Level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg

Student: Masilo Motloutsi

Student no.: 0002051R

Supervisor: Siyabonga Kunene

Co-supervisor: Vaneshveri Naidoo

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DECLARATION

I, Masilo Motloutsi, hereby declare the following:

The entirety of the work contained herein is my own unaided work, except where I have explicitly indicated otherwise.

I have followed the required conventions in referencing the thoughts and ideas of others.

This research report is being submitted for the degree of Master of Science in Physiotherapy at the University of the Witwatersrand, Johannesburg.

This research report has not been submitted before for any degree or examination at this or any other university.

Date: 28 May 2019

Signature: 

ABSTRACT

Introduction: Hip fractures are among the reasons for patient admission to an orthopaedic ward and are related to high rates of mortality and morbidity due to a loss of function and complications post surgery. Hip fractures are linked with significant impairment, including physical dependence and disability, reduced societal involvement, and depression. The clinical manifestation of hip fractures is apparent in the physical impairments that arise. A hip fracture is a significant contributor to permanent disability.

Aim: The goal of this research is to determine the level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg.

Methodology: An observational cross-sectional study was conducted. Sixty-two (62) patients (43 females and 19 males) from Charlotte Maxeke Academic Hospital and Chris Hani Baragwanath Academic Hospital who were six weeks post hip fracture surgery consented to participate in this study. To collect data, the following tools were used: verbal pain rating scale, Lower Extremity Functional Scale, Measure of Participation and Activities Screener, and a self-developed demographic questionnaire. Ethical clearance was obtained prior to commencement of the study. Data was collected over 22 weeks and analysed using the STATISTICA program. Descriptive and inferential tests were utilised to analyse the data.

Results: At six weeks post surgery, the majority of participants (n=36; 58.06%) presented with mild pain to no pain. Lower extremity function was significantly correlated with gender and pain factors: $p<.05$ [$F(3.58)=616.2106$ ($P<.0005$, adjusted $R^2=.97$)]. Pain was the only variable which significantly correlated with participation: $p<.05$ [$F(3.58)=295.50$, $p<.0005$, adjusted $R^2=.94$].

Conclusion: This study indicated that the postoperative functional outcome following a hip fracture in the research population in the public health system of South Africa is generally good. The factors that predict functional and participation outcomes following a hip fracture in these patients are gender and pain level.

Implications: The findings that gender and pain affect functional outcomes and that pain affects activity and community re-integration participation level have important implications for rehabilitation clinical practice.

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Finally, I would like to dedicate this research report to the memory of my late father, Motopi Modoutsi.

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ANOVA	Analysis of Variance
AP	Anterior-Posterior
CI	Confidence Interval
CMN	Cephalomedullary Nail
CT	Computerised Tomography
DHS	Dynamic Hip Screw
FIM	Functional Independence Measure
HRQoL	Health-Related Quality of Life
ICF	International Classification of Functioning, Disability and Health
ICU	Intensive Care Unit
IMN	Intramedullary Nail
IMPACT-S	Measure of Participation and Activities Screener
LEFS	Lower Extremity Functional Scale
MRI	Magnetic Resonance Imaging
MVA	Motor Vehicle Accident
OR	Odds Ratio
PEB	Perceived Environmental Barrier
POB	Perceived Outdoor Barrier
PVA	Pedestrian-Vehicle Accident
QoL	Quality of Life
SD	Standard Deviation
THA	Total Hip Arthroplasty
TUG	Timed Up and Go
VRS	Verbal Rating Scale

CHAPTER 1: INTRODUCTION

1.1 Background

Hip fractures are among the most common reasons for admission to an orthopaedic ward and are correlated with high rates of mortality and illness in the elderly due to the loss of function and complications post surgery (Cankaya et al., 2016). The National Health Services (2016) indicated that, in the elderly, falling is most likely to result in a hip fracture, with a mortality of 10% at one month, and 30% at one year. For these reasons, understanding the degree of physical function following a hip fracture six weeks post surgery is important for rehabilitation outcomes and guidelines.

