Self-care and functional mobility outcomes of patients diagnosed with Tuberculosis of the spine in KwaZulu Natal

MICHELLE HANNINGTON

0704892G

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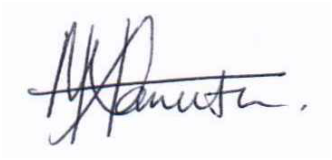
DECLARATION

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



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DEDICATION

'Those who have the privilege to know have the duty to act.'

Albert Einstein

ABSTRACT

There is a lack of research available on the functional outcomes achieved by patients with Tuberculosis (TB) of the spine, which is relevant for occupational therapists (OTs) to set diagnosis-specific outcomes. The aim of the study was to determine the self-care and functional mobility outcomes achieved by TB spine patients, in KwaZulu Natal, and the factors impacting on these outcomes.

A quantitative cross-sectional descriptive design was used and sampling included all TB spine patients accessing the hospitals included in the study. Data collection occurred over a nine month period. The outcome measures used included: a demographic and medical questionnaire, the American Spinal Injury Association classification scale, and the self-care and mobility sections within the Spinal Cord Independence Measure III.

TB spine showed a good prognosis for functional independence, with the majority of the population performing well in self-care and functional mobility outcomes, with lower limbs activities the most affected.

Factors associated with good functional outcomes included no other TB history, incomplete neurological fallout, and a lesion in the lumbar spine. Back pain, paraplegia and a lesion in the thoracic spine were associated with poorer functional outcomes. Only a small percentage of patients were referred to OT.

Patients diagnosed with TB spine have a good prognosis for self-care and functional mobility outcomes, however there was poor referral of TB spine patients to OT which indicates a need for further education around the role of occupational therapists in TB spine.

Key Words: TB spine, self-care, functional mobility, functional outcomes, non-traumatic spinal cord lesion, occupational therapy.

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LIST OF ACRONYMS

Adss: adaptive devices and/or specific settings
ASIA: American spinal cord injury association
Bzl: buttons, zippers or laces
CT: Computerised tomography
C-spine: Cervical spine
Cwobzl: clothes without buttons, zippers or laces
DOTS: Directly observed treatment short course
HIV: Human immunodeficiency virus
KZN: KwaZulu Natal
L-Spine: Lumbar spine
MDR: Multi drug resistant
MDT: Multi-disciplinary team
MRI: Magnetic resonance imaging
NTSCL: Non-traumatic spinal cord lesion
OPA: Occupational performance area
OT: Occupational therapist
SCIM: Spinal cord independence measure
S-Spine: Sacral spine
T-Spine: Thoracic spine
TB: Tuberculosis
WHO: World Health Organisation
XDR: Extensively drug resistant

CHAPTER ONE: BACKGROUND AND NEED

1.1. INTRODUCTION

"Tuberculosis (TB) remains a growing public health problem especially in developing countries (1)(p.469)". According to the Department of Health, South Africa is identified to have the seventh highest incidence of TB in the world (2). KwaZulu Natal (KZN) is one of the provinces most severely impacted by TB and has been identified as the epicenter of the co-epidemic of HIV and TB (3).

With a global rise in TB, there has also been a global rise in extrapulmonary TB, with approximately 15% of cases reported being extrapulmonary (4). Of those patients diagnosed with extrapulmonary TB, bone and joint TB can account for 15-35% of cases (5). TB of the spine is considered a form of bone and joint TB as it most commonly affects the vertebral bodies (6). In a study conducted in 2008 by Godlwana, Gounden, Ngubo, Nsibande, Nyawo, and Puckree, on the incidence and profile of spinal TB in KZN, research found that skeletal TB accounts for 10% of extrapulmonary cases in this province. In more than 65% of these cases, the area affected is the vertebral column, i.e. TB spine (3).

Tuberculosis of the spine, also known as Pott's disease, is most often due to a dissemination of TB to the vertebral column through the blood supply from a previous TB focus, mainly pulmonary (7). The initial infection starts at the vertebral bodies and can spread into the disc space, which may result in: narrowing of the disc space, caseous necrotic tissue leading to abscess, or mechanical instability, such as dislocation or collapse (7, 8). Neurological involvement can occur when there is compression of the cord, when there is direct vascular involvement to the cord, or secondary to vertebral instability (1). Consequently, paraplegia is one of the most threatening complications of TB spine (5, 8, 9).

Occupational therapists (OTs) play a role in the rehabilitation of patients diagnosed with TB spine, as any neurological involvement or paralysis leads to significant changes in occupational performance (4).

According to the occupational therapy practice framework (OTPF), part of the OT process is setting outcomes for the patient (10). The OTPF has been adopted by South African OTs and is taught by all South African Universities offering degrees in occupational therapy, making it relevant to the South African setting. Outcomes are taught as a part of the OT process in all undergraduate training (11). One of the types of outcomes that are set are occupational performance outcomes, which address the ability to participate in the various areas of occupation (10). These include participation in self-care activities and functional mobility, which are the areas of focus for this research. These two areas are prioritised, as there is consensus amongst OTs that these skills are fundamental to other areas of higher functioning, and independence in these two areas leads to greater overall quality of life (12, 13). Functional mobility and self-care have also been highlighted as important to the patient (14). For many patients with spinal cord lesions, such as TB spine, their main concern is the ability to walk or move around again. Self-care activities, such as dressing, bathing, and grooming are also highlighted to be of great priority to patients with spinal cord lesions, and these activities are amongst the most frequently reported areas of difficulty (13). As patients diagnosed with TB spine show deficits in self-care and functional mobility, this would be an integral focus of OT intervention.

If there can be early prediction of neurological recovery and occupational performance in self-care and functional mobility, it would be easier to set realistic outcomes with the patient for these specific areas and assist them to achieve their maximum potential (15).

1.2. PROBLEM STATEMENT

Tuberculosis of the spine is a much researched subject, however, the focus has been on medical treatment, with little evaluation of what occupational performance changes these patients experience (16). It is widely accepted that the foundation of the rehabilitation process for these patients is setting occupational performance outcomes within each area of occupation (10, 17, 18). At present, there is no literature available on any of the functional outcomes these patients achieve, but as the focus of this study is on self-care and functional mobility, it is relevant to note there is no specific literature available on these two areas. The result is that the functional prognosis, in these two areas, for a patient diagnosed with TB spine, is unknown. One of the factors that is considered when setting outcomes is the prognosis for the patient, thus ensuring the outcomes are attainable (15, 19). Due to the lack of literature, OTs are forced to set generic outcomes based on spinal cord injury as a diagnosis, rather than specific, realistic outcomes related to TB spine.

1.3. RESEARCH QUESTION

What are the self-care and functional mobility outcomes achieved by patients diagnosed with TB spine in KZN within the first two years after initial diagnosis and the related impacting factors?

1.4. AIM OF STUDY

To determine the self-care and functional mobility outcomes achieved by patients diagnosed with TB spine in KZN within the first two years after initial diagnosis and the factors impacting on these outcomes.

1.5. OBJECTIVES OF STUDY

A. To determine the medical and demographic characteristics of patients diagnosed with TB spine at four participating hospitals in KwaZulu Natal.
B. To determine the self-care and functional mobility outcomes patients diagnosed with TB spine are achieving at three different time periods within the first two years after initial diagnosis using the Spinal Cord

Independence Measure (Version III) (within the first six months, the first year and the first two years).

C. To determine the impact or effect of the identified medical and demographic factors on the self-care and functional mobility outcomes achieved.

1.6. JUSTIFICATION

For OTs working in KZN, there is a demand to deliver services to an increasing number of patients with TB spine, due to the high percentage who present with neurological fallout. As there is a gap in literature with regards to the prognosis in TB spine for self-care and functional mobility outcomes, research into what these patients achieve in both areas would contribute to the body of knowledge and has guided the motivation for this study. Functional mobility and self-care are both areas that are fundamental to all other occupational performance areas and they are identified as important by the patients. Clinical experience indicates that these are the two areas most often focused on first in OT. This information will assist OTs working with patients with TB spine to set realistic outcomes in the areas of self-care and functional mobility. Knowledge about prognosis and outcomes for TB spine is not only important for the individual patient receiving rehabilitation, but also for the greater population with regards to creating prevention campaigns (20). Insight into the functional outcomes of TB spine patients will assist with setting goals, developing screening tools, planning for discharge, and motivating for specialised care (21). Providing patients and their families with realistic goals also assists them to accept the diagnosis and prepare for discharge (13). There has been an identified need for research into this area by professionals working with patients diagnosed with TB spine, as well as by previous research studies on TB spine. This is reiterated by Godlwana et al., who noted a need for multidisciplinary research into the management of TB spine outcomes (3).

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

This chapter provides a review of the current literature available on TB spine and occupational therapy services provided to patients diagnosed with TB spine. It looks at the prevalence of TB spine in South Africa and KZN, and the demographic and medical characteristics of the population as highlighted by research. It focuses specifically on the factors that have an impact on the medical prognosis of the patient, such as a delayed diagnosis. It also focuses on the consequences of TB spine: the impact on functioning and the subsequent role OT plays in rehabilitation of patients diagnosed with TB spine. It aims to highlight the gaps in literature available on self-care and functional mobility outcomes specifically, to justify the need for this study.

A search of the literature was conducted in order to find current research and literature on TB spine, the factors impacting on prognosis and the functional outcomes achieved. The following databases were searched for literature: Cochrane, Cinhal, ebscohost, Pubmed and Google Scholar. For the literature review a total of 161 articles were included.

2.2. INTRODUCTION TO THE LITERATURE

The prevalence of TB is increasing across the world in both developed and developing countries and has had a large impact on South Africa (3, 22). Currently, the province of KwaZulu Natal is one of the worst affected in South Africa and has been shown to have the lowest cure rate and percentage of successful completion of treatment for TB (23). Although in research there has been a focus on pulmonary TB, extrapulmonary TB should not be overlooked as it has a large contribution to morbidity and mortality, and often causes lifelong disability (24). Tuberculosis of the spine is a topic of great importance to occupational therapists, as it can have a devastating impact on the quality of life for patients, even if they are effectively treated, due to the residual impairments of paralysis and spinal deformity (9). However, there is

an identified gap in the literature with regards to TB spine, the functional outcomes they achieve and the role of occupational therapy.

2.3. STATISTICS OF TUBERCULOSIS OF THE SPINE IN SOUTH AFRICA AND KWAZULU NATAL

In a Korean study that looked at the outcomes and management of TB spine according to the severity of the disease, it was noted that TB spine is on the rise worldwide, in both developing and developed countries (22). With a global rise in TB there has also been a global increase in extrapulmonary TB, with the World Health Organisation (WHO) reporting 15% of new cases in 2011 as extrapulmonary, and South Africa is following this trend (24, 25). In 2009, South Africa was reported to have the highest incidence of TB in the world, and in 2011, 5.8 million new cases of TB were reported by the WHO (24, 25). Within South Africa, skeletal TB is the second most common form of extrapulmonary TB at 3-10%, and of those affected, 50% have TB of the spine resulting in an incidence of 1.5-5% of TB spine (25-27).

Tuberculosis of the spine is classified as a non-traumatic spinal cord lesion (NTSCL), and at the start of 2014, a worldwide study was conducted to determine the aetiologies of NTSCL around the world. At the time, the only country included in the study from Sub-Saharan Africa was Zimbabwe. The global study found that TB spine was found to be the second most common cause of NTSCL at 28% after tumours (28). In other African countries, such as Kenya and Malawi, TB of the spine was the most common cause of NTSCL. This trend has been found to be common in several developing countries, including India, Fiji, Ethiopia, Kenya, Malawi, Zimbabwe, Ghana and Nigeria (28, 29). Similarly, in a study that focused on the aetiologies of spinal cord injuries in Sub-Saharan Africa, TB was identified as the leading cause of NTSCL in South Africa. Together with tumours, it reportedly makes up almost 50% of NTSCL aetiology (20).

In South Africa, KZN has been identified as the province with one of the highest prevalence's of TB and extrapulmonary TB. Tuberculosis of the spine is common in areas of poor sanitation, poor nutrition, and low socioeconomic status. KZN, specifically, has high areas of poverty, malnutrition, and overcrowding (7). These factors have been associated with TB spine and have been suggested to contribute to the high prevalence in this province (7). In this study, there was a prevalence of five to ten patients per month at the tertiary and secondary hospitals in the urban areas, but only one to four patients per six months in the rural areas at the district level hospitals. This may be explained by the fact that spinal tuberculosis is most commonly managed at tertiary level hospitals due to the need for MRI, CT scans, and specialists (25). Patients may be seen in primary health care facilities, but they are then referred on to a tertiary level for management. Health care professionals at primary care level may not be able to recognise or diagnose TB spine and also refer on to tertiary level hospitals (25). This result was similar to that of a study conducted by Polley and Dunn in 2009, in the Western Cape, that found that most TB spine patients were seen at tertiary level institutions, due to the need for specialist care, investigations, and procedures (25).

2.4. DEMOGRAPHICS OF THE POPULATION WITH NON-TRAUMATIC SPINAL CORD LESIONS

From clinical experience working with patients with NTSCL, clinicians have found there is a difference in demographics of the population and functional outcomes between traumatic and non-traumatic lesions, and this impacts on the care provided (30). Therefore, in recent years, there has been an increase in the research around NTSCL in order to identify the specific characteristics of the population of patients with NTSCL and the outcomes they achieve.

There have been several global studies to date on the demographics of people with NTSCL, and they have found that the population tend to be of an older age, female and retired (30). However, there is minimal research on

NTSCL, and more specifically TB spine, in South Africa, and it is possible the international research is not relevant to the South African setting. This is due to the fact that the South Africa has unique factors that can impact on the demographics of patients with NTSCL, for example high illiteracy rates and unemployment. Within South Africa there is a quadruple burden of disease which is made up of infectious diseases related to poverty and underdevelopment, non-communicable and chronic diseases, high rates of injury and HIV/AIDS pandemic (31). Tuberculosis falls into both the infectious diseases category, as well as has associations with the HIV/AIDS pandemic. This burden of disease will have an impact on the demographics of those at risk for TB of the spine within South Africa (31). Tuberculosis of the spine is its own disease and has demographics that differ to other NTSCL aetiologies, specifically in South Africa. This is due to the mechanism of the disease, the co-morbidities commonly associated with the disease, and the specific factors that put people at risk for TB spine. These factors create a population of people with specific demographic characteristics, which are at risk for TB spine. In general, TB affects young adults, therefore lowering the average age of TB spine patients (26). Patients are also more likely to contract spinal TB if they are infected with HIV, and HIV is most prevalent in young, working adults (26). This is in comparison to international studies that have found patients with NTSCL to be of an older age. This is relevant to occupational therapy, as the age of a patient will impact on their life status, for example working versus retired, and can therefore impact on the functional outcomes set. Therefore, there is a need to gather data on the demographics of the TB spine population in South Africa.

Tuberculosis has been identified as a disease of poverty, in a study in Delhi, India, that looked at neurological fallout in patients with TB spine, it was found that the majority of patients had a low socioeconomic status. TB is also prevalent in areas where there is poor sanitation, poor living facilities, and poor nutrition, all of which are common consequences of a low socioeconomic status (29). From clinical experience, the same can be said for South Africa,

where the majority of patients with TB spine come from lower socioeconomic areas with poor living conditions. Some of the other factors that have been identified to predispose one to spinal TB include overcrowding and illiteracy, which are often associated with a lower socioeconomic status (26).

2.5. FACTORS IMPACTING ON MEDICAL PROGNOSIS OF TUBERCOLOSIS OF THE SPINE

At present, there have been several factors identified to have a negative impact on the medical prognosis of patients with TB spine. They will be briefly discussed here, as well as researched in this study to determine if they also have an association with poor occupational performance outcomes.

2.5.1. Delayed diagnosis

The most commonly identified factor, linked with a poor prognosis, is a history of long duration of symptoms prior to diagnosis (5). Delayed diagnosis leads to a delay in treatment for the patient, either pharmacological or surgical. In this case, the spinal cord is compressed for a longer time which results in further neurological fallout, as well as a poorer prognosis for neurological and functional recovery (29). A delayed diagnosis is not only linked with a poorer neurological and functional outcome, but it has also been shown to lead to more complications and greater severity of complications (27).

The timeframe between onset of symptoms and diagnosis varies in the literature available from weeks to years, but most commonly is between four to 10 months (26, 32). The reasons for a delay in diagnosis are not clear, but a few suggestions have been made.

The main reason for a delay in diagnosis appears to be due to the chronic and insidious onset of symptoms, as patients do not seek help until the signs and symptoms are markedly progressed (8). Patients also tend to ignore general symptoms, such as generalised pain or fever, and only seek help when there are neurological symptoms, which may occur later in the disease (27).

Generalised symptoms can be broad and may present as less threatening diseases. The symptoms that most commonly lead to patients seeking help are severe pain, spinal deformity, or neurological symptoms (26).

Many patients are also not educated on the disease and its signs and symptoms, and this lack of awareness can lead to patients not seeking help immediately. This lack of awareness is compounded by poor literacy levels, which are common in the population affected by TB (27). Health promotion and prevention campaigns for TB at hospitals and clinics are commonly in the form of written posters and handouts, but if patients do not have the literacy levels to understand, then they are not educated on the disease.

A delayed diagnosis may also be due to the treating medical professional not diagnosing TB of the spine immediately (25). The symptoms the patients present with may look like other aetiologies, and it is possible TB spine is not considered a first option differential diagnosis (24). The difficulties of diagnosing TB spine are compounded when patients do not have any constitutional symptoms and only complain of back pain, the most common presenting symptom. This makes the list of differential diagnoses long and cumbersome to work through and may result in a delayed diagnosis (27). As highlighted earlier, specialists most commonly manage TB spine at a tertiary level, and it is possible that health care providers at a primary level are not commonly exposed to a diagnosis of TB spine.

2.5.2. Access to health services

Another reason for delayed diagnosis may be due to difficulties with access to the required level of health care services. Difficulty accessing health care facilities may be due to poor ability to physically access services, as well as poor availability of health care centres (33). As a specialist often manages TB spine, this includes availability of tertiary centres and specialist services. Difficulty accessing health care also has implications on the statistics of TB spine in the country. In general, local health care professionals have found

that new incidences of TB spine are poorly documented, and therefore the available statistics about TB spine may be under documented and inaccurate (1).

Approximately 80% of the population in KZN use health care services offered by the Department of Health, with a focus on primary health care clinics and district hospitals (3). In KZN, community-based primary health care is also the most accessible form of health services provided (34). Due to the geographical layout of the population, equality in accessing health care is not always guaranteed (34). Access to health care is specifically important in TB where compliance to medication is imperative, and close proximity to clinics has shown to increase the use of health services by patients with chronic illness (35).

Due to the fact that TB spine results in neurological fallout for more than half the patients, physical access to health care services should be assessed. When taking into account these patients symptoms, getting to the health care facility and accessibility into the physical premises may be problematic (33). Ease of access to health care services, using assistive devices, such as wheelchairs and walking frames, is imperative. In rural KZN, 60.8% of patients walk to clinics, 38.8% use public transport, and 0.4% use their own transport (34). This would have an impact on patients presenting with even mild to moderate neurological involvement, who may not have access to public or personal transport, but are no longer able to walk the far distances to their nearest clinic. Low socioeconomic status and a lack of finances for travel may also result in poor attendance at health care facilities, and as TB spine is prevalent in poorer communities, this should be considered to be a large contributing factor (33).

Additionally, if there is difficulty accessing health care this may possibly lead to lack of utilisation of rehabilitation services. Patients may not have access to daily, intensive inpatient therapy but are rather treated through outreach

programmes to clinics on a monthly basis or through home visits. Currently, the South African health system faces challenges of unequal access and quality of services (36). This highlights the need for re-engineering of primary health care to strengthen the balance between community-based and hospital-based care. This will ensure those patients who are treated at a community level receive the care they require, as well as ensure the healthcare professionals in primary health care can offer the services needed (37). The extent of the rehabilitation they receive may impact on the occupational performance outcomes they achieve (15). Currently, there is no data available on how many TB spine patients do receive rehabilitation services, and if they do, where they receive these services, how frequently, and for what duration.

2.5.3. Treatment and compliance

The medical treatment provided to the patient also has an impact on prognosis. Currently, the treatment of TB spine is either anti-TB chemotherapy, surgical intervention, or both (5, 6). There is still much research being conducted in this area, and it is currently a topic of debate (5). It has been found that results tend to depend on individual cases and should be specific to the individual patients. Anti-TB chemotherapy without surgery is more commonly indicated in cases with no complications, such as no HIV comorbidity, or neurological fallout. The length of the regime is also debated from a minimum period of six months to a course of 24 months (27). In a study completed in 2012 on the efficacy of direct observed treatment, it was found that a short course of anti-TB chemotherapy was found to be as effective as a 24 month course (32). One of the reasons there has been a debate about the treatment provided and the time course it should be taken over is due to no established endpoint of the disease. Patients may display no symptoms but still show signs of active disease on scanning, as well as vice versa with late onset paraplegia in the healed stages of disease (32).

Compliance to medical treatment is a large contributing factor to its efficacy, and it has been found that internationally there are problems with compliance to medication (27). Poor compliance is a severe problem as it could lead to drug resistant strains of TB (32). Compliance may be poor as patients see early improvement and stop their medication, unaware they should continue, due to ineffective education by health care workers. This is more common in longer regimens (29). Other factors that may lead to poor compliance include lack of financial ability, side effects of the medication, immobility, and poor health literacy about the disease and its treatment (38). Comorbid substance abuse and HIV infection have also been shown to decrease compliance (38). Compliance has improved worldwide, including within South Africa, since the introduction of the directly observed treatment short course (DOTS) (32).

Some specialists feel that a non-surgical approach is not appropriate as chemotherapy is timeous, resulting in continued compression of the cord and delayed recovery (39). A suggestion has been made to allow for a three to four week period of chemotherapy alone, and if there is no neurological recovery then surgery is indicated. However, if the patient starts to show improvement, chemotherapy alone may be sufficient (39). However, these findings have not been compared in a randomised controlled trial as yet.

Surgery is typically indicated in cases that are more complex, if the patient is not responding to treatment, there is neurological fallout, or spinal deformity (32). Surgery is also indicated in high risk patients who should not be immobilised for long periods of time, such as the elderly (39). The aim of surgical intervention is to relieve the compression of the spinal cord. Surgery has been shown to lead to quicker and greater improvement in functional and neurological gains (39), and research shows that early surgery and mobilisation does not have a negative effect on recovery (40).

2.5.4. Co-morbidity

Co-morbidity is another factor that should be taken into account when looking at medical and functional prognosis for a patient with TB spine. This is specifically relevant in TB, as it is more common in patients with immunocompromise, such as in HIV (3). In KZN, the high prevalence of TB is linked to the HIV epidemic. For occupational therapists, this creates a unique presentation as HIV itself can have a direct impact on the occupational performance of the patient (35). It would be relevant to determine if a co-morbidity of HIV has a negative impact on the functional outcomes a patient with TB spine achieves, and as such this has been included in this study.

Several co-morbid conditions have been closely linked to TB spine, including malnutrition, alcoholism, drug abuse, diabetes mellitus, and most commonly HIV (26). Many of the patients with TB spine have also previously or concurrently been infected with pulmonary TB, with approximately 50% of TB spine patients with current or previous pulmonary infection (39).

2.5.5. Multi-Drug-Resistant and Extensively-Drug-Resistant Tuberculosis

A diagnosis of multi-drug-resistant (MDR) or extensively-drug-resistant (XDR) TB is a poor prognostic factor for a patient with TB spine. The treatment is more difficult and lengthier, as well as more complicated and costly (38). As many patients develop MDR or XDR TB due to poor compliance, there is already a problem with adherence that needs to be overcome. MDR and XDR TB also require the skills and knowledge of a specialised physician, which may not be available to all patients, specifically in a rural setting. There are no statistics available to determine the prevalence of MDR or XDR TB in patients with TB spine.

2.6. CONSEQUENCES OF TUBERCULOSIS OF THE SPINE

2.6.1. Neurological Fallout

Tuberculosis of the spine is a condition that OT's are concerned about as it can lead to neurological fallout, with subsequent occupational performance changes and possible disability.

Neurological fallout can occur during the active phases of the disease and is known as early onset. Alternatively, it can occur after there is healing, and this is known as late onset (39). Although early onset is most common, there have been several case studies reported of late onset. Injury to the spinal cord can occur during the active disease due to pressure on the cord itself. This pressure can be caused by granulation tissue, an abscess, or due to dislocation secondary to mechanical instability of the vertebral bodies (41). There can also be formation of an internal gibbus due to instability, which places pressure on the cord (39). A lesion to the cord may also occur due to oedema and inflammation or direct infection of the meninges by the TB (39).

In the international studies included, the incidence of neurological fallout due to TB spine varies between 10-76% of patients (26, 29, 39). In South Africa, the incidence of neurological fallout in TB spine is suggested to be 10-47%. However, many cases are not well documented and reported, and therefore it is likely that this percentage is higher (1). Godlwana et al. found over half the patients in KZN presented with neurological deficits, 24% with complete paraplegia and 32% with incomplete (3).

Patients presenting with paraplegia or paraparesis are often classified using the American Spinal Injury Association (ASIA) impairment scale to determine the extent of motor and sensory loss. The initial ASIA grade has been found to be a good prognostic indicator for later neurological recovery and occupational performance for the patient (42). The greater the degree of neurological fallout, the more unfavourable the occupational performance and studies on NTSCL have shown that paraplegia is more common than

quadriplegia in non-traumatic lesions (28, 30, 33). Patients also tend to have a higher ASIA score, i.e. they have incomplete injuries, in comparison to traumatic injuries, which more commonly leads to better functional outcomes (30).

2.6.2. Impact on functioning and occupational performance

Spinal cord lesions, whether traumatic or non-traumatic, have always been within the domain of the OT, due to the loss of functioning the diagnosis can bring (45). Literature cites the main areas of occupational performance that are impaired in TB spine are: self-care, transfers, mobility, and bowel and bladder function (43, 44). Due to the size of this study, it was not possible to focus on all of the occupational performance areas that are impacted on by TB spine. In this study, the focus will be on functional mobility and self-care.

2.7. OCCUPATIONAL THERAPY AND TUBERCULOSIS OF THE SPINE

The goal of the OT in NTSCL rehabilitation is to assist the patient to be able to recover as much independence in function, that they can return to living a productive and purposeful life (45). It has been shown that, despite the aetiology or severity of the spinal cord lesion, OT intervention results in better performance in functional outcomes. Not only do the patients make gains in functional outcomes after OT, but they also display greater neurological recovery (42). According to Gupta, Taly, Srivastava and Murali, "*Irrespective of the aetiology, severity and extent of insult to the cord, patients with spinal cord lesions perform better in activities of daily living, in a much better way after rehabilitation intervention and show significant neurological recovery" (42)(p.307).'* In support of the previous statement, occupational therapy has a direct impact on the occupational performance areas identified to be impaired in TB spine, however there is currently no research to show the direct link between OT intervention and functional outcomes in TB spine specifically.

2.8. OCCUPATIONAL THERAPY AND FUNCTIONAL OUTCOMES

The goal of OT should be to address the occupational performance areas that have been impacted by the disease process. It is widely accepted that a part of the OT process is setting outcomes for the patient (46). These outcomes need to be realistic, individualised and specific, and set with the patient, family, and occupational dysfunction in mind (19). Patients often ask difficult questions, about how independent they will be and what activities they will be able to continue and perform, and the OT should answer these clearly and as accurately as possible (47). This links to setting functional outcomes, as clearly described outcomes provides an opportunity to discuss what the patient will be able to do. This will then define for the patient what activities they can expect to continue and perform independently. This is also an important step in therapy to allow the patient and their family to accept and cope with the condition, as well as to start long-term planning for after discharge (13).

There are many factors that influence outcomes, but it is important for the clinician to have sufficient knowledge of the condition and prognosis, to ensure the outcomes are attainable (15, 48). Setting functional outcomes for the patient at the beginning of rehabilitation should be guided by knowledge and literature that explores the prognosis of TB spine, as well as clinical experience and assessment of the patient. As highlighted previously, there is a difference in demographics, the disease process and occupational performance between TB spine and other spinal cord lesions, and therefore a lack of specific research could lead to generic OT intervention, rather than evidence based practice (49).

As the focus of this study has been functional mobility and self-care, it is relevant to identify the specifics about the outcomes set in these two areas. These two areas are prioritised, as they are areas identified as of a high importance for patients. Not only are they important to the patients, but also both functional mobility and self-care activities are fundamental aspects of life

and necessary components of many other occupations (13). As patients diagnosed with TB spine show deficits in self-care and functional mobility, this would be an integral focus of occupational therapy intervention.

