Guideline document and the United Nations (UN) Convention on the Rights of Persons with Disabilities (55). These guidelines state that every person with a disability has a right to an appropriate wheelchair, services and to be managed by staff who are adequately trained (21)(55).

Thus according to South African guidelines, only adequately trained rehabilitation providers, such as occupational therapists and physiotherapists are allowed to order and distribute wheelchairs (55). It should be standard procedure that all new graduates be required to undergo specific training in the issuing of wheelchairs just after they have been employed (55). If these guidelines are not followed and an inappropriate wheelchair is provided, it is in essence a violation of the human rights of the client with SCI as it affects the quality of his/her life (44).

In order to determine whether clients with SCI have received an appropriate wheelchair, determining the clients' subjective feelings towards their wheelchair is a valuable tool in promoting client-centred therapy (3)(22). Thus determining the clients'

satisfaction levels with their wheelchairs is important to consider during wheelchair prescription.

2.5 Importance of wheelchair satisfaction during the wheelchair prescription

There are various studies that have explored clients' satisfaction with their wheelchair which will now be evaluated.

Bergstroem and Samuelsson, 2006, carried out a study where they specifically explored the clients' satisfaction with their manual wheelchairs focusing on clients with SCI (22). The study carried a large sample size of 126 participants indicating that the results yielded significant statistical influence (22). It was a cross-sectional study exploring whether there were any associations between the participants' level of satisfaction and the wheelchair ergonomics (22). Conclusions were that ease of use and the ability to propel the wheelchair were highly correlated with each other and that it was important that clients were satisfied with their comfort in the wheelchair during the participation in activities (22). Both of these aspects indicate the importance of wheelchairs being correctly suited to the client. The researchers of the study reported that the QUEST 2.0 was a useful measurement tool to use and that it was simple to administer (22). They did however criticise the QUEST 2.0 for lacking questions regarding the environment in which the participants needed to use the wheelchair, and how the participants responded to different activities in the wheelchair; hence they added additional questions to their research (22). Overall, over 80% of the participants were satisfied with their wheelchairs (22).

Another study in which wheelchair satisfaction relative to active lifestyle and participation in clients with SCI was explored found that there was also a high level of satisfaction with the wheelchair in clients with SCI in Sweden (19). The total sample size was also quite large (N=109) which also allowed for reliable statistics (19). In contrast to the other study which explored the association between satisfaction and wheelchair configuration, this study explored whether there was a relationship between the participants' satisfaction and their participation in activities (19). Whereas the other study found strong correlations, this study found the exact opposite, i.e. that there was no relationship between the participants' satisfaction and their engagement in activities (19)(22).

This finding was also found to be true in another study conducted in China where there was a poor relationship between the clients' satisfaction and their perceived

participation in the community (18). Compared to the other two, this study was very small (N=31), which was viewed as a limitation to their study (18).

Despite conflicting results with regards to whether wheelchair satisfaction and functional mobility in the wheelchair are correlated, the studies have shown how effective determining the clients' satisfaction levels are as it has provided the therapists with insight into what aspects are important to consider in wheelchair prescription.

Even though there is evidence in numerous countries indicating a high level of satisfaction with wheelchair prescription, it is unclear whether clients in South Africa are experiencing the same level of satisfaction as no evidence was found to determine this.

2.6 Current problems with prescribing appropriate wheelchairs in South Africa

A major concern facing South Africa in prescribing appropriate wheelchairs that enhance self-esteem and quality of life is that wheelchair prescribers, i.e. therapists, often lack adequate knowledge regarding the types of wheelchairs that are available. This is despite the fact that South Africa provides numerous seating courses in order to improve therapists' knowledge regarding wheelchair prescription and wheelchair seating (24)(34).

Not only do therapists lack knowledge on the types of wheelchairs that are available, they also lack knowledge on particular outcome measures that could assist them in selecting an appropriate wheelchair that assists their clients in their everyday life tasks (47). In South Africa, there is no research that indicates whether therapists are using outcome measures to assist in appropriate wheelchair prescription for clients with SCI. South Africa also lacks research as to what outcome measures are appropriate to use in a South African setting that specifically relates to assisting in the selection of an appropriate wheelchair for clients with SCI.

As mentioned previously, many clients with SCI who rely on medical aids/insurances are experiencing budget cuts towards their wheelchairs and are thus not prescribed the wheelchair initially chosen (15). With the use of rental equipment increasing, customisation of wheelchairs is decreasing which leads to poor wheelchair fit and ultimately a poor quality of life for the client needing a wheelchair (15). Unfortunately there are also no specific statistics in South Africa as to whether appropriate wheelchairs in the private hospitals are being prescribed.

Ultimately, South Africa lacks research as to whether clients with SCI are being prescribed an appropriate wheelchair that allows them to be able to perform their

everyday tasks functionally and whether the wheelchair they have been prescribed is satisfactory.

Hence this research will serve to explore whether clients with SCI are involved in the prescription of their wheelchair as this has shown to yield better quality of life and satisfaction in research carried out in other countries (18)(22). This research will determine whether clients are satisfied with the wheelchair they have been prescribed and whether they are able to use their wheelchair in everyday tasks. In addition since research has shown that the type of wheelchair influences the client's functioning, this will be explored too (21). Two outcome measures will be used to determine satisfaction with wheelchair prescription and functional mobility in the wheelchair, namely the QUEST 2.0 and WUFA. These outcome measures were chosen as they have shown considerable reliability and validity in other developing countries (4)(54)(56).

2.7 Summary of Chapter

The review of the literature has provided insight into the importance of an appropriate wheelchair enhancing the quality of life in clients with SCI, where their only form of mobility is a wheelchair (18) (33). Literature has provided evidence into the negative impact an inappropriately prescribed wheelchair has on a client with SCI, namely that a poorly suited wheelchair can result in secondary physical and psychological implications, poor quality of life, wheelchair abandonment and ultimately increased costs in order to address the medical problems arising from an inappropriate wheelchair (3) (14). In order to prevent inappropriate wheelchair prescription, the importance of an in-depth assessment of the client and his/her environment is emphasised. Along with this a thorough understanding of the different wheelchairs and the biomechanical properties of wheelchairs is expected and described in this chapter (57). Finally relevant outcome measures pertaining to wheelchair mobility are discussed and the importance of client satisfaction as indicated in previous literature is described.

CHAPTER 3 – Research Methodology

3.1 Research Design

A descriptive non-experimental correlational research design was used in order to investigate whether there was a relationship between the participants' level of involvement in wheelchair prescription, the type of wheelchair prescribed and the participants' satisfaction with their wheelchair and their functional mobility in daily life. The same type of research design was also used in order to determine whether there was an association between the participants' satisfaction with their wheelchair and their functional mobility in daily life. The results of the study will provide clinicians, particularly occupational therapists, with more insight into what aspects clients deem to be important during wheelchair prescription. It will also provide insight into whether occupational therapists in private hospitals are client-centred by involving clients in wheelchair prescription and whether they are prescribing appropriate wheelchairs. Since previous studies conducted in Sweden and China have yielded conflicting results in the relationship between clients' satisfaction levels with their wheelchair and their participation in daily tasks (18)(22), it would be of interest to determine what results a private hospital in a South African context would yield. In addition, since evidence has also shown that the type of wheelchair prescribed influences participation in daily tasks, it would be beneficial to determine whether this is also true for clients in a private hospital in South Africa. The study was not a true experiment as there was no random assignment of subjects; hence it is a descriptive non-experimental research design.

3.2 Population

All clients with SCI in South Africa that fell within the American Spinal Injury Association (ASIA) Impairment Scale of A, B, C and D and required a manual (non-motorised) wheelchair for functional mobility formed the study population. The ASIA Impairment Scale classifies the client's neurological severity as a result of their SCI (57). The aetiology and level of injury in a client with SCI was not taken into account as literature has indicated that all clients with SCI who need a wheelchair for functional mobility require an appropriate wheelchair (3)(18)(58).

3. 3 Type of Sampling

The type of sampling used was a total population purposive sampling. One private hospital was recruited over a period of 11 months in which forty participants formed part of the total study sample. The sample size used was the total number of participants falling within the criteria that were current clients within the hospital during the period of 11 months.

The study was done at the Netcare Rehabilitation Hospital, a private hospital in Johannesburg, South Africa. The hospital specifically caters for clients in need of physical rehabilitation services (59). It forms part of the Netcare Hospital group in South Africa and is situated in Auckland Park (59). The Netcare Rehabilitation Hospital focuses on clients with the following conditions: Spinal cord injuries, traumatic brain injuries, cerebrovascular accidents, polytrauma, amputations, neurological conditions, burns, near drowning cases and general weakness (59). This hospital was chosen for the study as it caters specifically for clients with SCI.

Table 3.1 Inclusion and exclusion criteria for Study Population

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none">• Clients with SCI older than 18 years• A minimum of three months using the prescribed wheelchair	<ul style="list-style-type: none">• None

*A minimum of three months using the prescribed wheelchair was a prerequisite in order to ensure that the participants were comfortable and functionally mobile in their wheelchairs.

3. 4 Measurement Tools

3.4.1 Demographic Questionnaire (Appendix A)

A demographic questionnaire was used to gather demographical information from each participant. The participant's age, gender, level of injury and the client's classification according to the ASIA Impairment Scale formed part of the demographic questionnaire. The hospital that prescribed the wheelchair, years/months of experience in the prescribed wheelchair, type of prescribed wheelchair, involvement in wheelchair prescription, seating assessment, wheelchair cushion, modifications to the wheelchair and how the wheelchair was funded also formed part of the demographic questionnaire so that some general information regarding the wheelchair was included.

3.4. 2 Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) 2.0 (Appendix B)

The QUEST 2.0 measurement tool was used to investigate the satisfaction of clients with SCI with regards to their prescribed wheelchairs (53). The tool was designed to determine how satisfied the clients are with different aspects of the assistive devices they have been issued; it does not measure the clients' performance with their assistive devices (53). The QUEST 2.0 is divided in two parts: eight items relate to the device and four items to the services that were provided with regards to the assistive device (7). Each question in the QUEST 2.0 is scored according to a five-point satisfaction scale; one denotes "not satisfied at all" and five "very satisfied" (7). Subsequently the three most important aspects influencing satisfaction from the twelve items that were presented in the questions are chosen (7).

An international content validation was done on the QUEST 2.0 and it was found that the test was sufficiently sampled according to the different dimensions of satisfaction with assistive devices (54). Content validity ranged from 0.5 to 0.9 (54). Inter-rater reliability of the QUEST 2.0 was assessed and correlation coefficients were found to be 0.89, 0.76 and 0.91, which shows substantial reliability (4).

Demers, Weiss-Lam and Ska (2002), found that the QUEST 2.0 is a suitable measurement tool to use to compare with other measurement tools (4). Since one of the objectives was to investigate the association between the clients' satisfaction with the use of their prescribed wheelchairs and their functional mobility in daily life, the QUEST 2.0 was a suitable measurement tool to use to compare to functional mobility in the wheelchair. The level of involvement in the prescription process has also shown to influence clients' satisfaction with their assistive devices as well as influence their quality of life while in their wheelchairs (18)(22). The QUEST 2.0 was a suitable measurement tool to use to determine the association between clients' overall satisfaction level with their assistive devices and their level of involvement during the prescription process. Adding to this, research has shown that the type of wheelchair provided, i.e. correct fit and prescription of a wheelchair, directly influences the person's functioning with the device, hence the QUEST 2.0 and a functional mobility assessment tool were suitable to use in order to determine whether there is an association between clients' satisfaction with their prescribed wheelchairs and their functional mobility in daily life (11).

3.4.3 Wheelchair Users Functional Assessment (WUFA) (Appendix C)

The outcome measure that was used along with the QUEST 2.0 was the WUFA. This tool was chosen as it is able to assess clients' functional mobility in the wheelchair as

well as their ability to access the community in the wheelchair (51). The test consists of thirteen items, which include the following tasks: pushing through a tight space, uneven terrain, door management, street crossing, ramp, curb, bed transfer, toilet transfer, floor transfer, bathing, upper and lower dressing, reaching function and picking up objects/sweeping (51). For the purpose of this study however, some sections – bathing, dressing and sweeping - were omitted from the questionnaire, as they were not relevant to the aim and objectives of the study. Validity and reliability have been shown not to be affected through the omission of these three sections.

The scoring is dependent on the level of independence the client can achieve, which is rated from one (completely dependent), to seven, (completely independent) (51). Each subsection was scored and a total score was calculated. For this study, the score therefore had ten items, instead of the thirteen items which were mentioned initially. Hence, a maximum score of 70 points could be reached by the participants.

Content validity was established through a panel of six physical therapists for the 13-item test (51). Inter-rater and intra-rater reliability was determined and found to be adequate for the WUFA (51). A high internal consistency (standardised coefficient $\alpha=0.96$) was established for the WUFA (51).

3. 5 Research Procedure

Once ethical clearance was obtained (Appendix D), permission from the Chief Executive Officer (CEO) of the Netcare branches and the hospital manager of Netcare Rehabilitation Hospital as well as permission from the partners of Rita Henn and Partners working at Netcare Rehabilitation Hospital was requested and granted before conducting the study. (Appendix E)

Before data for this study could be collected, a pilot study was conducted to determine what was needed to score the WUFA. Since the participants of the study were being video recorded while performing the WUFA (Appendix C), the researcher had to ensure that the video showed appropriate aspects for analysis.

3.5.1 Piloting of the video angles

The aim of the pilot study was to ensure that the videos taken while performing the tasks in the WUFA showed exactly what was needed so that the scoring of the WUFA would not be compromised. The pilot study was conducted on one participant performing all tasks in the WUFA while being filmed from three different video angles. The video angles used were a front angle, a rear angle and a side angle. During the

video recording of the tasks, it became clear that all three angles could not always be clearly established.

“Crossing the street” could not be shot from a typical front or back view but rather footage was taken so that the participant was tracked while performing the task. The photographs below show how the video footage from the front and side angle is unclear. (See picture 1 and 2)

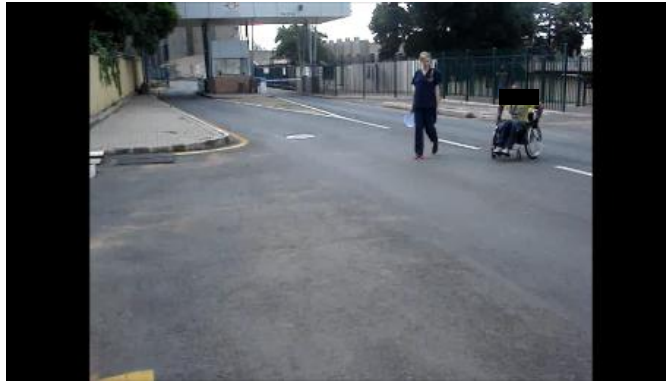


Photograph 3.1 Crossing Street: Front Angle



Photograph 3.2 Crossing Street: Side Angle

The following two pictures demonstrate video footage when the participant is tracked. A clear view of the participant and the researcher can be seen.



Photograph 3.3 Crossing Street: Video tracking participant



Photograph 3.4 Crossing Street: Video tracking participant

“Toilet transfers” could only be video recorded from the front as there was not enough space to take a video from the back or the side in the bathroom.



Photograph 3.5 Toilet transfers: Front Angle

“Uneven terrain” could only be shot from a side view by tracking the participant with the camera as there was not enough space within the hospital setting used for this study for a complete view of the task to be taken. The side view showed adequate video footage as seen in Photograph 6, 7 and 8.



Photograph 3.6 Uneven terrain at start: Side Angle



Photograph 3.7 Uneven terrain at middle: Side Angle



Photograph 3.8 Uneven terrain at end: Side Angle

Once video footage of the WUFA was taken, three occupational therapists studied each task of the WUFA using the different angles to determine which angle could best show the participant executing the tasks of the WUFA. The three occupational therapists discussed each angle and came to a conclusion about which angle best showed the tasks. The preferred angle is demonstrated in the table below.