Roughly 1.6 million hip fractures are sustained worldwide on an annual basis and, with many individuals living longer, by 2050 this number could reach 4.5 million (Tuzun et al., 2012). The frequency of hip fractures rises dramatically by way of increasing age (Cumming et al., 1997).

A few studies have observed varying degrees of hip fracture in different regions of the world (Cheng et al., 2011; Johnell and Kanis, 2006). However, there is a paucity of literature on the causes and epidemiology of hip fractures in Africa. A study by Dhanwal et al. (2011) looked at worldwide geographic variation in the epidemiology of hip fracture, but an extensive literature search yielded no results for South Africa on epidemiology.

The International Classification of Functioning, Disability and Health (ICF) is the World Health Organization's authority body that classifies health and health-related domains (World Health Organization, 2010). The ICF describes functioning and disability as issues related to the body functions and structures of individuals, the actions performed, the existing territories in which they take an interest; as well the environmental factors that influence these encounters (World Health Organisation, 2010). In the ICF framework, impairments, loss of capacity to execute useful activities (activity limitations), and failure to be actively involved in life situations (participation restrictions) are recognised.

A hip fracture is linked with substantial impairment, including physical reliance and incapacity, decreased societal activity, and depression (Langer et al., 2015). The

clinical appearance of hip fractures is apparent in the physical impairments that follow. According to Leibson et al. (2002), a hip fracture is a significant contributor to long-term disability. Following a hip fracture, individuals may struggle to perform simple activities, such as taking a bath, toileting and putting on clothes (Dawson, 2000). Individuals who sustain a neck of femur fracture have an increased mortality and morbidity incidence, with up to 20% requiring prolonged care post fracture, and an additional 30% do not go back to their pre-fracture activity status (National Health Services, 2016).

Factors that predict functional and participation outcomes after a hip fracture have previously been studied and they include pain, gender, age, timing of surgery, and pre-fracture functional level (Brown et al., 2017; Foss et al., 2006; Dawson, 2000; Semel et al., 2010; Mizrahi et al., 2014; Adam et al., 2013; Morrison et al., 2003).

Hip fracture patients have substantially more effects on their daily activities as a result of their disability compared to age-related disability over 24 months (Magaziner, 2003). A study by Salpakoski et al. (2014) looked at a huge section of community-dwelling elderly people recuperating following a hip fracture and found that they experience a major decline in outdoor walking due to post-surgery complications, such as pain, limited range of movement, and muscle weakness, which can be attributed to a lack of appropriate rehabilitation. Hospital-based physiotherapy is an important part of effective physical improvement following hip fractures in the elderly (Lenze et al., 2004).

1.2 Problem statement

The majority of research examining post hip fracture physical activity concentrates on the acute hospital setting, looking at acute pain, mental status, and level of mobilisation. No published study has been done to look at the level of physical impairment, activity limitation, and participation restriction six weeks post hip fracture surgery in South Africa. The importance of understanding the six-week postoperative level of physical impairment, activity and participation status among patients with hip fractures is to enable therapists to provide patients with appropriate and optimum post-surgery rehabilitation to prevent problems that affect function. The reason for choosing the time frame of study as early as six weeks is to identify those patients at risk of not regaining basic independence.

1.3 Research question

What was the level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg?

1.4 Aim of the study

The aim of the study was to determine the level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg.

1.5 Research objectives

The objectives of the study were to determine:

1.5.1 Participants' demographic profile;
1.5.2 Participants' activity limitations (Lower Extremity Functional Scale (LEFS));
1.5.3 Participants' physical participation restrictions (Measure of Participation and Activities Screener (IMPACT-S));
1.5.4 The level of pain among participants (pain Verbal Rating Scale (VRS)); and
1.5.5 The association between participants' demographic profile and other variables (physical impairment, activity limitation, participation restriction, and pain).