2.8.1. Functional Mobility Outcomes

For many patients with spinal cord injury, whether traumatic or non-traumatic, their first concern is whether they will be able to walk or move around again (13). This is understandable considering that functional mobility is a requirement for success in all other occupational performance areas. Functional mobility does not only encompass walking but also independence in moving oneself around, which may include the use of any assistive devices, such as a wheelchair. Patients themselves also report functional mobility to be an important outcome due to the concept of being perceived as 'disabled' if they are not able to move around (13).

Although being able to walk again is the most common goal patients set for themselves, it is not always realistic (13). Therefore, the OT counselling the patient needs to know the prognosis and how realistic this goal is to be able to counsel the patient appropriately. In 2003, Sundaraj, Behera, Ravi, Venkatesh and Lee conducted a study in India, to determine the influence of posterior stabilisation on functional mobility outcomes in patients with TB spine (40). They found that patients who underwent early mobilisation through rehabilitation displayed significant gains in their functional mobility outcomes by the time they were discharged. This was in comparison to patients who only had surgery but were not mobilised. Those who attended rehabilitation and mobilised early also displayed fewer complications, increases in self-esteem and a decrease in pain (40).

With regards to functional mobility in TB spine, the aspects of outcomes that would be important to focus on would be: the mode of functional mobility, from walking to the use of assistive devices, such as crutches or a wheelchair; the ability to transfer between surfaces, such as between a wheelchair and the

toilet, and the ability to cover different distances and terrains. This is specifically relevant to KZN where the majority of patients are required to travel far distances over rough terrain. This study has incorporated the SCIM-III as an outcome measure, which measures each of these aspects of functional mobility outcomes (50).

2.8.2. Self-Care Outcomes

Self-care activities, such as dressing, bathing, and grooming are also highlighted to be of great importance to patients with spinal cord injury. These activities are amongst the most frequently reported areas of difficulty (13). As with functional mobility, self-care activities are essential to many other occupations. For OTs treating spinal cord injured patients, despite the aetiology of the condition, independence in self-care activities is often a primary goal in the beginning of rehabilitation. As with functional mobility, it is essential to understand what is realistic to expect of the patient in terms of self-care outcomes (13).

The aspects of self-care that would be relevant for occupational therapists to focus on in TB spine would include: independence in dressing, bathing, feeding, and grooming, as well as the need for supervision, adaptive devices, or a specific setting. The self-care section in the SCIM-III addresses all of these areas (50). However, although self-care activities are incorporated into therapy by most OTs, there is a lack of studies on what self-care outcomes are addressed in rehabilitation. OTs typically use a variety of methods to assist patients to achieve independence in self-care activities. The exact self-care outcomes that are set, are individualised to the patient and should focus on competence and autonomy (51).

2.9. FACTORS IMPACTING ON FUNCTIONAL PROGNOSIS

There are several factors that have been highlighted and discussed previously that have been shown to have an impact on the medical prognosis in TB spine. Yet, currently there is limited knowledge about the factors that impact

on the functional prognosis of a patient with TB spine within South Africa. Prognosis is defined as the "*foretelling of the course of health status after an original health state has been determined* (52) (p.424)". When determining the functional prognosis, the focus is on the expected course of function the patient will achieve (53). In this study, the level of independence patients with TB spine are likely to achieve in self-care and functional mobility are the aspects of functional prognosis focused on. The factors that impact the medical prognosis may influence length of stay in hospital, the type of intervention techniques used, the multidisciplinary team members involved, and most importantly for the occupational therapist, the functional outcomes being worked towards (45).

Some of the above mentioned medical factors also have an influence on rehabilitation, such as comorbidities, level of injury, and the severity (ASIA grade) of injury, as well as general demographics, such as age, employment, and socioeconomic status (45). As the aetiology can be expected to make a difference with regards to these factors, the characteristics of the TB spine population may differ from other aetiologies, and these patients may require a different rehabilitation programme (54).

Patients who have no neurological deficit or spinal deformities have the best prognosis for independence in their occupational performance areas (26). For patients with neurological fallout there is potential for neurological recovery. A younger age and good nutrition are both factors associated with positive recovery of the cord (39). If the onset of the paraplegia has been more insidious, as opposed to a rapid onset, there is a better prognosis for neural recovery. The duration of neurological symptoms also affects recovery, with shorter duration having a better prognosis. This is linked with quicker diagnosis and commencement of treatment, which gives the patient a better outcome (39).

The site of the lesion can also have an impact on neurological recovery, as certain areas, such as the cervicodorsal and upper thoracic spine have narrower canals, and therefore are prone to cord compression quicker (39). The severity of neurological impairment will also determine recovery, with complete lesions having poorer chances of neural recovery (39).

Patients who are younger and have surgery also tend to have a better prognosis, specifically for walking and relief of pain, as opposed to those who have chemotherapy alone (22).

Research shows that health care services have a direct influence on the functional outcomes achieved by patients (55). Poor referral systems may cause further delay in diagnosis, as well as result in patients going to tertiary hospitals further from their homes and losing their social support. The availability of rehabilitation centres and the admission criteria that must be met in order to be accepted may result in patients with TB spine being denied specialised rehabilitation. Tuberculosis of the spine requires a full multi-disciplinary team (MDT) approach, but in some hospitals the services available may be limited. The managing physician may also lack the knowledge of the role of each of the allied health members and not refer the patient appropriately, denying them the opportunity to certain services. A lack of outpatient follow up, health promotion, and prevention programmes may decrease the amount of functional gain the patient makes (55). For example, patients with NTSCL have shown to still make significant improvement in functional mobility after 18 months of diagnosis if they continue to receive outpatient rehabilitation, but this is not always available to them (56).

However, despite the many factors discussed above that have been identified to impact on functional prognosis, there is no consensus about what a good or poor functional prognosis is. In a complete, traumatic spinal cord injury, the patient is often not likely to walk but will still be considered to have reached a good functional outcome if they are fully independent in their wheelchairs.

However, there is no research to guide the functional prognosis for TB spine patients and what can be expected, as well as if there are any direct relationships between the above-mentioned factors and functional prognosis. This research study therefore aims to determine the outcomes that patients with TB spine achieve, in order to develop a body of knowledge from which functional prognosis can be determined. It also aims to identify any associations between the identified factors and functional outcomes achieved.

2.10 CONCLUSION

In conclusion, TB spine is a growing concern for occupational therapists working in KwaZulu Natal. Global research has started to outline the demographics of the NTSCL population, but there is no literature available on the demographics of patients diagnosed with TB spine, in South Africa. There have been several medical factors identified that impact on the prognosis of patients diagnosed with TB spine, which include a delayed diagnosis, access to health care, treatment and compliance, co-morbidity and neurological fallout. The current literature available on TB spine is focused on the medical factors with a gap in the literature on function. Two of the key areas of function identified to be impacted in patients with TB spine, include functional mobility and self-care. However, there is a dearth of literature available on what outcomes these patients can be expected to achieve in these areas. This information would be pertinent to occupational therapists when setting functional outcomes, a critical step in the therapeutic process.

CHAPTER 3: RESEARCH METHOLODOLGY

3.1. INTRODUCTION

This chapter aims to describe how the study was conducted and how the results were produced. It defines the study design used and why it was the best design for the set aim and objectives. It describes the study population and sample and the criteria used for sample selection. The outcome measures used are described, including the development of the measures and the validity and reliability of each. The method of data collection is outlined step-by-step so that the research can be reproduced if required, and the methods for data analysis of the results. The ethical considerations for the study are also included.

3.2. STUDY DESIGN

A quantitative descriptive design was used in this study (57). This is a non-experimental approach with no attempt to change or manipulate the performance of the participants during the research. This is the most suited design for the study, as the aim is to determine the outcomes achieved by the patients without manipulating their current abilities. The participant's performance at the time of the research was noted, with no additional intervention to attempt to change or impact on their ability. The study used both numerical and categorical data, and therefore was useful in analysing trends and frequency distributions of the various outcomes. It provided data that could be statistically analysed to determine and describe the central tendency and variability within the population. A cross-sectional design was implemented, as the participants were assessed at one point in time (58). The sample was divided into three groups, each at a different time frame post diagnosis and treatment, in order to determine any differences in the occupational performance being achieved. This was the most appropriate, as it provided an opportunity to compare the functional outcomes achieved at varying times since diagnosis in this cross-sectional study and isolate any specific factors impacting on the outcomes achieved.

3.3. STUDY POPULATION AND SAMPLE

The population that was studied was comprised of patients diagnosed with TB spine, who are currently living in and accessing health care services in KZN. Currently there are no statistics available on the population size of TB spine patients within the province. Initially, the population size was based on estimated statistics, by the clinicians working in the hospitals, from each of the four hospitals included in the study, with the average number of TB spine patients being 10 in a one month period.

Sample size

Cochrane's formula was used to determine the sample size for ordinal data and a sample size of 92 out of the approximately 360 cases that could be expected in a nine month period was set to ensure it was representative of the estimated population at a 0.05 margin of error (59). However, as discussed in the literature review, the majority of the patients were referred to tertiary hospitals for specialised care, therefore there were fewer patients seen at the district and secondary level hospitals. Due to this, convenience sampling of the total population was used. All of the patients with TB spine who attended the hospitals during the nine months of data collection and met the inclusion criteria, were included in the study (Table 3.1). At the end of the nine months, the total sample was 53.

The hospitals that were included in the study were: Grey's Hospital (tertiary) and Edendale Hospital (regional), both set in an urban area, as well as Bethesda Hospital (district) and Manguzi Hospital (district), set in a rural area. These hospitals were chosen for their convenience, as well as for a variety in the level of health care services and inclusion of both urban and rural areas.

Table 3.1 Inclusion and exclusion criteria for the study

Inclusion Criteria	Exclusion Criteria
Patients diagnosed with TB spine	Patients with a primary condition of the spine, other than TB spine
Patients between the ages of 18-65 years	Patients with any additional/co-morbid condition, not SCI related that could influence functionality
	Patients with cognitive impairment

3.4. INSTRUMENTATION

Three measurement techniques were used for this research:

3.4.1 Demographic and medical questionnaire (Appendix A)

This questionnaire was used to gather data about the medical and demographic characteristics of the sample to determine the impact of these factors on the self-care and functional mobility outcomes achieved. The questionnaire was formulated by the researcher, based on literature that focused on the medical and demographic factors that have been identified to play a role in TB spine.

The questionnaire is three pages long with 33 items and takes approximately ten minutes to administer. It is administered by the researcher and a translator if required. The questionnaire is divided into three sections. The first section includes demographic items about the patient's age, gender, education, and residential setting. The second section includes all relevant medical information with regards to co-morbidities, general TB history, and history related to the current diagnosis of TB spine, such as presenting symptoms, pharmacological, and surgical treatment. The final section pertains to access to health care and allied services and includes whether the patient received OT services, as well as the frequency, setting, and duration. Each of the items on the questionnaire provides several possible categories, and the patient selects one option that is most appropriate to their situation. The content of

the quetionnaire is supported by literature and was validated through a pilot study.

3.4.2. The American Spinal Injury Association Impairment Scale (ASIA Scale) (Appendix B)

This impairment scale is currently identified by international guidelines as a valid assessment tool to determine the severity and completeness of the spinal cord injury and define the extent of neurological fallout of the patient (60). Currently, it is the most widely used scale to evaluate the degree of injury in spinal cord injured patients, and it has been endorsed by the International Spinal Cord Society for all aetiologies of spinal cord injury (61, 62). It is used to determine the level of injury as well as whether it is a complete or incomplete injury. This is done through a full motor and sensory examination of the patient (60). As it assesses only the motor and sensory components which are a direct result of the injury and not impacted on by environmental factors, it is relevant to all settings, including South Africa. To date, there are no studies within South Africa that provide information on the ASIA classifications of patients with TB spine.

There have been good levels of agreement found between examiners for both the motor (Kappa coefficient 0.76) and sensory (Kappa coefficient 0.78) components (62). This shows good inter-rater reliability for the ASIA in all components of the scale (62). It has been shown to be sensitive and reliable in determining neurological change, represented in changes in the total score, and is therefore an appropriate tool to use in spinal cord injury research (62). For this study, it was completed through examination by a medical doctor, and the patient was then classified according to their sensory and motor functioning into the five possible grades (as stated below). The ASIA score was obtained from the medical folder and then entered into the quetionnaire by the researcher or researcher assistants. It was included in the demographic and medical questionnaire (Items 13 and 14).

- **Grade A:** Complete **-** Absent motor and sensory function

- **Grade B:** Incomplete **-** Sensation present, absent motor function
- **Grade C:** Incomplete **-** Sensation present, motor function present but not useful (Grade 2-3/5)
- **Grade D:** Incomplete - Sensation present, motor function present and useful (Grade 4/5)
- **Grade E:** Normal - Normal motor and sensory functioning

3.4.3. The Spinal Cord Independence Measure Version III (SCIM-III) (Appendix C)

The SCIM was developed at the Department of Spinal Rehabilitation of Loewenstein Rehabilitation Hospital in Israel, in order to assess functional ability of spinal cord injured patients (63). It has been adapted twice since the original SCIM (developed in 1997), with addition of items and a revision of the wording of the scoring system to improve accuracy (61). The final version, version III, which has been used in this study, was revised in 2007, and was developed through a multi-cultural study (62). The areas of functioning that are measured are self-care, respiration, and sphincter management and functional mobility (63). However, for this study only the self-care and functional mobility sections were included as this was the focus of the research. Parts of the SCIM-III can be used in isolation, and permission to do so for the study was obtained from the author. The test has been subjected to Rasch analysis and fits the Rasch model, which means each section can be totalled (50).

The validity and reliability of the SCIM-III has been tested on an international population of spinal cord injured patients, of both first and third world countries (12). Test retest reliability was found to be good with a K range of 0.66-0.73 (61). Inter-rater reliability was found to be good with total agreement between 74.5-96.2%. Convergent validity with the functional independence measure, also assessing occupational performance in spinal cord injured patients, was found to be good (r=0.85) (61). The SCIM-III has shown to be more sensitive

to change in several subscales, specifically functional mobility indoors and outdoors (62).

In a systematic review by Dawson, Shamley, and Jamous on outcome measures for spinal cord injury, the SCIM-III was found to be one of the best outcome measures in determining occupational performance (61). Initially, it was designed to be completed through observation, however it can also be completed through interview, and the results have shown to be comparable with no statistically significant differences (64). For this study, the SCIM was completed by interview with each of the participants.

For the purpose of this research, two sections from the SCIM were used: the self-care and functional mobility sections. Each item has several statements related to the degree of independence the patient has and whether they require adaptive devices or a specific setting. Each statement is allocated a number. The researcher reads out each statement to the patient, and they choose the statement that best describes their current ability for that activity. The number is then indicated on the form.

The self-care section includes items for feeding, bathing the upper body, bathing the lower body, dressing the upper body, dressing the lower body, and grooming. The functional mobility section includes items for mobility in bed and actions to prevent pressure sores, transfers between the bed and wheelchair, transfers between the wheelchair, toilet and bathtub, transfers between the wheelchair and car, transfers between the wheelchair and ground, mobility indoors, mobility for moderate distances (10-100 meters), mobility outdoors (more than 100 meters), and stair management.

This questionnaire provided data that assisted in meeting the objectives of the study to determine what self-care and functional mobility outcomes patients diagnosed with TB spine are achieving.

3.5. PILOT TEST OF THE DEMOGRAPHIC AND MEDICAL QUESTIONNAIRE

Prior to the start of the main study, the demographic and medical questionnaire was validated through a pilot test, which was conducted in two phases The first phase incorporated piloting the questionnaire with medical professionals working in the field of spinal rehabilitation to determine the content validity of the questionnaire. The second phase tested the face validity of the instrument and was field tested on patients diagnosed with TB spine that met the inclusion criteria, to determine the ease of administration and the clarity of the questions.

3.5.1 Phase One

This was conducted by choosing a convenient sample of 10 professionals who worked in the field of TB spine and occupational therapy. An inclusion criteria of three or more years' experience was included to ensure healthcare professionals had experience in both their field as well as in the health care system and could contribute to the content validity of the questionnaire. Below is the inclusion and exclusion criteria used (Table 3.2).

Table 3.2. Inclusion and exclusion criteria for the pilot study

Inclusion Criteria
Medical doctor or occupational therapist currently working in the field of spinal rehabilitation or involved in the management of TB spine patients
Three or more years' experience

The sample was made up of five medical doctors, of which one was working at a district level, two were orthopaedic registrars, and two orthopaedic consultants. All five doctors had experience working with patients with TB spine, and one of the consultants was a specialised spinal surgeon. The other five professionals were occupational therapists, all currently working in the field of spinal rehabilitation (Table 3.3). The 10 professionals were each given

the questionnaire and asked to read through it. They were asked to make written notes on the questionnaire about changes or suggestions they had, with regards to the content. The professionals made suggestions in their own time with no contact from the researcher and provided feedback in a written format.

Table 3.3. List of professionals included in the pilot study

Profession	**Qualification and University**	**Years of experience**
Orthopaedic Surgeon Consultant	MBChB (University of Stellenbosch) FCS (Ortho)	10
Orthopaedic Surgeon Registrar	MBChB (University of KwaZulu Natal)	7
Orthopaedic Surgeon Registrar	MBChB (University of Cape Town) MSc Diagnostic Imaging (Oxford University) MSc Orthopaedic Surgery (Oxford University)	5
Orthopaedic Surgeon Consultant	FCS (Ortho)	7
Medical Officer	MBChB (University of Cape Town)	3
OT	B.OT (University of Pretoria) Diploma in Vocational Rehabilitation (University of Pretoria)	19
OT	BSc (OT) (University of the Witwatersrand)	3
OT	BA (OT) (University of KwaZulu Natal)	5
OT	B.OT (University of Free State)	5
OT	B.OT (University of Free State)	3

From the comments of the professionals and further review of the questionnaire, the following changes were made:

- Age: this item was changed from age groups (example 25-35 years, 36-45 years) to a specific date of birth, as clinical experiences states that patients often do not know their exact age. For data analysis, the age of the patient will be determined from their date of birth.
- Vocation status: the option of pension was changed into two options of pension and disability grant, as they are seen as two separate entities and could have individual influences on the outcomes seen.
- Area resides in: a space was added for the name of the area the patient lives in as many patients are unable to define if they live in an urban or rural area. This can be determined at a later stage by the researcher. The characteristics used by Unicef to define urban, peri-urban and rural were used. Urban includes areas that have a presence of urban characteristics, such as electric lighting; rural areas included sparsely populated areas where people are dependent on natural resources; and peri-urban included all areas between consolidated urban and rural areas.
- Resides with: an additional item of who the patient resides with was added as several of the professionals felt that family and friend support would be a relevant factor in influencing the functional outcomes of the patients.
- American Spinal Injury Association grading: the professionals in the review noted that an ASIA grading can change from initial presentation to currently, and this could be confusing when administering the demographic questionnaire. Therefore, an additional item was added, one from initial ASIA grading and one for the current grading. However, not all patients have a documented initial ASIA grading, therefore an 'unknown' option was added for this item.

3.5.2 Phase Two

Following the pilot test, the changes were made to the demographic and medical questionnaire, and it was then field-tested on three patients who fit the inclusion criteria. This was to ensure ease of administration and that all relevant options were represented for the sample. Several items were found

to be ambiguous and lacking relevant options. The following changes were made to the questionnaire after field-testing:

- TB History: an additional option of unknown was added to the TB history as it was noted that some patients were unable to say whether they previously had TB, or more specifically MDR or XDR.
- Co-morbidities: in the original questionnaire, there was an item for substance abuse. However, on field testing it was noted that patients are specific about alcohol versus cigarette smoking. Therefore, this was split into two categories.
- Surgical intervention: two out of the three patients in the field-testing had had biopsies done and identified this as surgical intervention. However, a biopsy would not have an influence on the functional outcomes of the patient, and therefore is not relevant to this particular study. An additional note was added to the questionnaire to state that a biopsy should not be included as surgical intervention.
- Level of initial contact health services: on the original questionnaire, only the level of initial contact was required. However, on field testing it was noted that all three patients had been referred to higher-level institutions. This was confirmed by the orthopaedic doctors managing TB spine patients that reported that TB spine is considered a condition that requires specialised intervention, which is most often only available at a tertiary level. Therefore, patients are referred to higher level institutions. This is also relevant as many of the occupational therapy services provided were at a tertiary level, and therefore relevant to this study. Additional items were added to look at transport and allied services at both the initial health care service and the current (highest) health care service.
- Allied services: two out of the three patients were unsure as to whether they had received occupational therapy but were able to state someone had seen them for ‘exercises’. This is not clear as to whether the allied professional was an occupational therapist or physiotherapist. As this could influence the results, an additional option of ‘unknown’ was added to this item.

3.6. DATA COLLECTION

After the relevant permission was gained for the study, the researcher invited two occupational therapists working with patients with TB spine to participate in the data collection as research assistants. They were both orientated to the aims and outcomes of the study and the outcomes measures to be used. To ensure inter-rater reliability, the researcher and each of the research assistants completed the outcome measures on three patients in the same manner. This was done separately and independently from each other with each individual therapist as they each worked at different hospitals. The findings were compared and showed 100% agreement between researcher and assistants for the demographic and medical questionnaire and the SCIM-III. One research assistant was based at Grey's Hospital, one at Edendale Hospital, and the main researcher was based at Grey's, Bethesda and Manguzi Hospitals.

The data collection occurred in a nine month period, from November 2013 to July 2014. Each researcher and researcher assistant identified the patients at their participating hospitals that met the inclusion criteria and invited them to participate in the study.

1. Due to the fact that most patients in KZN speak Zulu as their first language, an interpreter was used if necessary. The interpreters used were office hospital interpreters that understood confidentiality. They were briefed prior to the start of the interviews on the content of the questionnaire and SCIM-III and asked to interpret verbatim. Each researcher used the same interpreters with each patient. This assisted in eliminating any influence on the results, when using different interpreters.
2. The demographic and medical questionnaire was completed first.
    a. A structured interview was used to gather the required data, to complete the items of the questionnaire.
    b. If any of the items could not be completed through the structured interview, they were completed through a review of the medical records.
3. The ASIA scale was then completed.

a. This was done through a review of the records, if the ASIA scale had been stated.
b. If the ASIA scale was not stated in the data, the researcher asked the medical officer to do a neurological examination of the patient and complete the ASIA scale.

4. The SCIM-III was then completed.
   a. A structured interview was used to complete the SCIM-III by reading out each line and asking the participant to identify which description best fits their current level of functioning for the particular activity. It took approximately 10 minutes to administer.

3.7. DATA ANALYSIS

The demographic and medical questionnaire was formulated so that the data collected was nominal. This data, together with the scores from the SCIM-III, were compiled and entered into *Microsoft Excel*. All data was compiled together into one *Microsoft Excel* spreadsheet and checked by research assistants to ensure accuracy. In order to meet the objective of determining the functional outcomes achieved by the participants at three different time frames since diagnosis, the participants were categorised into groups as follows:

- The first group included participants diagnosed within the past six months and made up 45.29% of the sample (0 - 6 months).
- The second group included participants diagnosed within the past six months to one year and made up 24.52% of the sample (>6 months - 12 months).
- The third group included participants diagnosed within the past twelve months to two years and made up 30.19% of the sample (>12 months - 24 months).

Statistics were completed on the programme Statistica (version 12). The analysis of the data is described below according to the objectives of the study.

3.7.1. Objective 1. To determine the medical and demographic characteristics of patients diagnosed with TB spine at four participating hospitals in KwaZulu Natal.

The data from the medical and demographic questionnaire, including the ASIA scale, were presented in percentages in medians and lower and upper quartiles as the data were not normally distributed. Data were analysed according to the three groups according to onset time of the condition. The non-parametric Chi-squared, Kruskal-Wallis and Fisher's exact tests were used. Where groups contained less than five participants in any of the groups Fisher's exact test was used using multiple cells (65)

3.7.2. Objective 2. To determine what self-care and functional mobility outcomes patients diagnosed with TB spine are achieving at three different time periods within the first two years after initial diagnosis using the Spinal Cord

Only two sections of the SCIM were included in the study, namely the self-care and functional mobility sections. Therefore, the total score was not calculated for the full SCIM-III. However, totals for each section were included as the SCIM-III has been subjected to Rasch analysis and each subtest can be totalled. In addition, a number was allocated per category for each item and frequency of category was determined. The data collected were presented in medians and lower and upper quartiles as the data were not normally distributed. The non-parametrics Chi-squared test was used to determine if there was a significant difference between the groups for self-care and functional mobility. The non-parametric Chi-squared test was used on the ordinal scale on the Spinal Cord Independence Measure Version III (SCIM-III) as the data were not normally distributed and small sample size resulted from dividing the data into three groups.

3.7.3. Objective 3. To determine the impact or effect of the identified medical and demographic factors on the self-care and functional mobility outcomes achieved.

Mann Whitney U were used to determine any significant differences between the ordinal self-care and functional mobility outcomes and the demographic and medical history variables. Only variables where significant differences were found were presented in the results.

Spearman's correlation coefficient was then used to determine the association between the outcomes achieved and other identified variables measured on ordinal scales. Non parametric Spearman's correlation coefficient was used on the ordinal scale on the Spinal Cord Independence Measure Version III (SCIM-III) and ordinal scales for the timeframe between onset of symptoms and seeking medical care, the ASIA scale and level of the lesion, all of which allow ranking of the data from least ability of function to most ability of function (58).

3.8. ETHICAL CONSIDERATIONS

Ethical clearance to conduct the study was obtained from the Human Research Ethics committee (Medical) at the University of the Witwatersrand (ethical clearance number M1130807) (Appendix D). The researcher then e-mailed or faxed letters of consent to the chosen centres, as well as covering information letters (Appendix E), explaining the purpose of the study and inviting them to participate. After reviewing the research protocol, letters of consent were received from each of the chosen centres reporting they were happy for the research to be conducted (Appendices F, G, H, I).

Participants were given a participation information sheet, explaining the research (Appendix J). If they agreed to participate, they were given a letter of consent to sign (Appendix K). All patients who were invited to participate in the study agreed to participate and signed the consent forms. No names were placed on the questionnaires, but rather they were coded for the sample, and in this way confidentiality was maintained. Participants were permitted to

withdraw themselves from the research, which would involve all information relevant to that particular participant being withdrawn from the study. However, due to the anonymity of the research, once the data was compiled, withdrawal of information would no longer be a possibility. All participants were told that, if they chose not to take part, it would have no impact on the treatment they received.

3.9 CONCLUSION

For this study three outcome measures were used: a demographic and medical questionnaire developed by the researcher and validated through a pilot test, the ASIA scale, included in the questionnaire, and the self-care and functional mobility subsections of the SCIM-III. The researcher and two research assistants selected a convenient sample of participants, chosen from the four participating hospital according to the inclusion and exclusion criteria. An interpreter was used if necessary with participants.

Data were gathered through a structured interview and record review. All data were entered into *Microsoft Excel* and statistics were completed through Stastica (version 12). Chi squared and Fisher's exact tests were used to analyse the demographic and medical data and the SCIM-III data. Spearman's correlation coefficient was used to determine any associations between outcomes achieved and demographic and medical questionnaires.

Ethical clearance to conduct the study was obtained from the Human Research Ethics Committee and participants were required to sign consent forms after being informed on the research procedure and agreeing to participate in the study.

CHAPTER FOUR: RESULTS

4.1. INTRODUCTION

During the nine months of data collection, all patients who fitted the inclusion criteria and attended one of the participating hospitals were included in the study. The sample consisted of 53 participants, and no participants dropped out during this time. In order to meet the objective of determining the functional outcomes achieved by the participants at three different time frames since diagnosis, the participants were placed into one of three groups. The first group included participants diagnosed within the past six months and made up 45.2% of the sample. The second group included participants diagnosed within the past six months to one year and made up 24.5% of the sample. The third group included participants diagnosed within the past one to two years and made up 30.1% of the sample (figure 4.1). For the purpose of this study, the demographic and medical data, as well as the functional outcomes were analysed within the whole sample, as well as within the three groups to determine any statistically significant differences.