Table 3.2 Video angles for recoding tasks for the Wheelchair Users Functional Assessment

WUFA Task	Video angle
1. Manoeuvring between tight spaces	Side angle with tracking
2. Uneven terrain	Side angle with tracking
3. Door management	Back angle
4. Street crossing	Tracking
5. Bed transfers	Back angle
6. Toilet transfers	Front angle
7. Floor transfers	Side angle
8. Ramp	Side angle
9. Curb	Side angle
10. Functional activity	Side angle

3.5.2 Data Collection

The researcher contacted participants either in the inpatient or outpatient department to participate in the study. After the clients with SCI signed written informed consent and permission to be video recorded (Appendix F), the participants were asked to complete the demographic questionnaire. On completing the demographic questionnaire, the participants were asked to fill in the QUEST 2.0 (Appendix B).

If the participants required a translator, one was provided for them to translate the consent form, the researcher's questions and instructions as the forms were all in English. An occupational therapy technician (OTT) from the hospital assisted with the translations if needed. The OTT used was trained by the researcher on the use of the QUEST 2.0 prior to gathering the data from the participants.

The second part of the study was then conducted with an identified research assistant who was used throughout, taking a video recording of each participant performing the tasks in the WUFA (Appendix C). The research assistant recorded the videos while the researcher provided the instructions, as well as assistance to the participants when

needed. The test was completed in the hospital spinal department as well as in the grounds of the hospital. Each participant completed the various sections of the test in an appropriate environment. The WUFA tasks were carried out in such a way that all tasks that needed to be completed indoors were done first; the outdoor tasks (ramps, curbs and street crossing) were then completed subsequently.

Due to the specific requirements of the WUFA, the tasks were set-up beforehand. The pictures provided depict some of the measurements that needed to be carried out prior to executing the tasks with the participants.



Photograph 3.9 Set-up for the task of Tight Spaces
(The diameter of the circle is 152.4 centimetres, followed by 152.4 cm straight line)



Photograph 3.10 Low curb
(Measured to be 10 cm as required)



Photograph 3.11 High curb
(Measured to be 15 cm as required)

In order to reduce bias, the videos of the WUFA were scored by an occupational therapist research assistant, who read and researched the entire manual in order to have sufficient training in the scoring of the WUFA.

The data was collected for 11 months. Finally the researcher compiled all scores from both assessments and the questionnaire and entered the data into a spread sheet.

3.6 Data Analysis

The first part of the study included the demographic questionnaire. Answers to each of the demographic questions were categorised. This form of data collection allowed for the nominal data and ordinal data. Nominal data provided insight into the frequency the clients chose the same answer. Descriptive statistics were used for the ordinal data.

The demographic questionnaire was used to determine whether there were any associations with the information gathered and the client's satisfaction with the use of their prescribed wheelchair and their functional mobility in the wheelchair. A Spearman's correlation coefficient test was used because of the ordinal nature of the data. The Analysis of variance (ANOVA) was used to determine whether there was a significant difference between the type of wheelchair prescribed, the QUEST 2.0 and the WUFA. The ANOVA was also used to determine whether there was a significant difference between the level of involvement in the wheelchair prescription process, the QUEST 2.0 and the WUFA.

The QUEST 2.0 as well as the WUFA were both measured using ordinal scales. The QUEST 2.0 rates clients' satisfaction ranking from one to five, while the WUFA rates clients' functional mobility according to a seven- rank scale. This data was analysed with frequency distributions and descriptive statistics.

In order to meet the final study objective that sought to investigate the association between the client's satisfaction with their prescribed wheelchair and their functional mobility in daily life a Kruskal-Wallis Test was used because of the ordinal nature of the data.

3.7 Ethics

Prior to conducting the study, ethical clearance was requested from the Wits University Human Research Ethics Committee and permission was granted to use the QUEST 2.0 (Appendix D and G). The WUFA was freely available and obtained from the internet. Written permission was obtained from the Netcare Hospital group, the Netcare Rehabilitation Hospital manager and Rita Henn and Partners where the study was conducted. (Appendix E). Permission to use additional hospitals was granted in the ethical clearance, however these were then not needed as Netcare Rehabilitation Hospital and the outpatient department of Rita Henn and Partners provided a sufficient sample size for the study. Possible clients were provided with an information sheet explaining the outline of the study and were given the opportunity to ask questions pertaining to the study. Written informed consent was gathered from the clients agreeing to the study (Appendix F). Since the study includes video recording, written informed consent was obtained exclusively for this (Appendix F). The videos were coded; the data stored and locked away in safety and will be destroyed after 6 years according to the Health Professions Council of South Africa (HPCSA) rules and regulations to ensure confidentiality and anonymity. At any given point, the clients were allowed to withdraw from the study without having to give reason or being subjected to prejudice in order to ensure the well being of the clients, i.e. beneficence. Feedback was made available on request.

3.8 Summary of Chapter

In summary, the study was a non-descriptive correlational research design that included a study sample of 40 participants with SCI falling within the criteria described in this chapter. A pilot study was carried out in order to determine appropriate video angles for the actual data collection. Upon obtaining ethical approval for the study, the data collection took place at Netcare Rehabilitation Hospital in Auckland Park. The participants were asked to fill out two questionnaires (demographical information sheet as well as the QUEST 2.0) and were then asked to perform ten tasks in the wheelchair using the WUFA in order to determine their functional mobility in their prescribed chair while video recorded. An identified research assistant scored the WUFA in order to

refrain from bias during the study. The various data was then entered into a spread sheet and finally analysed using nominal and ordinal scales.

CHAPTER 4: RESULTS

4.1 Introduction

The results are presented in relation to the study objectives. Initially the results will explore the demographic data, followed by the involvement of participants in the private hospital with SCI in the prescription of their wheelchairs. The satisfaction levels of participants in the private hospital with SCI with the use of their prescribed wheelchair in their daily life will be presented as well as the functional mobility of participants with SCI in the private hospital in their prescribed wheelchair. Lastly the results will indicate whether there is an association between the type of wheelchair prescribed and the level of involvement in wheelchair prescription with the satisfaction levels and the functional mobility of with the use of their prescribed wheelchair in daily life.

4.2 Demographical Information

4.2.1 Demographic Data

The research recruited forty participants to participate in the study (Table 4.1). The participants of the study consisted of a greater number of males, i.e. 70%. The participants were recruited between February and December 2014 at the Netcare Rehabilitation Hospital. The results also indicated that 90% of the participants with SCI recruited for this study were below the age of 50 years.

Table 4.1 Demographic Data of participants (n=40)

Age	18-30 years	31-50 years	51-60 years
	40% (16)	50% (20)	10 % (4)
Gender	Male		Female
	70% (28)		30% (12)

4.2.2 Medical History

The injuries ranged from the level of C7 to the level L1 to L5 with the majority of participants having sustained a SCI at the level of T10 to T12 (Table 4.2).

Table 4.2 Level of spinal cord injury (n=40)

Level of Injury	C7	T1 – T2	T3-T4	T5-T6	T7-T9	T10-T12	L1 –L5
	7.5% (3)	2.5% (1)	10% (4)	10% (4)	15% (6)	45%(18)	10% (4)

4.3 Wheelchair use and prescription

4.3.1 Duration of wheelchair use and involvement in prescription

A large proportion of the study sample (65%) had been using their wheelchair for less than a year and 10% had been using a wheelchair for longer than 10 years (Table 4.3).

Table 4.3 Duration of wheelchair use (n=40)

Duration of wheelchair use:	Within 1 year	1-5 years	5-10 years	10- 15 years
	65% (26)	17.5% (7)	7.5% (3)	10% (4)

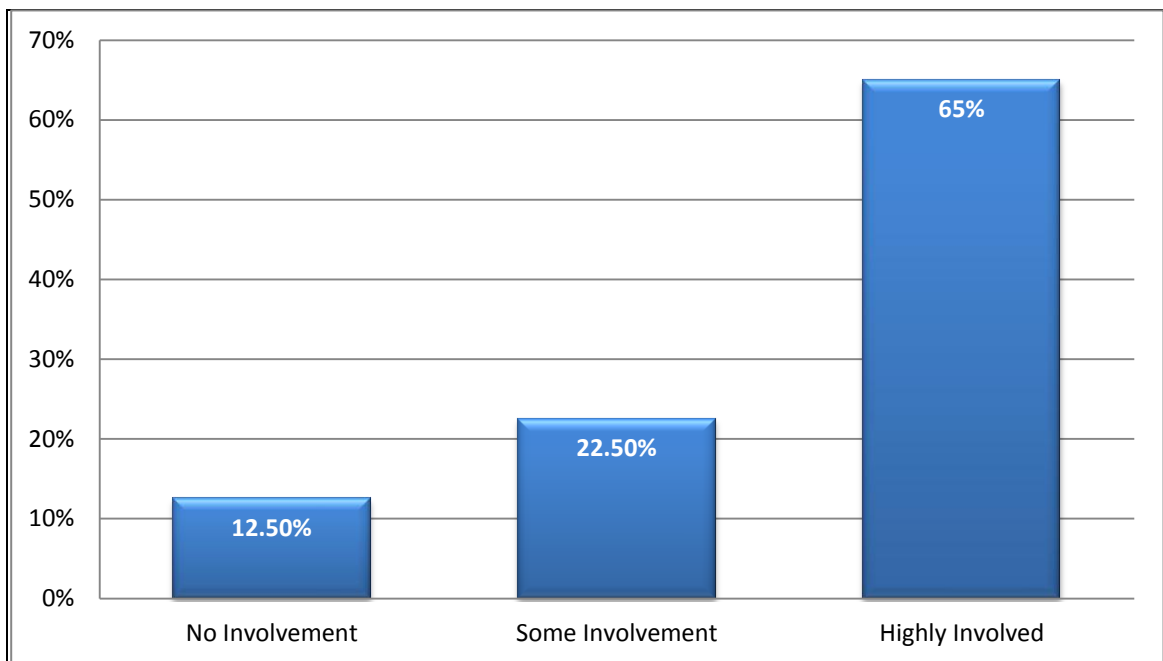


Figure 4.1 Percentage of participants involved in wheelchair prescription (n=40)

More than half of the participants were highly involved in the prescription of their chairs and only just over 12% had had no involvement (Figure 4.1).

4.3.2 Seating assessment, cushion prescription and modifications to wheelchair

The majority of the participants (87.50%) received a seating assessment along with the prescription of their wheelchair (Table 4.4). The three participants that did not receive a cushion along with their wheelchair already had a cushion in the wheelchair they had been using, i.e. it was their initial cushion or it was bought at a different stage to the time of purchase of their wheelchair. Of the total study sample, 90% received specific modifications to their wheelchair, among these modifications 85% received

modifications to their backrest, 22.5% to their armrest, 77.5% to their footplates and 67.5% received a specialised cushion along with their wheelchair.

Table 4.4 Seating assessment, cushion prescription and modifications to wheelchair (n=40)

Seating Assessment	Yes	No
	87.5% (35)	12.5% (5)
Wheelchair cushion prescribed along with wheelchair	Yes	No
	92.5% (37)	7.5% (3)
Modifications done on wheelchair	Yes	No
	90% (36)	10% (4)
What modifications		
Backrest modifications	85% (34)	
Armrest modifications	22.5% (9)	
Footrest modifications	77.5% (31)	
Wheelchair cushion	67.5% (27)	

4.3.3 Funding

The type of funding received for the participants' wheelchairs varied among the study sample. The medical aid funded seventeen participants (n=40), 1 participant was funded through the Swaziland government, 10 participants funded their wheelchair privately, one received his/her wheelchair through charity and 11 participants received their wheelchairs through other means, i.e. through Rand Mutual Assurance or Workman's Compensation (Table 4.5).

Table 4.5 Funding of wheelchairs (n=40)

How was wheelchair funded	Government	Medical Aid	Private	Charity	Other
	2.5 % (1)	42.5% (17)	25% (10)	2.5% (1)	27.5% (11)

4.3.4 Types of wheelchairs

From the 40 participants in the study, 34 participants were prescribed rigid frame wheelchairs whereas only six participants were prescribed folding frame wheelchairs (Table 4.6).

Table 4.6 Type of wheelchairs

Folding vs. rigid frame wheelchair	Rigid frame wheelchair		Folding frame wheelchair			
	85% (34)		15% (6)			
Type of wheelchair prescribed	Custom-lite rigid frame wheelchair	Panthera rigid frame Wheelchair	Rollability MK 2/3 rigid frame wheelchair	Tilite rigid frame wheelchair	Quickie wheelchair	Folding frame wheelchair
	57. 5% (23)	10% (4)	7. 5% (3)	2. 5% (1)	10% (4)	12. 5% (5)

The wheelchairs were also divided into the specific brand of wheelchair, i.e. 57.5% of the participants were using a Custom-lite rigid frame wheelchair from Chairman Industries (South Africa), 10% a Panthera rigid frame wheelchair from Sweden, 7.5% a Rollability MK 2/3 rigid frame wheelchair from CE mobility (South Africa), one a Tilite wheelchair from America and 10% a Quickie wheelchair from America (one of which was a folding frame Quickie wheelchair).

4.3.5 Type of wheelchair, demographic and other wheelchair prescription factors

In order to determine whether the type of wheelchair prescribed was influenced by other variables assessed in terms of the participants' use of wheelchairs, an ANOVA was completed. A significant difference was found for the type of wheelchair prescribed and the number of years using the wheelchair ($p=0.02$). Highly significant results were also found with the type of wheelchair used and whether a seating assessment was done or not, i.e. ($p=0.00$). Of the five participants who did not receive a seating assessment, two had less than one year of experience in the wheelchair, while the other three had more than ten years' experience in the wheelchair. The type of wheelchairs prescribed to each of those five participants were varied, i.e. two received a Rollability MK 2/3 wheelchair, two a Quickie wheelchair and one a Custom-lite rigid frame wheelchair. The type of wheelchair also influenced whether a cushion was prescribed ($p=0.00$). The participants who did not receive a cushion with their wheelchair were prescribed a Quickie wheelchair. Both of the participants had more than ten years of experience in the wheelchair. No other demographic or medical

variables, such as level of injury, had any significance related to the type of wheelchair prescribed.

4.4 Satisfaction with wheelchair prescription

4.4.1 Satisfaction with wheelchair

The satisfaction levels with eight aspects of the wheelchair were assessed using the QUEST 2.0. Most of the participants in the study were very satisfied with the wheelchair that was prescribed for them. All eight aspects of the QUEST 2.0 were scored 'very satisfied' by more than 50% of the participants (Figure 4.2).

One participant in the study was not satisfied at all with the ease of adjusting his/her wheelchair (scored one out of five for this aspect); however no comment was provided as to why this was the case.

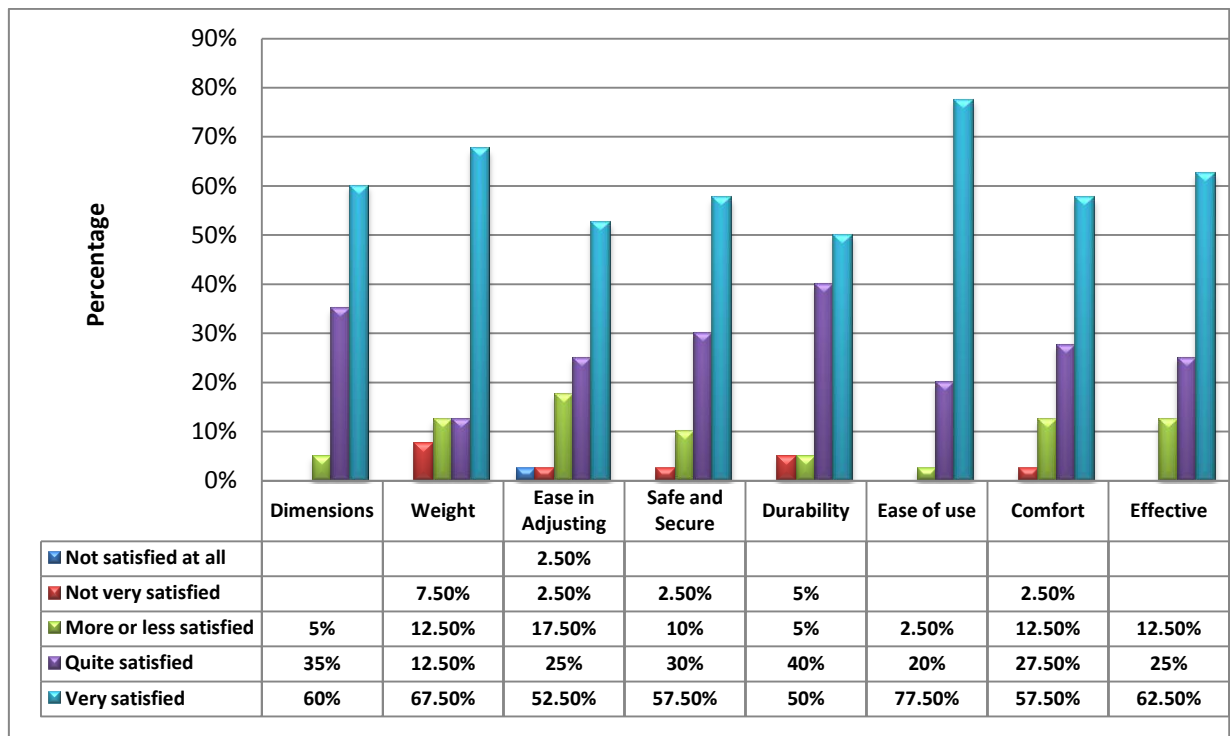


Figure 4.2 Level of satisfaction with the wheelchair (n=40)

Only three participants (7.5 %) were not very satisfied with the weight of their wheelchair, one participant was not very satisfied with the ease in adjusting his/her wheelchair, the security as well as the comfort in his/her wheelchair and another two participants were not very satisfied with the durability of their wheelchairs. None of the participants commented on the reason for their dissatisfaction.