1.6 Significance of the study

Rehabilitation is a goal-oriented and time-constrained process that centres around ensuring that physically limited persons reach an ideal or improved psychological, physical and societal functional level. The importance of knowing the level of function six weeks postoperative in individuals who had a hip fracture enables one to give patients an appropriate and optimum rehabilitation programme, thus preventing or reducing the risk of disability. The results and recommendations of this study will also provide information to physiotherapists who form part of the rehabilitation process of these patients. The results and recommendations of this study may also lead to further research projects that seek to develop rehabilitation guidelines to address the problems that the aforementioned patients present with after surgery.

CHAPTER 2: LITERATURE REVIEW

The review describes the literature on the functional, physical, psycho-social and mortality outcomes of people with hip fractures. In this chapter, a traumatic hip fracture is defined and the different types and causes of hip fracture. The review also looks at impairments and the functional level following a hip fracture.

2.1 Literature search strategy

The literature used in this research report was searched for and collected through the following databases: Elsevier Science Direct, Clinical key, PubMed, PubMed central, Sabinet, and EBSCO HOST electronic journal service. The following keywords were used: hip fracture, traumatic hip fracture, preoperative status in traumatic hip fracture, surgical management of hip fracture, conservative management of hip fracture, incidence, prevalence, epidemiology, physical functional outcomes, participation in hip fractures, pain and hip fractures, physical impact, psychological impact, ICF, and hip fracture outcome measures.

The search review was mostly focused on literature written in the English language and published in the past ten years; however, literature older than ten years appears in this review.

2.2 Introduction

Nearly 1.6 million hip fractures occur worldwide annually and, with many individuals living longer, this number could reach 4.5 million by 2050 (Tuzun et al., 2012). The incidence of hip fractures rises dramatically with increasing age (Cumming et al., 1997).

A few studies have surveyed hip fracture incidences in various regions of the world (Cheng et al., 2011; Johnell and Kanis, 2006). There is a scarcity of literature on the causes and epidemiology of hip fractures in Africa. A study by Dhanwal et al. (2011) looked at the worldwide geographic variation in the epidemiology of hip fracture, but only a few studies were available for African countries. In Cameroon, Zebaze and Seeman (2003) found that the prevalence of low-impact trauma fractures of the hip (per 100 000 persons above 35 years) was 57.1% for women and 43.7% for men. Comparable low-impact fracture incidences were found in Morocco in 2005 (El

Maghraoui et al., 2005). An extensive literature search yielded no results for South Africa.

2.3 Definition and types of hip fractures

In the hip region, the most serious injury is a hip fracture. According to the American Academy of Orthopaedic Surgeons (2016), a hip fracture is essentially a disruption of continuity in the superior quarter of the femur bone. Three main types of hip fractures have been identified by the American Academy of Orthopaedic Surgeons (2016): intracapsular, intertrochanteric, and subtrochanteric fractures (depending on which area of the upper quadrant of the femur the fracture occurs).

Intracapsular fractures occur in the area of the head of the femur and just proximal to the neck of the femur (Pipkin, 1957). As the name implies, intertrochanteric fractures occur between the lesser and greater trochanter of the femur (Leslie and Baumgaertner, 2015). Subtrochanteric fractures take place in the region extending from the lesser trochanter to 5cm distal (Kulkarni et al., 2006).

2.4 Aetiology of hip fractures

Cummings and Nevitt (1989) suggested that four factors cause a hip fracture: an impact mechanism that directs the force at the trochanter, a decline in protective measures, decreased soft tissues around the hip, and diminished bone strength. Over the years, research has not shown the need for these factors to be revised dramatically.

Hip fractures have different aetiologies at different ages. In the young person or healthy adult (18-35 years), this kind of fracture is caused by some form of impact (a high-energy blow/trauma) in the majority of the cases (Farooq et al., 2005; Whiting and Zernicke, 2008), whereas in older adults (aged older than 55 years), it is usually the result of a simple fall, which accounts for 90% or more of hip fractures (Kulkarni et al., 2006). Decreased bone mineral density, smaller femoral neck diameter, or increased femoral neck length also contribute to a predisposition for hip fracture (Parvizi and Kim, 2010).