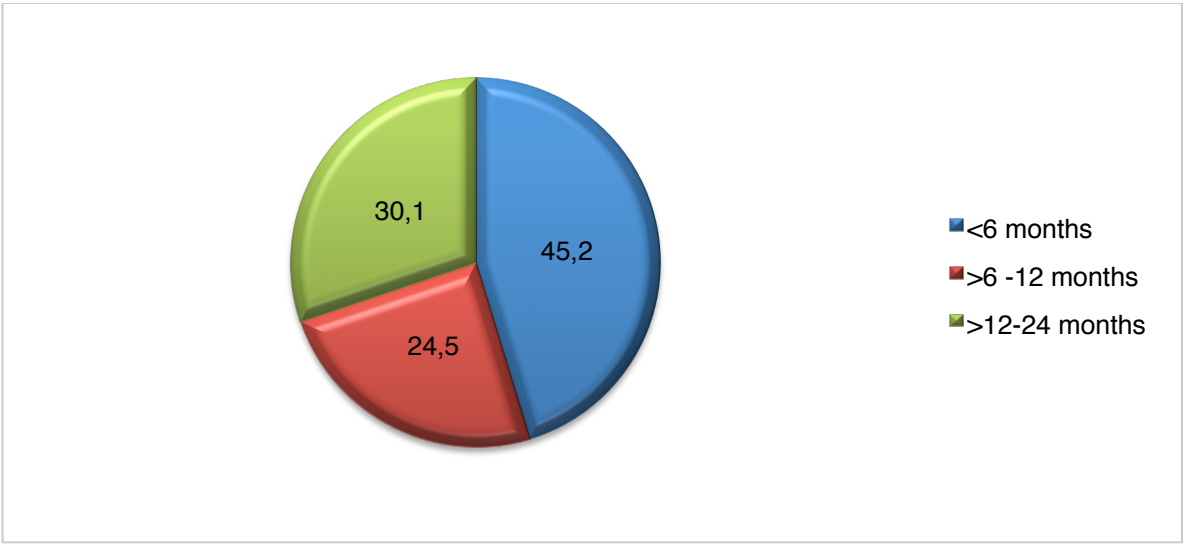

Figure 4.1. Percentage of participants by time categories since diagnosis (n=53)

4.2 DEMOGRAPHICS

4.2.1 Demographics

The sample was made up of fewer male participants (32.0%) than female participants (67.9%). The ages ranged between 18.0 years and 81.0 years, with a median age of 39.4 years. The differences assessed using a Chi squared test in gender distribution and Kruskal-Wallis tests for age range were not statistically significantly between the three groups making the groups comparable (Table 4.1)

Table 4.1 Demographics of the participants in the groups according to time since diagnosis

			Time since diagnosis				
		Total Sample (n=53)	**≤ 6 months (n=24)**	**>6 - 12 months (n=13)**	**>12-24 months (n=16)**	**p Value**	**Chi^2 (df)**
Gender		**n (%)**					
	Male	17 (32.0)	7 (29.1)	5 (38.4)	5 (31.2)	0.843	0.341 (52)
	Female	36 (67.9)	17 (70.8)	8 (61.5)	11 (68.7)		
Age	**Range**	**Median (Lower and Upper Quartile)**					
	Years 18– 81	36 (31-46)	39 (30-46)	36 (35-42)	33 (27-45)	0.490	
		n (%)					
Education	**No formal education**	4 (7.5)	1 (4.2)	2 (15.4)	1 (6.3)	0.428	
	Primary level of education	14 (26.4)	7 (29.1)	3 (23.0)	4 (25)	0.925	
	Secondary level education	20 (37.7)	9 (37.5)	4 (30.7)	7 (43.7)	0.774	
	Grade 12	12 (22.6)	6 (25.0)	3 (23.0)	3 (18.7)	0.916	
	Tertiary education	3 (5.6)	1 (4.1)	1 (7.6)	1 (6.2)	0.100	
Voca-tional Status and Income	**Unemployed**	15 (28.3)	6 (25.0)	5 (38.4)	4 (25.0)	0.731	
	Disability grants	24 (45.2)	10 (41.6)	5 (38.4)	9 (56.2)	0.632	
	Paid employment	7 (13.2)	6 (25.0)	1 (7.6)	0 (0)	0.058	
	Studying	3 (5.6)	1 (4.1)	0 (0)	2 (12.5)	0.444	
	Old age Pension	3 (5.6)	1(4.1)	1 (7.6)	1 (6.2)	0.100	
	Informal traders	1 (1.8)	0 (0)	1 (7.6)	0 (0)	0.249	

Within the sample, over three quarters received a formal education, with more than a quarter receiving a primary level education (up to Grade 7) and more than one third of the participants receiving a secondary level education (up to Grade 11). Less than half of those that attended high school had completed Grade 12. Only 5.6% of the sample received a tertiary education.

With regards to vocation status, 13.2% of the sample had formal paid employment, and 28.3% were unemployed. Only a small percentage of the sample were studying or informal traders. Over half of the sample received grants in the form of a disability grant or old age pension. The differences in the education level and vocation status were not statistically significantly different between the three groups when tested with Fisher's exact test (Table 4.1).

4.2.2. Geographic location and residence

Table 4.2. Geographic location and residence of the participants in the groups according to time since diagnosis

			Time since diagnosis			
		Total Sample (n=53)	***≤ 6 months (n=24)***	**>6 - 12 months (n=13)**	**>12-24 months (n=16)**	***P value***
		n (%)				
Geographical location	**Rural area**	19 (35.8)	9 (37.5)	5 (38.4)	5 (31.2)	0.876
	Urban area	17 (32.0)	10 (41.6)	2 (15.3)	5 (31.2)	0.292
	Peri-urban area	13 (24.5)	5 (20.8)	4 (30.7)	4 (25.0)	0.852
	Unknown	4 (7.5)	0 (0)	2 (15.3)	2 (12.5)	0.100
Resides with	**Parents and siblings**	21 (39.6)	12 (50)	3 (23.0)	6 (37.5)	0.284
	Spouse and children	18 (33.9)	8 (33.3)	5 (38.4)	5 (31.2)	0.932
	Parents	6 (11.3)	2 (8.3)	3 (23.0)	1 (6.2)	0.409
	Did not indicate	3 (5.6)	0 (0)	1 (7.6)	2 (12.5)	0.157
	Alone	3 (5.6)	2 (8.3)	0 (0)	1 (6.2)	0.782
	Spouse	2 (3.7)	0 (0)	1 (7.6)	1 (6.2)	0.295

The area the participants resided in was described as rural, peri-urban, or urban. Overall, more of the participants came from rural settings with just less than a third coming from urban and nearly a quarter from peri-urban areas.

The majority of the sample resided with family members (88.6%), with most participants residing with their parents and siblings (39.6%) or with their spouse and children (33.9%). Fewer participants reported living with their parents alone (11.3%) or their spouse alone (3.7%).

There were no significant differences in the geographical location and whom the participants resided with between the three groups.

4.3 MEDICAL HISTORY

Of the 53 participants, 75.4% of the sample attended Grey's Hospital, the only tertiary hospital included in the study, 18.8% attended Edendale hospital (secondary hospital), and 3.7% and 1.8% attended Bethesda Hospital and Manguzi Hospital respectively, both district level hospitals (Figure 4.2).

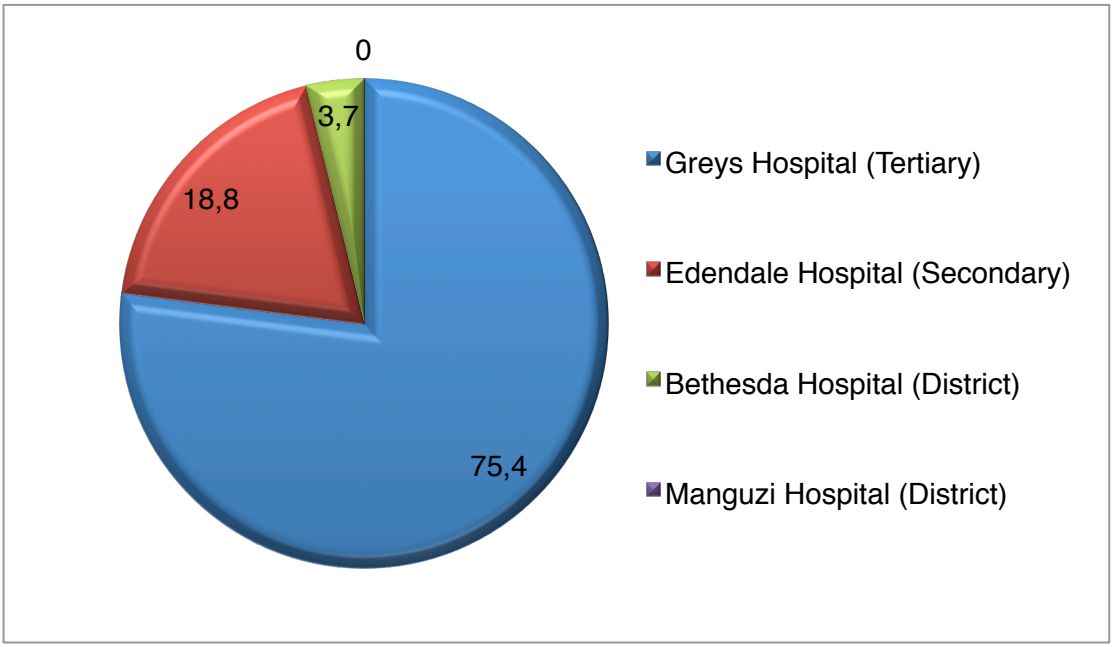

Figure 4.2. Percentage of patients per hospitals attended (n=53)

Within the sample 26.4% of participants had pulmonary TB either previously or currently, and 11.3% had extrapulmonary TB (other than TB of the spine). However, over half of the sample had no other previous TB history (60.3%). The three groups were comparable as the TB history in the groups was not statistically significantly different (p=0.39) when tested tested with Fisher's exact test (Table 4.3).

Within the sample, 79.2% of the participants were RVD positive. The HIV status of the participants was determined by checking the medical records. Other co-morbid conditions that were represented in the population included hypertension (13.2%) and diabetes (1.8%). Risk factors that were represented in the popultion included smoking (13.2%) and alcohol abuse (3.7%). Within the sample 3.7% of the participants identified having other co-morbid conditions not listed. There were no statistically significant differences between the samples, with regards to co-morbid conditions or risk factors (Table 4.3.).

The most common symptom that participants initially experienced was back pain (84.9%). Other common symptoms were paraparesis (58.4%) and paraplegia (26.4%), with fever (22.6%) and spinal deformity (16.9%) presenting less frequently. The p-values for each presenting symptom were all more than 0.05, making the three groups comparable for initial presenting symptom when tested with tested with Fisher's exact test (Table 4.3).

Within the sample, just under half of the participants (47.1%) waited 2 weeks to one month to seek medical care, with 28.3% seeking medical care within the first week of symptoms appearing. The remainder of the participants waited between 2 to 12 months (24.5%) to seek care. No participants waited longer than a year to seek medical care (Table 4.3). As the p-value for each timeframe was more than 0.05, there were no statistically significant differences between the groups with regards to the timeframe between onset of symptoms and seeking medical care.

Table 4.3. Medical history of the groups according to time since diagnosis

			Time since diagnosis			
		Total Sample (n=53)	***≤ 6 months (n=24)***	**>6 - 12 months (n=13)**	**>12-24 months (n=16)**	**p value**
		n (%)				
TB History	**No other TB history**	31 (60.3)	14 (58.3)	6 (46.1)	11 (68.7)	0.475
	Pulmonary TB	12 (26.4)	6 (25.0)	4 (30.7)	2 (12.5)	0.444
	Extra-pulmonary TB	5 (11.3)	2 (8.3)	2 (15.3)	1 (6.2)	0.100
	Unknown history	3 (3.7)	1 (4.1)	1 (7.6)	2 (12.5)	0.806
	MDR TB	1 (1.8)	1 (4.1)	0 (0)	0 (0)	0.100
Co-morbid conditions	**RVD positive**	42 (79.2)	21 (87.5)	8 (61.5)	13 (81.2)	0.195
	Hyper-tension	7 (13.2)	3 (12.5)	3 (23.0)	1 (6.2)	0.444
	Diabetes	1 (1.8)	0 (0)	0 (0)	1 (6.2)	0.100
	Other	2 (3.7)	0 (0)	1 (7.6)	1 (6.2)	0.295
Risk factors	**Smokers**	7 (13.2)	2 (8.3)	1 (7.6)	4 (25.0)	0.444
	Alcohol abuse	2 (3.7)	1 (4.1)	1 (7.6)	0 (0%)	0.724
Initial/ presenting symptom	**Back pain**	41 (84.9)	21 (87.5)	9 (84.6)	11 (81.2)	0.892
	Paraparesis	31 (58.4)	16 (66.6)	6 (46.1)	9 (56.2)	0.427
	Fever	12 (22.6)	3 (12.5)	3 (23.0)	6 (37.5)	0.178
	Spinal deformity	9 (16.9)	5 (20.8)	1 (7.6)	3 (18.7	0.657
	Paraplegia	14 (26.41)	8 (33.3)	2 (7.6)	4 (25.0)	0.342
	Other	14 (26.4)	8 (33.3)	2 (15.3)	4 (22.0)	0.574
Timeframe between onset of symptoms and seeking medical care	**< 1 week**	15 (28.3)	6 (25.0)	2 (15.3)	7 (43.7)	0.267
	2 weeks – 1 month	25 (47.1)	14 (58.3)	5 (38.4)	6 (37.5)	0.365
	2 months- 6 months	10 (18.8)	3 (12.5)	5 (38.4)	2 (12.5)	0.144
	7 months- 12 months	3 (5.6)	1 (4.1)	1 (7.6)	1 (6.2)	0.100

4.3.1. Spinal Cord Involvement

Within the sample, 1.8% of the participants had cervical spine (C-spine) involvement, 43.4% had thoracic spine (T-spine) involvement, and 67.9% had

lumbar spine (L-spine) involvement. No participants presented with sacral spine (S-spine) involvement. Within the sample, 16.9% of the participants presented with involvement of more than one area, with all of these participants presenting with a lesion in the thoracolumbar junction. The differences in the level of spinal cord involvement were not statistically significant between the three groups when tested with tested with Fisher's exact test (Table 4.4).

Table 4.4. Spinal cord involvement of the participants in the groups according to time since diagnosis

			Time since diagnosis			
		Total Sample (n=53)	***≤ 6 months (n=24)***	**>6 - 12 months (n=13)**	**>12-24 months (n=16)**	**p value**
		n(%)				
Level of spinal involve-ment	**Cervical spine**	1 (1.89)	0 (0)	1 (7.6)	0 (0)	0.10
	Thoracic Spine	14 (26.4)	7 (29.1)	2 (15.3)	5 (31.2)	0.667
	Lumbar spine	27 (50.9)	12 (50)	6 (46.1)	9 (56.2)	0.884
	Unspecified	2 (37.7)	2 (83.3)	0 (0)	0 (0)	0.459

The initial ASIA grades, done on admission, were distributed with most participants presenting with incomplete paraplegia: Grade C: Motor Incomplete - muscle grade less than 3 (24.5%) or Grade D: Motor Incomplete - muscle grade greater than 3 (39.6%). The rest of the sample presented with Grade A: Complete (11.3%), Grade B: Sensory Incomplete (5.6%), and Grade E: Normal (5.6%). There were a small percentage of patients (13.2%) who did not have an initial ASIA grading noted in their files.

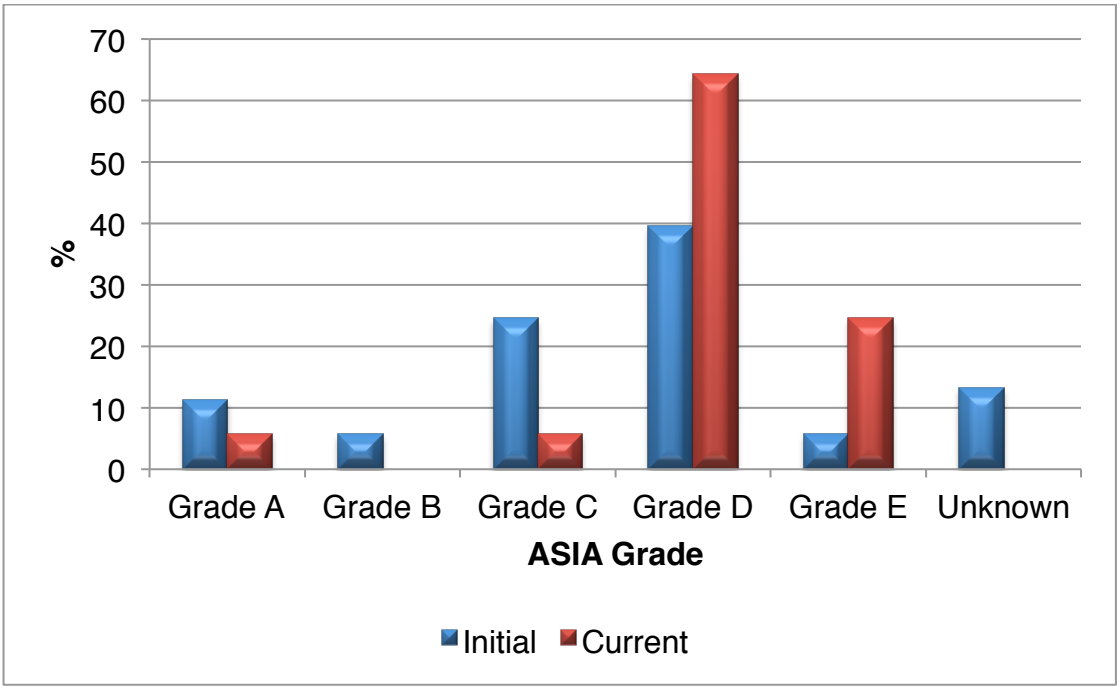

Figure 4.3. Comparison of initial and current American Spinal Injury Association Grades (n=53)

The current ASIA grading was done by a medical doctor when the research study was conducted. When comparing the initial and current ASIA grading, the current ASIA grading was distributed mainly between Grade D: Motor Incomplete - muscle grade greater than 3 (64.1%) and Grade E: Normal (24.5%). No participants were Grade B: Sensory Incomplete, and 5.66% were Grade A: Complete and Grade C: Motor Incomplete - muscle grade less than 3 (Figure 4.3). Overall, the population showed an improvement in terms of neurological fallout. The differences in both the initial ASIA grading (p=0.28) and current ASIA grading (p=0.21) were not statistically significant between the three groups.

4.3.2. Treatment received

Within the sample, 75.4% of the participants did not receive surgery while 24.5% did. With regards to pharmacotherapy, 73.5% of the participants were currently completing treatment. A small amount did not receive treatment (9.43%), and only 1.8% reported defaulting. No significant difference was found between the groups using the Fisher's exact test (Table 4.5).

Table 4.5. Treatment received by the participants in the groups according to time since diagnosis

			Time since diagnosis			
		Total Sample (n=53)	***≤ 6 months (n=24)***	**>6 - 12 months (n=13)**	**>12-24 months (n=16)**	**p value**
		n (%)				
Surgical Interven-tion	**Surgery**	13 (24.5)	5 (20.8)	2 (15.3)	6 (37.5)	0.395
	No surgery	40 (75.4)	19 (79.1)	11 (84.6)	10 (62.5)	
Pharmaco -therapy	**Completing treatment**	39 (73.5)	18 (75.0)	9 (69.2)	12 (75.0)	0.922
	Completed treatment	8 (15.0)	2 (8.3)	4 (30.7)	2 (12.5)	
	Defaulted treatment	1 (1.8)	1 (4.1)	0 (0)	0 (0)	
	No treatment	5 (9.4)	3 (12.5)	0 (0)	2 (12.5)	
Names of drugs	**Rifafour**	32 (60.3)	14 (58.3)	9 (69.2)	9 (56.2)	0.817
	Ritib	2 (3.7)	0 (0)	1 (7.6)	1 (6.2)	0.295
	Rifinah	1 (1.8)	1 (4.1)	0 (0)	0 (0)	0.100

Of the participants that had received or were currently receiving treatment, more than half were on Rifafour (60.3%).

The differences in the surgical intervention (p=0.33) and pharmacotherapy (p=0.99) were not statistically significant between the three groups when tested with Fisher's exact test (Table 4.5).

4.4 HEALTH CARE AT INITIAL CONTACT AND REFERRAL TO OTHER SERVICES FOR FURTHER TREATMENT

As highlighted in the section above, the three groups were comparable to each other as there were no characteristics that were statistically significant between the groups. Therefore, the data from the health care the participants received was analysed from the total sample.

4.4.1 Level at which care took place

More than half the participants received their initial care at a primary health care level (52.8%) and over a third at secondary hospitals (37.7%). Only 1.8% received their initial care at a tertiary hospital, and the remaining 7.5% sought care at a private general practitioner.

The majority of the participants were referred on to higher levels of health services, which resulted in two thirds of the participants being seen at tertiary hospitals (62.2%) with just under one third treated at secondary hospitals (32.0%). Only 1.8% of participants were referred to a quaternary hospital for further treatment, and no participants were referred to a primary health care clinic.

There was a significant difference ($p<0.001$) in the level of health care services for initial contact and further treatment, with the majority of patients being seen at a primary or secondary level initially. After referral the majority was seen at a secondary and tertiary level (Table 4.6).

Table 4.6 Level of health care at initial contact and referral to other services for further treatment (n=53)

	Level of initial contact	***Referral for further treatment***	***p value***
	n(%)		
Primary Health Care Clinic	28 (52.8)	0 (0)	**0.001****
Secondary Hospital	20 (37.7)	17(32.0)	
Tertiary Hospital	1 (1.8)	32(62.2)	
Quaternary Hospital	0 (0)	1(1.8)	
Other/ not referred	4 (7.5)	2(3.7)	

**Significance $p\leq0.01$

4.4.2 Mode of transport used to access health care

In order to access the initial health care services, over a third of the participants walked (39.6%), a third used a taxi (33.9%), and 13.2% used their own transport. Once participants were referred to other services for further treatment, just over half of the participants (52.8%) used planned patient

transport to access health care. The rest of the participants relied on public transport (24.2%) to access these services, with a small minority walking (7.5%) or using their own transport (9.4%) (Table 4.7).

Table 4.7 Transport to access care at initial contact and on referral to other services for further treatment (n=53)

	Mode of transport to initial services	***Mode of transport to further services***	***p value***
	n(%)		
Walked (with or without assistive devices)	21 (39.6)	4 (7.5)	**0.001****
Public taxi	19 (33.9)	11 (18.8)	
Own transport	7 (13.2)	5 (9.4)	
Planned patient transport	4 (7.5)	30 (52.8)	
Pushed themselves in a wheelchair	3 (5.6)	0 (0)	
Public bus	0 (0)	3 (5.6)	

**Significance p≤0.01

The type of transport used to access health care differed significantly from that used for the initial contact and that used to obtain further treatment, with a p-value of less than 0.001. The main form of transport to initial services was walking, whereas to further services it was planned patient transport.

4.4.3 Allied health care

The allied health care services included in this study were occupational therapy, physiotherapy, dietetics, social work and psychology. Two thirds of the participants (62.2%) did not receive allied health care services at the health care facility where they first sought care. Only a slightly smaller number (50.9%) reported they did not receive allied health care services when referred to other health care (Table 4.8). There was no significant difference in the allied health care services received initially and later on referral for other treatment, mostly due to the high number of patients who did not know whether they had received allied services in the facilities where further treatment was provided. A record review was done to clarify if allied services were provided, but not all of the medical records for the primary health care

services were available. The number receiving allied health care services differed very little between the initial contact and further services.

Table 4.8 Allied health care at initial contact and referral to other services for further treatment (n=53)

	Allied health care services on initial contact	***Allied health care services on referral for further treatment***	***p value***
	n(%)		
Received	19 (35.8)	20 (37.7)	0.147
Did not receive	34 (62.2)	33 (62.3)	

Of the participants who received allied health care services, two thirds received physiotherapy at the initial care facility (33.9%) as well as when referred for further care (32.0%). Only two patients out of the 53 (3.7%) were referred to occupational therapy in the facility where they first sought care. A further nine participants (16.9%) were referred to OT in the health care facilities where they received further treatment. This difference was not significant. No participants were referred to social work or psychology either on initial contact with the health services or when referred for further treatment to other health care facilities (Table 4.9).

Both groups of participants who were referred for occupational therapy at the initial and further health care services were less than ten (n=2; n=9). Due to these small sample sizes, the data with regards to the duration, frequency, and location of the OT services could not be analysed to show any statistically sound results.

Table 4.9 Type of allied health care at initial contact and referral to other services for further treatment (n=53)

	Allied health care services on initial contact	**Allied health care services on referral for further treatment**	**p value**
	n(%)		
None	29 (54.7)	24 (45.2)	0.165
Occupational Therapy	2 (3.7)	9 (16.9)	
Physiotherapy	18 (33.9)	17 (32.0)	
Dietetics	4 (7.5)	3 (5.6)	

4.5. FUNCTIONAL OUTCOMES

The functional outcomes were categorized within the SCIM-III and rated according to the degree of assistance required, as well as the need for any assistive devices. The more independent the participant was in the activity, the higher they scored.

4.5.1 Self-care

With regards to eating and drinking, as well as grooming, 100% of the participants were totally independent.

For washing the upper body, 16.9% of the participants needed some form of assistance, with 11.3% requiring partial assistance, and 5.6% requiring an assistive device. Within the whole sample, 83.0% were able to wash independently (Figure 4.4).

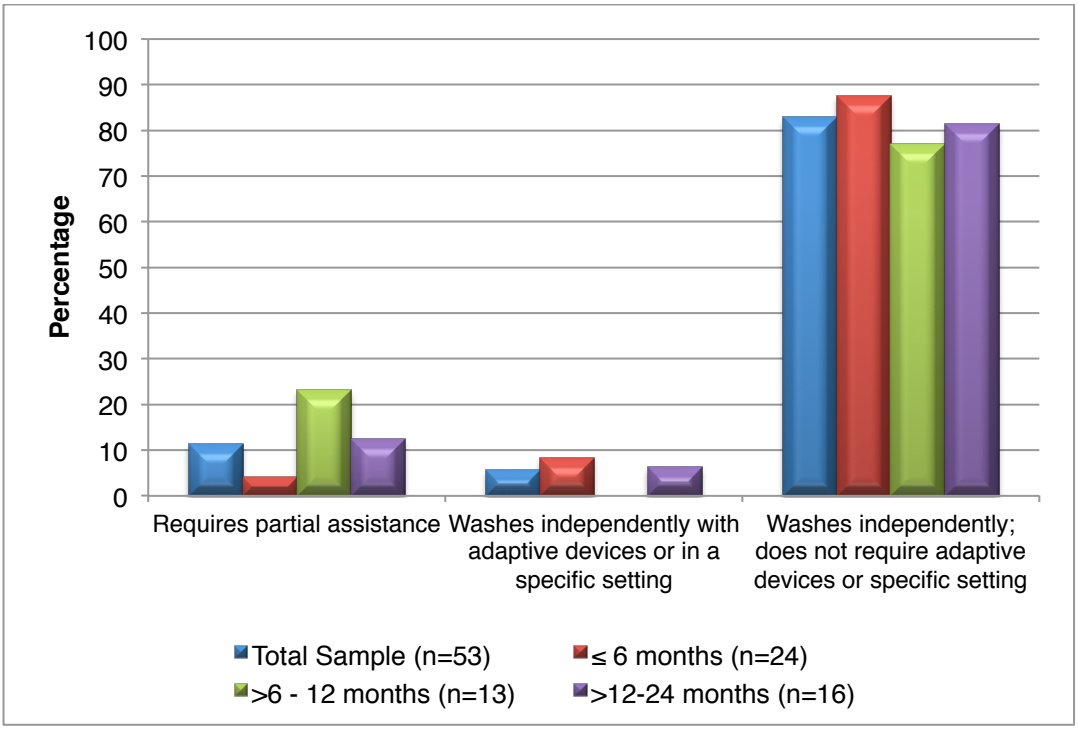

Figure 4.4 Level of independence achieved in washing the upper body

With regards to washing the lower body, 9.4% required total assistance, 28.3% required partial assistance, and 7.5% required assistive devices or a specific setting. More than half of the participants (54.7%) were able to wash their lower limbs independently (Figure 4.5).