One participant who was not very satisfied or not satisfied at all with aspects of the wheelchair had a folding frame wheelchair which was loaned to him. This wheelchair he kept as his prescribed wheelchair. Another participant that scored low in the QUEST 2.0 had been in the same wheelchair for over five years.

As with the wheelchair, the participants of the study were for the most part satisfied with the services they had received regarding their wheelchair prescription. Some participants, especially inpatient participants, felt that follow-up services as well as repairs and servicing were not applicable to them as they had not yet been discharged home where these aspects would be addressed; hence these two aspects were not scored. Only 29 participants (72.5%) completed the question regarding repairs and servicing and only 23 participants (57.5%) felt that they could answer the question regarding follow-up services.

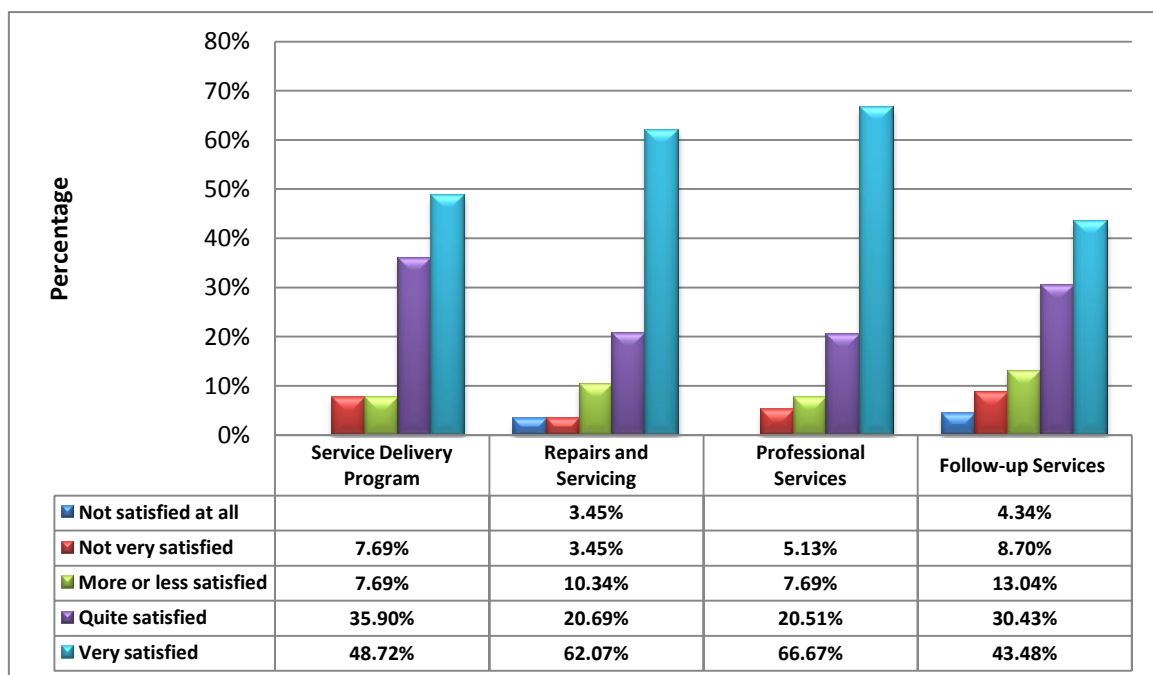


Figure 4.3 Level of satisfaction with wheelchair services (n=29)

Figure 4.3 indicates that a lower percentage of participants scored very satisfied with services with less than 50% being very satisfied with the service delivery programme and follow up services. One participant commented that it took a long time to receive his wheelchair and he was thus dissatisfied with the service delivery. While over 60% of participants were very satisfied with the repairs and servicing, there was one participant who commented that he was not satisfied with the repairs and servicing of

the wheelchair as many parts of his wheelchair needed repairing after only two years of use. Participants were most satisfied with professional services although one participant also commented that no one contacted him once he was discharged and he was hence dissatisfied with the follow-up services. Another participant who scored the professional services aspect lower commented that he was not provided with much information regarding wheelchairs.

It was clear that the participants were more satisfied with the wheelchair they received than with the services that were provided to them (Figure 4.4) and that 88% of the sample was satisfied with their wheelchairs and the services. There is no specific rule as to how satisfied clients should be with their wheelchair and the services but the QUEST 2.0 manual does suggest that if more than 25% of participants are somewhat satisfied to very dissatisfied the wheelchair prescriber, i.e. the occupational therapist, should look at adjusting the wheelchair to suit his/her client's satisfaction level (53). The results indicate that this is not the case in this study (Figure 4.4).

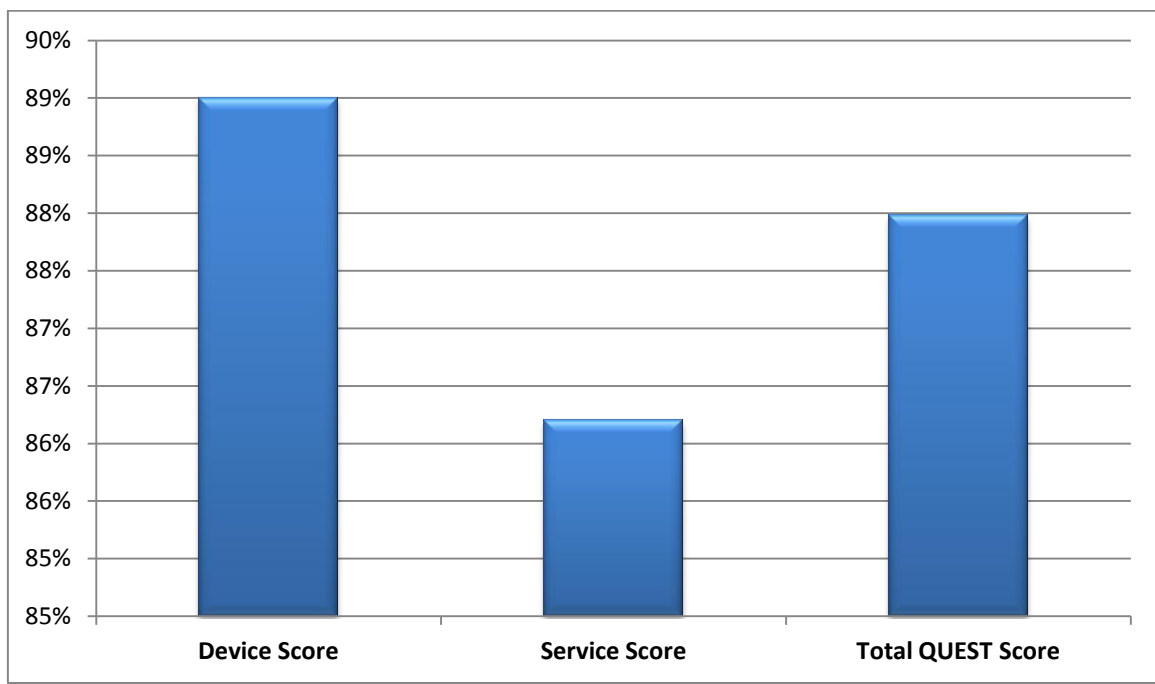


Figure 4.4 Total satisfaction scores on the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) (n=40)

4.4.2 Level of satisfaction with the wheelchair and involvement in the prescription of the wheelchair

There was a significant difference in the involvement in the prescription of the wheelchair and the participants' total satisfaction with their assistive technology, i.e. the total QUEST 2.0 Scores (p=0.05). The participants who were highly involved in the

prescription of their wheelchairs had the highest mean total QUEST 2.0 scores indicating they were most satisfied with their wheelchairs. The results indicate that ease of use received the highest mean score, indicating that the more involved the participant was in wheelchair prescription, the higher the satisfaction level for ease of use. The participants who had no involvement in the prescription of their wheelchairs had the lowest mean total QUEST 2.0 score. (Table 4.7)

Table 4.7 Mean scores on the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) according to involvement in prescription (n=40)

	No involvement(n=5)	Some involvement (n=9)	Highly involved (n=26)	p value
	Mean (SD)	Mean (SD)	Mean (SD)	
Q dimensions	4.00 (0.71)	4.56 (0.73)	4.65 (0.48)	0.11
Q- weight	3.80 (1.10)	4.44 (1.01)	4.50 (0.94)	0.31
Q- ease of adjusting	3.40 (1.67)	4.33 (0.87)	4.35 (0.84)	0.42
Q- safety/secure	4.20 (0.84)	4.33(0.71)	4.50 (0.81)	0.48
Q- durability	3.80 (1.10)	4.11(0.78)	4.54 (0.70)	0.08
Q- ease of use	4.60 (0.55)	4.67 (0.50)	4.81 (0.49)	0.38
Q - comfort	3.80 (0.84)	4.33 (0.71)	4.54 (0.81)	0.09
Q- effectiveness	4.40 (0.89)	4.22 (0.83)	4.62 (0.63)	0.36
Q- service delivery	4.00 (0.82)	4.11(1.67)	4.35 (0.84)	0.62
Q –repairs &servicing	5.00 (0.00)	4.00 (1.53)	4.43 (0.87)	0.66
Q- professional services	4.50 (0.58)	4.67 (0.71)	4.42 (0.94)	0.72
Q - follow-up services	2.00 (0.00)	3.86 (1.46)	4.20 (0.94)	0.29
Q -Device Score	80.00 (14.68)	87.50(9.68)	91.25 (11.31)	0.06
Q -Service Score	82.50 (12.58)	84.44 (18.28)	87.37 (14.50)	0.17
Total QUEST SCORE	79.10 (13.14)	86.41 (10.39)	90.23 (10.47)	0.05*

Significance set at $p \leq 0.05$

Significance set at $p \leq 0.01$

4.4.3 Type of wheelchair prescribed and satisfaction with the wheelchair

There was no significant difference in the type of wheelchair (rigid frame wheelchair or folding frame wheelchair) prescribed and the participants satisfaction levels with regards to their wheelchair and the services provided ($p=0.42$). The highest QUEST 2.0 score was obtained for the Tilite rigid frame wheelchair but only one participant had this chair. The second highest score was for the Rollability MK 2/3 rigid frame wheelchair and the lowest score was given to the Quickie wheelchair. (Table 4.8)

Table 4.8 Mean scores on the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST-2) according to wheelchair type (n=40)

Total QUEST score			
Type of Wheelchair	n	Mean	Std.Dev.
Custom- lite rigid frame wheelchair	23	88.46	11.02
Panthera rigid frame Wheelchair	4	89.50	7.27
Folding frame wheelchair	5	85.63	16.47
Rollability MK 2/3 rigid frame Wheelchair	3	91.11	8.39
Tilite rigid frame wheelchair	1	95.00	
Quickie wheelchair	4	82.50	13.51

Significance set at $p \leq 0.05$

Significance set at $p \leq 0.01$

4.4.4 Most important factors to consider during wheelchair prescription

One of the aspects of the QUEST 2.0 considers the most important factors that should be considered during the prescription of a wheelchair.

Three quarters of the participants felt that the most important factor to be considered during the prescription of a wheelchair was comfort. The next most important factors were safety (55%), easy to use (45%) and weight (42.5%). (Figure 4.5)

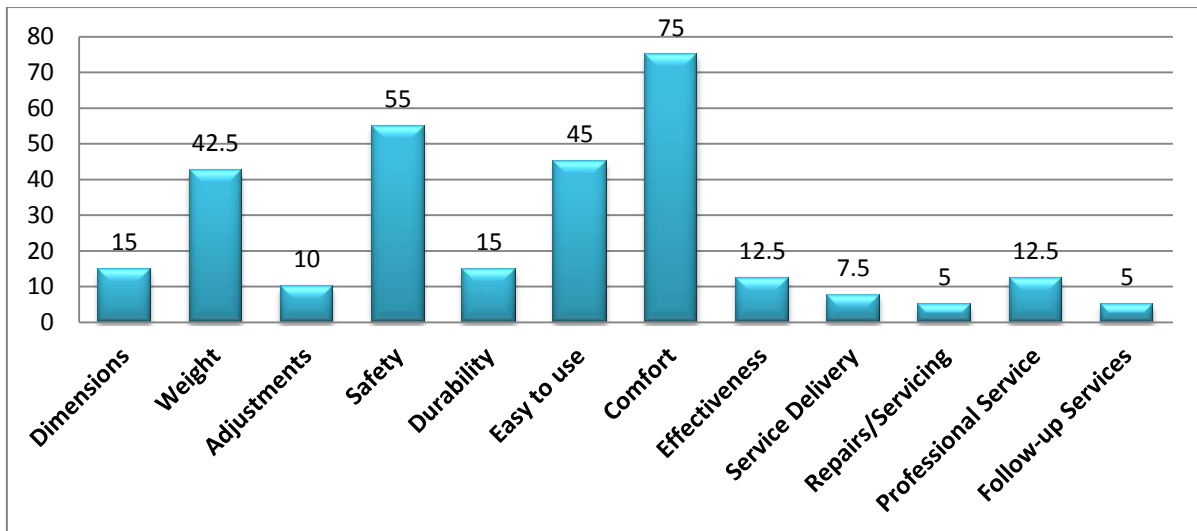


Figure 4.5 Important factors to consider during wheelchair prescription (n=40)

4.5 Functional assessment in prescribed wheelchair

4.5.1 Functional assessment scores - Wheelchair Users Functional Assessment

The average score of the participants in the study was 84.82%. Generally the participants scored highly and through this, it can be inferred that the participants were functionally mobile in their wheelchairs.

From Figure 4.6 it can be seen that complete independence was observed in tight spaces, uneven terrain, ramps and the functional task (reaching, lifting, carrying and pouring) among all participants. This means that for four out of the ten tasks the participants were completely independent while for the rest of the tasks, the scores are varied.

Overall the aspects with which the participants struggled most were door management, street crossing, curbs, bed transfers, toilet transfers and floor transfers. Curbs and floor transfers were the only two tasks where some of the participants were completely dependent, i.e. 22.5 % were completely dependent in curbs and 32.5 % were completely dependent in floor transfers. In the aspect of curbs, only five participants achieved complete independence. The rest of the functional tasks were attempted by all even if maximal assistance was required for some of the participants.