It has been estimated that 75% of all hip fractures occur in women and that one-third of all women reaching age 90 years will have sustained a hip fracture (Jordan and

Cooper, 2002). This is confirmed by Fisher and Davis (2011), who found similar gender differences whereby female participants had higher rates of hip fractures, and this could be attributed to gender-related pathophysiological and clinical factors (e.g., woman having higher rates of osteoporosis).

2.5 Diagnosis of a hip fracture

By simple radiography, together with history-taking and a physical assessment, the majority of hip fractures are easily diagnosed (Frihagen et al., 2005).

Radiographic assessment includes views of the anterior-posterior (AP) image, an oblique and a lateral view of the hip (Deleanu et al., 2015). However, some cases with a clinical suspicion of a fractured femur can have negative radiographs. In such cases, magnetic resonance imaging (MRI) is used to help reach a diagnosis (Frihagen et al., 2005).

In cases where MRI is contraindicated, such as in disorderly patients and patients with cardiac pacemakers, Gill et al. (2013) have shown that current multi-slice computerised tomography (CT) may be similarly effective in spotting difficult to see fractures.

2.6 Management of hip fractures

2.6.1 Conservative management

Hip fracture surgical management was only started in the 1950s, and until then hip fractures were treated by means of conservative methods based on bed rest and traction (Handoll and Parker, 2008).

Surgery might not be the best option following a hip fracture, especially for patients who are too ill and the elderly (Hossain et al., 2009). It might also not be an available option in under-resourced hospitals; therefore, treatment includes bed rest and pain management (Hossain et al., 2009). Hossain et al. (2009) followed the treatment outcomes of patients with hip fracture that were managed conservatively compared to those managed surgically between 2004 and 2006 in the UK and they found that conservative treatment following a hip fracture is suitable for medically weak patients and ends in a statistically insignificant difference in functional outcome or mortality compared to patients treated with surgery.

A systemic review looking at studies comparing conservative management and surgery was conducted by Handoll and Parker (2008) including five randomised trials and a total of 428 hip fracture patients. Just a single trial involving 106 patients could be deliberated upon to examine present practice. There were no significant differences identified in mortality, and long-term and medical complications. However, surgical management was more likely to result in the fracture healing without leg-length discrepancy, a shorter hospital admission, and a statistically insignificant increase in patients going back to their pre-injury dwelling (Handoll and Parker, 2008).

In a systemic review comparing conservative management and surgical management by van de Ree et al. (2017), 1189 patients were included, of whom 242 (20.3%) were managed non-surgically, and seven observational investigations were incorporated. The 30-day and one-year death rates were higher in the non-surgical group (odds ratio (OR): 3.95, 95% certainty interim (CI): 1.43-10.96; OR: 3.84, 95% CI: 1.57-9.41), and the 30-day and one-year mortality rate of the conservative group was four times higher than the surgical group (OR: 3.95). The studies reviewed did not compare quality of life (QoL), functional outcome, or healthcare costs between the two groups. The analysis revealed a significantly higher 30-day and one-year mortality rate for conservatively managed hip fracture patients.

Additional studies are required to reach consensus on how decision-making should be conducted for surgery or conservative management in frail elderly patients with progressive comorbidity and a shorter life expectation (van de Ree et al., 2017). In most cases, surgery is favoured, while conservative management is considered for a small number of patients where the prognosis of surgery is considered poor (Wilson, 2017).

2.6.2 Surgical management outcomes

Surgical management studies look at various outcomes including blood loss, failure rate, operation fracture rate, postoperative pain, function, and absence of deformity.