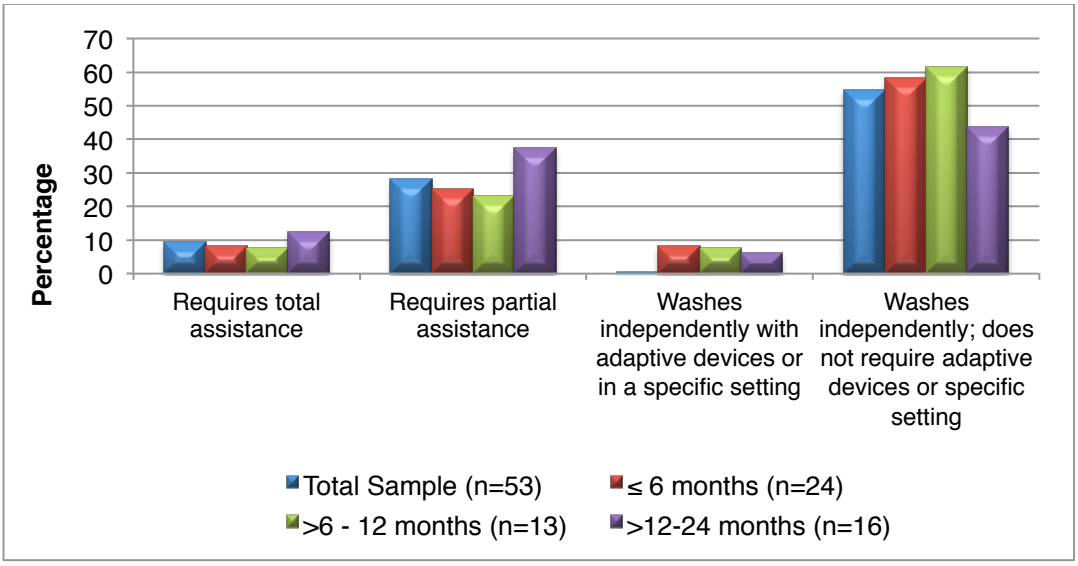

Figure 4.5 Level of independence achieved in washing the lower body

For dressing the upper body, the majority of the sample was independent with all clothing (83.0%). Only a small amount of participant's required adaptive devices or a specific setting (3.7%), and even fewer participants required assistance (1.8%) (Figure 4.6).

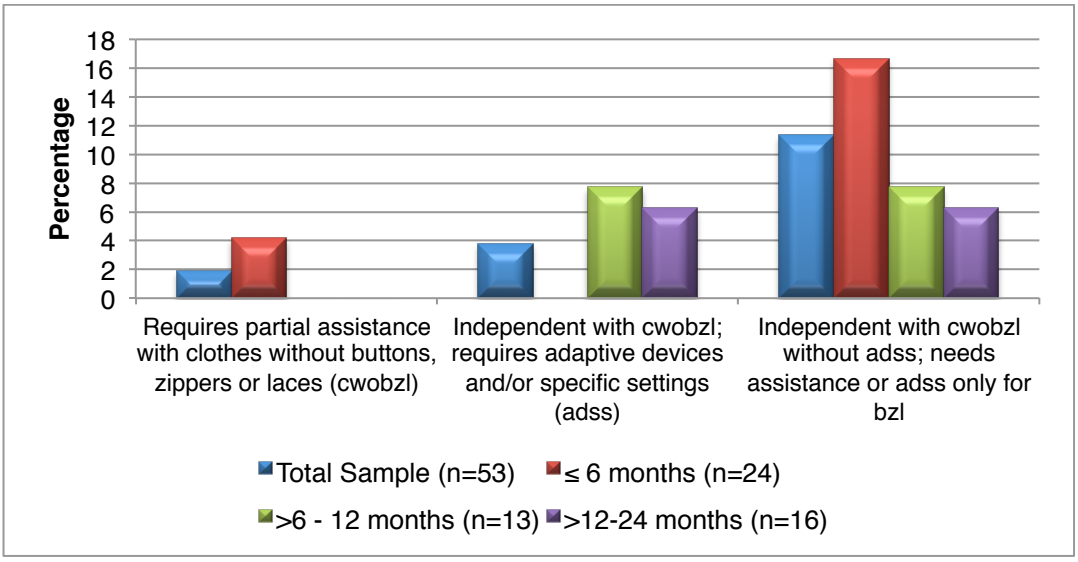

Figure 4.6 Level of independence achieved in dressing the upper body

For the lower body, 54.7% were independent but 9.4% required total assistance, and 24.5% required partial assistance with clothes without fastenings. A small amount of participants (1.8%) required adaptive devices or a specific setting (Figure 4.7).

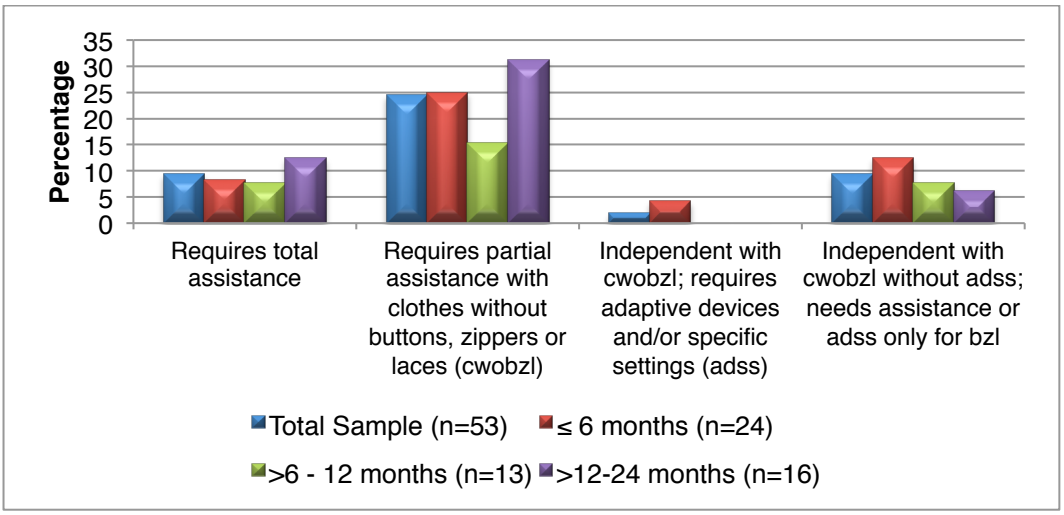

Figure 4.7 Level of independence achieved in dressing the lower body

There were no statistically significant differences between the three groups with regards to self-care outcomes (Table 4.10.). However, participants who were 13 – 24 months since diagnosis needed more help with lower limb activities, whereas those less than one year needed more help with upper limb activities.

Table 4.10. Self-care functional outcomes in the three groups according to time since diagnosis

	Total Sample (n=53)	**≤ 6 months (n=24)**	**>6 - 12 months (n=13)**	**>12-24 months (n=16)**	**p Value**
	Median (Lower and Upper Quartile)				
Feeding	3 (3-3)	3 (3-3)	3 (3-3)	3 (3-3)	
Bathing upper body	3 (3-3)	3 (3-3)	3 (3-3)	3 (3-3)	
Bathing lower body	3 (1-3)	3 (1-3)	3 (1-3)	1.5 (1-3)	
Dressing Upper body	4 (4-4)	4 (4-4)	4 (4-4)	4 (4-4)	
Dressing Lower body	4 (1-4)	3.5 (1-4)	4 (3-4)	3.5 (1-4)	
Grooming	3 (3-3)	3 (3-3)	3 (3-3)	3 (3-3)	
Subtotal	18 (15-20)	18.5 (15-20)	19 (16-20)	18 (14-20)	0.857

4.5.2. Functional Mobility Outcomes

For ease of data analysis, the functional mobility outcomes were divided into two sections. The first looking at the mode of mobility of the patient in bed, indoor, for moderate distances, outdoors, and for stairs. These outcomes were assessed according to what assistive devices were used (motorized or manual wheelchair, cane, crutches, walking frame, or orthosis) and the degree of assistance required. The second section looked at transfers between surfaces.

The functional mobility outcome of mobility in bed was achieved independently by the majority (86.7%) of the sample. Some participants were able to perform one (5.6%) or two (5.6%) of the activities on their own. Only 1.8% required total assistance for mobility in bed (Figure 4.8).

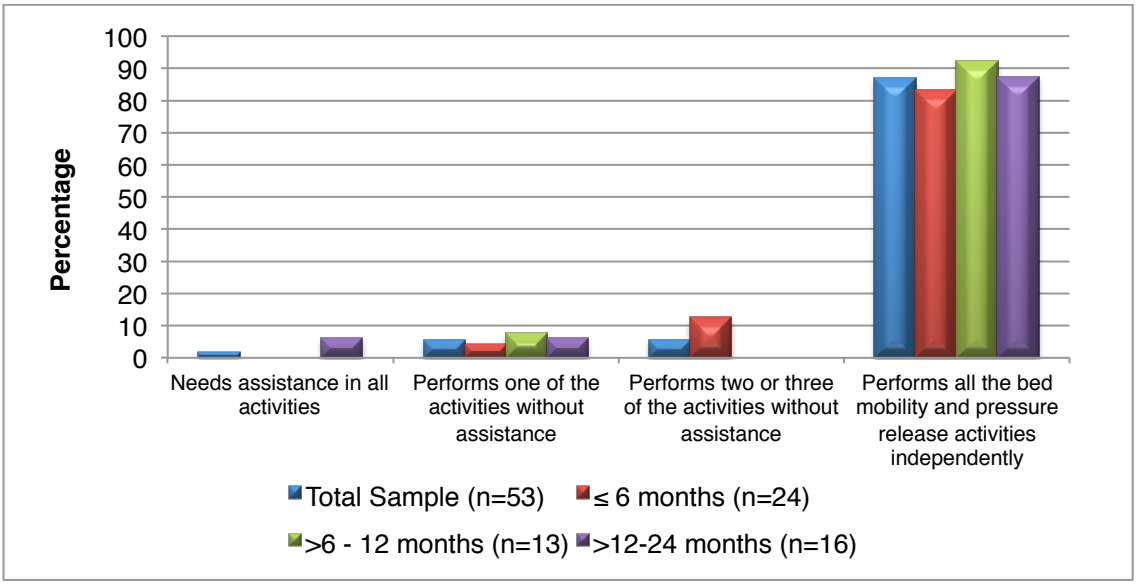

Figure 4.8 Level of independence achieved in mobility in the bed

For mobility indoors, 5.6% of the sample required total assistance, and over half were independent (66.3%). The remaining participants required some form of assistance, with 9.4% using a wheelchair and the rest using crutches (13.2%), a walking frame (5.6%), or a cane (5.6%) (Figure 4.9). Participants who had been diagnosed between 6 months and a year ago were the most mobile without any assistance or devices.

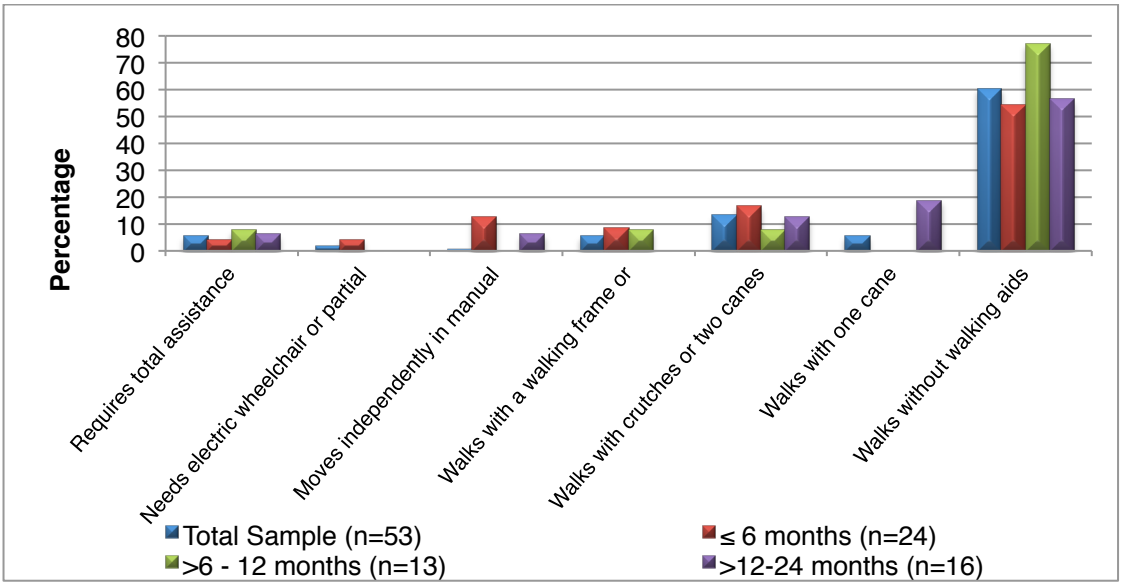

Figure 4.9 Level of independence achieved in mobility indoors

For mobility of moderate distances the outcomes were similar to indoors, but with just less than half walking independently (45.2%), 9.4% using a wheelchair, and just over a third using crutches (16.9%), a walking frame (7.5%), or a cane (15.0%) (Figure 4.10). More participants used crutches or two canes if their onset was over a year ago, while those who had been diagnosed between 6 months and a year ago were the most mobile without any assistance or devices.

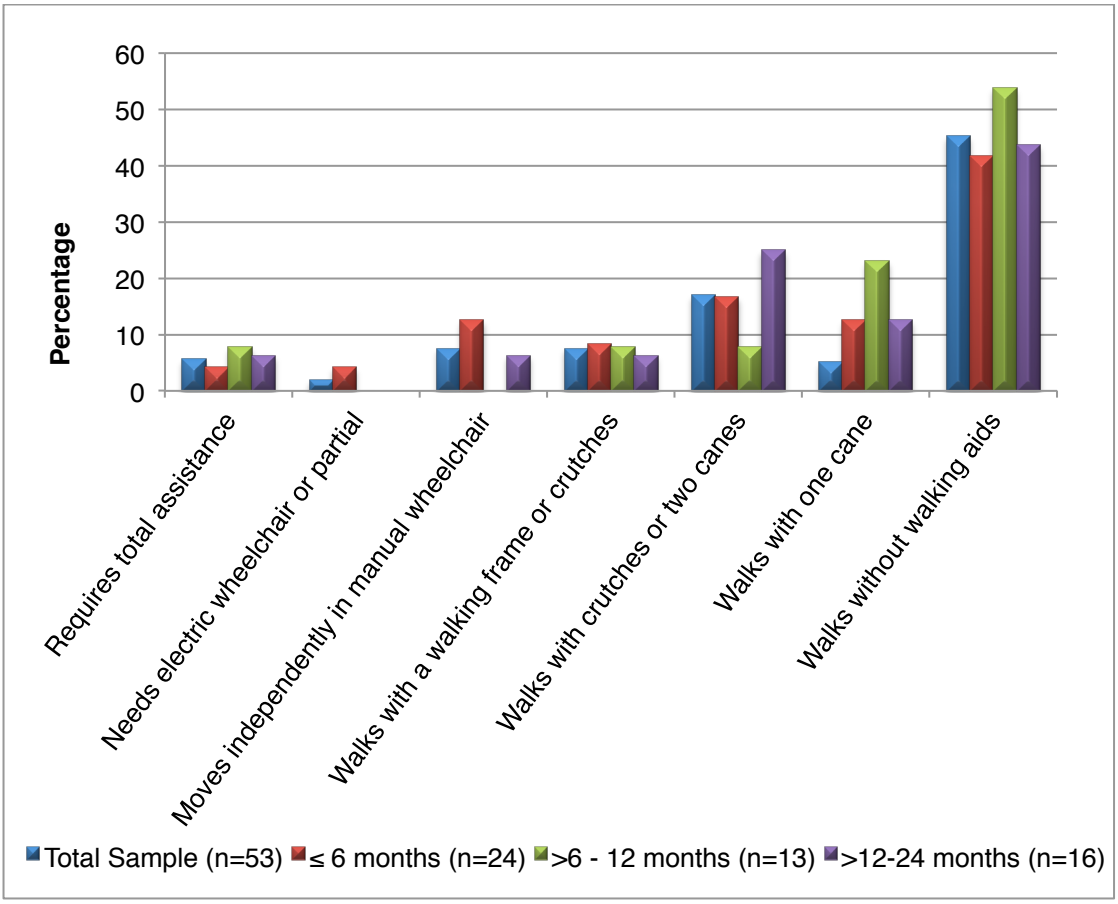

Figure 4.10 Level of independence achieved in mobility for moderate distances

For mobility outdoors, nearly half the sample was independent in walking outdoors, and 15% required a wheelchair. Of the remaining sample, just over 32% used crutches, a walking frame, or a cane (Figure 4.11).

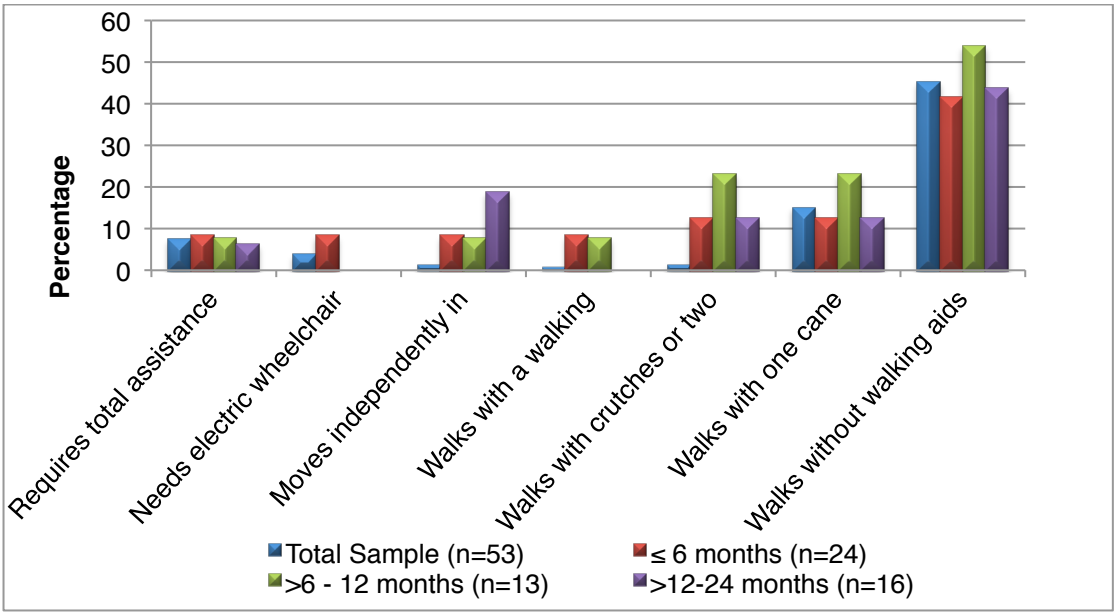

Figure 4.11 Level of independence achieved in mobility outdoors

For the functional mobility outcome of managing stairs, nearly a third of participants were unable to ascend or descend stairs, just under half of the sample required supervision or assistance. Even though nealy half the participants could walk unaided outside only approximately a quarter could manage stairs independently without any support or supervision (Figure 4.12).

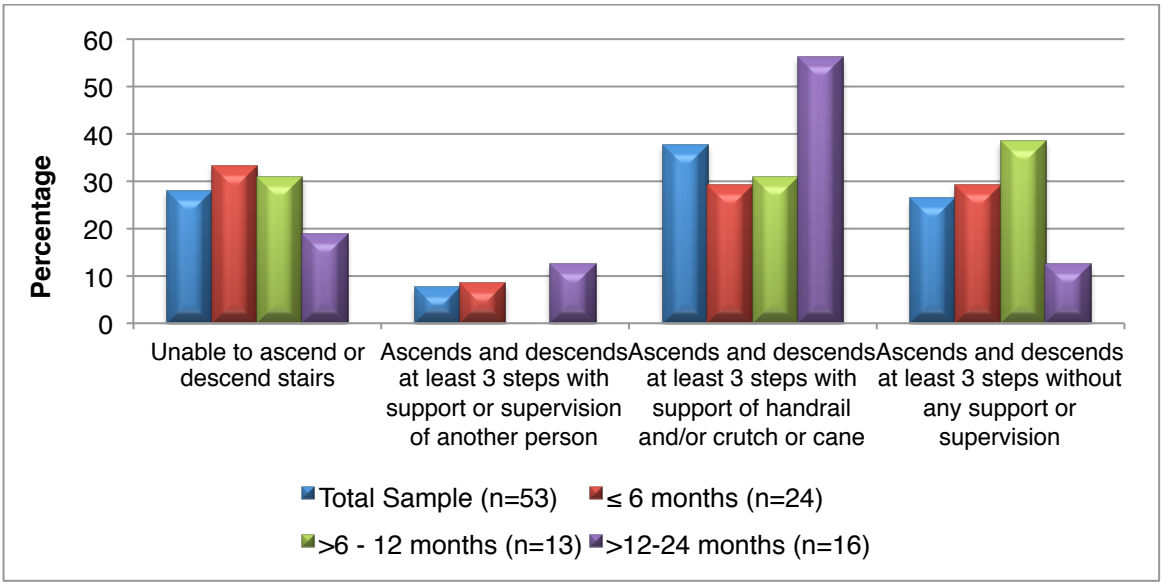

Figure 4.12 Level of independence achieved in stair management

The second section of the functional mobility outcomes looked at transfers between surfaces.

This included from the wheelchair to the bed, bath, toilet, car, and floor. The outcome was scored according to the degree of assistance required or the need for an assistive device. Transfers included locking the wheelchair, lifting the footrests, removing and adjusting the arms rests, transferring and lifting the feet.

With regards to transferring between the bed and the wheelchair, 5.6% of the participants required total assistance, 7.5% needed partial assistance, supervision, or adaptive devices, and 86.7% were independent or did not require a wheelchair (Figure 4.13).

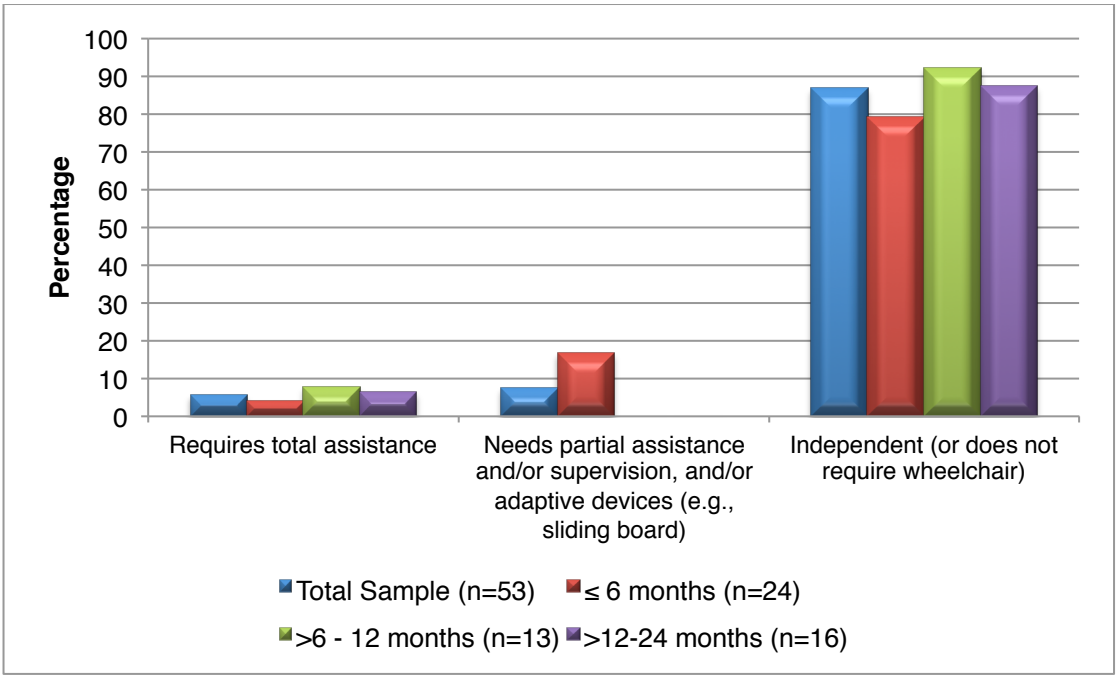

Figure 4.13 Level of independence achieved in transferring from the wheelchair to the bed

For transferring between the wheelchair, toilet, and bath, 9.4% of the participant's required total assistance, and 84.9% were independent or did not require a wheelchair. The other 5.6% required partial assistance or supervision (Figure 4.14).

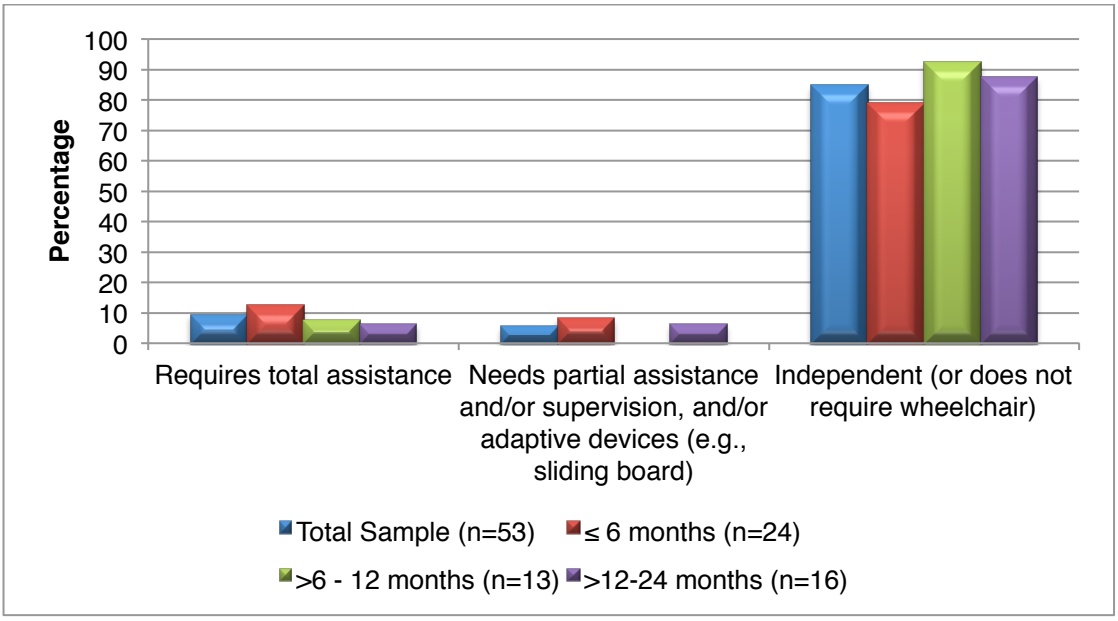

Figure 4.14 Level of independence achieved in transferring from the wheelchair to the toilet and tub

For transfers between the wheelchair and car, 9.4% required total assistance, 9.4% needed partial assistance or supervision, and 81.1% transferred independently or do not require a wheelchair (Figure 4.15).

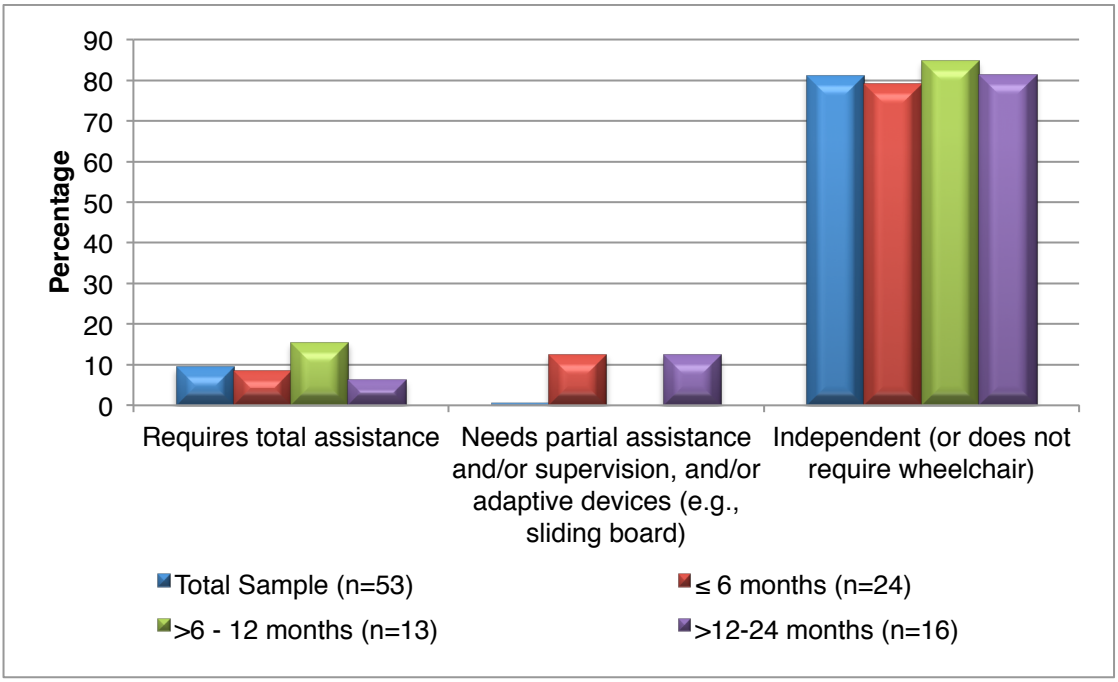

Figure 4.15 Level of independence achieved in transferring from the wheelchair to the car

For transfers between the wheelchair and ground, 39.6% of the participant's required total assistance and 60.3% transferred independently or did not require a wheelchair (Figure 4.16).