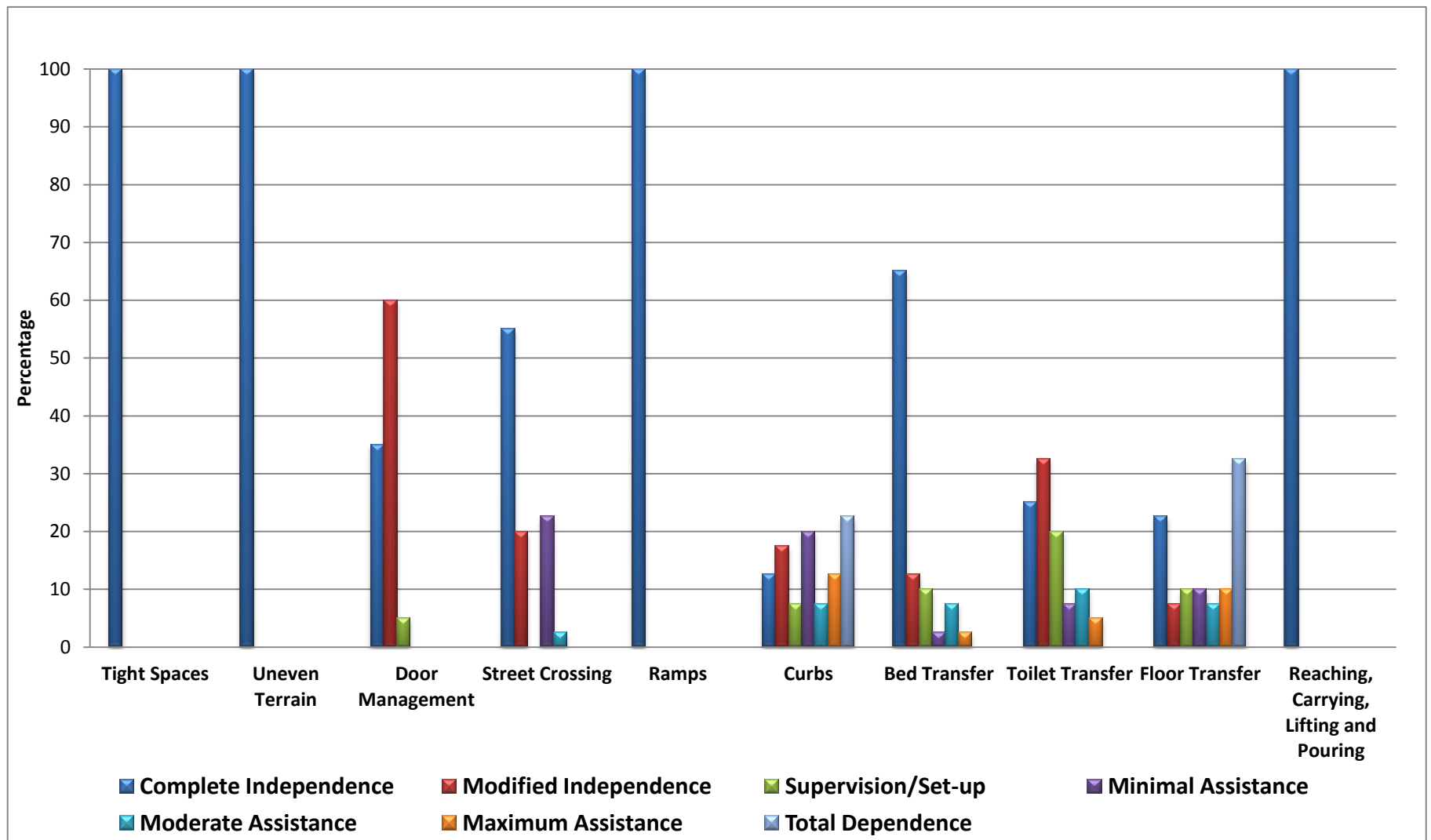


Figure 4.6 Level of independence on Wheelchair Users Functional Assessment (n=40)

4.5.2 Involvement in the prescription of the wheelchair and functional assessment

There was no significant difference in the involvement in the prescription of the wheelchair and the participants' functional mobility. The scores for those who were highly involved in the prescription of their wheelchairs were higher than those who had some involvement. Those who had no involvement obtained the lowest WUFA scores (Table 4.9).

Table 4.9 Mean scores on the Wheelchair Users Functional Assessment and the level of involvement in wheelchair prescription

	No involvement (n=5)	Some involvement (n=9)	Highly involved (n=26)	p value
	Mean (SD)	Mean (SD)	Mean (SD)	
Tight Spaces	7.00 (0.00)	7.00 (0.00)	7.00 (0.00)	1.00
Uneven Terrain	7.00 (0.00)	7.00 (0.00)	7.00 (0.00)	1.00
Door Management	5.80(0.44)	6.33 (0.71)	6.38 (0.50)	0.12
Street Crossing	5.20 (1.64)	6.11 (1.27)	6.15 (1.23)	0.51
Ramps	7.00 (0.00)	7.00 (0.00)	7.00 (0.00)	1.00
Curbs	2.80 (2.17)	3.00 (1.66)	4.27 (2.20)	0.15
Transfer - Bed	5.60 (2.19)	6.11 (1.76)	6.31 (1.09)	0.78
Transfer - Toilet	5.60 (1.34)	5.22 (1.56)	5.42(1.50)	0.92
Transfer - floor	2.80 (1.79)	3.89 (2.20)	3.77 (2.63)	0.67
Functional Task	7.00 (0.00)	7.00 (0.00)	7.00 (0.00)	1.00
Total WUFA	79.71 (11.93)	83.81 (11.11)	86.15 (10.58)	0.40

Significance set at $p \leq 0.05$

Significance set at $p \leq 0.01$

4.5.3 Influence of type of wheelchair prescribed on functional assessment

An ANOVA analysis indicated there were significant differences in the participants' functional mobility when the types of wheelchairs were compared. The type of frame that was prescribed to the participant, i.e. the folding frame wheelchair versus the rigid frame wheelchair showed significant difference ($p=0.01$). The participants who used a rigid frame wheelchair scored higher in the WUFA than the participants who were in a folding frame wheelchair, which means that the participants in the rigid frame wheelchair were more functionally mobile than those participants that were using the folding frame wheelchair (Table 4.10).

Table 4.10 Wheelchair Users Functional Assessment scores for rigid and folding frame wheelchairs (n=40)

Total WUFA				
	Valid N	Mean	Std.Dev.	p value
Rigid Frame Wheelchairs = 1	34	86.80	9.61	0.01**
Folding Frame Wheelchairs = 2	6	73.57	10.94	

Significance set at $p \leq 0.05$

Significance set at $p \leq 0.01$

The results of the study indicate that for both rigid and folding frame wheelchairs a large standard deviation exists; functional mobility between the subjects in both rigid and folding frame wheelchairs thus varies significantly from the mean (Table 4.10).

Table 4.11 Mean Scores and Standard Deviations for the Wheelchair Users Functional Assessment for the different wheelchair brands

Total WUFA score			
	n	Mean	Std.Dev.
Custom- lite rigid frame wheelchair 1	23	84.04	9.99
Panthera rigid frame wheelchair 2	4	92.14	4.44
Folding frame wheelchair 3	5	73.14	12.18
Rollability MK 2/3 rigid frame wheelchair 4	3	95.23	2.18
Tilite rigid frame wheelchair 5	1	100.00	
Quickie wheelchair 6	4	82.50	13.51

The specific type of wheelchair (i.e. the brand of wheelchair) had a significant impact on the functional mobility of the participants ($p=0.02$). The participants with customised wheelchairs made from Chairman Industries, CE mobility and the rigid frame wheelchairs imported from overseas had greater mobility in their wheelchairs as seen by the higher scores in the WUFA than those participants who had a folding frame wheelchair (Table 4.11).

For the Custom-lite rigid frame wheelchair, folding frame wheelchair and the Quickie wheelchair a greater standard deviation than the Panthera wheelchair and Rollability MK 2/3 rigid frame wheelchair was generated (4.10). This shows that for the Custom-lite, folding frame and Quickie wheelchairs scores in the WUFA are more varied than the other two wheelchair types.

Table 4.12 p-values for each WUFA domain

WUFA domains	Mean	Std Dev	p value
Tight Spaces	7.00	0.00	1.00
Uneven Terrain	7.00	0.00	1.00
Door Management	6.30	0.56	0.01**
Street Crossing	6.03	1.31	0.06
Ramps	7.00	0.00	1.00
Curbs	3.80	2.14	0.14
Bed Transfers	6.18	1.39	0.12
Toilet Transfers	5.40	1.46	0.18
Floor Transfers	3.68	2.42	0.04*
Functional Task	7.00	0.00	1.00

Significance set at $p \leq 0.05$

Significance set at $p \leq 0.01$

Table 4.12 shows that through ANOVA analysis significant differences were found between the type of wheelchair prescribed and the task of door management and floor transfers ($p=0.01$ and $p=0.04$ respectively). The participants in the folding frame wheelchair scored significantly lower than the other participants in rigid frame wheelchairs while performing the task of door management ($p=0.01$) (Figure 4.7).

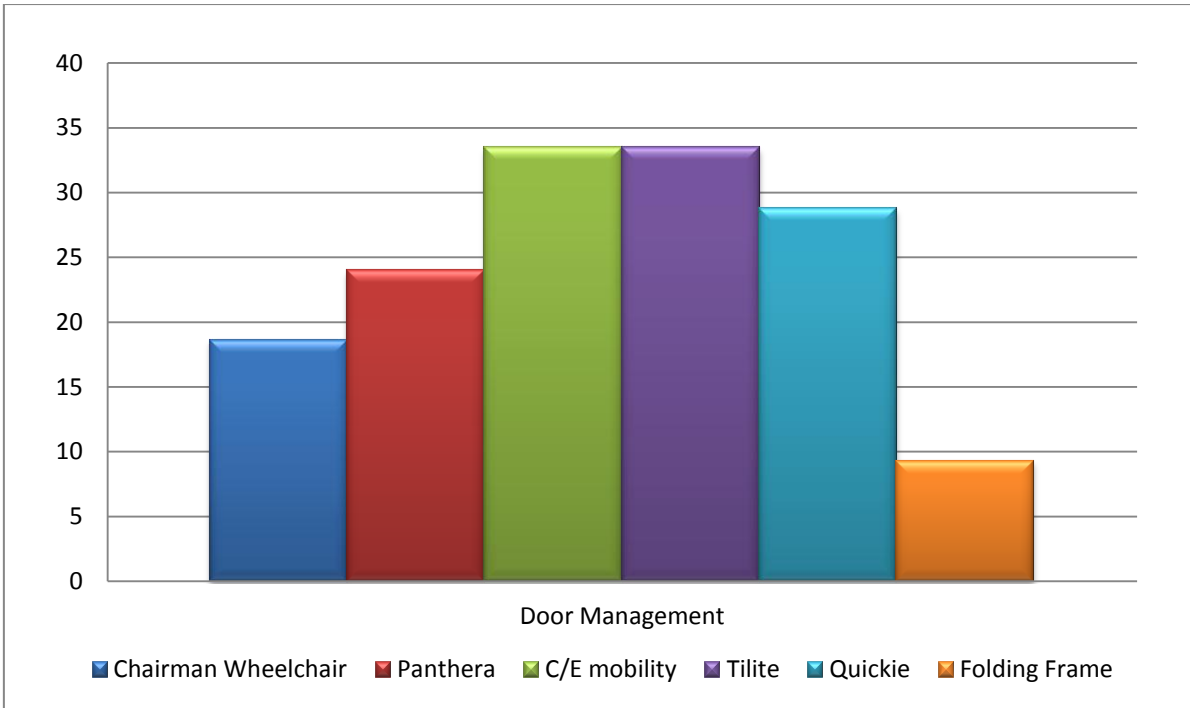


Figure 4.7 Mean values on the Wheelchair Users Functional Assessment the task of door management (n=40)

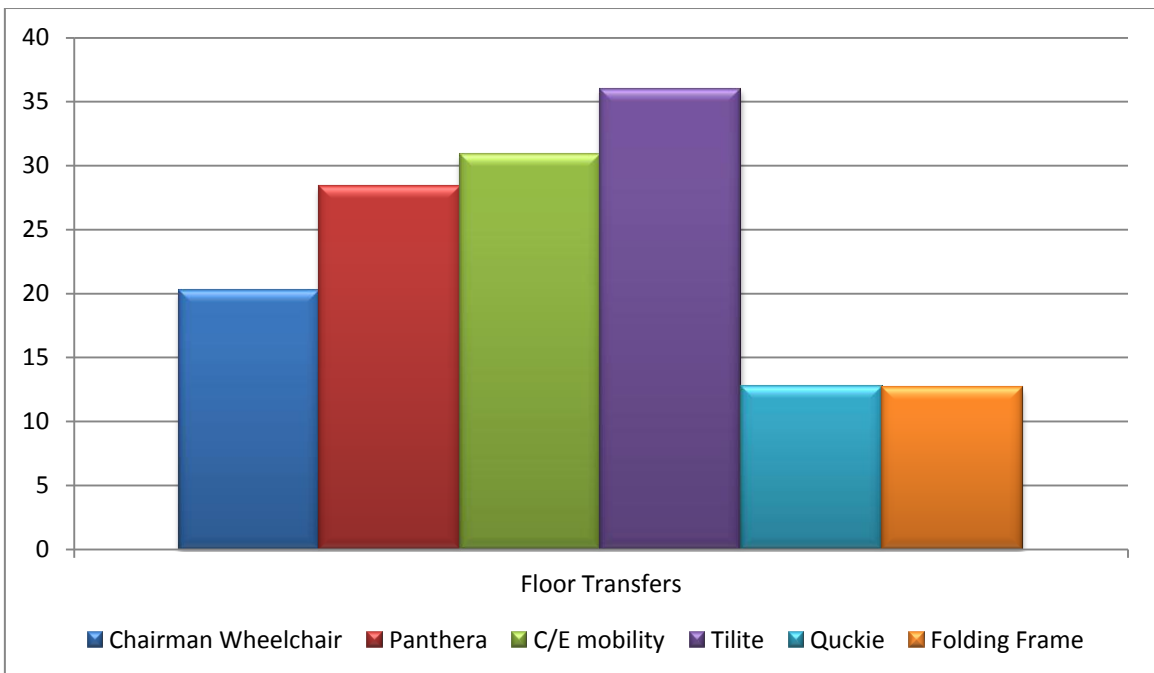


Figure 4.8 Mean values on the Wheelchair Users Functional Assessment the task of floor transfers (n=40)

The participants with folding frame wheelchairs as well as the Quickie rigid frame wheelchairs had particular difficulty with floor to wheelchair transfers (Figure 4.8).

4.6 Association between the satisfaction levels and the functional mobility of the prescribed wheelchairs

4.6.1 Association of demographics data, medical history and wheelchair prescription factors

Table 4.13 Table of correlations

Value of the Correlation Coefficient	Strength of Correlation
1	Perfect
0.7 – 0.9	Strong
0.4 – 0.6	Moderate
0.1 – 0.3	Weak
0	Zero

No associations were found between the demographic data, medical history and factors related to wheelchair prescription except that a moderate correlation for the number of years in the wheelchair and the prescription of a cushion was found ($r=0.52$). The participants who had one year of experience in the wheelchair were mostly prescribed with a cushion. The participants who did not receive a cushion along with their wheelchair were participants who were in a wheelchair for a longer duration and had already been previously prescribed with a cushion. A strong correlation was also found between a seating assessment and the prescription of a cushion ($r=0.75$) which indicates that the therapists in the private hospital in this study use a seating assessment to prescribe a cushion.

4.6.2 Associations between demographic data, medical history and wheelchair prescription factors and Wheelchair Users Functional Assessment

The results also indicated that there are no strong associations between any of the demographic information and wheelchair prescription factors and any of the functional mobility tasks on the WUFA that the participants were required to carry out, except for the door management in the WUFA and the number of years in a wheelchair. A moderate correlation was found between the WUFA door management score and the number of years in a wheelchair ($r=0.66$), thus the participants ability to open and close doors and go through doorways and their years of experience in the wheelchair are associated.

4.6.3 Associations between demographic data, medical history and wheelchair prescription factors and Quebec User Evaluation of Satisfaction with Assistive Technology

Results of this study show that there are no strong correlations between the participants' demographic information and their level of satisfaction with their wheelchair with which they have been provided.

4.6.4 Correlations between Quebec User Evaluation of Satisfaction with Assistive Technology and Wheelchair Users Functional Assessment

There was no association between how satisfied participants were with their wheelchairs and the functional assessment in terms of their independence in their wheelchairs.

4.6.5 Correlations within the Quebec User Evaluation of Satisfaction with Assistive Technology and Wheelchair Users Functional Assessment

A strong correlation exists between the participants' satisfaction with the use of their wheelchairs and their satisfaction of comfort in their wheelchairs ($r=0.70$). A strong correlation also exists between the participants' level of satisfaction with the follow-up services and how safe the participants feel in their wheelchair ($r=0.70$) and the participants' level of satisfaction with their service delivery ($r=0.85$). Generally if the clients are satisfied with the service delivery, they will also be satisfied with the follow-up services. Both aspects are similar in nature and hence there is also a strong correlation between the two.