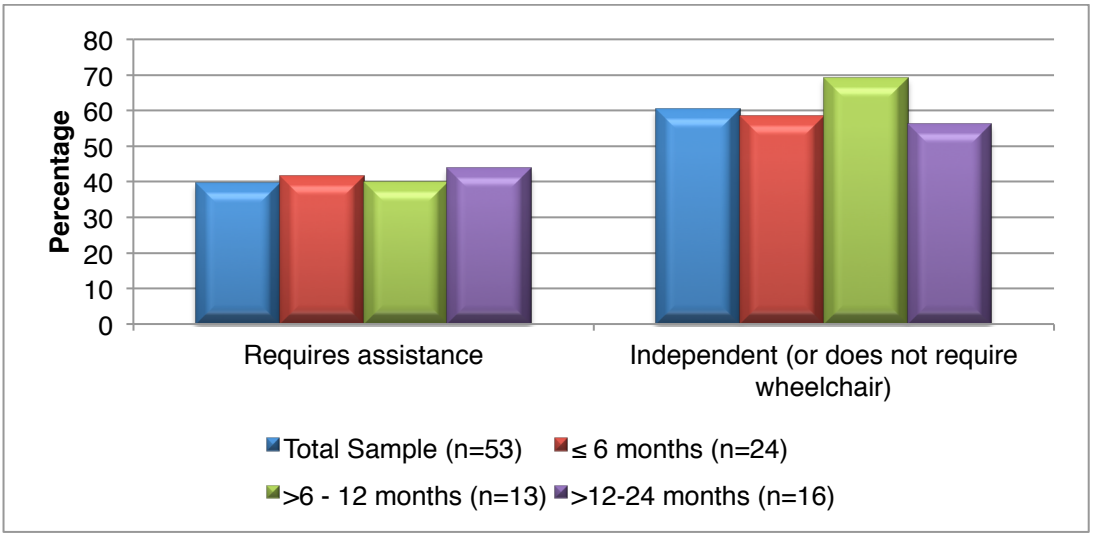

Figure 4.16 Level of independence achieved in transferring from the wheelchair to the floor

There were no statistically significant differences between the three groups with regards to functional mobility (Table 4.11).

The data from the demographic and medical questionnaire and the SCIM III was analysed using a Chi squared test to determine if there were any differences between the variables and the functional outcomes achieved. The results showed significant differences between the variables discussed below and the functional outcomes achieved. As shown in the section above, the three groups are comparable and therefore the sample was analysed as a whole.

Table 4.11. Transfer outcomes in the groups according to time since diagnosis

	Total Sample (n=53)	≤ 6 months (n=24)	>6 - 12 months (n=13)	>12-24 months (n=16)	P Value
	Median (Lower and Upper Quartile)				
Mobility in bed	6 (6-6)	6 (6-6)	6 (6-6)	6 (6-6)	
Mobility indoors	8 (5-8)	8 (4-8)	8 (8-8)	8 (5-8)	
Mobility moderate distances	6 (5-8)	6 (2-8)	8 (6-8)	6 (5-8)	
Mobility Outdoors	6 (4-8)	6 (3-8)	8 (6-8)	6 (3.5-8)	
Stair management	2 (0-3)	2 (0-3)	2 (0-3)	2 (1-2)	
Bed – wheelchair	2 (2-2)	2 (2-2)	2 (2-2)	2 (2-2)	
Wheelchair – toilet – bath	2 (2-2)	2 (2-2)	2 (2-2)	2 (2-2)	
Wheelchair – car	2 (2-2)	2 (2-2)	2 (2-2)	2 (2-2)	
Wheelchair - ground	1 (0-1)	1 (0-1)	1 (0-1)	1 (0-1)	
Subtotal	34 (27-40)	33 (26-40)	39 (33-40)	33 (25-39)	0.768

4.6. DEMOGRAPHIC AND MEDICAL CHARACTERISTICS AND THEIR IMPACT ON FUNCTIONAL OUTCOMES ACHIEVED

4.6.1. Demographic and medical factors with no impact on functional outcomes achieved

The majority of the demographic and medical factors included in the questionnaire did not display any direct association or significant differences with achieving better or worse functional outcomes. The results from these tests were included as an appendix (Appendix L). There were no statistically significant differences in the functional outcomes achieved, in both the self-care and mobility areas, with regards to the following factors: age, gender, level of education, vocational status and income, geographical location, who the participant resided with, surgical intervention, pharmacotherapy received, the level of initial contact or further referral, mode of transport used, and allied

services. Due to the fact that this was a small sample, it is possible that these factors would have an impact on functional outcomes achieved, but the samples were too small for them to show as statistically significant in this study.

4.6.2 Tuberculosis history and functional outcomes

Using a Mann Whitney U test the analysis showed that having no previous history of TB had a significant impact on good functional outcomes in mobility. In comparison, patients with a history of other types of TB achieved significantly worse functional mobility outcomes (Table 4.12).

Table 4.12. Tuberculosis history and independence in functional outcomes

	Other types of Tuberculosis (n=23)	***No other Tuberculosis history (n=31)***	***p value***
	Median (Lower and Upper Quartiles)		
SELF-CARE OUTCOMES			
Subtotal	16 (14-20)	19 (15-20)	0.170
FUNCTIONAL MOBILITY OUTCOMES AND TRANSFER OUTCOMES			
Mobility in bed	6 (6-6)	6 (6-6)	0.070
Mobility Indoors	8 (4-8)	8 (5-8)	0.028
Mobility Moderate Distances	5.5 (4-8)	6 (5-8)	**0.027****
Mobility Outdoors	5.5 (2-8)	6 (5-8)	**0.021****
Stair Management	2 (0-2)	2 (0-3)	0.459
Transfers - bed-w/c	2 (2-2)	2 (2-2)	0.074
Transfers - w/c-toilet-bath	2 (2-2)	2 (2-2)	0.168
Transfers - w/c-car	2 (2-2)	2 (2-2)	0.121
Transfers - ground-w/c	1 (0-1)	1 (0-1)	0.337
Subtotal	33 (22-39)	35 (27-40)	**0.023****

**Significance p≤0.01

4.6.3 Co-morbidities and functional outcomes

Table 4.13 RVD status and functional outcomes

	RVD positive (n=42)	***RVD negative (n=11)***	***p value***
	Median (Lower and Upper Quartiles)		
SELF-CARE OUTCOMES			
Feeding	3 (3-3)	3 (3-3)	**0.991***
Bathing - Upper body	3 (3-3)	3 (3-3)	**0.004****
Bathing - Lower body	3 (1-3)	1 (0-3)	0.196
Dressing - Upper body	4 (4-4)	4 (2-4)	**0.001****
Dressing - Lower body	4 (1-4)	3.5 (1-4)	0.010
Grooming	3 (3-3)	3 (3-3)	0.991
Subtotal	20 (18-20)	15 (11-17)	**0.037****
Subtotal			
FUNCTIONAL MOBILITY OUTCOMES AND TRANSFER OUTCOMES			
Mobility in bed	6 (6-6)	4 (2-6)	0.000**
Mobility Indoors	8 (5-8)	6 (0-8)	**0.029****
Mobility Moderate Distances	8 (5-8)	5 (0-6)	**0.019****
Mobility Outdoors	8 (5--8)	5 (0-6)	**0.033****
Stair Management	2 (1-3)	0 (0-2)	0.122
Transfers - bed-w/c	2 (2-2)	2 (0-2)	**0.001****
Transfers - w/c-toilet-bath	2 (2-2)	2 (0-2)	**0.001****
Transfers - w/c-car	2 (2-2)	2 (0-2)	**0.006****
Transfers - ground-w/c	1 (0-1)	0 (0-1)	0.072
Subtotal	37.5 (27-40)	27 (2-40)	**0.024****

*Significance p≤ 0.05
**Significance p≤0.01

The RVD status of the participants was the only co-morbidity that showed to have an impact on the functional outcomes achieved. This data was then further analysed, and a statistically significant difference was found with regards to both self-care and functional mobility outcomes between patients who were RVD positive and those that were RVD negative (Table 4.13). In both the self-care and the mobility sections, the participants who were RVD positive achieved better functional outcomes than those who were RVD negative. This result is not expected and may be due to the small number of participants in the RVD negative group. The difference seen here is most likely due to other factors like back pain.

4.6.4 Initial presenting symptom and functional outcomes

The initial presenting symptoms shown to have an impact on the functional outcomes achieved were back pain and paraplegia.

There were no statistically significant differences in the self-care functional outcomes achieved by the participants with back pain in comparison to those without. (Table 4.14). Back pain was a significant factor in indoor , moderate distance and outdoor mobility with those with back pain achieving lower scores for these aspects of functional mobility and the sub total for mobility and transfers.

Table 4.14. Back pain and independence in functional outcomes

Independence in functional outcome	***No Back Pain (n=12)***	***Back Pain (n=41)***	***Chi² (df)***	***p value***
	Median (Lower and Upper Quartiles)			
SELF-CARE OUTCOMES				
Subtotal	20 (15-20)	18 (15-20)	15.64(11)	0.84
Subtotal				
FUNCTIONAL MOBILITY OUTCOMES AND TRANSFER OUTCOMES				
Mobility in bed	6 (6-6)	6 (6-6)	15.33(11)	0.133
Mobility Indoors	8 (5-8)	7 (5-8)		**0.039***
Mobility Moderate Distances	7 (5-8)	6 (4-8)		**0.040***
Mobility Outdoors	7 (5.5-8)	6 (2-8)		**0.042***
Stair Management	2 (1-2)	2 (0-3)		0.955
Transfers - bed-w/c	2 (2-2)	2 (2-2)		0.133
Transfers - w/c-toilet-bath	2 (2-2)	2 (2-2)		0.422
Transfers - w/c-car	2 (2-2)	2 (2-2)		0.268
Transfers - ground-w/c	1 (0-1)	1 (0-1)		0.880
Subtotal	36 (28-39)	34 (25-40)		**0.044***

*Significance p≤ 0.05

For participants who presented with paraplegia as their initial presenting symptoms, self care and functional mobility outcomes achieved were significantly poorer (Table 4.15). Statistically significant differences were found for participants who initially presented with paraplegia for washing and dressing of the lower body in comparison to those who presented with no paraplegia. The significant differences found for mobility showed that those with no paraplegia had better out comes.

Table 4.15 Initial presenting symptom of paraplegia and functional outcomes

	No Paraplegia (n=39)	**Paraplegia (n=14)**	**p value**
	Median (Lower and Upper Quartile)		
SELF-CARE OUTCOMES			
Feeding	3 (3-3)	3 (3-3)	0.992
Bathing - Upper body	3 (3-3)	3 (3-3)	**0.006****
Bathing - Lower body	3 (1-3)	1.5 (1-3)	0.080
Dressing - Upper body	4 (4-4)	4 (2-4)	0.105
Dressing - Lower body	4 (1-4)	1.5 (1-4)	0.387
Grooming	3 (3-3)	3 (3-3)	0.991
Subtotal	20 (15-20)	15 (14-20)	0.082
FUNCTIONAL MOBILITY OUTCOMES AND TRANSFER OUTCOMES			
Mobility in bed	6 (6-6)	6 (6-6)	**0.001****
Mobility indoors	8 (5-8)	8 (2-8)	**0.012****
Mobility moderate distances	6 (5-8)	6 (2-8)	**0.009****
Mobility outdoors	6 (4-8)	6 (2-8)	**0.019****
Stair management	2 (0-3)	2 (0-2)	0.205
Transfers - bed-w/c	2 (2-2)	2 (1-2)	**0.034****
Transfers - w/c-toilet-bath	2 (2-2)	2 (1-2)	0.057
Transfers - w/c-car	2 (2-2)	2 (1-2)	0.130
Transfers - ground-w/c	1 (0-1)	0 (0-1)	0.906
Subtotal	35 (27-40)	34 (12-39)	**0.024****

**Significance p≤0.01

A statistically significant difference ($p<0.01$) was also found with patients who initially presented with fever for achieving poor mobility in bed in comparison to those who presented with other symptoms.

4.6.5 Timeframe between onset of symptoms and seeking medical care and functional outcomes

Spearman's co-efficient was used to determine any correlations between timeframe between onset of symptoms and when the patient sought health care with the functional outcomes achieved. There was a positive moderate correlation between the length of time the participant took to seek care and better functional ability in dressing the lower body, all mobility and transfers. It appears the longer the patient waited, the better the functional outcomes achieved (Table 4.16).

Table 4.16. Correlation between timeframe between onset of symptoms and seeking medical care and functional outcomes in the total population

	Rho (r)
SELF CARE OUTCOMES	
Feeding	1.00
Bathing - Upper body	0.04
Bathing - Lower body	0.35
Dressing - Upper body	0.21
Dressing - Lower body	0.38
Grooming	0.10
Subtotal	0.38
FUNCTIONAL MOBILITY AND TRANSFER OUTCOMES	
Mobility in bed	0.36
Mobility Indoors	0.41
Mobility Moderate Distances	0.44
Mobility Outdoors	0.43
Stair Management	0.41
Transfers - bed-w/c	0.28
Transfers - w/c-toilet-bath	0.34
Transfers - w/c-car	0.30
Transfers - ground-w/c	0.38
Subtotal	0.40

This could be attributed to the fact that patients with milder symptoms and functional involvement may wait longer to seek help and therefore overall achieve better in their functional outcomes in comparison to those who sought help sooner due to more severe symptoms.

4.6.6. Spinal involvement and functional outcomes

The current ASIA grading is an indicator for the degree of neurological fallout and the completeness of the injury. The Spearman's Rho correlations indicate a correlation between participants with a higher ASIA Grade (i.e. complete neurological fallout) achieving poorer self-care for lower body washing and dressing and functional mobility and transfer outcomes. (Table 4.17).

Table 4.17. Correlation between current American Spinal Injury Association grading and functional outcomes in the total population

	Rho (r)
SELF CARE OUTCOMES	
Feeding	1.00
Bathing - Upper body	0.06
Bathing - Lower body	0.41
Dressing - Upper body	0.27
Dressing - Lower body	0.39
Subtotal	0.43
FUNCTIONAL MOBILITY AND TRANSFER OUTCOMES	
Mobility in bed	0.41
Mobility Indoors	0.46
Mobility Moderate Distances	0.53
Mobility Outdoors	0.52
Stair Management	0.60
Transfers - bed-w/c	0.41
Transfers - w/c-toilet-bath	0.42
Transfers - w/c-car	0.40
Transfers - ground-w/c	0.44
Subtotal	0.62

The level of spinal involvement was also shown to have some correlation with the functional outcomes achieved. Having a lesion in the thoracic spine had a weak to moderate negative correlation with achieving poorer functional outcomes in both self-care and mobility, whereas having a lesion in the lumbar spine had a weak to moderate positive correlation with achieving positive functional outcomes. This indicates the participants with a lumbar lesion were more functional (Table 4.18).

Table 4.18. Correlation between the level of spinal involvement and functional outcomes in the total population

	Rho (r)
SELF CARE OUTCOMES	
Feeding	1.00
Bathing - Upper body	- 0.07
Bathing - Lower body	0.15
Dressing - Upper body	0.03
Dressing - Lower body	0.23
Subtotal	0.11
FUNCTIONAL MOBILITY AND TRANSFER OUTCOMES	
Mobility in bed	0.33
Mobility Indoors	0.19
Mobility Moderate Distances	0.17
Mobility Outdoors	0.15
Stair Management	- 0.00
Transfers - bed-w/c	0.10
Transfers - w/c-toilet-bath	0.22
Transfers - w/c-car	0.26
Transfers - ground-w/c	0.16
Subtotal	0.08

4.7. CONCLUSION

The aim of the study was to determine the self-care and functional mobility outcomes achieved by patients diagnosed with TB spine in KZN within the first two years after initial diagnosis and the factors impacting on these outcomes. The first objective was to determine the medical and demographic characteristics of patients diagnosed with TB spine. The study found that the sample was made up of mainly females with a mean age of 39.41 years. The majority of the sample had received some form of education, but only 13.2% were gainfully employed, and over half of the sample received grants. Most of the participants came from a rural setting, and almost all lived with a family member.

More than half the sample did not have a history of TB, with only a quarter presenting with current or previous pulmonary TB. The majority of the sample were RVD positive. The most common initial presenting symptom was back pain and then paraparesis. More than half the sample waited less than one month to seek medical care. The most frequently involved spinal level was the lumbar spine, and then the thoracic spine.

The second objective was to determine the self-care and functional mobility outcomes achieved by TB spine patients at three different time periods within the first two years after diagnosis. The majority of patients were independent in self-care outcomes. Dressing and washing of the lower limbs was the most affected self-care functional outcome, with just over half independent in these activities. With regards to functional mobility, approximately half of the patients were walking without any assistive devices, with only a small percentage wheelchair bound. Of those patients who were wheelchair bound, most of them were capable of transferring between a variety of surfaces, with transfers between the wheelchair and floor most poorly achieved. There were no statistically significant differences between the three groups at the varying times since diagnosis.

The final objective was to determine if any of the demographic and medical factors had an impact on the functional outcomes achieved. No demographic factors had a statistically significant impact on functional outcomes. There was a positive relationship between better functional outcomes and having no previous TB history, being RVD positive, waiting a longer time to seek medical care, having incomplete neurological fallout, and a lesion in the lumbar spine. In comparison, a history of extra-pulmonary TB, a lesion in the T-spine, and initial presenting symptoms of back pain and paraplegia were factors that led to poorer functional outcomes.

CHAPTER FIVE: DISCUSSION

5.1. INTRODUCTION

A sample of 53 patients diagnosed with TB spine in the last two years and currently living in KZN were interviewed using a demographic and medical questionnaire and the SCIM-III for this study. The results identified demographic characteristics of this particular population, as well as described the functional outcomes currently being achieved in terms of functional mobility and self-care. The sample was divided into three groups, based on the time since diagnosis, and through comparative analysis, showed no statistically significant difference in functional outcomes achieved at six months, one year, or two years post diagnosis. This discussion focuses on interpretation of and exploration of the significance of the results, reflecting on the implications for clinical practice and for further research within TB spine based on the demographic and medical characteristics of the sample as well as the functional outcomes achieved by the sample.

5.2. DEMOGRAPHIC CHARACTERISTICS

With regards to the demographic characteristics, there were no factors that showed a statistically significant impact on the functional outcomes achieved. Due to the fact that there is currently no research available on the factors that have an impact on functional prognosis in TB spine, it is not possible to compare this result to other studies. However, there is research available on non-traumatic spinal cord lesions (NTSCL) that has highlighted several factors, such as age, employment, and socioeconomic status, to have an impact on the functional outcomes achieved (45). As TB spine is classified as a NTSCL, it is likely to have similar findings. Therefore, the fact that the results of the study did not highlight any demographic factors to have an impact functional prognosis may be due to the small size of the sample. It is, however, relevant to note that the demographic characteristics still have a clinically relevant impact on OT intervention and therefore should be considered by therapists. These will be discussed in turn.

For this study, the sample was made up of mainly females. This is in line with demographics of other research. For example, in a study done in 2009 by Polley and Dunn, on the incidence of noncontiguous spinal tuberculosis, also conducted in a South African setting, 57% of the sample were female (25). In general, NTSCLs tend to affect females more than males (30). There is no research to indicate why females tend to be more affected by NTSCL. However, this is a relevant factor for OTs to consider, as females tend to have gender specific roles, such as household maintenance and childcare, that may be impacted on. This will impact on OT intervention planning as the focus will be on gender specific activities that are relevant to the roles of the population.

The median age in this study was mid-thirties, with the majority of participants between the ages of 31 and 46 years, which can be considered as a young population. In comparison to traumatic spinal cord injuries, non-traumatic lesions tend to occur in an older population; however, Tuberculosis, as a disease, has been found to affect mainly young adults (26, 66). As highlighted in this study, the TB spine population is of a younger age and literature reports it usually occurs within the first three to four decades of life (67, 68). This is relevant to occupational therapists, as age will impact on the occupations engaged in and the outcomes focused on. In this population specifically, the productive years are impacted and therefore work-related activities will be of a concern to the occupational therapists.

With regards to the level of education, only a small percentage of the sample had education further than matriculation. However, most participants were educated to some degree, with at least half of the participants completing primary school (completion of Grade 7) and having some level of high school education. There is no research available that looks specifically at level of education and TB spine, which this result can be compared to. In a 2004 study conducted in Zambia that assessed the factors contributing to treatment adherence and knowledge of TB, the majority of patients had attained a

primary level of education (69). This finding is similar to the current study. However, a link has been found between illiteracy and TB spine, as illiteracy is associated with a lower socioeconomic status, which has been identified as a factor that predisposes one to TB spine (26). The level of education and its link to TB spine should be further investigated as there is currently no research focused on it.

It would be relevant to note that a patient can be educated but still have poor health literacy. In a report published in 2001 by Yale University on health literacy, it was noted that although South Africa has one of the highest literacy rates in Africa it is also one of the most affected by HIV and TB. The report highlights that general literacy and health literacy do not necessarily go hand in hand. It also emphasizes that health literacy is an important contributing factor in disease transmission and treatment (70), Therefore, despite most of the sample in this study having some form of education, as a whole they may still be lacking in knowledge about TB spine. As illiteracy has been shown to be prevalent amongst patients with TB spine, it would be interesting to do further research into literacy levels and health related literacy specific to TB spine and the impact on functional outcomes and prognosis.

Within this sample, half of the participants were receiving disability or old age pension grants, with only a fifth gainfully employed or studying. The statistics for employment rates in spinal cord injury vary in the literature, but a study by Jang, Wang, and Wang, conducted in Taiwan, found that more than half of persons with spinal cord injury are not employed following their injury (71). As Taiwan is a developed country, employment rates may differ to the South African context. The length of time since diagnosis has been identified as a factor in the vocational status of patients. Employment rates tend to increase with every year since diagnosis, i.e. patients who are one year post diagnosis are less likely to be employed than those five years post diagnosis (72). However, in this current study there were no statistically significant differences in employment rates between the three groups at varying times since

diagnosis. The high level of unemployment in this study should be interpreted against the backdrop of the South African setting, where unemployment rates in general are high. According to the quarterly labour force survey conducted in 2014, the unemployment rate within KZN was 20.8% at the end of 2014 (73). The percentage of people unemployed in this sample is much higher than the provincial rates, which may be indicative of the impact TB spine has on employment, although due to the small sample size this cannot be deduced. Further research into unemployment rates in the TB spine population in comparison to a control group of similar demographics would be interesting to see if unemployment rates are in fact higher in the TB spine population.

The sample was equally divided between living in rural and urban areas. These results were similar to the results of Wang, Wang, Zhang, and Zhou who conducted a study in Southwest China in 2012, on the characteristics of patients with TB spine. It was found that this sample was also equally divided between both rural and urban areas (68). However, due to the small sample size this may not be indicative of the distribution of TB spine within KZN as a whole.

The majority of the participants in this sample in this study lived with someone, with only a few participants identifying living alone. The patients that did live with someone mainly lived with either parents and siblings or their spouses and children. Currently, there is no literature available to indicate a possible reason for this. This could be an area of interest that requires further research.

However, it is an important element in the occupational therapy process, as the social environment has been shown to impact functional independence (10). The social environment is the context in which the patient will perform their self-care and functional mobility tasks, and the social context can have an influence on this performance. This could be in the form of support,

physical assistance, or encouragement for example. Marriage in particular has been identified as an important positive factor in well-being and quality of life for patients with spinal cord lesions (74).

Any form of social support provided to the spinal injured population has proven to have positive associations with life satisfaction, independence in functional mobility, and overall functioning (74, 75). The high level of social support available to the participants may have had a positive influence on the functional outcomes they achieved. However, this study did not show any statistically significant differences between patients who lived with others in comparison to those who lived alone. This may be due to the fact that the majority of the sample had some form of social support, with minimal participants living alone. Therefore, the size of the sample was too small to make a meaningful comparison as only a few participants lived alone.

5.3. MEDICAL CHARACTERISTICS

Several of the medical characteristics were shown to have correlations with the functional outcomes achieved. These included TB history, RVD status, the initial presenting symptom, the timeframe between onset of symptoms and seeking medical care, the ASIA grading, and the level of spinal involvement. All of the medical characteristics of the sample will be discussed, as even those that did not have a statistically significant impact on the functional outcomes are clinically important. Those factors that did have an impact will be further highlighted, and the relationship with the functional outcomes will be discussed further.

5.3.1. TB History

More than half of the sample did not have any other history of TB, with only 26.4% having a history of current or previous pulmonary TB. This result is different to other research on TB spine, with this study showing a lower prevalence of co-morbid pulmonary TB. In comparison to the results of this study, Garg and Somvanshi state that literature has found pulmonary TB to be

common in patients with spinal TB, with more than half of the population experiencing a current or previous history of pulmonary TB when diagnosed with spinal TB (26). However, the results of this study were similar to a study by Wang et al. in Southwest China, where a concomitant diagnosis of pulmonary TB and TB spine was only noted in 25.7% of the sample, a near exact percentage to this study (68). It is important to highlight that in this study only a quarter of the participants had a history of pulmonary TB, as health care professionals may only consider TB spine as a diagnosis if there is a previous history of TB. With a delay in diagnosis being a particular difficulty in TB spine, it should be considered a differential diagnosis, despite other TB history. This is clinically relevant to medical officers who are diagnosing the patient, as they should consider TB spine as a diagnosis regardless of previous TB history.

Only one patient in this sample had a history of MDR TB, and this is similar to other studies, where MDR and XDR have not been found to be common in TB spine (26).

The results also showed that participants without a history of TB achieved significantly better functional mobility outcomes than those with a history of TB. This is important to note as any additional diagnosis can impact on function. Research has shown that having more than one diagnosis with an associated impact on function can lead to an even greater decrease in the quality of life (76). A co-morbid condition of TB, for example pulmonary TB could have a specific impact on function, for example it may impact on cardiorespiratory endurance which could affect performance in functional tasks, specifically functional mobility tasks of longer distances, therefore resulting in poorer occupational performance. As a clinical occupational therapist, it would be relevant to look at the TB history of the participant and take into account any other factors that may impact on the patient's performance. However, despite the correlations highlighted, there was no clear trend in statistically significant differences between participants with no

TB history and the functional outcomes achieved. This indicates that further research with a larger sample is required to identify any possible trends.

5.3.2. Co-morbidity

In this study, 80% of the sample reported being RVD positive. This result is similar to several other studies conducted on TB spine. According to a review on spinal tuberculosis, conducted in India in 2011, *'the risk of developing tuberculosis is estimated to be 20–37 times greater in people co-infected with HIV than among those without HIV infection* (26) *(p.440)'*. This was reflected in this study, with the majority of participants being infected with HIV. This is supported by many other studies and reviews of patients with TB spine, where HIV is a frequent co-morbid condition (77, 78). TB is one of the most common HIV related infections, and therefore the HIV population are at the highest risk for any TB related diseases (77, 79). In a 2012 worldwide study conducted on HIV and TB, South Africa was found to have the highest rate of HIV and TB infected patients, with 73% of TB cases being infected with HIV (77).

Being RVD positive showed a significant difference in the self-care and functional mobility outcomes achieved, in comparison to participants who were RVD negative. Participants who were RVD positive achieved significantly better functional outcomes than those who were RVD negative. This finding should be interpreted with the size of the sample in mind as it is not expected. As 80% of the sample were RVD positive, only a small number of participants were RVD negative, therefore it is most likely this result is from the small number of participants in the RVD negative group and the difference is due to other factors, for example back pain. A diagnosis of HIV can have a direct negative impact on the occupational performance of the patient, and therefore it would be more expected that being RVD positive would be correlated with poor functional outcomes (35). In a study conducted in Ethiopia in 2009, it was found that patients that were co-infected with both HIV and TB had worse quality of life in comparison to those infected with only HIV (76). Quality of life included physical, mental and social wellbeing of the

person. In a 2004 study that looked at the impact of HIV-Associated neuropsychological impairment on functioning, it was shown that independence in self-care activities was less in those with HIV infection (80). This was due to a range of subtle to severe neuropsychological symptoms. This is just one aspect of HIV that could have a direct impact on function, which is why poorer functional outcomes would be expected in the RVD positive group (80). Further research is indicated into the impact that co-infection of HIV and TB spine compared to TB spine alone would have on function.