Associations on the WUFA items indicate a moderate correlation between bed transfers and the ability to manage a door ($r=0.52$) and a strong correlation between a participant's ability to cross a street and manage a curb ($r =0.71$) as well as managing a bed transfer ($r=0.70$). These aspects were all related to the participants' wheelchair dexterity.

4. 7 Summary of Chapter

The demographic information provided insight into the age, gender and level of injury of clients with SCI treated at Netcare Rehabilitation Hospital. The demographic results also indicate that the majority of participants were involved in their wheelchair prescription, received a seating assessment and were provided with specialised modifications to their wheelchair. In this study the funding of wheelchairs was quite varied and over half of the participants were prescribed a Custom-lite Rigid Frame wheelchair.

The results revealed that the majority of the participants were quite satisfied with their wheelchairs with somewhat lowered satisfaction for the services received. There was a significant difference in the total satisfaction with the wheelchair related to the involvement in the prescription of the wheelchair. The more involved the participants were in the prescription of their wheelchair the more satisfied they were with the chair. The type of wheelchair prescribed made no significant difference to the participants' satisfaction with their wheelchair.

The functional assessment shows that a majority of the participants are functionally mobile in their wheelchair with complete independence demonstrated with propelling the wheelchair through tight spaces, uneven terrain, up and down ramps as well as with being able to pour a drink for themselves. The type of wheelchair prescribed made a significant difference to some aspects of functional mobility but the participants' involvement in the prescription of the wheelchair did not significantly affect their functioning in the wheelchair.

Lastly, the results have revealed no association between the participants' satisfaction levels and their functional mobility with their prescribed wheelchair.

CHAPTER 5 DISCUSSION

5.1 Introduction

The results are discussed in terms of the study objectives. This chapter considers the demographic information and the associations between the involvement in the prescription and type of wheelchair prescribed and the participants' level of satisfactions as well as their functional mobility. The satisfaction levels with the wheelchairs and the participants' functional mobility in the wheelchairs are also discussed. Lastly the limitations to the study and further recommendations for future research will be provided.

5.2 Participant demographics and medical history

Demographic trends reported by the WHO show that males are most at risk in young adulthood (20-29 years) for SCI; the majority of participants (70%) in this study were males (Table 4.1) (60). Although the WHO reports a 2:1 ratio of male to females with SCI the ratio in this study was higher and more similar to research carried out in Brazil, Russia, India and China (BRICS) with similar developmental status to South Africa (61). Most report a higher prevalence of SCI amongst males with studies in Brazil reporting 81.3% and 86.7% being male participants and a study in India in 2013 reporting 78.8% being male participants (62)(63)(64) .

The most common age for SCI to occur is between 16 and 30 years old (62). This study also supports this as 40% of the total study sample was between the ages of 18 to 30 years old (Table 4.1). Research in Canada has indicated that the reason for young males being more at risk of sustaining a SCI than females or elderly persons is the incidence of motor vehicle accidents (65). Although other studies have shown that there is an increase in elderly people sustaining a SCI as a result of fall-induced injuries being more common above the age of 65, this did not apply to this study in which no participant was above the age of 50 years old (65).

In South Africa, violence is cited as the leading cause of SCI (65)(66). This is followed by motor vehicle accidents and falls, all of which affect greater numbers of young males since both violence and motor vehicle accidents occur more commonly in younger generations (65)(66).

In this study the most common level of injury was found to be between the levels of T10 and T12. This finding is supported by a Brazilian study which explored the social

representations of the wheelchair for people with SCI, in which 40% of their participants had a level T12 injury (67).

The demographic information allowed for trends to be explored within Netcare Rehabilitation Hospital. Previous research has suggested the impact of demographic information on a client's functioning within the wheelchair in particular; it was thus useful to determine if this was also found to be true for this study. The following demographic information which was also obtained from the participants of the study pertains particularly to wheelchair prescription. This information yielded some interesting results which will be further elaborated on.

5.3 Wheelchair prescription

Most of the participants in the study had only one year of experience in their wheelchair (Table 4.3). This is due to the fact that the participants in the study were a convenient sample of clients who were generally still receiving inpatient or outpatient therapy in the form of occupational or physiotherapy at Netcare Rehabilitation Hospital. The participants with more than a year of experience in the wheelchair usually no longer received therapy. This is in accordance with other studies that have shown that rehabilitation therapy is most commonly received during the initial stages after the injury, i.e. within the first year (68).

As part of the rehabilitation therapy programme, it has become part of the rehabilitation guidelines to provide seating assessments in various countries (12). This also appears to be true at the chosen private hospital as the majority of participants (87.5%) received a seating assessment prior to the prescription of their wheelchair (Table 4.4). Other studies have emphasised the need for seating clinics as they promote optimal seating postures and thus improve functionality in the wheelchair (30). Taule et.al (2013) showed that there was an increased risk of developing pressure sores if not seated correctly (30). In another study, Giesbrecht, Mortenson and Miller (2012) reported that seating issues were found for 46% and 80% of the participants if no individual seating assessment was carried out (8). The fact that a large majority of the participants in this study had received a seating assessment indicates that the treating therapists were aware of the need to carry out seating assessments in order to prevent secondary complications such as pressure sores. The rehabilitation practice at Netcare Rehabilitation Hospital appears to follow the evidence which indicates that seating assessments are important in order to prevent the occurrence of secondary complications.

A seating assessment involves prescribing an optimal cushion along with the wheelchair (30). In this study there was a significant difference between the type of wheelchair prescribed, the prescription of a cushion and whether or not a seating assessment was completed. This supports the research conducted by Taule et.al (2013), in which it was shown that a seating assessment had an impact on the type of wheelchair prescribed as well as the prescription of a cushion in terms of preventing complications (30). Since the type of wheelchair has been shown to have an impact on the client's seating pressure, a seating assessment is important as it will guide the therapists and the client as to which wheelchair is most suitable for the client (30).

Five of the 40 participants in the study did not receive a seating assessment and three participants did not receive a cushion along with their wheelchair. Despite this statistic it needs to be acknowledged that all of the participants had a cushion when they were assessed. The results therefore need to be considered carefully because the participants who did not receive a cushion or seating assessment along with their current wheelchair were participants who already had several years of experience in a wheelchair (i.e. +5 years). The participants may have received a seating assessment initially but may not have received another seating assessment during the prescription of a new wheelchair which will influence the significance of the results. This is also true for the prescription of the cushion. A cushion may not have been prescribed with the current wheelchair because they already had one or it may have been replaced at a different stage to the wheelchair. This is a concern as evidence has shown that a wheelchair and cushion influence one another and that they should be seen together as one entity during the prescription of a wheelchair (30). If the two are prescribed at different occasions it means that they are not considered as one which has shown to increase the risk of secondary complications such as pressure sores (30). These results indicate the need for further research and should be considered in future practice.

The results showed that 90% of the participants in the study also received specific modifications to their wheelchairs, indicating that the therapists who prescribed the wheelchairs in this study regard adjustments as an integral part of appropriate wheelchair prescription. Specific modifications to the wheelchair have been shown to be a vital part of wheelchair prescription as evidence has shown that poor seating ergonomics (poor fit) can result in secondary complications post injury, such as back pain, postural deformities, pressures sores and shoulder injuries (12). One study which provided wheelchair seating intervention showed that every problem that was expressed by the participants initially was resolved positively after seating intervention

took place (12). Of Samuelsson, Larsson, Thyberg and Gerdle's total study sample, 91% expressed improved seating comfort, 64% improved propulsion, 91% improved posture, 77% reduced back pain and 68% expressed that they could cope for longer periods in the wheelchair, indicating that the majority of the participants benefited from individualised modifications to their wheelchair (12).

Customisation of a wheelchair does not only consider the client's biomechanical properties but also considers the environment in which the wheelchair is used(34). Especially in South Africa where roads are uneven and infrastructure not necessarily suitable to accommodate a wheelchair, the need to find a wheelchair that is durable and is able to handle uneven terrain is important. In this study it was found that rigid frame wheelchairs were the most common wheelchairs prescribed as 85% received such a chair, while only 15% received a folding frame wheelchair. Since rigid frame wheelchairs have been known to be more durable and known to withstand rougher terrain far better than folding frame wheelchairs (21)(36), the study shows that the environment in which the clients are going back to is taken into account by the therapists prescribing the wheelchairs.

These modifications allow for appropriate wheelchairs to be prescribed. The latest research, however, suggests that numerous medical aids abroad are cutting costs to save money in wheelchair prescription, preventing customisation (15). In addition these medical aids are suggesting renting rather than customising and prescribing wheelchairs, which limit the client's choice of the different types of wheelchairs (15).

In this study, no association was found between the type of wheelchair prescribed and the funds used to receive the wheelchair. As seen in Table 4.5, most of the participants' wheelchairs are funded by medical aid, closely followed by participants that fund their own wheelchairs privately and participants who were funded by Workmen's Compensation (WCA) or Rand Mutual Assurance (RMA). There appears to be a budget restriction within the different medical aids, different medical aid benefits, within WCA and RMA in the provision of equipment. However, no evidence was found as to what these restrictions are and whether clients feel limited by the funds that are available to them. Unfortunately this study also did not explore this.

It appears as though the majority of the participants do however rely on medical aids, WCA or RMA to pay for their wheelchair, as 42.5% of wheelchairs were paid by medical aid and 27.5% were paid by WCA or RMA.

Interestingly, the one participant that received a wheelchair through charity, i.e. the wheelchair was funded by the charity where the hospital had no involvement in the

wheelchair prescription, had an overall satisfaction for her wheelchair of 90%, which indicated that she was highly satisfied with her wheelchair. This is in contrast to previous studies where wheelchairs provided through charity were often abandoned as they resulted in more complications and barriers (17). The participant in the study also scored over 90% for the functional assessment in the wheelchair, indicating that the participant was able to use the wheelchair effectively and efficiently in everyday tasks. Despite what other studies have found, the experience of this particular participant was a positive one as the wheelchair was evidently appropriately prescribed.

With reference to the first study objective, which was to investigate whether their level of involvement and the type of wheelchair prescribed influenced the participants' satisfaction levels with their prescribed wheelchair and their functional mobility in the wheelchair, significant differences were found in the type of wheelchair that was prescribed and the functional mobility in the wheelchair. These differences will be discussed in further detail now.

Of the total study sample, 34 participants were prescribed a rigid frame wheelchair. This means that 85% of the participants were actually prescribed a rigid frame wheelchair in which they could be more active. Since clients with SCI are bound to their wheelchair as it is their only form of mobility, it is vital that they remain as active as possible and that they are able to participate in all pre-morbid activities of daily living. Studies have indicated that a standard folding frame wheelchair is more suitable for clients who are less active and require more stability whereas the rigid frame wheelchair is lighter and provides better mobility (69).

In this study, the total functional mobility of the participants using rigid frame wheelchairs was far greater than the ones using folding frame wheelchairs. The average score among the participants who were prescribed a rigid frame wheelchair was 86.80% whereas the average score for the folding frame wheelchair was 73.57%. The results not only showed a difference between these two frame types but also between the different brands of wheelchairs, i.e. between the Tilite, Quickie, Panthera, Chairman and CE Rollability MK2/3 wheelchair (see Table 4.6). The wheelchairs that were found to be made out of lighter material yielded higher average scores on the WUFA. For example the Tilite and Panthera wheelchairs, which are made out of Titanium and carbon fibre, both of which are light materials, averaged over 90% on the WUFA compared to the Chairman rigid frame wheelchair made out of aluminium, which averaged 84.04%. These results can be compared to another study carried out by Beekman, Miller-Porter and Schoneberger (26). They found that an ultra light wheelchair, such as the Tilite and Panthera wheelchair, allowed for better efficiency in

that better propulsion speed was noted and the distance travelled in the wheelchair was further with a lower cost of oxygen by the participants (26). For example, the mean speed for the participants with T2-8 paraplegia was 77.85 m/min in the ultra-light wheelchair, whereas the mean speed generated by the standard wheelchair was 67.85 m/min (26). This supports the findings of this study as it also demonstrated that the WUFA score was greater in participants who were using an ultra-light wheelchair such as the Panthera wheelchair (92.14%) compared to the participants that were using a Chairman wheelchair (84.04%) or folding frame wheelchair (73.14%) (see Table 4.11). Significant standard deviations between the wheelchair types exist, which means that the WUFA scores among the participants vary greatly (Table 4.11). Therefore the effect the type of wheelchair has on the functional mobility of a participant may not always be as significant as the results suggest. The large standard deviation is as a result of the small sample size, hence these results can therefore not be generalised to the total SCI population.

The number of years in the wheelchair may also have influenced these results. The results show that the participants who have been in a wheelchair for more than a year generally have a lighter wheelchair in which they can be more active in, e.g. a Panthera, Quickie or Tilite wheelchair, which may not have been their initial wheelchair. Research has shown that clients with SCI opt for lighter, user-friendlier and more efficient wheelchairs when they become more confident in their wheelchairs, indicating that they will tend to move on to other wheelchairs depending on their preferences (38). The experience in the wheelchair therefore may have contributed to their functionality and not only the type of wheelchair.

Not only has evidence emphasised the role the type of wheelchair plays in a client's quality of life, it has also emphasised the importance of being considered and taking into account clients' preferences as well as the clients' needs in wheelchair prescription (22)(26). The choice of frame type is dependent on whether the client wants to be more active in their wheelchair or not (21)(36). Due to the reduced turning circle in the rigid frame wheelchair, a client with SCI would better be able to move around using this type of wheelchair and thus allow the client to be more efficient. This study has shown that the task of door management was more efficient with the use of a rigid frame wheelchair compared to a folding frame wheelchair. The fact that 85% of the clients were prescribed rigid frame wheelchairs shows that the majority of clients with SCI at this hospital prefer to use a rigid frame wheelchair that allows them to be more active.

Involving the client in wheelchair prescription has yielded a higher satisfaction with the wheelchair and better functional outcomes and thus generated a better quality of life, which this study has also confirmed.

More than two thirds of the participants in this study indicated they were highly involved in wheelchair prescription. This is vital as research has shown that clients should be involved in wheelchair prescription as this improves well-being, self-esteem and participation in daily activities (3). In this study the total mean score for the WUFA was 86.15% for the participants who felt highly involved in wheelchair prescription, which was higher than the mean scores of the participants who felt only somewhat involved or not involved at all. These results therefore support previous research.

In this study, the clients who were more satisfied with their wheelchair also felt highly involved in wheelchair prescription. The participants who were highly involved in their wheelchair prescription had an average score of 90.23% for the QUEST 2.0, whereas the participants who felt they had no involvement in prescription had 79.10 % as their average QUEST 2.0 score.

Satisfaction with the wheelchair and being involved in wheelchair prescription are both important factors. If both aspects are not considered, there is a high risk of abandonment. One study carried out by Chaves et al. (2004) found that 53% of their participants indicated that their wheelchair was limiting them from being able to access their community as it did not meet their preferences, needs and environmental demands (3). Mortenson, Miller and Miller-Pogar (2007) commented that wheelchair abandonment was a common problem in clients who were dependent on wheelchairs for all mobility as the wheelchairs were inappropriate (50). Garber et al. found that 31% of their study sample had abandoned their wheelchairs due to the fact that the wheelchairs did not meet their participants' needs (32). The study indicates that, for the most part, the clients at Netcare Rehabilitation Hospital were considered in wheelchair prescription and that the therapists were client-centred in their approach to providing the client with a wheelchair. Involvement in wheelchair prescription increased the participants' satisfaction with their wheelchairs and their functional mobility in this study (Table 4.7 and 4.8).

If therapists are to be more client-centred, determining what participants deem as significant to consider during wheelchair prescription is important. Comfort was considered most important by the participants in this study closely followed by safety, ease of use and weight of the wheelchair. Some of these results are supported by

Bergstroem and Samuelsson in their study, where comfort and ease of use were the two most important aspects to be considered in the prescription of a wheelchair (22).

Research supports the strong correlation found on the QUEST 2.0 between participants' satisfaction with the use of their wheelchairs and their satisfaction of comfort in their wheelchairs. The association between these two factors was found by Bergstroem and Samuelsson (2006) in their study as with an improved sitting posture and improved comfort, clients were found to have improved engagement in activities which can be related to the fact that the participants found it easier to use the wheelchairs (12).