Other co-morbid conditions and risk factors that are commonly associated with TB spine were not as frequently reported in the study, with 1.9% of the sample having Diabetes and 13.2% being smokers. Similar results were found in the literature with between 1-25% of the population being affected (81).

5.3.3. Initial presenting symptoms

Within this current study, the majority of the population reported back pain as one of the initial symptoms they experienced. This was an expected result, as the most common symptom that patients present with is back pain, either local or generalised (26, 27, 67). In a review presented in the European Spine Journal on bone and joint TB, back pain was noted as a symptom in 83-100% of patients (81). Wang et al. also found that back pain was the most common symptom that patients presented with (68). This may make diagnosis more complex, as a single symptom of back pain has a multitude of differential diagnoses. Within the KZN context, due to the high prevalence of TB and HIV, it may be necessary to consider TB spine as a diagnosis for persons presenting with back pain. However, this may be not realistic or financially feasible. Further research into back pain and TB spine within KZN would need to be conducted in order to determine the prevalence of a diagnosis of TB spine.

For patients presenting with back pain as an initial symptom, there was a significant difference in the functional mobility outcomes achieved in comparison to those without back pain. Participants who experienced back pain achieved poorer functional mobility outcomes than those without. This result is expected as research has shown that back pain, regardless of the syndrome or associated diagnosis, can have an impact on functioning and activity participation (82). Back pain can impact on the mobility of the trunk which in turn affects activities such as bending, stopping, crouching and twisting, all of which are required for tasks such as dressing and stair management. Back pain, specifically lower back pain, has been associated with changes in gait which is in line with this research study which showed that back pain resulted in poorer functional mobility outcomes (82). As the majority of the sample presented with lumbar spine involvement, lower back pain would be considered a significant factor impacting on functional mobility.

With regards to other presenting symptoms, 22.6% of the participants in this study presented with fever as their initial symptom. This finding is similar to the literature in TB spine, where the more well-known symptoms of TB, i.e. the constitutional symptoms, such as fever, weight loss, and night sweats are only present in one third of the TB spine population (26, 81). Wang et al. noted 33.5% of the participants in their study presented with constitutional symptoms, which is similar to the results of this study (68).

In this current study the percentage of participants presenting with neurological fallout as their initial symptom was high, with over half of the patients reporting paraparesis as one of the initial symptoms and a quarter identifying paraplegia as a presenting symptom. This result differed to other studies, with a higher percentage of patients in this study experiencing neurological symptoms. In the 2006 study by Cormican, Hammal, Messenger, and Milburn on the current diagnosis and management of spinal tuberculosis, they noted an average of one third of the patients complain of neurological symptoms (27). Similar to Cormican et al., in a 22 year retrospective study

conducted in Taiwan on TB spine patients, paraparesis was noted in 33% of patients as their initial presenting symptom (83). However, other research has found the range to be much greater, which is similar to this current study. Garg et al. reported an incidence of 23% to 76% of neurological fallout in their review on spinal tuberculosis (26). The results from this current study, showed the overall percentage of patients with neurological fallout was much higher. This may be due to the mechanism of infection or the anatomical involvement of the lesion that leads to greater neurological fallout. However, there is currently no research to provide suggestions as to why this may be the case. It would be relevant to do further research into this topic to determine if the KZN population of TB spine patients are more susceptible to neurological fallout, and if so, why.

Similar to participants presenting with back pain, those who had an initial presenting symptom of paraplegia achieved significantly poorer functional outcomes. This is supported by other research on NTSCL, as patients with greater spinal cord involvement tend to have a poorer functional prognosis (30). The self-care activities that showed a significant difference were dressing and washing of the lower limbs. As less than 2% of the sample had cervical spine involvement, i.e. upper limb involvement, it is expected that self-care activities of the lower limbs would be impacted more greatly than the upper limbs. Functional mobility outcomes were also more heavily impacted as the participants in this study mainly had involvement of only the lower limbs, which are required for independent functional mobility.

The above-mentioned initial presenting symptoms have been shown by several studies and reviews, and now supported by this study, to be fairly stable in terms of presentation, with the majority of patients presenting with back pain, constitutional symptoms, and neurological fallout (26, 67, 81). Therefore a differential diagnosis of TB spine should be considered with any of these presentations.

TB spine is recognised as a slow, insidious disease with a prolonged onset, and therefore there has always been a delay between the presentation of symptoms and diagnosis. In this current study, just under half of the participants waited between two weeks and two months for diagnosis. The timeframe between onset of symptoms and diagnosis varied widely in the literature available from weeks to years, but most commonly was between 4 to 11 months (26, 32). This timeframe is much longer than the timeframe found in this study, which may suggest that people within KZN are seeking help faster and being referred more quickly to the appropriate health services. However, this does not account for TB spine patients who may not be accessing health care services. A shorter timeframe is a positive finding for the public health care system within KZN, as a shorter delay in diagnosis, leads to quicker treatment and rehabilitation, which is associated with a better prognosis.

Although a quicker diagnosis has been associated with better functional outcomes, in this study a lengthened time between onset of symptoms and seeking medical care was associated with better functional outcomes, in both self-care and functional mobility. This could be explained by the small number of participants (n=3) in the group that waited a long time, i.e. more than one year. This could also be as a result of participants with milder symptoms, for example no neurological fallout and minimal pain, waiting longer to seek help. As shown above these symptoms are related to achieving better functional outcomes. Although this study did not highlight the impact of a delayed diagnosis and rehabilitation, research supports this relationship (5). It may, however, be relevant to note that delayed diagnosis may not be a large problem in TB spine in KZN, with the majority of patients being diagnosed quickly and the remainder having minimal symptoms that do not impact on function. Patients may also be misdiagnosed and therefore not included in the sample.

5.4. SPINAL CORD INVOLVEMENT

The degree of neurological fallout impacts heavily on the functional prognosis of the patient. Patients that do not present with any neurological fallout have a generally good prognosis (26). In this study, the degree of neurological fallout was assessed through the ASIA grading system, with Grade A indicating complete neurological fallout (motor and sensory), Grade's B, C, and D indicating varying levels of incomplete neurological fallout, and Grade E indicating no neurological fallout. For this study, the percentage of participants presenting with neurological fallout was higher than what has been noted in other studies, with 75.4% of participants presenting with neurological involvement. In comparison to the results of this study, the current literature sites that 20-50% of TB spine patients in developing countries present with neurological fallout, but this has been found to be under estimated (81, 84). The results of this study were different to the study conducted by Godlwana et al. in KZN, as they reported 56% of the participants presented with neurological fallout (3). There is no research to suggest a reason for the higher prevalence of neurological fallout in this current study. However, as it has an impact on the functional outcomes achieved, it would be an important area to research and determine if there is a trend for an increase in neurological fallout.

However, the percentage of participants with complete paraplegia (ASIA Grade A) was comparably lower in this study, with only 5.6% presenting with complete paraplegia and 69.8% with incomplete paraplegia (ASIA Grades B-D). In comparison, Godlwana et al. reported 24% of the participants having complete paraplegia and 32% being incomplete (3). This is a positive finding, as paraparesis has a better prognosis for independence in functional activities. This statement is supported by the findings of this study, as there was a statistically significant trend noted in the functional mobility and self-care outcomes achieved, with participants with complete paraplegia achieving poorer outcomes.

Looking at the ASIA grade at the time of initial diagnosis in comparison to the ASIA grade at the time the study was conducted also assessed a change in neurological status. The grading at the time of initial diagnosis was distributed mainly between Grade C and Grade D. However, on assessment at the time of the study (which ranged up to two years post diagnosis), the ASIA grades showed improvement with the majority of participants between Grade D and Grade E. Other studies support this noted improvement with neurological recovery occurring in approximately 75% of the study's population (26).

This research found that the level of spinal cord involvement was distributed with just over half of the population presenting with lumbar spine involvement, 26.4% with thoracic involvement and the rest cervical spine. Several studies have shown that the most common sites affected in TB spine are in the thoracic and lumbar spines, specifically T10-12 and L3. However TB spine has been documented in all vertebra from C1 to S1 (29). Similar to this study, in 2013 Chen et al. found the lumbar area to be the most commonly affected area, with the thoracic area following closely and then the cervical area (83). On the other hand, several other studies have noted the thoracic area to be the most commonly affected (1). In addition to this, the thoracolumbar junction has also been found to be commonly affected, with studies suggesting around half of the TB spine population have lesions in this area (67, 81). In this current study, the percentage was comparably lower at 16.9% having lesions in the thoracolumbar junction. It is unclear why there was a difference in this study, but it is likely due to the small sample, and therefore it is not representative of the total population.

The site of the lesion was found to have an impact on the functional outcomes achieved, with a lesion in the thoracic spine having a weak to moderate correlation with poor outcomes, and comparably a lesion in the lumbar spine having a weak to moderate correlation with good functional outcomes. This finding is similar to what is observed by occupational therapists in clinical practice, as patients with lesions in the higher spine have involvement of more

muscle groups and therefore lose more motor function. This may lead to greater difficulty in functional outcomes. However, this study looked at the level of involvement as broad groups, i.e. thoracic versus lumbar. However, there are differences within these groups too. Therefore, it would be interesting to research the exact levels involved in TB spine and the impact this has on functional outcomes achieved.

5.5. TREATMENT RECEIVED

In this sample, only one quarter of the participants underwent surgery. Within literature, the percentage of patients who underwent surgical intervention ranged from 8-100% (26, 67). It is significant to note the amount of participants who underwent surgical intervention as it may have an impact on the functional prognosis of the patients. However, in this study there were no statistically significant differences in functional outcomes between participants who underwent surgical intervention in comparison to those who did not. In contrast to this, in a 2011 review on TB spine conducted in India, radical surgery was shown to have a positive correlation with a good prognosis and outcome (26). It is clinically relevant to occupational therapists treating patients with TB spine within KZN, if surgery has an impact on functional outcomes achieved, as it may not be easily available to all patients. This study showed that surgery did not have a significant impact. However, the sample was small, and this result should be interpreted with caution.

This current study found that the majority of participants were either currently receiving or had received treatment in the form of anti-tuberculosis chemotherapy. A similar result was noted by Wang et al. who reported 88.1% of their sample received treatment in the form of chemotherapy (68). There are several lines of drugs available, with the first line drugs being most effective (85). Rifafour is a composition of four first line drugs, and 60.3% of the sample in this study was prescribed this. In the 2009 study completed by Polley et al. in the Western Cape, patients were also treated with Rifafour (25). As first line drugs have been shown to be the most effective, it is positive

to note that this is what participants are receiving, as it could contribute to a better prognosis. However, due to the small number of participants who did not receive first line drugs in this study, it was not possible to determine if there was a statistically significant difference in the functional outcomes achieved between the two groups.

5.6. HEALTH CARE SERVICES

More than half of the sample were initially seen at primary health care centres, and just over a third at secondary hospitals. This is reflective of the health care system within KZN (3). For most people living in the province, specifically in rural areas, primary level of care is the most common form of health care accessed (34). However, the majority of participants were then referred on to higher level institutions, with more than two thirds of the sample being treated at a tertiary level institute. This can be explained by the complex nature of the disease and the need for management by a specialised team. A similar finding was noted in a research study on spinal TB in the Western Cape, where the majority of patients were seen at a tertiary level (25). This finding has a twofold importance for health care services. Firstly, health care staff working at the primary care level need to be well educated on the signs and symptoms of TB spine so that it can be quickly identified and the patients can be referred to higher health care centres. The National Primary Health Care Facilities Survey, conducted in 2003, showed an increase in the TB services available in primary health care centres within KwaZulu Natal since 1998, but the focus has been on pulmonary TB and not extrapulmonary. Therefore it is possible that staff are not as knowledgeable on extrapulmonary TB (86). The referral system between primary level of care and higher health care needs to be efficient and effective for quick referral between centres. Secondly, specialised services that are targeted to TB spine specifically, including the allied services, need to be made available at tertiary level centres so that patients can receive the care they require. Occupational therapy services are also required at a primary level once patients are discharged from tertiary hospitals.

Access to health care services was highlighted in the literature review as a possible factor impacting functional prognosis and specifically contributing to a delay in diagnosis. In the light of the fact that most patients require specialised care at a tertiary level, access to this type of care is of relevance. This study showed a statistically significant difference between the mode of transport used to access initial services and those used to access further services. Over half of the sample walked or used a public taxi to access initial services. However, this mode of transport is not feasible to access tertiary services as they are located far from the areas the participants resided in, which could lead to problems of inaccessible health care. However, of those referred to tertiary level services, over half utilised the planned patient transport system that is available. From clinical experience, the system involves the patient getting to their closest health care centre, staying overnight and then using a bus to get to the tertiary centre the next day. This makes tertiary health care more accessible to the KZN population. With a large proportion of this sample using planned patient transport, the effectiveness of this system is highlighted and shows that the necessary level of health care has been made accessible for TB spine patients. This can only be noted for the participants within the study, as there is no data available about how many people do not receive treatment.

5.7. OCCUPATIONAL THERAPY SERVICES

In this study, two thirds of the sample never received any form of allied health care, either at the initial health care level or at further referral centres. Of those that did receive allied health care, the majority received physiotherapy. Only two patients in the sample received OT at the initial health services, and a further nine patients received OT at referral facilities. This resulted in less than one fifth of the sample receiving OT. There is no literature available to determine whether this trend is similar or different amongst other provinces, and for other diagnosis. There are several reasons that may contribute to the lack of OT services received.

The differences and similarities in the roles of the OT and physiotherapist may contribute to poor referral to OT. Any spinal cord lesion is a complex condition and requires intervention by a team of specialists, which includes both physiotherapy and OT. However, although each clinician has their own role, occasionally these do overlap. Traditionally, there's is a preconceived notion by health care professionals that physiotherapists are thought to play more of a role in functional mobility outcomes, with a focus on the lower limbs, and the OTs play more of a role with quadriplegics who have hand function difficulties (87). However, this concept is not well founded and may be an underlying factor in a lack of referral to occupational therapy. In occupational therapy, the patient is assessed as a whole and any factor contributing to a lack of independence or poor quality of life and engagement in occupations is within the scope of OT. The focus of this study has been functional mobility and self-care, both of which are fundamental requirements for reintegration back into society and independence in the person's occupational performance areas (13). It is possible to suggest that functional mobility has previously been seen as the domain of the physiotherapist, and this could explain the increased number of referrals to physiotherapy in comparison to OT. In contrast, it is to the benefit of patients with TB spine to receive both OT and physiotherapy as there can be reinforcement of skills, as well as a holistic approach to the functional outcomes being worked towards (87).

The provision of OT services to patients with TB spine, at both a primary health care level and at higher levels, is reliant on referrals from other health care providers, mainly the doctors who are managing the case. This requires skilled doctors who have a good understanding of both the diagnosis of TB spine and its implications to function, as well as the role of the OT and the services that can be provided (88). The findings from this study may indicate that referrals between other health care professionals and OT is poor, and needs to be focused on through education campaigns by OTs working in the clinical field.

Another possible factor that could impact on the provision of OT services, could be a general lack of OT within KZN. Currently, there are no published statistics available on the ratio of patients to OTs within KZN. Yet, it is documented that in South Africa there is a poor distribution of health care workers between government facilities and private facilities, as well as between rural placements and urban placements (89). It is possible that the health care services the patients sought care at, specifically the primary health care services, could not provide OT due to a lack of personnel. This is a common problem not only across South Africa, but within sub-saharan Africa (90). Not only is there a lack of staff available, but there are limited therapists with the specialised skill set that may be required to provide OT to patients with TB spine (89). As highlighted in the literature review, there are no research studies available on the functional outcomes achieved by patients diagnosed with TB spine, therefore OTs can only provide generic therapy and set general outcomes for these patients rather than TB specific, tailored programmes.

5.8. FUNCTIONAL OUTCOMES

5.8.1 Self-care outcomes

With regards to self-care outcomes, the total sample was independent in grooming and eating and the majority of the sample were independent in dressing and washing the upper body. The most commonly affected self-care outcomes were dressing and washing the lower limbs. More than half the population was still independent in these tasks, but 28.3% required assistance for washing and 24.5% for dressing. Only one participant in the sample was a quadriplegic, therefore greater difficulty with lower limb activities in comparison to upper body fits with the neurological presentation of the participants (91). Due to the dearth of literature on the functional outcomes achieved by TB spine patients, it is not possible to compare this study's findings with regards to the level of independence in self-care outcomes.

In general in rehabilitation for spinal cord injuries, self-care activities are

among the most important and the first addressed within occupational therapy. '*Impaired ability to perform self-care activities, such as eating, grooming, dressing, and toileting, is one of the immediate impacts an individual likely experiences following his/her spinal cord injury* (91) (p.527)'. These basic activities of self-care are critical aspects of other occupations, such as engagement in leisure and work, making them a top priority for OT intervention (91). However, within this current study, independence in these tasks was not heavily compromised, and it would appear that self-care is not greatly impacted in TB spine. This means the OT should aim for complete independence in these tasks when addressing these outcomes in therapy. It would be important to do further research into this, possibly across several provinces or the whole country, as well as internationally, to determine the overall trend for self-care outcomes achieved, specifically as the sample of this study is small.

5.8.2 Functional mobility Outcomes

In terms of the functional mobility outcomes achieved, the majority of the sample were independent in functional mobility, with or without assistive devices. Approximately half were totally independent with no need for assistive devices for mobility indoors, for moderate distances, or outdoors. Those that did require assistive devices used manual wheelchairs, canes, walking frames, or crutches. Similar results were found in a 2009 study conducted in Bangalore on the functional outcomes achieved by non-traumatic spinal cord lesions. Within the sample, the majority were independent in their functional mobility but required assistive devices, including wheelchairs, crutches, or canes (42).

In comparison to other traumatic spinal cord lesions, NTSCL tend to have better functional mobility outcomes, specifically in the ability to walk (with or without assistive devices). In contrast to this, the results of this current study would suggest that within this sample of patients with TB spine there is an

even better functional prognosis for functional mobility, with most patients not only walking but not requiring assistive devices.

For those patients that are wheelchair bound, or require the use of assistive devices, it is important they master the necessary skill set for these assistive devices to be independently mobile (92). The proficiency required to be independent in using a wheelchair may be highlighted in the ability to transfer between a variety of surfaces. Within this study, the transfers looked at included: transferring between a wheelchair and a bed, toilet or bath, car, and the floor. As the majority of the population did not require the use of wheelchairs, these items were not relevant. However, only a small percentage of participants required assistance for the transfers. The majority of participants were able to transfer between the wheelchair and the bed. In comparison, one third of the sample required assistance to transfer between the wheelchair and the ground. There was a dearth of studies available to compare the transfer outcomes with, to determine how these functional mobility outcomes compare to other studies or populations. This is due to the fact that most studies that use the SCIM-III as an outcome measure, looking at the overall score for this subscale, whereas in this study the frequency for each individual category was calculated. However, due to the small number of participants within the sample that used a manual wheelchair, these findings are not representative of the greater population, and further research should be done on TB spine patients in wheelchairs specifically.

5.8.3. Comparison of functional outcomes at three different times since diagnosis

The sample was divided into three groups based on time since diagnosis. The groups were compared for each of the demographic and medical characteristics, and there were no statistically significant differences between them. Therefore, any differences in the functional outcomes achieved cannot be attributed to these characteristics, but rather to the length of time since diagnosis. However, between the three groups there were no significant

differences in the functional outcomes achieved in both self-care and functional mobility. If this result is analysed in isolation it would indicate that the functional prognosis of the patient does not improve or worsen with time but is rather impacted on by other factors, for example the degree of neurological fallout. However, as this was a heterogeneous sample that was assessed at one point in time only, it is possible that individual participants may improve or worsen over time, and therefore a longitudinal study would provide greater insight into the impact that time has on the functional outcomes achieved. This finding is relevant to occupational therapists, as it would indicate that the length of time since diagnosis may not play a large role in the functional outcomes achieved. However, other research studies on NTSCL have indicated that the length of time since diagnosis can have an impact on the functional prognosis. Therefore, as suggested, further research into this is required.

5.9 CONCLUSION

In this discussion, the demographic characteristics of the sample were discussed and were found to be congruent with both South African and international literature. Due to the dearth in published research available on the factors impacting on TB spine and functional prognosis, several of the factors were not able to be compared, but similarities were found in literature on NTSCL, which TB spine is classified as. In the discussion of the medical factors, it was found that this study sample was similar to other studies with regards to initial presenting symptoms, with the majority of the sample reporting back pain as their initial symptom. The study sample was also similar to other studies with regards to co-morbidities, with 80% of the sample reporting being RVD positive. In comparison, the current study had a lower rate of concomitant pulmonary TB but a higher percentage of participants presenting with neurological fallout, in comparison to the literature. This study also had on average a shorter length of time between onset of symptoms and diagnosis in comparison to the international literature.

None of the demographic factors included in the study were shown to have an impact on the functional outcomes achieved. However several of the medical factors had an impact, which included: TB history, RVD status, the initial presenting symptom, the timeframe between onset of symptoms and seeking medical care, the ASIA grading, and the level of spinal involvement.

With regards to the functional outcomes achieved, this study was compared to research on NTSCL as there is no other research available on functional outcomes in TB spine. This study showed the level of independence achieved in both self-care and functional mobility outcomes was higher in comparison to NTSCL literature. Approximately half of the sample were totally independent in mobility and required no need for assistive devices and the total sample were independent in grooming and eating. The self-care outcomes most impacted were washing and dressing the lower limbs. With regards to the functional outcomes achieved there were no significant differences between the three groups based on time since diagnosis.

More than half of the sample were initially seen at primary health care centres, however the majority were referred to higher level institutions. This was in keeping with other TB spine studies conducted in South Africa and can be explained by the need for specialised services. Only a small minority of the participants in this sample were referred to OT, but there is no research to determine if this is congruent with other provinces.

CHAPTER SIX: CONCLUSION

6.1. CONCLUSION

In conclusion, this study set out to provide a baseline of literature on TB spine and functional outcomes achieved within KZN, South Africa. It aimed to determine the demographic and medical characteristics of the TB spine population within KZN. These demographic and medical characteristics of the study population were described. It also outlined the functional outcomes achieved in the areas of self-care and functional mobility and aimed to determine if any factors had an impact on these outcomes.

Overall, TB spine showed a good prognosis for functional independence, with the majority of the sample performing well in both self-care and functional mobility outcomes. Self-care activities related to the lower limbs were the most affected. More than half of the population walked independently and only a small percentage required assistive devices.

The demographics of the sample were found to be similar to international studies with regards to initial presenting symptoms and co-morbidities. This sample showed a lower rate of concomitant pulmonary TB, a higher percentage of participants with neurological involvement and a shorter delay between onset of the initial symptoms and diagnosis. The sample also displayed an overall improvement in the ASIA grading from initial assessment to the current grading, indicating an improvement in neurological involvement.

Several factors showed an association with achieving good functional outcomes, including: no other TB history, incomplete neurological fallout, and a lesion in the lumbar spine. Back pain, paraplegia and a lesion in the thoracic spine were associated with poorer functional outcomes. Only a small percentage of patients were referred to occupational therapy, which indicates a need for further education around the role of occupational therapists in TB spine.

6.2. LIMITATIONS

Although this study provided a baseline of data available for this particular sample, the sample used was small, which presents limitations with regards to data analysis and applicability to the population as a whole. Due to the small sample size, several of the demographic and medical factors displayed no statistically significant differences.

Although this study highlighted the lack of referral of TB spine patients to occupational therapy, due to the small number of participants that were referred, it was not possible to analyse the impact that the duration and frequency of OT had on the functional outcomes achieved.

This particular study was specific to the population of TB spine patients referred to the four centres within KZN, therefore it is limited in its transferability to the rest of the South African population.

The study was a cross sectional study, measuring the participants functional outcomes at one point in time. Although the sample was divided into three groups according to time since diagnosis and the functional outcomes were analysed

6.3. CLINICAL IMPLICATIONS AND RECOMMENDATIONS

Firstly, this study revealed certain demographic and medical factors that would have clinical implications to OTs and medical officers, which include:

- More than half of TB spine patients have no previous history of TB. Therefore, TB spine should be considered as a diagnosis, despite the absence of previous TB.
- The majority of patients present with back pain as their initial symptom. Therefore, TB spine should be a differential diagnosis when presenting with back pain, especially if the patient is RVD positive, as there is a high correlation between the two.

This study revealed that in general TB spine patients have a good functional prognosis for self-care and functional mobility outcomes. Therefore, OTs working within KZN should consider this when setting goals and outcomes with the patients, and take into account the following:

- TB spine patients have the ability to achieve independence in self-care outcomes. Therefore, total independence should be worked on in therapy
- With regards to self-care, dressing, and washing of the lower limbs are the areas most affected. Therefore, focus should be placed on these activities
- TB spine patients have a good prognosis for walking, with or without assistive devices. Therefore, this outcome should be worked towards in therapy.
- The degree of neurological fallout, assessed through the ASIA scale, was the main factor shown to have an impact on the functional outcomes achieved. TB spine patients also showed an improvement in their ASIA grading. Therefore, OTs should do regular ASIA testing and consider the grade when setting functional outcomes.

6.4. IMPLICATIONS FOR EDUCATION AND RESEARCH

As TB spine has been shown through this study to be prevalent in South Africa and have it's own demographics and functional outcomes, it should be incorporated into the undergraduate curriculum for OTs, as it requires specialised training and knowledge.

Overall, there was a poor referral rate of TB spine patients to allied health care professionals, and particularly OT. OTs should develop education campaigns to health care professionals, specifically at a primary care level, to highlight the impact of TB spine on function and promote the role of OT. Further research into health care systems within South Africa and the role of occupational therapy in primary health care re-engineering would contribute greatly to the profession and the development of a protocol for patients diagnosed with TB spine. This could be incorporated into continuing professional development for all mutli-disciplinary team members working with patients diagnosed with TB spine.

This study provides the foundation for additional research topics that were identified through the results. As this study did not anaylse the impact of OT services on TB spine patients, due to the small sample size, further research on TB spine patients who are referred to OT is recommended. The focus of study could be on what impact the duration, frequency, and protocol used in OT has on the functional outcomes achieved. As the study only included four hospitals within the KZN province, incorporating more KZN hospitals in a larger study could further the research available on this topic. It would also be interesting to do a nationwide study and determine if there are any differences between provinces.

As this study was a cross-sectional study, it would be relevant to do a longitudinal study that assessed the functional outcomes achieved by the same patients at six months, one year, and two years post diagnosis to determine if time since diagnosis has an impact on functional outcomes achieved.

6.5. CONCLUSION

This study aimed to determine the self-care and functional mobility outcomes achieved by patients diagnosed with TB spine, in KZN, within the first two years after initial diagnosis and the factors impacting on these outcomes. It was found that patients have a good functional prognosis for these outcomes, and the factors that were identified to have an impact included: TB history, RVD status, the initial presenting symptom, the timeframe between onset of symptoms and seeking medical care, the ASIA grading, and the level of spinal involvement. The demographic and medical characteristics of the study were also described. This study concludes that TB spine patients have a good functional prognosis, but OT services are underutilized and should be developed in this area. With more efficient and effective OT services patients can be assisted to achieve greater functional outcomes and to regain as much independence in function as possible, so that they can return to living a productive and purposeful life (45).

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DEMOGRAPHIC AND MEDICAL QUESTIONNAIRE **APPENDIX A**

OCCUPATIONAL PERFORMANCE IN TB SPINE **DEMOGRAPHIC AND MEDICAL QUESTIONNAIRE**	Patient Number: _____ Date: _____

1. Gender:

Male	Female
1	2

2. Age: _____

3. Highest level of Education: _____

4. Vocation Status:

Paid employment	Informal Trader	Home duties	Studying	Unemployed	Pension	Disability Grant
1	2	3	4	5	6	7

5. Resides in: _____ **(name of area)**

Rural Area	Peri-Urban Area	Urban Area
1	2	3

6. Resides with:

Alone	Spouse	Spouse and children	Parents	Parents and siblings	Friend/s
1	2	3	4	5	6

Medical Information:

7. TB History:

Pulmonary TB (previously or currently)	Extrapulmonary TB - other than spine	MDR TB	XDR TB	Unknown	No other TB history
1	2	3	4	5	6

8. Co-morbidities:

RVD positive	Diabetes	Hypertension	Alcohol Abuse	Smoking	Other
1	2	3	4	5	6

9. Initial/Presenting Symptom:

Fever	Back Pain	Paraparesis	Paraplegia	Spinal Deformity	Other
1	2	3	4	5	6

10.Time frame between initial onset of symptoms and seeking medical care:_____days

<1 week	2 weeks - 1 month	2 - 6 months	7 - 12 months	13 + months
1	2	3	4	5

11.Time frame since initial diagnosis:

Within 1 month	2 - 6 months	7 - 12 months	13 – 18 months	19 – 24 months
1	2	3	4	5

12.Level of Spinal Involvement:_____level

Cervical Spine	Thoracic Spine	Lumbar Spine	Sacral Spine
1	2	3	4

13.ASIA Grading: (Initial)

A – Complete Absent motor and sensory function	**B – Incomplete** Sensation present, absent motor function	**C – Incomplete** Sensation present, motor function present but not useful (Grade 2-3/5)	**D – Incomplete** Sensation present, motor function present and useful (Grade 4/5)	**E – Normal** Normal motor and sensory functioning	**Unknown**
1	2	3	4	5	6

14.ASIA Grading: (Current)

A – Complete Absent motor and sensory function	**B – Incomplete** Sensation present, absent motor function	**C – Incomplete** Sensation present, motor function present but not useful (Grade 2-3/5)	**D – Incomplete** Sensation present, motor function present and useful (Grade 4/5)	**E – Normal** Normal motor and sensory functioning
1	2	3	4	5

15.Surgical Intervention: *(excluding biopsy)* **Date of Surgery:** _____

Yes	No
1	2

16.Pharmacotherapy:

Currently completing treatment	Completed treatment	Defaulted treatment	No treatment
1	2	3	4

17.Names of current treatment: _____

Patient knows the name of drugs	Patient does not know the name of drugs
1	2

<u>Access to Health Care and Allied Services</u>

18. Level of Initial Contact Health Services:

Primary Health Care Clinic	Secondary Hospital	Tertiary Hospital	Quaternary Hospital	Other
1	2	3	4	5

19.Mode of Transport to access initial health services:

Walking, with or without assistive devices	Pushing self in wheelchair	Public Taxi	Public Bus	Planned patient transport	Own Transport
1	2	3	4	5	6

20.Did the patient receive rehabilitation/allied services at district level:

Yes	No	Unknown
1	2	3

21.If yes, what type:

Occupational Therapy	Physiotherapy	Dietetics	Psychology	Social Work	Other
1	2	3	4	5	6

If yes to occupational therapy,

22.Where:

Hospital inpatient	Hospital outpatient	Clinic outpatient	Home based
1	2	3	4

23.Frequency:

1x per day	1x per week	1x every 2nd week	1x per month	1x in 3 months	1x in 6 months
1	2	3	4	5	6

24.Duration:

Initial 2 weeks	2 weeks - 1 month	1 month - 3 months	3 months - 6 months	Ongoing
1	2	3	4	5

25.Referral to tertiary/current Health Services:

Primary Health Care Clinic	Secondary Hospital	Tertiary Hospital	Quaternary Hospital	Other	None
1	2	3	4	5	6

26.Mode of transport to access tertiary/current health services:

Walking, with or without assistive devices	Pushing self in wheelchair	Public Taxi	Public Bus	Planned patient transport	Own Transport
1	2	3	4	5	6

27.Did the patient receive rehabilitation/allied services at tertiary/current level:

Yes	No	Unknown
1	2	3

28.If yes, what type:

Occupational Therapy	Physiotherapy	Dietetics	Psychology	Social Work	Other
1	2	3	4	5	6

If yes to occupational therapy,

29.Where:

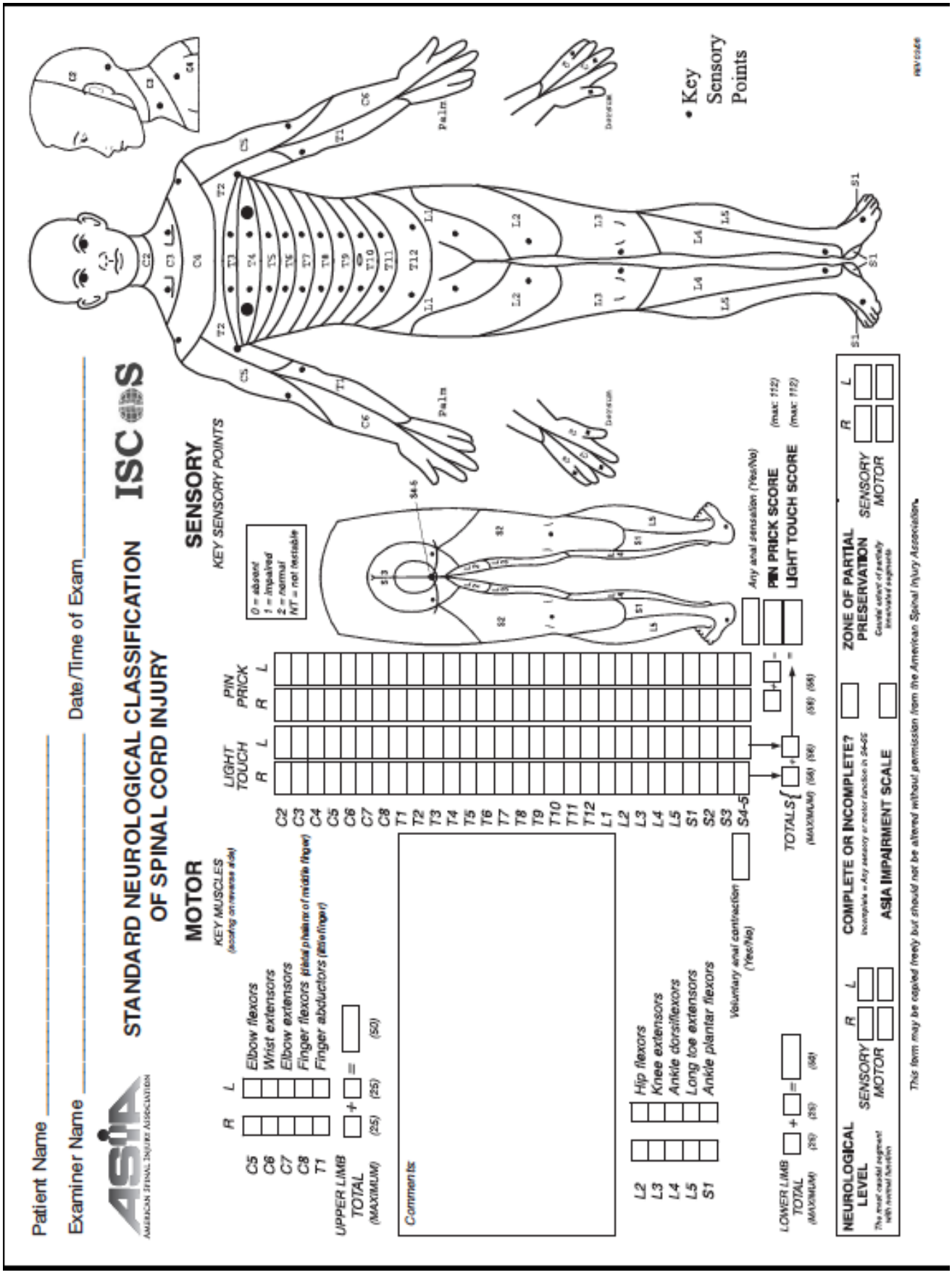
Hospital inpatient	Hospital outpatient	Clinic outpatient	Home based
1	2	3	4

30.Frequency:

1x per day	1x per week	1x every 2nd week	1x per month	1x in 3 months	1x in 6 months
1	2	3	4	5	6

31.Duration:

Initial 2 weeks	2 weeks - 1 month	1 month - 3 months	3 months - 6 months	Ongoing
1	2	3	4	5


Patient Name
Examiner Name
Date/Time of Exam
ASIA
AMERICAN SPINAL INJURY ASSOCIATION
STANDARD NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY
ISCOS
MOTOR
KEY MUSCLES
SENSORY
KEY SENSORY POINTS
LIGHT TOUCH
PIN PRICK
0 = absent
1 = impaired
2 = normal
NT = not testable
C5 Elbow flexors
C6 Wrist extensors
C7 Elbow extensors
C8 Finger flexors
T1 Finger abductors
UPPER LIMB TOTAL (MAXIMUM) (25) (25) (50)
L2 Hip flexors
L3 Knee extensors
L4 Ankle dorsiflexors
L5 Long toe extensors
S1 Ankle plantar flexors
Voluntary anal contraction (Yes/No)
S4-5
LOWER LIMB TOTAL (MAXIMUM) (25) (25) (50)
TOTALS (MAXIMUM) (56) (56) (56) (56)
Any anal sensation (Yes/No)
PIN PRICK SCORE (max: 112)
LIGHT TOUCH SCORE (max: 112)
Comments
NEUROLOGICAL LEVEL
The most caudal segment with normal function
SENSORY R L
MOTOR R L
COMPLETE OR INCOMPLETE?
Incomplete = Any sensory or motor function in S4-S5
ASIA IMPAIRMENT SCALE
ZONE OF PARTIAL PRESERVATION
Caudal extent of partially innervated segments
SENSORY R L
MOTOR R L
• Key Sensory Points
Palm
Dorsum
This form may be copied freely but should not be altered without permission from the American Spinal Injury Association.
REVISED

SPINAL CORD INDEPENDENCE MEASURE (VERSION III) **APPENDIX C**

שירותי בריאות
כ ל ל י ת

LOEWENSTEIN HOSPITAL REHABILITATION CENTER
Affiliated with the Sackler Faculty of Medicine, Tel-Aviv University
Department IV, Medical Director: Dr. Amiram Catz **Tel: 972-9-7709090 Fax: 972-9-7709986**
e-mail: amiramc@clalit.org.il

Patient Number: _____ Date: _____

SCIM-SPINAL CORD INDEPENDENCE MEASURE Version III, Sept 14, 2002

SELF-CARE

1. Feeding (cutting, opening containers, pouring, bringing food to mouth, holding cup with fluid)

0. Needs parenteral, gastrostomy, or fully assisted oral feeding
1. Needs partial assistance for eating and/or drinking, or for wearing adaptive devices
2. Eats independently; needs adaptive devices or assistance only for cutting food and/or pouring and/or opening containers
3. Eats and drinks independently; does not require assistance or adaptive devices

2. Bathing (soaping, washing, drying body and head, manipulating water tap)

A-upper body; B-lower body

A. 0. Requires total assistance
1. Requires partial assistance
2. Washes independently with adaptive devices or in a specific setting (e.g., bars, chair)
3. Washes independently; does not require **a**daptive **d**evices or **s**pecific **s**etting (not customary for healthy people) (adss)

B. 0. Requires total assistance
1. Requires partial assistance
2. Washes independently with **a**daptive **d**evices or in a **s**pecific **s**etting (adss)
3. Washes independently; does not require **a**daptive **d**evices (adss) or **s**pecific **s**etting

3. Dressing (clothes, shoes, permanent orthoses: dressing, wearing, undressing).

A-upper body; B-lower body

A. 0. Requires total assistance
1. Requires partial assistance with **c**lothes **w**ith**o**ut **b**uttons, **z**ippers or **l**aces (cwobzl)
2. Independent with cwobzl; requires **a**daptive **d**evices and/or **s**pecific **s**ettings (adss)
3. Independent with cwobzl; does not require adss; needs assistance or adss only for bzl
4. Dresses (any cloth) independently; does not require adaptive devices or specific setting

B. 0. Requires total assistance
1. Requires partial assistancewith **c**lothes **w**ith**o**ut **b**uttons, **z**ipps or **l**aces (cwobzl)
2. Independent with cwobzl; requires adaptive devices and/or specific settings (adss)
3. Independent with cwobzl without adss; needs assistance or adss only for bzl
4. Dresses (any cloth) independently; does not require adaptive devices or specific setting

4. Grooming (washing hands and face, brushing teeth, combing hair, shaving, applying makeup)

0. Requires total assistance
1. Requires partial assistance
2. Grooms independently with adaptive devices
3. Grooms independently without adaptive devices

MOBILITY (ROOM AND TOILET)

5. Mobility in Bed and Action to Prevent Pressure Sores

0. Needs assistance in all activities: turning upper body in bed, turning lower body in bed, sitting up in bed,
doing push-ups in wheelchair, with or without adaptive devices, but not with electric aids
2. Performs one of the activities without assistance
4. Performs two or three of the activities without assistance
6. Performs all the bed mobility and pressure release activities independently

6. Transfers:bed-wheelchair (locking wheelchair, lifting footrests, removing & adjusting arm rests,
transferring, lifting feet)

0. Requires total assistance
1. Needs partial assistance and/or supervision, and/or adaptive devices (e.g., sliding board)
2. Independent (or does not require wheelchair)

7. Transfers: wheelchair-toilet-tub (if uses toilet wheelchair: transfers to and from; if uses regular wheelchair:
locking wheelchair, lifting footrests, removing and adjusting armrests, transferring, lifting feet)

0. Requires total assistance
1. Needs partial assistance and/or supervision, and/or adaptive devices (e.g., grab-bars)
2. Independent (or does not require wheelchair)

MOBILITY (INDOORS AND OUTDOORS, ON EVEN SURFACE)

8. Mobility Indoors

0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal walking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

9. Mobility for Moderate Distances (10-100 meters)

0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal walking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

10.Mobility Outdoors (more than 100 meters)

0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal waking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

11.Stair Management

0. Unable to ascend or descend stairs
1. Ascends and descends at least 3 steps with support or supervision of another person
2. Ascends and descends at least 3 steps with support of handrail and/or crutch or cane

3. Ascends and descends at least 3 steps without any support or supervision

12. Transfers: wheelchair-car (approaching car, locking wheelchair, removing arm and footrests, transferring to and from car, bringing wheelchair into and out of car)

0. Requires total assistance
1. Needs partial assistance and/or supervision and/or adaptive devices
2. Transfers independent; does not require adaptive devices (or does not require wheelchair)

13. **Transfers: ground-wheelchair**

0. Requires assistance
1. Transfers independent with or without adaptive devices (or does not require wheelchair)

ETHICAL CLEARANCE CERTIFICATE **APPENDIX D**

R14/49 Mrs Michelle Hannington

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M130807

NAME: (Principal Investigator)	Mrs Michelle Hannington
DEPARTMENT:	Department of Occupational Therapy Grey's Hospital, Pietermaritzburg, Edendale Hospital, Pietermarizburg, Mseleni Hospital, KwaZulu Natal, Manguzi Hospital, KwaZulu Natal
PROJECT TITLE:	Exploring Occupational Performance Outcomes in Patients Diagnosed with Tuberculosis of the Spine in KwaZulu Natal
DATE CONSIDERED:	30/08/2013
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Ms Fasloen Adams
APPROVED BY:	Professor PE Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	07/10/2013

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 10/10/2013

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Human Research Ethics Committee (Medical)

Research Office Secretariat: Senate House Room SH 10005, 10th floor. Tel +27 (0)11-717-1252
Medical School Secretariat: Medical School Room 10M07, 10th Floor. Tel +27 (0)11-717-2700
Private Bag 3, Wits 2050, www.wits.ac.za. Fax +27 (0)11-717-1265

MEMORANDUM

TO: The Chief Executive Officers and Heads of Occupational Therapy Departments of Mosvold Hospital, Bethesda Hospital and Hlabisa Hospital, Northern KwaZulu

FROM: **Ms Zanele Ndlovu**
Administrative Officer: Human Research Ethics Committee (Medical)
Tel: 011 717-1252
e-mail: zanele.ndlovu@wits.ac.za

DATE: 24 March 2014

SUBJECT: **CONFIRMATION OF STUDY APPROVAL**
Protocol Ref no: M1130807
Protocol Title: Exploring Self-Care and Functional Mobility Outcomes of Patients Diagnosed with Tuberculosis of the Spine in KwaZulu Natal
Principal Investigator: Michelle Hannington

This letter serves to confirm that the Human Research Ethics Committee (Medical) has approved the above mentioned study. In order for a clearance certificate to be issued with the additional study sites, the researcher is required to submit written approval to conduct the study in your hospital.

Yours Sincerely,

.....
Ms Zanele Ndlovu
Administrative Officer
Human Research Ethics Committee (Medical)

UNIVERSITY OF THE WITWATERSRAND
OFFICE OF THE DEPUTY VICE CHANCELLOR RESEARCH
24 MAR 2014
RESEARCH OFFICE
JOHANNESBURG

COVERING INFORMATION LETTER TO CENTRES **APPENDIX E**

Name of Doctor
Position
Hospital

Dear Dr ……..

I, Michelle Hannington, am a Masters student in the Occupational Therapy Department at the University of the Witwatersrand. As part of my studies, I am completing a research project to explore the self-care and functional mobility outcomes achieved by patients diagnosed with TB spine, in KZN, within the first two years after initial diagnosis and which factors impact on these outcomes.

I am doing this research as there is a gap in literature with regards to the occupational performance prognosis in TB spine and research into the self-care and functional mobility these patients achieve would contribute to the base of knowledge. This has guided the motivation for this study. Literature indicates a need for multidisciplinary research into the management of TB spine outcomes.

Participants will be asked to complete a standardised interview questionnaire about their independence in self-care and functional mobility activities and questions about their condition. They will be asked to give permission for their medical records to be reviewed for further details.

Patients who present with TB spine, that meet the inclusion criteria, will be invited to participate. It would be appreciated if I could conduct my research by selecting a part of my sample from your centre. All the data collected and the results found will be made available to you on request.

Contact details of researcher/s:

For further information, please contact the researcher, Michelle Hannington at 081 270 9028 or hanningtonmichelle@gmail.com. Any ethical queries or reporting of study-related adverse events should be made to the chairperson of the Wits Human Research Ethics Committee, Prof. P. Cleaton-Jones at 011 717 1234.

Thank you
Michelle Hannington
Occupational Therapist

GREY'S HOSPITAL LETTER OF PERMISSION **APPENDIX F**

health

Department:
Health
PROVINCE OF KWAZULU-NATAL

GREY'S HOSPITAL
OFFICE OF THE CHIEF EXECUTIVE OFFICER
Private Bag X9001, Pietermaritzburg, 3200
Town Bush Road, Chase Valley, Pietermaritzburg
Tel.: 033 897 3321, Fax.: 033 3422 324
Email.: sandy.sivrathan@kznhealth.gov.za
www.kznhealth.gov.za

Reference: Research
Enquiries : Dr K B Bilenge
Telephone : (033) 897 3321

14 October 2013

Mrs Michelle Hannington
Occupational Therapy
Grey's Hospital

Dear Michelle,

RE : PERMISSION TO CONDUCT RESEARCH STUDY-
EXPLORING OCCUPATIONAL PERFORMANCE OUTCOMES IN PATIENTS DIAGNOSED WITH TUBERCULOSIS OF THE SPINE IN KWAZULU NATAL

I have pleasure in informing you that permission has been granted to you by the Hospital CEO to conduct the above research Study.

Please note the following:

1. Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. **This research will only commence once this office has received confirmation from the Provincial Health Research Committee in the KZN Department of Health.**
3. Please ensure this office is informed before you commence your research.
4. The Hospital will not provide any resources for this research.
5. You will be expected to provide feedback on your findings to the Hospital CEO.

Regards,

DR K. B. BILENGE
CHIEF EXECUTIVE OFFICER
GREYS HOSPITAL

EDENDALE HOSPITAL LETTER OF PERMISSION **APPENDIX G**

health

Department:
Health
PROVINCE OF KWAZULU-NATAL

Edendale Hospital
Private Bag X 509, Plessislaer, 3216
Tel: 033 395 4005, Fax: 033 395 4060
email: ojo.gideon@kznhealth.gov.za
www.kznhealth.gov.za

OFFICE OF THE SENIOR MANAGER MEDICAL SERVICES

Enquiries: Dr O.G.Ojo
Tel: 033-3954005

Date: 6th December 2013

Mrs M Hannington
Occupational Therapist

Dear Mrs Hannington,

RE: LETTER OF SUPPORT FOR APPROVAL OF RESEARCH: EXPLORING SELF-CARE AND FUNCTIONAL MOBILITY OUTCOMES OF PATIENTS DIAGNOSED WITH TUBERCULOSIS OF THE SPINE IN KWAZULU NATAL

Your request to conduct the above mentioned protocol is supported by Edendale Hospital Management, subject to approval by the Biomedical Ethics Research at Provincial Department of Health.

Yours Sincerely,

DR OG OJO
SENIOR MANAGER MEDICAL SERVICES
EDENDALE HOSPITAL

DEPARTMENT OF HEALTH
EDENDALE HOSPITAL
06 DEC 2013
PRIVATE BAG X509
PLESSISLAER 3216

MANGUZI HOSPITAL LETTER OF PERMISSION **APPENDIX H**

MANGUZI DISTRICT HOSPITAL

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Private Bag X301
KWA-NGWANASE
3973
Tel. No. 035 5920150 Ext. 205
Fax No. 035 592 0144/0158
E-mail: sipho.vumase@kznhealth.gov.za
www.kznhealth.gov.za

Date: 19 July 2013

Enquiry: Dr SB Vumase

Ms Michelle Hannington
Greys Hospital Occupational Therapy
P/Bag X9001
PIETERMARITZBURG
3200

RE: PERMISSION TO CONDUCT RESEARCH AT MANGUZI HOSPITAL

I have pleasure in informing you that permission has been granted to you by Manguzi Hospital to conduct research on titled **"Exploring occupational performance outcomes in patients diagnosed with Tuberculosis of the spine in KwaZulu Natal".**

Please note the following:

1. Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. This research will only commence once an approval has been received from the Provincial Health Research Committee in the KZN Department of Health as well as Umkhanyakude District Office.
3. There shall no distraction in the rendering of patient care
4. Please ensure this office is informed before you commence with your research.
5. The Hospital will not provide any resources for this research.
6. You will be expected to provide feedback on your findings to the hospital.

Sincerely

Dr SB Vumase
CEO: Manguzi Hospital

BETHESDA HOSPITAL LETTER OF PERMISSION **APPENDIX I**

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

BETHESDA HOSPITAL
P/Bag X602
UBOMBO
3970
Tel: (035) 5951004; Fax: (035) 5951973
Email: dr.nkabinde@gmail.com

MRS MICHELLE HANNINGTON 09/03/2014

Re: Permission to Conduct Research at Bethesda Hospital

Thank you for expressing interest in conducting research at our institution.
I have the pleasure in informing you that permission has been granted to you by Bethesda Hospital Ethics Committee to conduct research entitled:

"Exploring occupational performance outcomes in patients diagnosed with Tuberculosis of the spine in KwaZulu Natal "

We would be delighted to assist in ensuring as successful a research as possible.
Please however take note of the following:

1. Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. Commencement of research must be preceded by written approval from the Provincial Health Research Committee in the KZN Department of Health.
3. Please ensure that this office is informed before you commence your research.
4. We regret to inform you that we are unable to provide resources for this research.
5. Regular feedback on your findings during the course of the research and the final results of the research would be expected.

We look forward to future collaboration.
Please feel to contact me at any time should you require further assistance.

Kind Regards

Dr. TC Nkabinde
Chairperson of Bethesda Hospital Ethics Committee
Medical Manager
Bethesda Hospital

PARTIPANT INFORMATION SHEET **APPENDIX J**

Exploring Self-Care and Functional Mobility Outcomes of Patients Diagnosed With Tuberculosis of the Spine in KwaZulu Natal

I, Michelle Hannington, am a Masters student in the Occupational Therapy Department at the University of the Witwatersrand. As part of my studies, I am completing a research project to explore the self-care and functional mobility outcomes achieved by patients diagnosed with TB spine, in KZN, within the first two years after initial diagnosis and which factors impact on these outcomes.

I am doing this research to allow occupational therapists treating patients with TB spine to understand what level of function these patients achieve in their everyday so they can help clients work towards realistic outcomes.

I am inviting you to take part in this study. I will be asking you questions about your illness and about your everyday activities and how well you can still do these. This will involve questions about aspects like dressing, bathing and transferring from your wheelchair or walking. I would also require permission to access your medical records for information regarding your diagnosis, medication and other details.

Taking part in the study is voluntary and you may withdraw from the study if you wish at any time. You will be able to do so with no repercussions and this will not affect your therapy or treatment in any way. To ensure confidentiality all results of this study will have a numbered code and no names on the forms. Due to the anonymity of the research, once the data has been compiled, withdrawal of your information will no longer be a possibility.

Should you want feedback on the study, it will be provided on request.

Contact details of researcher/s:

For further information, please contact the researcher, Michelle Hannington at 081 270 9028 or hanningtonmichelle@gmail.com. Any ethical queries or reporting of study-related adverse events should be made to the chairperson of the Wits Human Research Ethics Committee, Prof. P. Cleaton-Jones at 011 717 1234.

Thank you

Michelle Hannington
Occupational Therapist

PARTICIPANT INFORMED CONSENT FORM

I have read the information sheet regarding the research to be conducted on exploring self-care and functional mobility outcomes achieved by patients diagnosed with TB spine. I understand the purpose of the study and what it involves and I am willing to participate.