5.4 Factors to consider when prescribing wheelchairs

The results of this study show, however, that almost half of the participants viewed the weight of the wheelchair as an important factor to consider when prescribing a wheelchair (Figure 4.5). In contrast Bergstroem and Samuelsson (2006) found that the weight of the wheelchair was not deemed as an important factor in the prescription of a wheelchair (22). It must therefore be accepted that the weight of the wheelchair should also be considered as important and it would be relevant to incorporate these aspects when prescribing a wheelchair in the context of this study. Possible reasons that wheelchair weight may be considered as an important factor by the participants of this study is that many of them need to be able to take the wheelchair apart and put it into a car. Despite there being some advocacy in improving public transport in South Africa, accessing public transport with a disability still poses great challenges, hence many of the clients with SCI will rather drive by themselves than access public transport (70). Thus the need to load and unload a wheelchair makes wheelchair weight an important factor in wheelchair prescription.

Safety was the second most important aspect identified in the study when prescribing a wheelchair. This was strongly associated with the participants' level of satisfaction with follow up services and service delivery. There is no other published research that could be found that supports this finding. This relationship may be due to participants feeling safer in a wheelchair that has received follow-up services and where they can rely on having the wheelchairs repaired promptly and well.

Emphasising the factors that the clients deem important in the wheelchair prescription process will lead to an overall higher satisfaction with the wheelchair as well as the services being provided, as stated in this study and several others. Determining a client's overall satisfaction with the wheelchair prescription needs to be part of general

practice as it encompasses the client-centred nature of occupational therapists. This leads to the next objective of the study, which explores the clients' satisfaction levels with regards to wheelchair prescription.

5. 5 Satisfaction with wheelchair prescription

Overall the participants of the study are quite satisfied or very satisfied with their wheelchairs (Figure 4.2). Ninety five percent of participants scored above quite satisfied with the dimensions of their wheelchair and with the ease of use with which they move their wheelchair. For the rest of the attributes (weight, safety and security, durability, comfort and effectiveness) 80% and more scored above quite satisfied. These results indicate that most of the participants in this study had their needs taken into consideration when their wheelchairs were prescribed.

This is probably related to the seating assessment that they received and specific modifications made to their wheelchair on prescription. This reflects the results of Giesbrecht et al. (2012), who found that a higher level of satisfaction with wheelchairs was reported when their participants with SCI were provided seating intervention and when modifications to the backrest, footrests and cushion were made. An earlier study by Samuelsson et al. (2001) also determined that satisfaction in the wheelchair was far greater where specific wheelchair modifications were made to improve the participants' functionality in their wheelchairs. It was found that by changing the backrest, providing an optimal cushion or by adjusting/changing the wheelchair to suit the client's overall functionality that 91 % of the participants were positively or very positively affected with the comfort they felt in the wheelchair (12). The findings of this study, where results indicate that even with the appropriate modifications made, only 85% of the participants were quite or very satisfied with the comfort in their wheelchair (Figure 4.2), which did not achieve quite the same level of satisfaction for this aspect.

A much greater percentage of participants (90%) in this study were quite to very satisfied with the ease in using the wheelchair and with how effective the wheelchair was in their execution of their daily tasks (87.5%) than in Samuelsson et al.'s study (12). Only 64% of the participants in their study were positively affected by the changes made to their wheelchair in terms of their wheelchair propulsion and only half of the participants were positively affected by the fact that they could perform an activity better (12). It can be deduced that specific modifications positively affect the level of satisfaction with their wheelchairs among clients with SCI. The level of satisfaction with comfort achieved in this study did not reflect that everyone whose wheelchair was modified was satisfied with the comfort of their wheelchair. This is of concern as over

three quarters of the participants viewed comfort as one of the most important factors to consider during the prescription of a wheelchair.

Bergstroem and Samuelsson (2006) found that the greatest level of satisfaction using the QUEST was for the ease of use with their wheelchair (22), as was the case for this study (Figure 4.2).

Interestingly, 31% of the participants of Bergstroem and Samuelsson's study were somewhat or less satisfied with the ease in adjusting the wheelchair (22), which was also the second lowest scored characteristic of this study (22.5%) (Figure 4.2). Ease in adjusting was the only characteristic of the eight that scored 'not satisfied at all'. This characteristic may have been scored lower in the participants of this study due to the fact the wheelchair is generally difficult to take apart and handle due to the size of the wheelchair and the physical limitations of the clients with SCI. Rigid frame wheelchairs have been thought to be more difficult to take apart and put in cars as the wheels need to be removed (38). This may be a reason why some of the participants are less satisfied with the ease in adjusting the wheelchair. The only participant who was not satisfied at all with this characteristic was actually due to get a new wheelchair and so his current wheelchair may no longer suit his immediate needs, which could explain why he was not satisfied.

The second part of the QUEST 2.0 measured the clients' satisfaction with the services provided by the rehabilitation team and the suppliers. Despite the overall satisfaction levels of the services being lower than the overall satisfaction levels with the wheelchair, the figures show that the participants still had a high level of satisfaction with the services provided (Figure 4.3), especially when compared to other research. Bergstroem and Samuelsson (2006) found lower overall scores for the levels of satisfaction with services. They concluded that only 55% of their participants were fully satisfied with the follow-up services provided although the results in this study showed that a greater percentage (73.91 %) of participants were satisfied with follow-up services. A reason for the lower satisfaction levels with regards to the follow-up services could be due to there being more emphasis on inpatient intervention and providing a suitable wheelchair during the initial phase as opposed to interventions provided at a later stage (22). In the present study many of the participants were also still inpatients and so little comment could be made on follow-up services as this did not yet apply to them; hence the results of this section need to also be considered carefully.

In other studies the lower scores for the services sections were reported as due to a lack of concern with regards to the client's needs and opinions where wheelchairs have been abandoned (12). This may be due to some of the therapists assisting with the prescription of wheelchairs having limited training in this field and thus not exposing the client to a variety of options which will impact on the overall service delivery of the wheelchair (71). The high percentage of participants who were quite and very satisfied with professional services indicates that this was not the case in this study (Figure 4.4).

Previous research indicates that increased satisfaction with the wheelchair also leads to increased wheelchair use and improved the participants' functional reach, wheelchair propulsion and their sense of well-being (8). Thus the participants' functional mobility in their wheelchairs will now be covered, thus addressing the third study objective.

5.6 Functional mobility in the wheelchair

The results of the study illustrate that the overall study sample was functionally mobile in their wheelchairs, with a total mean average of all functional tasks among all participants of 84.82% (Figure 4.6).

Regardless of which wheelchair the participants were prescribed the entire study sample was able to demonstrate complete independence in propelling through tight spaces, manoeuvring the wheelchair across uneven terrain, managing curbs as well as carrying out a functional task (i.e. reaching, carrying, lifting and pouring).

Interestingly, a strong correlation was found in the participants' ability to manage a door and the number of years' experience they had in a wheelchair. The participants that had more experience were better able to demonstrate complete independence than the ones who had less than a year's experience in the wheelchair. These results are not unexpected as the participants with less experience were more likely to still be inpatients, thus having had little exposure to opening and closing a door in a hospital environment where they are often accompanied by a nurse who assists in managing doors. Participants who had already been discharged probably practice this functional task on a daily basis. There is limited published research on the change in wheelchair skills over time. Only one study was found that investigated participants' wheelchair skills on discharge and one year post-discharge which showed that the participants' functional skills had increased by 1.8 times over this period (72). It can be assumed therefore that there was an improvement in wheelchair skills and functionality with experience of more than a year post-discharge for participants in this study as well.

A moderate correlation between the participants' ability to manage a door and transfer on/off a bed was also found in this study. This association may also be related to experience in using a wheelchair and other physical components that are needed in order to carry out the task, i.e. the participants require a certain amount of strength, balance, endurance and confidence in order to carry out the task. Literature presents clear evidence that in order to carry out everyday tasks such as managing a curb, managing a door, mounting and descending a curb and transferring on/off a bed, specific physical components are required, otherwise dependence in these tasks results (73). This supports the strong correlation between crossing a street, managing a curb and bed transfers.

The type of wheelchair frame also had an impact on the participants' functional mobility in the wheelchair. For a rigid frame wheelchair, the participants scored a mean average of 86.80% while the participants with a folding frame wheelchair only scored a mean average of 73.57%. This finding was supported in a study conducted by Liu, Pearlman, Cooper, Hong, Wang, Salatin and Cooper (2008), where they showed that wheelchair dimensions affected the manoeuvrability of the wheelchair (38). In their study the more compact wheelchairs allowed for better manoeuvrability than the larger ones (38). In the current study it was found that there is a significant difference between door management and wheelchair type as the participants in folding frame wheelchairs had greater difficulty in going through the door and opening and closing the door due to the greater turning circle of these wheelchairs.

The task of floor transfers was also significantly affected by the type of wheelchair. The mean score for floor transfers for folding frame and Quickie wheelchairs was significantly lower than the mean scores for the other wheelchairs (Figure 4.8). Since research suggests that height difference between wheelchair and transfer surface such as the floor affects the ease of carrying out a transfer (58), it can be assumed that the seat height difference between the folding frame and rigid frame wheelchair will have impacted on the participants' transferring ability, i.e. that it is easier to transfer between the rigid frame wheelchair and the floor as the rigid frame seat height is lower than the folding frame seat height.

It needs to be acknowledged however that the demographics of the participants also play a role in floor to wheelchair transfers although these factors did not show significance in this study. All the female participants except one were able to perform a floor to wheelchair transfer completely independently. In addition the participants' level of injury had an influence on the level of independence in executing a floor transfer. Of the nine participants who were able to execute a floor transfer independently, seven of

them had a low level of injury, i.e. between T10-T12 and L1-L5. Therefore, although the type of wheelchair provided can influence transfers, these demographic factors may also have influenced the results.

Demographic and injury factors also affected the results found for the Quickie wheelchair where transfers to floor scored almost similarly to the folding frame wheelchair. It needs to be taken into consideration that all participants with the Quickie wheelchair were participants who had a relatively high level of SCI, i.e. ranging from C7 quadriplegia to T1 to T6 paraplegia so in this case it was their level of injury that contributed to their decreased independence in floor transfers, and not necessarily their wheelchairs.

The participants using the Tilite and Panthera wheelchairs, which are made out of light weight material such as titanium and carbon fibre, scored above 90% in the overall mean score of the WUFA. These wheelchairs allow the participants to be more active, thereby yielding better functional outcomes. These results are in line with those of Beekman et al. (1999) who found that participants in the titanium wheelchairs compared to the aluminium wheelchairs generated greater speed, were able to push further and preserved more energy, which allowed for more active use and greater functional mobility (26). Factors accounting for improved functionality in the titanium wheelchairs are static stability of the wheelchair, geometry, bearing resistance, frame stiffness, wheel camber and the vertical location of the seat (26).

5.7 Association between satisfaction levels and functional mobility in the wheelchair

Somewhat surprisingly, no association at all was found between the satisfaction levels of the participants in the wheelchairs and their independence in functional tasks in the wheelchairs. This finding contributes to the final study objective, which was to investigate the association between the two. This means that the participants may be satisfied with their wheelchair but may not be able to use it functionally in tasks. Other studies have yielded contradictory results in that some have found an association between the two, while others have not. Results were found where participants generated higher satisfaction levels when they had increased self-efficacy due to their ability to demonstrate a high level of wheelchair skills (72). Yet others have indicated that there is a poor correlation between wheelchair satisfaction and wheelchair skills. In a study conducted by Groot, Post, Bongers-Janssen, Bloemen-Vrencken and van der Woude (2011), where the relationship between manual wheelchair users' satisfaction

and their participation in their active lifestyle was examined, no correlation was found between the total satisfaction score and the activity/participation scores (19).

A reason for the poor relationship between satisfaction and function in the wheelchair in this current study may be the fact that all participants actually performed well in the Wheelchair Users Functional Assessment (WUFA). In addition there were other factors which affected their wheelchair skills such as their physical capacity, self-efficacy and the level of their lesion. External factors such as the environment were not explored in this specific study.

With all study objectives addressed and discussed, limitations to the study can now be explored.

5.8 Limitations to the study

Some of the difficulties were found during the data collection of the study, specifically with the administration of the WUFA outcome measure. While the QUEST 2.0 was simple to administer and did not pose any challenges amongst the participants, the WUFA was found to be extremely difficult to administer in terms of the standardised measures that needed to be taken into account. For example, a specific ramp with exact measurements in terms of dimensions or a street with a curb cut was difficult to find in and around the hospital environment and in Johannesburg in general. While it is an outcome measure that measures function, it becomes less realistic when faced with specific measurements, especially in a developing country where infrastructure is not always according to exact measurements. Alternative outcome measures such as the Wheelchair Outcome Measure (WhOM), the Functioning Everyday with a Wheelchair Questionnaire (FEW- Q) and the Wheelchair Skills Test (WST) were also not suitable as they had stricter rules of administration than the WUFA which would have made the data collection procedure even more difficult.

Once the specific measurements of each task of the WUFA were met, the administration was easier and a set routine for each task could be established. Another limitation was that only Netcare Rehabilitation Hospital was chosen to administer the test and so participants of the study reflect only clients who have come from this specific hospital and who have been treated by therapists from Rita Henn and Partners. Other hospitals where resources for the WUFA may not have been available were not included in this study, which means that the results of this study can therefore not be generalised to all the private hospitals.

As part of the demographic information, it would have been beneficial to ask the participants if they felt that they were limited by the funding they received for the prescription of their wheelchair (i.e. if their medical aids cut costs thereby preventing them from obtaining the wheelchair they preferred) and, if given a choice, would have chosen an alternative wheelchair. This would have been beneficial for medical aids as it could have provided evidence as to whether limited funds impacted on the participants' choice of wheelchairs. An association between the funding and the type of wheelchair could then have been explored.

Some of the associations that were found may be somewhat skewed in that there may also be other variables contributing to the associations found. This could be the case in the type of wheelchair that was prescribed and the WUFA score. The results show a significant difference between the type of wheelchair prescribed and the WUFA score but some of the demographic information may have contributed to the WUFA score, e.g. level of injury, age and gender. Despite the fact that no correlations were found in this study with regards to these demographics, other research has suggested that level of injury, gender and age may impact on the participants' ability to carry out functional tasks in the wheelchair. In a recent study done by Fliess-Douer et al. (2013), it was found that age, level of lesion and self-efficacy were determining factors in the level of performance in the wheelchair (72). In the study they found that the older participants had a slower average speed compared to the younger participants, i.e. the older participants were 2.5 seconds faster on average (72). The participants' level of injury also contributed to their performance in that the participants with tetraplegia were 13.1 seconds slower on average than the participants with paraplegia (72).

The small sample size in this study may have impacted on the associations and significance found between the demographic information and the WUFA score. The only aspects that showed a correlation were door management and number of years in the wheelchair as well as the type of wheelchair prescribed. In this study both appear to affect the WUFA score but there is a limitation in determining exactly which aspect contributes more or less to the WUFA score.

In addition to these demographic contributions, the standard deviation found in the WUFA scores when associated with the wheelchair type was found to be quite significant, indicating that the participants' scores varied among the individuals. Hence even though the results indicate that wheelchair type definitely affects the WUFA score, the standard deviation needs to be considered as it shows that the wheelchair type may in the end not have played such a significant role in the WUFA score. Further

research with a larger study sample to explore this is therefore required before making generalisations about the results of this study.

Another limitation to the study was the fact that the participants were not measured according to whether they were inpatients or outpatients. This would have been a beneficial characteristic to determine in hindsight as research has shown that there is a difference in functionality between the two. There is evidence suggesting that after one year post discharge there is an improvement in performing wheelchair skills which contributes to the participants' ability to be more efficient in functional tasks (72). There may have been a stronger correlation between the time of discharge and the WUFA score compared to the type of wheelchair prescribed. This was also shown in one of the aspects of the WUFA. Door management was found to be dependent on the amount of experience in the wheelchair. To determine the level of functional mobility as an inpatient versus as an outpatient would be beneficial as it also allows for therapists to evaluate whether the clients' achievements are based on what they have taught their clients or whether it is strongly related to what they get exposed to when they are discharged and back in their own home environments. This limitation could be grounds for conducting further research.