Sign:_____ Date:_____

RESULTS OF STATISTICAL TESTS NOT REPORTED ON **APPENDIX L**

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable TB History Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	478.0000	953.0000	225.0000	-2.08489	0.370800
Bathing - Lower body	515.5000	915.5000	262.5000	-1.40798	0.159138
Dressing - Upper body	608.5000	822.5000	326.5000	0.25271	0.800489
Dressing - Lower body	552.0000	879.0000	299.0000	-0.74912	0.453787
Grooming	594.0000	837.0000	341.0000	0.00903	0.992799
subtotal	521.5000	909.5000	268.5000	-1.29967	0.193714
Mobility in bed	534.5000	896.5000	281.5000	-1.06501	0.286872
Mobility Indoors	541.5000	889.5000	288.5000	-0.93865	0.034791
Mobility Moderate Distances	536.5000	894.5000	283.5000	-1.02891	0.030352
Mobility Outdoors	528.5000	902.5000	275.5000	-1.17332	00.24067
Stair Management	554.5000	876.5000	301.5000	-0.70399	0.481440
Transfers - bed-w/c	535.5000	895.5000	282.5000	-1.04696	0.295119
Transfers - w/c-toilet-bath	546.0000	885.0000	293.0000	-0.85742	0.391212
Transfers - w/c-car	535.0000	896.0000	282.0000	-1.05598	0.290976
Transfers - ground-w/c	639.5000	791.5000	295.5000	0.81230	0.416623
Subtotal	528.5000	902.5000	275.5000	-1.17332	0.024067

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable TB History Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-3.19304	0.140800	22	31	0.036291
Bathing - Lower body	-1.56198	0.118293	22	31	0.157733
Dressing - Upper body	0.38698	0.698771	22	31	0.795280
Dressing - Lower body	-0.82725	0.408098	22	31	0.457082
Grooming			22	31	
subtotal	-1.36712	0.171589	22	31	0.192369
Mobility in bed	-1.81070	0.070189	22	31	0.285487
Mobility Indoors	-1.06494	0.028690	22	31	0.034634
Mobility Moderate Distances	-1.08572	0.027760	22	31	0.030210
Mobility Outdoors	-1.23647	0.021628	22	31	0.023934
Stair Management	-0.73999	0.459304	22	31	0.479124
Transfers - bed-w/c	-1.78063	0.074974	22	31	0.293717
Transfers - w/c-toilet-bath	-1.37823	0.168135	22	31	0.394429
Transfers - w/c-car	-1.54950	0.121262	22	31	0.293717
Transfers - ground-w/c	0.95867	0.337728	22	31	0.414723
Subtotal	-1.18650	0.023542	22	31	0.023934

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable RVD positive Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	234.5000	1196.500	168.5000	-1.35977	0.173905
Bathing - Lower body	181.0000	1250.000	115.0000	-2.53311	0.011306
Dressing - Upper body	258.0000	1173.000	192.0000	-0.84437	0.398463
Dressing - Lower body	167.0000	1264.000	101.0000	-2.84016	0.004509
Grooming	297.0000	1134.000	231.0000	0.01097	0.991251
subtotal	153.0000	1278.000	87.0000	-3.14720	0.001649
Mobility in bed	174.5000	1256.500	108.5000	-2.67567	0.007458
Mobility Indoors	209.0000	1222.000	143.0000	-1.91903	0.054982
Mobility Moderate Distances	195.5000	1235.500	129.5000	-2.21510	0.026754
Mobility Outdoors	204.5000	1226.500	138.5000	-2.01772	0.043621
Stair Management	229.5000	1201.500	163.5000	-1.46943	0.141718
Transfers - bed-w/c	200.0000	1231.000	134.0000	-2.11641	0.034311
Transfers - w/c-toilet-bath	201.0000	1230.000	135.0000	-2.09448	0.036218
Transfers - w/c-car	212.0000	1219.000	146.0000	-1.85323	0.063850
Transfers - ground-w/c	227.0000	1204.000	161.0000	-1.52425	0.127446
Subtotal	195.0000	1236.000	129.0000	-2.22607	0.026010

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable RVD positive Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-2.08250	0.037298	11	42	0.172876
Bathing - Lower body	-2.81019	0.004952	11	42	0.009865
Dressing - Upper body	-1.29298	0.196018	11	42	0.403771
Dressing - Lower body	-3.13637	0.001711	11	42	0.003477
Grooming		0.01097	11	42	
subtotal	-3.31052	0.000931	11	42	0.001050
Mobility in bed	-4.54909	0.000005	11	42	0.005962
Mobility Indoors	-2.17721	0.029465	11	42	0.054134
Mobility Moderate Distances	-2.33742	0.019418	11	42	0.024503
Mobility Outdoors	-2.12632	0.033477	11	42	0.041304
Stair Management	-1.54458	0.122449	11	42	0.140390
Transfers - bed-w/c	-3.59951	0.000319	11	42	0.032938
Transfers - w/c-toilet-bath	-3.36668	0.000761	11	42	0.034885
Transfers - w/c-car	-2.71934	0.006542	11	42	0.063263
Transfers - ground-w/c	-1.79892	0.072033	11	42	0.128757
Subtotal	-2.25108	0.024381	11	42	0.024503

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Diabetes Marked tests are significant at p <.05000					
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value	Z adjusted
Bathing - Upper body			0.00	0.00	1.000000	0.00
Bathing - Lower body			0.00	0.00	1.000000	0.00
Dressing - Upper body			0.00	0.00	1.000000	0.00
Dressing - Lower body			0.00	0.00	1.000000	0.00
Grooming			0.00	0.00	1.000000	0.00
subtotal			0.00	0.00	1.000000	0.00
Mobility in bed			0.00	0.00	1.000000	0.00
Mobility Indoors			0.00	0.00	1.000000	0.00
Mobility Moderate Distances			0.00	0.00	1.000000	0.00
Mobility Outdoors			0.00	0.00	1.000000	0.00
Stair Management			0.00	0.00	1.000000	0.00
Transfers - bed-w/c			0.00	0.00	1.000000	0.00
Transfers - w/c-toilet-bath			0.00	0.00	1.000000	0.00
Transfers - w/c-car			0.00	0.00	1.000000	0.00
Transfers - ground-w/c			0.00	0.00	1.000000	0.00
Subtotal			0.00	0.00	1.000000	0.00

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Diabetes Marked tests are significant at p <.05000		
	p-value	Valid N Group 1	Valid N Group 2
Bathing - Upper body	1.000000	52	1
Bathing - Lower body	1.000000	52	1
Dressing - Upper body	1.000000	52	1
Dressing - Lower body	1.000000	52	1
Grooming	1.000000	52	1
subtotal	1.000000	52	1
Mobility in bed	1.000000	52	1
Mobility Indoors	1.000000	52	1
Mobility Moderate Distances	1.000000	52	1
Mobility Outdoors	1.000000	52	1
Stair Management	1.000000	52	1
Transfers - bed-w/c	1.000000	52	1
Transfers - w/c-toilet-bath	1.000000	52	1
Transfers - w/c-car	1.000000	52	1
Transfers - ground-w/c	1.000000	52	1
Subtotal	1.000000	52	1

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Hypertension Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	1210.500	220.5000	129.5000	-0.814381	0.415427
Bathing - Lower body	1220.000	211.0000	139.0000	-0.564812	0.572202
Dressing - Upper body	1266.000	165.0000	137.0000	0.617353	0.537002
Dressing - Lower body	1275.000	156.0000	128.0000	0.853786	0.393224
Grooming	1242.000	189.0000	161.0000	-0.013135	0.989520
subtotal	1249.500	181.5000	153.5000	0.183892	0.854098
Mobility in bed	1245.000	186.0000	158.0000	0.065676	0.947636
Mobility Indoors	1221.500	209.5000	140.5000	-0.525407	0.599301
Mobility Moderate Distances	1228.000	203.0000	147.0000	-0.354650	0.722852
Mobility Outdoors	1227.500	203.5000	146.5000	-0.367785	0.713034
Stair Management	1241.000	190.0000	160.0000	-0.013135	0.989520
Transfers - bed-w/c	1246.000	185.0000	157.0000	0.091946	0.926741
Transfers - w/c-toilet-bath	1242.000	189.0000	161.0000	-0.013135	0.989520
Transfers - w/c-car	1236.000	195.0000	155.0000	-0.144487	0.885116
Transfers - ground-w/c	1274.500	156.5000	128.5000	0.840651	0.400544
Subtotal	1243.500	187.5000	159.5000	0.026270	0.979042

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Hypertension Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-1.24723	0.212312	46	7	0.416150
Bathing - Lower body	-0.62659	0.530927	46	7	0.579882
Dressing - Upper body	0.94535	0.344481	46	7	0.544970
Dressing - Lower body	0.94283	0.345767	46	7	0.401360
Grooming			46	7	
subtotal	0.19344	0.846618	46	7	0.847178
Mobility in bed	0.11166	0.911093	46	7	0.948792
Mobility Indoors	-0.59610	0.551112	46	7	0.597706
Mobility Moderate Distances	-0.37423	0.708231	46	7	0.728508
Mobility Outdoors	-0.38758	0.698327	46	7	0.709243
Stair Management	-0.01381	0.988984	46	7	0.989752
Transfers - bed-w/c	0.15638	0.875735	46	7	0.928353
Transfers - w/c-toilet-bath	-0.02111	0.983155	46	7	1.000000
Transfers - w/c-car	-0.21201	0.832097	46	7	0.887624
Transfers - ground-w/c	0.99213	0.321134	46	7	0.401360
Subtotal	0.02657	0.978806	46	7	0.969262

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Alcohol abuse Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	35.00000	1396.000	32.00000	-0.863506	0.387860
Bathing - Lower body	52.00000	1379.000	49.00000	-0.070014	0.944183
Dressing - Upper body	63.00000	1368.000	42.00000	0.396746	0.691555
Dressing - Lower body	58.00000	1373.000	47.00000	0.163366	0.870230
Grooming	54.00000	1377.000	51.00000	-0.023338	0.981381
subtotal	50.00000	1381.000	47.00000	-0.163366	0.870230
Mobility in bed	36.50000	1394.500	33.50000	-0.793492	0.427492
Mobility Indoors	44.00000	1387.000	41.00000	-0.443422	0.657461
Mobility Moderate Distances	48.00000	1383.000	45.00000	-0.256718	0.797397
Mobility Outdoors	51.00000	1380.000	48.00000	-0.116690	0.907106
Stair Management	37.50000	1393.500	34.50000	-0.746816	0.455175
Transfers - bed-w/c	36.00000	1395.000	33.00000	-0.816830	0.414026
Transfers - w/c-toilet-bath	34.00000	1397.000	31.00000	-0.910182	0.362727
Transfers - w/c-car	35.00000	1396.000	32.00000	-0.863506	0.387860
Transfers - ground-w/c	48.50000	1382.500	45.50000	-0.233380	0.815466
Subtotal	40.00000	1391.000	37.00000	-0.630126	0.528613

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Alcohol abuse Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-1.32247	0.186012	2	51	0.419448
Bathing - Lower body	-0.07767	0.938089	2	51	0.943396
Dressing - Upper body	0.60754	0.543496	2	51	0.702467
Dressing - Lower body	0.18040	0.856835	2	51	0.870827
Grooming			2	51	
subtotal	-0.17184	0.863560	2	51	0.870827
Mobility in bed	-1.34907	0.177315	2	51	0.444122
Mobility Indoors	-0.50308	0.614908	2	51	0.670537
Mobility Moderate Distances	-0.27089	0.786473	2	51	0.801161
Mobility Outdoors	-0.12297	0.902130	2	51	0.907112
Stair Management	-0.78501	0.432447	2	51	0.470247
Transfers - bed-w/c	-1.38923	0.164762	2	51	0.444122
Transfers - w/c-toilet-bath	-1.46303	0.143460	2	51	0.394775
Transfers - w/c-car	-1.26707	0.205132	2	51	0.419448
Transfers - ground-w/c	-0.27543	0.782983	2	51	0.801161
Subtotal	-0.63720	0.523992	2	51	0.551524

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Smoking Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	1290.000	141.0000	113.0000	1.247841	0.212090
Bathing - Lower body	1298.000	133.0000	105.0000	1.458004	0.144840
Dressing - Upper body	1264.500	166.5000	138.5000	0.577948	0.563300
Dressing - Lower body	1302.000	129.0000	101.0000	1.563086	0.118033
Grooming	1242.000	189.0000	161.0000	-0.013135	0.989520
subtotal	1310.500	120.5000	92.5000	1.786384	0.074038
Mobility in bed	1245.000	186.0000	158.0000	0.065676	0.947636
Mobility Indoors	1226.000	205.0000	145.0000	-0.407190	0.683868
Mobility Moderate Distances	1254.500	176.5000	148.5000	0.315244	0.752576
Mobility Outdoors	1248.500	182.5000	154.5000	0.157622	0.874755
Stair Management	1258.000	173.0000	145.0000	0.407190	0.683868
Transfers - bed-w/c	1217.500	213.5000	136.5000	-0.630488	0.528376
Transfers - w/c-toilet-bath	1214.000	217.0000	133.0000	-0.722435	0.470028
Transfers - w/c-car	1207.000	224.0000	126.0000	-0.906327	0.364763
Transfers - ground-w/c	1221.500	209.5000	140.5000	-0.525407	0.599301
Subtotal	1255.500	175.5000	147.5000	0.341515	0.732717

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Smoking Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	1.91109	0.055994	46	7	0.217233
Bathing - Lower body	1.61748	0.105776	46	7	0.147635
Dressing - Upper body	0.88501	0.376153	46	7	0.562301
Dressing - Lower body	1.72611	0.084329	46	7	0.119685
Grooming			46	7	
subtotal	1.87909	0.060234	46	7	0.071418
Mobility in bed	0.11166	0.911093	46	7	0.948792
Mobility Indoors	-0.46197	0.644100	46	7	0.690154
Mobility Moderate Distances	0.33265	0.739398	46	7	0.747939
Mobility Outdoors	0.16611	0.868074	46	7	0.867360
Stair Management	0.42802	0.668640	46	7	0.690154
Transfers - bed-w/c	-1.07231	0.283581	46	7	0.527897
Transfers - w/c-toilet-bath	-1.16124	0.245543	46	7	0.478294
Transfers - w/c-car	-1.32990	0.183552	46	7	0.372702
Transfers - ground-w/c	-0.62008	0.535204	46	7	0.597706
Subtotal	0.34535	0.729831	46	7	0.728508

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Other Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	1396.000	35.00000	32.00000	0.86351	0.387860
Bathing - Lower body	1379.000	52.00000	49.00000	0.07001	0.944183
Dressing - Upper body	1368.000	63.00000	42.00000	-0.39675	0.691555
Dressing - Lower body	1380.000	51.00000	48.00000	0.11669	0.907106
Grooming	1377.000	54.00000	51.00000	-0.02334	0.981381
subtotal	1384.000	47.00000	44.00000	0.30339	0.761590
Mobility in bed	1370.000	61.00000	44.00000	-0.30339	0.761590
Mobility Indoors	1356.000	75.00000	30.00000	-0.95686	0.338640
Mobility Moderate Distances	1348.000	83.00000	22.00000	-1.33027	0.183432
Mobility Outdoors	1348.000	83.00000	22.00000	-1.33027	0.183432
Stair Management	1372.000	59.00000	46.00000	-0.21004	0.833635
Transfers - bed-w/c	1370.000	61.00000	44.00000	-0.30339	0.761590
Transfers - w/c-toilet-bath	1369.000	62.00000	43.00000	-0.35007	0.726286
Transfers - w/c-car	1367.000	64.00000	41.00000	-0.44342	0.657461
Transfers - ground-w/c	1356.000	75.00000	30.00000	-0.95686	0.338640
Subtotal	1359.000	72.00000	33.00000	-0.81683	0.414026

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Other Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	1.32247	0.186012	51	2	0.419448
Bathing - Lower body	0.07767	0.938089	51	2	0.943396
Dressing - Upper body	-0.60754	0.543496	51	2	0.702467
Dressing - Lower body	0.12886	0.897468	51	2	0.907112
Grooming			51	2	
subtotal	0.31914	0.749622	51	2	0.767779
Mobility in bed	-0.51582	0.605980	51	2	0.767779
Mobility Indoors	-1.08559	0.277659	51	2	0.371553
Mobility Moderate Distances	-1.40372	0.160403	51	2	0.208999
Mobility Outdoors	-1.40187	0.160956	51	2	0.208999
Stair Management	-0.22078	0.825260	51	2	0.835994
Transfers - bed-w/c	-0.51600	0.605854	51	2	0.767779
Transfers - w/c-toilet-bath	-0.56270	0.573637	51	2	0.734398
Transfers - w/c-car	-0.65066	0.515269	51	2	0.670537
Transfers - ground-w/c	-1.12928	0.258781	51	2	0.371553
Subtotal	-0.82601	0.408802	51	2	0.444122

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Back pain Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	1053.000	378.0000	192.0000	-1.13701	0.255534
Bathing - Lower body	1067.000	364.0000	206.0000	-0.83948	0.401203
Dressing - Upper body	1103.000	328.0000	242.0000	-0.07438	0.940705
Dressing - Lower body	1098.000	333.0000	237.0000	-0.18065	0.856645
Grooming	1107.000	324.0000	246.0000	0.01063	0.991522
subtotal	1073.500	357.5000	212.5000	-0.70133	0.483095
Mobility in bed	1065.000	366.0000	204.0000	-0.88198	0.377788
Mobility Indoors	1071.000	360.0000	210.0000	-0.75447	0.045057
Mobility Moderate Distances	1069.500	361.5000	208.5000	-0.78634	0.043166
Mobility Outdoors	1070.500	360.5000	209.5000	-0.76509	0.044421
Stair Management	1110.000	321.0000	243.0000	0.05313	0.957627
Transfers - bed-w/c	1065.000	366.0000	204.0000	-0.88198	0.377788
Transfers - w/c-toilet-bath	1083.000	348.0000	222.0000	-0.49944	0.617473
Transfers - w/c-car	1071.000	360.0000	210.0000	-0.75447	0.450570
Transfers - ground-w/c	1113.500	317.5000	239.5000	0.12752	0.898533
Subtotal	1085.000	346.0000	224.0000	-0.45693	0.044772

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Back pain Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-1.74135	0.081623	41	12	0.259273
Bathing - Lower body	-0.93130	0.351700	41	12	0.406125
Dressing - Upper body	-0.11390	0.909314	41	12	0.941500
Dressing - Lower body	-0.19949	0.841882	41	12	0.858533
Grooming			41	12	
subtotal	-0.73773	0.460679	41	12	0.481474
Mobility in bed	-1.49952	0.133741	41	12	0.382621
Mobility Indoors	-0.85597	0.039201	41	12	0.045556
Mobility Moderate Distances	-0.82977	0.040667	41	12	0.043044
Mobility Outdoors	-0.80627	0.042008	41	12	0.044290
Stair Management	0.05585	0.955462	41	12	0.958196
Transfers - bed-w/c	-1.50004	0.133605	41	12	0.382621
Transfers - w/c-toilet-bath	-0.80279	0.422094	41	12	0.621836
Transfers - w/c-car	-1.10707	0.268266	41	12	0.455569
Transfers - ground-w/c	0.15049	0.880376	41	12	0.891588
Subtotal	-0.46206	0.044037	41	12	0.041851

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Paraparesis Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	144.5000	1286.500	108.5000	-1.76401	0.077731
Bathing - Lower body	152.0000	1279.000	116.0000	-1.57767	0.114642
Dressing - Upper body	173.0000	1258.000	137.0000	-1.05592	0.291005
Dressing - Lower body	184.0000	1247.000	148.0000	-0.78262	0.433849
Grooming	216.0000	1215.000	180.0000	0.01242	0.990088
subtotal	149.0000	1282.000	113.0000	-1.65221	0.098494
Mobility in bed	138.0000	1293.000	102.0000	-1.92550	0.054167
Mobility Indoors	126.5000	1304.500	90.5000	-2.21122	0.027021
Mobility Moderate Distances	116.0000	1315.000	80.0000	-2.47210	0.013433
Mobility Outdoors	126.5000	1304.500	90.5000	-2.21122	0.027021
Stair Management	167.0000	1264.000	131.0000	-1.20499	0.228207
Transfers - bed-w/c	165.5000	1265.500	129.5000	-1.24226	0.214142
Transfers - w/c-toilet-bath	168.0000	1263.000	132.0000	-1.18015	0.237943
Transfers - w/c-car	174.0000	1257.000	138.0000	-1.03108	0.302506
Transfers - ground-w/c	220.5000	1210.500	175.5000	0.09938	0.920836
Subtotal	126.0000	1305.000	90.0000	-2.22365	0.026173

	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Paraparesis Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-2.70160	0.006901	8	45	0.075361
Bathing - Lower body	-1.75024	0.080079	8	45	0.115946
Dressing - Upper body	-1.61693	0.105895	8	45	0.297117
Dressing - Lower body	-0.86425	0.387452	8	45	0.441112
Grooming			8	45	
subtotal	-1.73795	0.082221	8	45	0.099146
Mobility in bed	-3.27368	0.001062	8	45	0.052981
Mobility Indoors	-2.50872	0.012117	8	45	0.024108
Mobility Moderate Distances	-2.60860	0.009092	8	45	0.011382
Mobility Outdoors	-2.33024	0.019794	8	45	0.024108
Stair Management	-1.26662	0.205292	8	45	0.233096
Transfers - bed-w/c	-2.11279	0.034620	8	45	0.214021
Transfers - w/c-toilet-bath	-1.89697	0.057832	8	45	0.243054
Transfers - w/c-car	-1.51295	0.130293	8	45	0.308790
Transfers - ground-w/c	0.11729	0.906631	8	45	0.912697
Subtotal	-2.24862	0.024537	8	45	0.024108

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Other Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	585.5000	845.5000	332.5000	-0.14441	0.885178
Bathing - Lower body	629.5000	801.5000	305.5000	0.63179	0.527528
Dressing - Upper body	633.5000	797.5000	301.5000	0.70399	0.481440
Dressing - Lower body	605.0000	826.0000	330.0000	0.18954	0.849673
Grooming	594.0000	837.0000	341.0000	-0.00903	0.992799
subtotal	618.0000	813.0000	317.0000	0.42420	0.671421
Mobility in bed	537.5000	893.5000	284.5000	-1.01086	0.312086
Mobility Indoors	584.0000	847.0000	331.0000	-0.17148	0.863843
Mobility Moderate Distances	597.5000	833.5000	337.5000	0.05415	0.956813
Mobility Outdoors	594.5000	836.5000	340.5000	0.00000	1.000000
Stair Management	634.5000	796.5000	300.5000	0.72204	0.470270
Transfers - bed-w/c	535.5000	895.5000	282.5000	-1.04696	0.295119
Transfers - w/c-toilet-bath	542.0000	889.0000	289.0000	-0.92963	0.352565
Transfers - w/c-car	540.0000	891.0000	287.0000	-0.96573	0.334180
Transfers - ground-w/c	666.0000	765.0000	269.0000	1.29065	0.196827
Subtotal	616.5000	814.5000	318.5000	0.39712	0.691278

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Other Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-0.22116	0.824966	22	31	0.879126
Bathing - Lower body	0.70089	0.483372	22	31	0.524865
Dressing - Upper body	1.07802	0.281027	22	31	0.479124
Dressing - Lower body	0.20930	0.834212	22	31	0.850981
Grooming			22	31	
subtotal	0.44621	0.655444	22	31	0.674017
Mobility in bed	-1.71863	0.085683	22	31	0.310640
Mobility Indoors	-0.19456	0.845740	22	31	0.865032
Mobility Moderate Distances	0.05714	0.954431	22	31	0.950072
Mobility Outdoors	0.00000	1.000000	22	31	0.992863
Stair Management	0.75897	0.447872	22	31	0.468032
Transfers - bed-w/c	-1.78063	0.074974	22	31	0.293717
Transfers - w/c-toilet-bath	-1.49429	0.135102	22	31	0.355654
Transfers - w/c-car	-1.41707	0.156465	22	31	0.337185
Transfers - ground-w/c	1.52321	0.127706	22	31	0.198638
Subtotal	0.40158	0.687991	22	31	0.687151

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Fever Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	98.0000	1333.000	88.00000	-0.31988	0.749058
Bathing - Lower body	104.0000	1327.000	94.00000	-0.11785	0.906186
Dressing - Upper body	97.0000	1334.000	87.00000	-0.35355	0.723674
Dressing - Lower body	92.0000	1339.000	82.00000	-0.52191	0.601732
Grooming	108.0000	1323.000	98.00000	0.01684	0.986568
subtotal	86.0000	1345.000	76.00000	-0.72394	0.469101
Mobility in bed	73.0000	1358.000	63.00000	-1.16168	0.245368
Mobility Indoors	88.0000	1343.000	78.00000	-0.65660	0.511439
Mobility Moderate Distances	80.0000	1351.000	70.00000	-0.92597	0.354461
Mobility Outdoors	86.0000	1345.000	76.00000	-0.72394	0.469101
Stair Management	70.5000	1360.500	60.50000	-1.24585	0.212819
Transfers - bed-w/c	72.0000	1359.000	62.00000	-1.19535	0.231952
Transfers - w/c-toilet-bath	68.0000	1363.000	58.00000	-1.33003	0.183508
Transfers - w/c-car	75.0000	1356.000	65.00000	-1.09433	0.273810
Transfers - ground-w/c	97.0000	1334.000	87.00000	-0.35355	0.723674
Subtotal	79.5000	1351.500	69.50000	-0.94281	0.345779

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Fever Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-0.48990	0.624203	4	49	0.757729
Bathing - Lower body	-0.13074	0.895980	4	49	0.909513
Dressing - Upper body	-0.54139	0.588236	4	49	0.733120
Dressing - Lower body	-0.57635	0.564382	4	49	0.614504
Grooming			4	49	
subtotal	-0.76151	0.446352	4	49	0.483866
Mobility in bed	-1.97504	0.048264	4	49	0.256351
Mobility Indoors	-0.74494	0.456310	4	49	0.525809
Mobility Moderate Distances	-0.97710	0.328519	4	49	0.368732
Mobility Outdoors	-0.76291	0.445519	4	49	0.483866
Stair Management	-1.30957	0.190341	4	49	0.215726
Transfers - bed-w/c	-2.03300	0.042053	4	49	0.242315
Transfers - w/c-toilet-bath	-2.13790	0.032525	4	49	0.191131
Transfers - w/c-car	-1.60577	0.108325	4	49	0.285959
Transfers - ground-w/c	-0.41726	0.676487	4	49	0.733120
Subtotal	-0.95340	0.340388	4	49	0.351179

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Spinal deformity Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	1147.500	283.5000	157.5000	-0.947559	0.343355
Bathing - Lower body	1210.000	221.0000	176.0000	0.509313	0.610533
Dressing - Upper body	1197.500	233.5000	188.5000	0.213201	0.831171
Dressing - Lower body	1215.000	216.0000	171.0000	0.627758	0.530163
Grooming	1188.000	243.0000	198.0000	-0.011844	0.990550
subtotal	1206.000	225.0000	180.0000	0.414557	0.678467
Mobility in bed	1181.000	250.0000	191.0000	-0.153978	0.877627
Mobility Indoors	1209.500	221.5000	176.5000	0.497468	0.618859
Mobility Moderate Distances	1204.500	226.5000	181.5000	0.379023	0.704671
Mobility Outdoors	1195.000	236.0000	191.0000	0.153978	0.877627
Stair Management	1237.000	194.0000	149.0000	1.148915	0.250592
Transfers - bed-w/c	1181.500	249.5000	191.5000	-0.142134	0.886974
Transfers - w/c-toilet-bath	1180.000	251.0000	190.0000	-0.177667	0.858984
Transfers - w/c-car	1167.000	264.0000	177.0000	-0.485624	0.627234
Transfers - ground-w/c	1199.500	231.5000	186.5000	0.260579	0.794418
Subtotal	1211.000	220.0000	175.0000	0.533002	0.594033

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Spinal deformity Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-1.45120	0.146726	44	9	0.343346
Bathing - Lower body	0.56502	0.572060	44	9	0.616257
Dressing - Upper body	0.32647	0.744066	44	9	0.824946
Dressing - Lower body	0.69323	0.488166	44	9	0.536459
Grooming			44	9	
subtotal	0.43607	0.662786	44	9	0.683476
Mobility in bed	-0.26179	0.793484	44	9	0.879726
Mobility Indoors	0.56440	0.572484	44	9	0.616257
Mobility Moderate Distances	0.39995	0.689192	44	9	0.700693
Mobility Outdoors	0.16227	0.871097	44	9	0.879726
Stair Management	1.20768	0.227173	44	9	0.255388
Transfers - bed-w/c	-0.24174	0.808985	44	9	0.879726
Transfers - w/c-toilet-bath	-0.28558	0.775198	44	9	0.861391
Transfers - w/c-car	-0.71258	0.476105	44	9	0.632800
Transfers - ground-w/c	0.30753	0.758438	44	9	0.788862
Subtotal	0.53899	0.589895	44	9	0.599900

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Paraplegia Marked tests are significant at p <.05000				
	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-value
Bathing - Upper body	314.5000	1116.500	209.5000	-1.27098	0.203737
Bathing - Lower body	327.5000	1103.500	222.5000	-1.00871	0.313113
Dressing - Upper body	366.0000	1065.000	261.0000	-0.23200	0.816535
Dressing - Lower body	285.0000	1146.000	180.0000	-1.86612	0.062026
Grooming	378.0000	1053.000	273.0000	0.01009	0.991952
subtotal	292.0000	1139.000	187.0000	-1.72490	0.084547
Mobility in bed	348.5000	1082.500	243.5000	-0.58505	0.558512
Mobility Indoors	371.5000	1059.500	266.5000	-0.12105	0.903655
Mobility Moderate Distances	353.0000	1078.000	248.0000	-0.49427	0.621116
Mobility Outdoors	360.0000	1071.000	255.0000	-0.35305	0.724052
Stair Management	310.5000	1120.500	205.5000	-1.35167	0.176480
Transfers - bed-w/c	323.5000	1107.500	218.5000	-1.08941	0.275974
Transfers - w/c-toilet-bath	330.0000	1101.000	225.0000	-0.95828	0.337924
Transfers - w/c-car	342.0000	1089.000	237.0000	-0.71619	0.473877
Transfers - ground-w/c	313.0000	1118.000	208.0000	-1.30124	0.193178
Subtotal	325.5000	1105.500	220.5000	-1.04906	0.294151

variable	Mann-Whitney U Test (w/ continuity correction) (Data Collection Master Copy 2015) By variable Paraplegia Marked tests are significant at p <.05000				
	Z adjusted	p-value	Valid N Group 1	Valid N Group 2	2*1sided exact p
Bathing - Upper body	-1.94652	0.051593	14	39	0.202655
Bathing - Lower body	-1.11905	0.263122	14	39	0.312117
Dressing - Upper body	-0.35527	0.722390	14	39	0.818631
Dressing - Lower body	-2.06075	0.039328	14	39	0.061506
Grooming			14	39	
subtotal	-1.81441	0.069615	14	39	0.084580
Mobility in bed	-0.99469	0.319888	14	39	0.555931
Mobility Indoors	-0.13733	0.890769	14	39	0.896891
Mobility Moderate Distances	-0.52156	0.601976	14	39	0.624929
Mobility Outdoors	-0.37205	0.709855	14	39	0.727061
Stair Management	-1.42081	0.155374	14	39	0.175281
Transfers - bed-w/c	-1.85283	0.063908	14	39	0.275016
Transfers - w/c-toilet-bath	-1.54034	0.123479	14	39	0.341961
Transfers - w/c-car	-1.05090	0.293306	14	39	0.478259
Transfers - ground-w/c	-1.53571	0.124609	14	39	0.195543
Subtotal	-1.06085	0.288761	14	39	0.293182