The fact that the assessment was performed at a hospital instead of the client's own environment at home will also influence the results. The home environment could have yielded more accurate and realistic results. A comparison between the functional mobility at the hospital and within the home environment is another interesting topic to explore in the future.

5.9 Implications for practice in Occupational Therapy

The results clearly indicate the need to be client-centred in prescribing a wheelchair as each individual will have individualised needs which will need to be taken into account during the prescription of a wheelchair. For some, comfort and ease of use will be important to consider during wheelchair prescription while others may feel that the weight of the wheelchair and the safety in the chair are more important. In addition the results show that involving the clients in wheelchair prescription has indicated a higher level of satisfaction, providing another reason why client-centeredness in wheelchair prescription is important. Therapists involved in the wheelchair prescription process should therefore have sufficient knowledge regarding the different types of wheelchairs available so that an appropriate discussion of wheelchairs can take place between the client and therapist. In addition clients with SCI should be allowed to try different wheelchairs while still in hospital in order to allow them to make an informed decision

as to which wheelchair suits their abilities and environment best. Since previous research has shown that ultra-light rigid frame wheelchairs have shown to be more durable, it is advised that clients do not become despondent towards a more expensive wheelchair as it would be a more cost-effective wheelchair in the long term(26)(37). At the same time therapists also need to inform their clients about the fact that the client's initial wheelchair will not be their first wheelchair and that their needs and capabilities will change with time. Studies have suggested that increased experience in the wheelchair provides a higher level of confidence and self-efficacy; hence a wheelchair that allows them to propel faster (i.e. where the rear wheels are set more forward in the wheelchair) will be more suitable for them(26). At the same time an initial wheelchair user may want a more rigid wheelchair that is heavier and where the rear wheels are set back more to accommodate for their decreased self-efficacy in their wheelchair (26)(69). It is thus important to allow clients sufficient time in different wheelchairs so that they are able to determine what would best suit their current needs. Ultimately this study shows that most clients with SCI actually opt for a rigid frame wheelchair, are functionally mobile in the wheelchair and are satisfied in the wheelchair they have received indicating that the rigid frame wheelchair is the more suitable wheelchair for clients with SCI.

Before finalising a wheelchair, therapists need to be reminded that there is a significant difference between the type of wheelchair prescribed and the seating assessment and modifications done on the wheelchair, and a seating assessment is thus important and should always accompany wheelchair prescription. Along with this, therapists need to have a good understanding of the different adjustments that can be made on a wheelchair in order to ensure that the wheelchair suits the client's biomechanical properties and needs. By making even minor adjustments to the wheelchair, the wheelchair can either enhance or limit function (40), hence knowledge and specific training in appropriate seating and wheelchair prescription is vital. In South Africa, numerous seating workshops exist in order for therapists to be sufficiently trained in appropriate seating and wheelchair prescription (34).

The QUEST 2.0 has shown to be a useful instrument for use during the prescription of a wheelchair and should be considered to become part of general practice in the hospitals as it provides therapists with reminders of what aspects should be considered during wheelchair prescription and it helps determine what aspects are important to the client. In this way, the QUEST 2.0 facilitates a client-centred approach.

In the provision of a suitable wheelchair, therapists need to be reminded of the importance of assessing the clients' functional mobility while they are in their

wheelchairs. In doing so it can be determined whether the client is able to actively participate in activities and whether the wheelchair is enhancing or limiting their function. Assessing functional mobility in the wheelchair is important especially in an Occupational Therapy context where function and a satisfactory quality of life is the primary goal. Since medical aids and other funders are requesting more and more evidence to support the need for appropriate equipment, particularly wheelchairs, determining a client's function in the wheelchair would best be able to provide this form of evidence as it would clearly show how the specific wheelchair aids the client in their everyday life (14). Occupational therapists should make use of outcome measures assessing clients' functional mobility in the wheelchair as it also provides them with an objective measure as to whether their clients are improving through their intervention.

5.10 Summary of Chapter

The study shows that the participants are highly satisfied with the prescription of their wheelchair and that they are functionally mobile in their wheelchairs. A significant difference between the type of wheelchair prescribed and the participants' overall functioning in the wheelchair was found: the rigid frame wheelchair yielded a higher level of functioning in clients with SCI compared to the folding frame wheelchair, and is thus a better wheelchair to prescribe for this population group. Furthermore, the results show that the greater the involvement of participants in wheelchair prescription, the higher the satisfaction levels, indicating the importance for occupational therapists to be client-centred in their prescription of wheelchairs for clients with SCI.

Generally the outcomes of the study show that the participants have a high level of satisfaction with regards to their wheelchair prescription at Netcare Rehabilitation Hospital and that the participants in the study have adequate functional mobility in the wheelchair provided. The outcomes of this study show that the therapists are providing appropriate wheelchairs as their seating assessments, provision of wheelchair cushions, involvement of the participants and provision of specialised modifications to the wheelchair are evidence based.

CHAPTER 6 CONCLUSION

6.1 Summary of research and results

Since there was limited research in South Africa as to whether clients with SCI in South Africa are provided with appropriate wheelchairs, the need to investigate whether clients with SCI in a private hospital in Johannesburg are satisfied with their wheelchair prescriptions and whether they are functionally mobile in their wheelchairs became apparent. It was known that folding frame wheelchairs are commonly prescribed in public hospitals in South Africa yet it was unclear as to what types of wheelchairs are provided in a private hospital in South Africa (21). Numerous research in other countries have also emphasised the importance of client involvement, client satisfaction as well as the importance of being functionally mobile in the wheelchair in order to achieve a satisfactory quality of life (18)(22). The study therefore also explored whether the clients' level of involvement in wheelchair prescription, and the type of wheelchair influenced the clients' satisfaction levels and functional mobility in the wheelchair.

Literature revealed the importance of an appropriate wheelchair enhancing the quality of life in clients with SCI and has provided evidence into the negative impact an inappropriately prescribed wheelchair has on a client with SCI, namely that a poorly suited wheelchair can result in secondary physical and psychological implications, poor quality of life, wheelchair abandonment and ultimately increased costs in order to address the medical problems arising from an inappropriate wheelchair (3) (14). Other studies have provided evidence in the use of in-depth assessments of the client and his/her environment in order to provide appropriate wheelchairs. Along with this, according to literature, a thorough understanding of the different wheelchairs and the biomechanical properties as well as the importance of including clients in choosing a wheelchair is necessary (57). Ultimately the literature results allowed for a relevant topic to be formed and thus the aim of the study was to investigate whether the level of involvement of the clients with SCI in a private hospital in Johannesburg in the wheelchair prescription process and the type of wheelchair prescribed is related to their level of satisfaction with the prescribed wheelchair and how this satisfaction is associated with their functional mobility in the wheelchair.

The study was a non-descriptive correlational research design that included a study sample of 40 participants with SCI falling within the criteria. A pilot study was carried out in order to determine appropriate video angles for the actual data collection. Upon

obtaining ethical approval for the study, the data collection took place at Netcare Rehabilitation Hospital in Auckland Park. The participants were asked to fill out two questionnaires (demographical information sheet as well as the QUEST 2.0) and were then asked to perform ten tasks in the wheelchair using the WUFA in order to determine their functional mobility in their prescribed chair while video recorded. An identified research assistant scored the WUFA in order to refrain from bias during the study. The various data was then entered into a spread sheet and finally analysed using nominal and ordinal scales.

The study revealed the importance of including clients in wheelchair prescription as a higher level of satisfaction with the wheelchair was found among participants who felt that they were involved in wheelchair prescription. By incorporating clients in wheelchair prescription, therapists are being client-centred and ensuring that their clients' needs are met. This is in accordance with earlier evidence carried out in other countries, which has shown that feeling a part of wheelchair prescription has resulted in an increased quality of life (18). The results of the study have also demonstrated the importance of conducting seating assessments and making specialised modifications to the wheelchair as the results have shown how the influence of these two factors have contributed to the overall satisfaction with the wheelchair as well as the functional mobility in the wheelchair. This supports previous studies which have found that seating assessments and customisation of wheelchairs have enhanced appropriate wheelchair prescription and have decreased the occurrence of secondary complications (12). Seating assessments, client involvement and specialised modifications to the wheelchair allow for an appropriate wheelchair to be chosen for the client, which has also shown in this study to have an influence on functional mobility. The study revealed that there was a significant difference between the type of wheelchair prescribed and the clients' mobility in the wheelchair. The rigid frame wheelchairs have been shown to provide higher scores in the WUFA compared to the folding frame wheelchairs. In addition the results of the study have shown how ultra-light wheelchairs, i.e. wheelchairs made out of light materials such as the Panthera and the Tilite wheelchair yield even better scores on the WUFA than a standard rigid frame wheelchair like the Chairman wheelchair. These results are supported by other evidence in which faster wheelchair propulsion and better energy conservation was noted among wheelchair users with ultra-light wheelchairs (26). All in all, the study has shown that the participants of this study are satisfied with their wheelchair prescription at Netcare Rehabilitation Hospital and that the participants also demonstrated adequate functional mobility in the wheelchairs with which they have been prescribed.

Since both a low level of satisfaction and poor functional mobility in the wheelchair lead to a poor quality of life, it can be deduced that the participants of this study were prescribed appropriate wheelchairs as over 80% of them were satisfied with their wheelchairs and over 80% are functionally mobile in the chair. Lastly, no association in this study was found between the satisfaction levels and the clients functional mobility in the wheelchair, which has also been supported by other studies carried out in China and Sweden (18)(22). Despite the valuable results found in this research, the limitations need to be acknowledged, and the need for further research in this field is thus required in order to generalise the results for clients with SCI.

6.2 Recommendations for future studies

Since this study included a sample size of only 40 participants, which is deemed quite small, it would be beneficial to conduct the study with a larger sample size to yield more substantial results. A larger study sample could generate a larger number of females, differing lesions and an increased age range, thereby establishing more accurate results and possibly generating further associations between the outcome measures and demographic information. However since this data was a true reflection of the participants coming in and out of one private hospital within a year, it indicates the type of clients that generally do exist in a certain frame of time and at a specific hospital, i.e. that males are more prone to SCI, that the incidence rate of SCI is within younger clients and that T10 to T12 level of injury appears to be a common level of injury among clients with paraplegia.

A study sample with a higher variety of wheelchairs would also be beneficial in order to yield more accurate results, compared to this study sample where there were only a few participants using ultra-light wheelchairs or folding frame wheelchairs. Since wheelchair users in the US are more and more limited by their health insurances in the prescription of appropriate wheelchairs, it would be beneficial to determine whether the same problems exist in South Africa. Therefore it would be useful to incorporate the investigation of whether clients with SCI are limited by their choice in wheelchairs due to the medical aid funding with a study where the functional mobility of different wheelchair types is explored.

A study that is representative of the whole SCI population in Southern Africa with the inclusion of both private and public hospitals will be beneficial to determine the type of wheelchairs prescribed as a whole in the region. An alternative wheelchair outcome measure to the WUFA should be explored for this study as the WUFA will not be a useful measurement tool for public hospitals where resources are limited.

Lastly, since one of the limitations to the study was the use of the WUFA within the hospital context, the need to determine the applicability of various wheelchair skill outcome measures in South Africa is necessary. If therapists are provided with outcome measures that are useful in a South African context, more therapists may make use of outcome measures and will thus be better able to substantiate why they request a specific or specialised wheelchair for their clients which could further encourage medical aids to authorise and fund appropriate wheelchairs.

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APPENDICES

Appendix A: Demographic Questionnaire

Subject number: _____

Hospital: _____

Type of wheelchair prescribed: _____

Date of injury _____

We kindly ask you to answer the following questions:

Please tick where appropriate

1. Age:

1. 18 - 30	2. 31 -50	3. 51- 60	4. 61 - 70	5. 71 +

2. Gender:

1. Male	2. Female

3. Level of injury?

1. T1 – T2	2. T3 – T4	3. T5 – T6	4. T7 – T9	5. T10 – T12	6. L1 – L5

4. Classification of injury according to the ASIA Impairment Scale?

1. A	2. B	3. C	4. D

5. How long have you been using your wheelchair?

1. Within 1 year	2. Between 1 – 5 years	3. Between 5 – 10 years	4. Between 10 – 15 years	5. Between 15 – 20 years	6. Over 20 years

6. Were you involved in the prescription of your wheelchair?

1. No involvement	2. Some involvement	3. Highly involved

7. Did you receive a Seating Assessment?

1. Yes	2. No

8. Were you prescribed a cushion along with your wheelchair?

1. Yes	2. No

9. Did your wheelchair receive any specific modifications?

1. Yes	2. No

10. Please specify/tick where modifications were made:

1. Backrest	2. Armrests	3. Footrests	4. Wheelchair cushion

11. How was your wheelchair funded?

1. Government	2. Medical Aid	3. Private	4. Charity	5. Other

Please specify if other was ticked: _____

Appendix B: QUEST 2.0

Quebec User Evaluation of Satisfaction with Assistive Technology QUEST (Version 2.0)

DO NOT COPY OR DISTRIBUTE

© L. Demers, R. Weiss-Lambrou & B. Ska, 2000

Technology device: Wheelchair

Code: _____

Date of assessment: _____

The purpose of the **QUEST** questionnaire is to evaluate how satisfied you are with your assistive device and the related services you experienced. The questionnaire consists of 12 satisfaction items.

- For each of the 12 items, rate your satisfaction with your assistive device and the related services you experienced by using the following scale of 1 to 5.

1	2	3	4	5
not satisfied at all	not very satisfied	more or less satisfied	quite satisfied	very satisfied

- Please circle or mark the **one number** that best describes your degree of satisfaction with each of the 12 items.
- **Do not** leave any question unanswered.
- For any item that you were not "very satisfied", please comment in the section **comments**.

Thank you for completing the QUEST questionnaire

1	2	3	4	5
not satisfied at all	not very satisfied	more or less satisfied	quite satisfied	very satisfied

ASSISTIVE DEVICE (WHEELCHAIR)	
<i>How satisfied are you with,</i>	
1. the dimensions (size, height, length, width) of your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
2. the weight of your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
3. the ease in adjusting (fixing, fastening) the parts of your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
4. how safe and secure your assistive device (wheelchair) is? <i>Comments:</i>	1 2 3 4 5
5. the durability (endurance, resistance to wear) of your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
6. how easy it is to use your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
7. how comfortable your assistive device (wheelchair) is? <i>Comments:</i>	1 2 3 4 5
8. how effective your assistive device (wheelchair) is (the degree to which your wheelchair meets your needs)? <i>Comments:</i>	1 2 3 4 5

1	2	3	4	5
not satisfied at all	not very satisfied	more or less satisfied	quite satisfied	very satisfied

SERVICES	
How satisfied are you with,	
9. the service delivery program (procedures, length of time) in which you obtained your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
10. the repairs and servicing (maintenance) provided for your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
11. the quality of the professional services (information, attention) you received for using your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5
12. the follow-up services (continuing support services) received for your assistive device (wheelchair)? <i>Comments:</i>	1 2 3 4 5

- Below is the list of the same 12 satisfaction items. PLEASE **SELECT THE THREE ITEMS** that you consider to be **the most important to you**. Please put an X in the **3 boxes** of your choice.

- | | |
|---|---|
| <input type="checkbox"/> 1. Dimensions | <input type="checkbox"/> 7. Comfort |
| <input type="checkbox"/> 2. Weight | <input type="checkbox"/> 8. Effectiveness |
| <input type="checkbox"/> 3. Adjustments | <input type="checkbox"/> 9. Service delivery |
| <input type="checkbox"/> 4. Safety | <input type="checkbox"/> 10. Repairs/servicing |
| <input type="checkbox"/> 5. Durability | <input type="checkbox"/> 11. Professional service |
| <input type="checkbox"/> 6. Easy to use | <input type="checkbox"/> 12. Follow-up services |

QUEST
Scoring Sheet

This page is for scoring the answers to your questions.

DO NOT WRITE ON THIS PAGE.

- Number of non-valid responses _____

- **Device** subscale score _____
For items 1 to 8, add the ratings of the valid responses and divide this sum by the number of valid items in this scale.

- **Services** subscale score _____
For items 9 to 12, add the ratings of the valid responses and divide this sum by the number of valid items in this scale.

- Total QUEST score _____
For items 1 to 12, add the ratings of the valid responses and divide this sum by the number of valid items.

- The 3 most important satisfaction items:

Appendix C: Wheelchair Users Functional Assessment (WUFA)

Assessment Date		
Wheelchair propulsion	Tight Spaces	
	Uneven Terrain	
	Door Management	
	Street Crossing	
	Ramps	
	Curbs	
Transfers	Wheelchair - Bed	
	Wheelchair - Toilet	
	Wheelchair - Floor	
Function	Picking Up Objects &Sweeping	
Total Score:		

October 2004 R.Weston

WUFA

1. WHEELCHAIR PROPULSION--MANOEUVRING IN TIGHT SPACE

Directions: Propel wheelchair down straight line, turn 180 degrees in designated space, and propel back. Stay within the designated lines. Perform as fast as you can.

Performance requirements: Need designated area with a marked start line followed by 5 feet straight line and a 60 inch diameter circle. Patient will 1) propel 5 feet, 2) turn 180 degrees in 60 inch diameter space 3) propel back 5 feet. If the patient crosses boundaries, he/she is not given credit for that part of task. Timing will begin at start of 5 foot runway and end at the same point.

- 7 Complete independence: Patient performs all three parts of activity safely without assistance in less than 25 seconds.
- 6 Modified independence: Patient performs all three parts of activity safely without assistance in greater than 25 seconds.
- 5 Supervision or Set up: Patient requires cues or coaxing or stand by for safety to perform any three parts of the task.
- 4 Minimal Assistance: Patient requires assistance with 1 of the 3 parts of the task.
- 3 Moderate Assistance: Patient requires assistance with 2 of the 3 parts of the task.
- 2 Maximum Assistance: Patient requires assistance with all 3 parts of the task.
1. Total Dependence: Patient is unable to perform any part of activity or requires assistance of two people.

Appendix D: Ethical Clearance



R14/49 Ms Nadine Wolf

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL) CLEARANCE CERTIFICATE NO. M130937

NAME: Ms Nadine Wolf
(Principal Investigator)

DEPARTMENT: Occupational Therapy
Netcare Rehabilitation, Muelmed Mediclinic, Natalspuit,
South Rand and Edenvale Hospitals

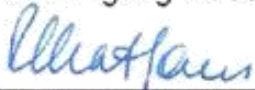
PROJECT TITLE: Satisfaction with Wheelchair Prescription and
Functional Mobility of Clients with Paraplegia

DATE CONSIDERED: 27/09/2013

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Denise Franzen & Lebogang Maseko

APPROVED BY: 

Professor PE Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 30/10/2013

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.**

Principal Investigator Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix E: Hospital and Therapy Permission Letter and Written Consent

Occupational Therapy

School of Therapeutic Sciences • Faculty of Health Sciences • 7 York Road, Parktown 2192, South Africa
Tel: +27 11 717-3701 • Fax: +27 11 717-3709 • E-mail: denise.franzsen@wits.ac.za



CEO of Netcare/Hospital Manager of Netcare Rehabilitation Hospital/Rita Henn and Partners

Dear Sir/Madam,

I, Nadine Wolf, am currently doing my masters degree in Occupational Therapy at the University of the Witwatersrand. I have chosen to investigate: 'Satisfaction with wheelchair prescription and functional mobility of clients with paraplegia'. The aim of this research is to investigate how satisfied clients with paraplegia are with the use of their wheelchair in everyday life and how this satisfaction is associated with their functional mobility in the wheelchair.

Therefore I would like to ask permission to conduct my research at various rehabilitation centres in Gauteng/at your hospital as they are/ your hospital is specifically specialised in the rehabilitation of spinal cord injuries.

The participants in the study will need to be clients with paraplegia, who have been using their wheelchair for at least three months. Clients will be invited to participate in the study and will be provided with an information sheet which will explain the aim of the research as well as what will be expected of them. The clients will be asked to sign a consent form. The participants will be asked a few demographic questions in the form of a semi-formal interview before they will be asked to complete a questionnaire regarding their satisfaction with their wheelchair. Once completed, they will then be asked to complete 10 functional tasks in the wheelchair which will be video recorded for data analysis. The participants will also be asked to sign a consent form regarding the video recording prior to the commencement of the study. The video tapes will be kept in a safe place to ensure confidentiality. The participants will be allowed to withdraw from the study at any given point without reason or prejudice.

If the participants have not learnt to perform a certain task yet, they will be excluded from the task so as to avoid any possible harm or injury.



Occupational Therapy

School of Therapeutic Sciences • Faculty of Health Sciences • 7 York Road, Parktown 2192, South Africa
Tel: +27 11 717-3701 • Fax: +27 11 717-3709 • E-mail: denise.franzsen@wits.ac.za



Once my research has been completed, I will gladly send each hospital a copy of the findings upon request.

For further enquiries or information with regards to my research, please do not hesitate to contact me on the following e-mail address: nadine.wolf@hotmail.com

Should there be any ethical queries about the research please feel free to contact the Human Research Ethics Committee (HREC) Chairman Prof P Cleaton-Jones at 011 7171234 or anisa.keshav@wits.ac.za for reporting of complaints / problems

Yours sincerely,

Nadine Wolf



Permission from Hospital Manager



Netcare Rehabilitation Hospital

Tel: +27 (0) 11 489 1111
Fax: +27 (0) 11 489 1190
2 Bunting Road, Auckland Park, Johannesburg, South Africa
PO Box 150, Auckland Park, 2006, South Africa
www.netcare.co.za

LETTER CONFIRMING KNOWLEDGE OF CLINICAL MEDICATION RELATED TRIAL OR CLINICAL NON-MEDICATION RELATED TRIAL RESEARCH TO BE CONDUCTED IN THIS NETCARE FACILITY

Dear **Nadine Wolf**

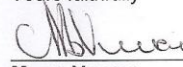
Re: **Satisfaction with wheelchair prescription and functional mobility of clients with paraplegia**

We hereby confirm knowledge of the above named research application to be made to the Netcare Research Committee and in principle agree to the research application for **Netcare Rehabilitation Hospital**, subject to the following:

- i) That the research may not commence prior to receipt of FINAL APPROVAL from the Academic Board of Netcare (Research Committee).
- ii) That the researcher will notify the Academic Board of Netcare (Research Committee) of the proposed date of commencement of the project, in writing.
- iii) That insurance stating the necessary indemnity cover (where applicable) will be provided by the researcher and maintained for the duration of the research, protecting both the staff and the hospital facility from potential liability
- iv) That, in accordance with MCC approval, that medicine will be administered by or under direction of the authorised Trialist
- v) That Netcare will be furnished with a STATUS REPORT on the progress of the study at least annually on 30th September irrespective of the date of approval from Academic Board of Netcare (Research Committee) as well as a FINAL REPORT with reference to intention to publish and probable journals for publication, on completion of the study.
- vi) That the Hospital Management reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental to the subjects / Netcare or should the researcher not comply with the conditions of approval.

We wish you success in your research.

Yours faithfully



M van Vuuren
Hospital General Manager

03-02-14
Date

Permission from CEO of Netcare



Netcare Management (Pty) Limited

Tel: + 27 (0)11 301 0000
Fax: Corporate +27 (0)11 301 0499
76 Maude Street, Corner West Street, Sandton, South Africa
Private Bag X34, Benmore, 2010, South Africa

RESEARCH OPERATIONAL COMMITTEE FINAL APPROVAL OF RESEARCH

Approval number: UINV-2014-0009

Ms N Wolf

E mail: nadine.wolf@hotmail.com

Dear Ms Wolf

RE: SATISFACTION WITH WHEELCHAIR PRESCRIPTION AND FUNCTIONAL MOBILITY OF CLIENTS WITH PARAPLEGIA

The above-mentioned research was reviewed by the Research Operational Committee's delegated members and it is with pleasure that we inform you that your application to conduct this research at Netcare Rehabilitation Hospital, has been approved, subject to the following:

- i) Research may now commence with this FINAL APPROVAL from the Sustainability Committee of Netcare (Research Operational Committee).
- ii) All information with regards to Netcare will be treated as confidential.
- iii) Netcare's name will not be mentioned without written consent from the Sustainability Committee of Netcare (Research Operational Committee).
- iv) All legal requirements with regards to patient rights and confidentiality will be complied with.
- v) Insurance will be provided and maintained for the duration of the research. This cover provided to the researcher must also protect both the staff and the hospital facility from potential liability
- vi) In accordance with MCC approval, that medicine will be administered by or under direction of the authorised Trialist
- vii) The research will be conducted in compliance with the GUIDELINES FOR GOOD PRACTICE IN THE CONDUCT OF CLINICAL TRIALS IN HUMAN PARTICIPANTS IN SOUTH AFRICA (2000)
- viii) Netcare must be furnished with a STATUS REPORT on the progress of the study at least annually on 30th September irrespective of the date of approval from Sustainability Committee of Netcare (Research Operational Committee) as well as a

Directors: M S F da Costa, J du Plessis, K N Gibson R H Friedland, K Naiker, M B Nkosi, C Pailman, N Phillipson,
P Warrenner, D van den Bergh

Company Secretary: L Bagwandeem Reg. No. 1995/012717/07

FINAL REPORT with reference to intention to publish and probable journals for publication, on completion of the study.


- ix) A copy of the research report will be provided to Netcare (Research Operational Committee) once it is finally approved by the tertiary institution, or once complete.
- x) Netcare has the right to implement any Best Practice recommendations from the research.
- xi) Netcare reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental to the subjects/Netcare or should the researcher not comply with the conditions of approval.
- xii) APPROVAL IS VALID FOR A PERIOD OF 36 MONTHS FROM DATE OF THIS LETTER.

We wish you success in your research.

Yours faithfully



Prof Dion du Plessis
Full member, Research Operational Committee & Medical Practitioner evaluating research applications
as per Management and Governance Policy

Shannon Nell 
Chairperson: Research Operational Committee
Network Healthcare Holdings Limited (Netcare)
Date: 4/3/2014



RE: Status report regarding my master's research

From: **Research** (Research@netcare.co.za)
Sent: 06 October 2014 09:45:52 AM
To: Nadine (nadine.wolf@hotmail.com)

Dear Nadine

Thanks for the report

All of the best with your research

Trina

Dr CW Folscher
Project Manager: Bursaries & Research
Telephone: 0832911871
Address:
557 Mirage Street
Elardus Park
Pretoria

From: Nadine [mailto:nadine.wolf@hotmail.com]
Sent: 02 October 2014 01:35 PM
To: Research
Subject: Status report regarding my master's research

Dear Dr Folscher,

I am currently doing my masters degree in Occupational Therapy in the field of neurosciences. In March I received approval to conduct my research at Netcare Rehabilitation Hospital in Auckland Park. This e-mail serves to give you an update with regards to the progress I have made so far.

I am currently still busy with the data collection. I have so far been able to conduct my research on 27 participants and still require 13 more participants to complete my data collection. Once my data collection is completed I will start with the data analysis and write-up of my thesis. I will send through a final report once the university is satisfied with my report.

If there are any further queries regarding my research, please contact me on this e-mail address.

Thank you.

Kind Regards,

Nadine Wolf

Permission from Rita Henn and Partners

Netcare Rehabilitation Hospital
2 Bunting Road
Auckland Park
Johannesburg

Tel (011) 489 1229
Fax 086 545 5557
Email: rhenn@physicalrehab.co.za
Website: www.physicalrehab.co.za



PostNet Suite 224
Private bag X 9
Melville
Johannesburg
2109

Pr: 050 000 0206822
Reg No. 2003/024744/21
Vat reg no: 4040209365

19 November 2013

To Whom It May Concern

Re: Research At RITA HENN & PARTNERS INCORPORATED

Regarding your letter requesting approval and permission to conduct this study at Netcare Rehabilitation Hospital we are extremely willing and grant permission for this study to be conducted. Please note that while you are busy with any activities with the patients that you are completely liable for any incidences that may arise. Please ensure that at no time the research study interferes with patients therapy sessions. Please always lease with relevant staff and patients where necessary. Separate permission is required from Hospital Management the group of Netcare Hospitals.

Yours Truly

Megan Knox
PhD (Physiotherapy) Wits
The Partners of Rita Henn and Partners Inc.

Directors: R Henn, M Knox, M Marx, H Tiernay, L Dearle, S Reynolds, S Quinlan, A Smit, R Tovell-Holdt

Appendix F: Permission to use the QUEST 2.0

Date: Mon, 6 May 2013 11:08:29 -0400

Subject: Re: Using the QUEST 2.0 as an outcome measure for my research study

From: louise.demers@umontreal.ca

To: nadine.wolf@hotmail.com

Dear Ms Wolf,

Thank you for your interest in our tool.

You are welcome to use it, as long as it is acknowledged in your written reports.

The questionnaire and manual are attached.

Best of success with your work,

LD

Louise Demers, PhD, OT(C)

Director, School of Rehabilitation

Associate Vice-Dean for Health Sciences, Faculty of Medicine

Université de Montréal, Box 6128, Succ. Downtown, Montreal (QC), H3C 3J7

Researcher, Centre de recherche de l'Institut universitaire de gériatrie de Montréal

4565, Queen Mary Rd, Montreal (QC), H3W 1W5

www.criugm.qc.ca

E-Mail: louise.demers@umontreal.ca

Appendix G: Participant Information Sheet

Occupational Therapy

School of Therapeutic Sciences • Faculty of Health Sciences • 7 York Road, Parktown 2192, South Africa
Tel: +27 11 717-3701 • Fax: +27 11 717-3709 • E-mail: denise.franzsen@wits.ac.za



PARTICIPANT INFORMATION SHEET

Title: 'Satisfaction with wheelchair prescription and functional mobility of clients with paraplegia'.

Hello,

My name is Nadine Wolf and I am currently doing my masters degree in Occupational Therapy at the University of the Witwatersrand. The aim of this research is to investigate how satisfied clients with paraplegia are with the use of their wheelchair in everyday life and how this satisfaction is associated with their functional mobility in the wheelchair.

I would like to invite you to take part in my study as your participation and contribution would be of great value. If you choose to agree to participate in the study you will be asked to answer just a few general questions about yourself and your wheelchair prior to completing a questionnaire regarding your satisfaction with the wheelchair that you have been with. Once completed, you will then complete 10 functional everyday tasks in the wheelchair which will be video recorded. These functional tasks include: pushing the wheelchair through a tight space, uneven terrain, managing a door, crossing a door, managing a ramp and curb, transferring to the bed, toilet and floor and lastly pouring a glass of water from a jug. If you have not yet learnt how to perform a certain task or if you feel unsafe performing a task, you will not have to do it. This is to ensure that you do not injure or harm yourself. I will also stand next to you at all times while you perform each task for safety and prevention of any injury.

I will provide a form for you to sign in order to gain permission for you to be videoed while performing the functional tasks. The video recording will only be used for research purposes in order to make more accurate conclusions about the results obtained. The videos will only be viewed by the researcher and another occupational therapist that is a research assistant and will be locked away in a safe place.



Occupational Therapy

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Tel: +27 11 717-3701 • Fax: +27 11 717-3709 • E-mail: denise.franzsen@wits.ac.za



Confidentiality will be ensured as far as possible and no names will be used on any of the data collection sheets.

You are allowed to withdraw from the study at any given point without reason and this will not affect your therapy in the hospital in any way. If you feel that the study has caused you psychological stress of any sort, I have a list of contact details of relevant counsellors/psychologists in the area that you can follow-up with if you wish to do so.

Once my research has been completed, I will gladly send you a copy of the findings upon request.

Your participation in my research will be greatly appreciated.

If you have any further enquiries or information with regards to my research, please do not hesitate to contact me on the following e-mail address: nadine.wolf@hotmail.com

Should there be any ethical queries about the research please feel free to contact the Human Research Ethics Committee (HREC) Chairman Prof P Cleaton-Jones at 011 7171234 or anisa.keshav@wits.ac.za for reporting of complaints / problems

Kind Regards,

A handwritten signature in blue ink, appearing to read 'Nadine Wolf'.

Nadine Wolf



INFORMED CONSENT

Subject number:

I hereby agree to participate in the study title: 'Satisfaction with wheelchair prescription and functional mobility of clients with paraplegia'. I have understood all information pertaining to the study and agree to all the terms in the study.

Signature of participant

Witness

Date

PERMISSION TO VIDEO RECORD ASSESSMENT

Subject number:

I hereby agree to being video recorded while carrying out the functional tasks in the wheelchair. I am aware that the video will only be used for this research.

Signature of participant

Witness

Date

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