2.6.2.1 Intracapsular fractures

Available methods for surgical management of intracapsular fractures include arthroplasty, and cephalomedullary nail (CMN) and screws. According to Handoll and Parker (2008), approximately half of all hip fractures occur outside the hip joint capsule (extracapsular), and the rest are within the joint capsule (intracapsular).

In a systemic review, Ye et al. (2016) looked at eight prospective randomised studies involving 2206 patients. All the studies directly compared arthroplasty and internal fixation effectiveness. The results revealed that patients in the arthroplasty group showed significantly lower rates of complications (risk ratio: 0.56; 95% CI: 0.38-0.80), reoperation (risk ratio: 0.17; 95% CI: 0.13-0.22), and revision rates (risk ratio: 0.11; 95% CI: 0.08-0.16). Furthermore, they had better functional outcomes in comparison to the internal fixation equivalents and were less likely to experience post-surgery pain.

Wani et al. (2014) studied a sample size of 100 patients who had sustained a displaced neck of femur fracture. These patients were divided into two groups; 50 were managed with closed reduction and internal fixation with cannulated screws (group A), and the other 50 patients with total hip arthroplasty (group B). The patients in the primary total hip arthroplasty group had a better Harris Hip Score (domains covered pain, function, absence of deformity, and range of motion) and fewer patients (less than 1%) required reoperation. However, with regard to complications, there was no statistically significant difference found between these groups.

A comparative study by Tidermark (2003), comparing undisplaced and displaced neck of femur fractures managed with internal fixation, found that the QoL of patients with undisplaced fractures managed with internal reduction methods was higher than those with displaced fractures. Furthermore, a randomised study was done. The group with displaced neck of femur fractures were randomised to internal fixation or total hip arthroplasty. Total hip replacement (4%) resulted in fewer complications than internal fixation (36%) and necessitated fewer reoperations, at 4% versus 42% respectively. The total hip replacement group had improved hip function and QoL (EQ-5D).

A systematic review by Bhandari et al. (2003) of studies between 1968 and 2002 identified 140 randomised control trials with a total of 1162 patients and in-depth data on mortality statistics over the first four months post surgery. The review compared internal reduction with hip replacement for intracapsular fractures. The results showed that hip replacement significantly decreased the risk of revision surgery, but there was a greater chance of infection and blood loss, longer operation time, and possibly a rise in mortality rates.

Zhang et al. (2018) advocate for arthroplasty if there is a femoral neck fracture displacement. However, if fracture displacement is not obvious, for patients with more medical diseases, poor physical condition and poor surgical tolerance, and if postoperative life expectancy is not high, the first choice of treatment is closed reduction and cannulated screw fixation.

2.6.2.2 Extracapsular hip fractures

The available methods for the surgical management of extracapsular fractures include a dynamic hip screw (DHS), intramedullary nail (IMN), classic sliding hip screw, CMN, and screws. The benefits and drawbacks of these types of internal fixation will be discussed below.

The benefits of faster recovery of function and lower risk of postoperative morbidity following intramedullary nailing in intertrochanteric femoral fractures have resulted in this method growing in popularity (Giessauf et al., 2012).

Giessauf et al. (2012) looked at the QoL up to 12 months post hip surgery with IMN and the use of Gamma nails. The results showed good functional and radiographic outcomes: 43 patients (67%) had excellent or good outcomes, but there was a substantial decrease in patient QoL.

A randomised control study by Kouvidis et al. (2012) compared CMN to the classic sliding hip screw for the treatment of intertrochanteric fractures. The functional recovery scores for two techniques were compared and the researchers found that there were no significant differences found. There were also insignificant differences in reoperations and mortality rates.

In a study by Queally et al. (2014) involving a total of 2130 adults (predominantly female and the elderly) with mainly unstable trochanteric hip fractures, the sliding hip screw and the IMN types of internal fixation were compared. Although the sliding hip screw proved to be a better option in comparison to IMN for extracapsular hip fractures, the authors state that the design of IMN to treat extracapsular fractures should not be a priority (Queally et al., 2014). There is insufficient evidence in outcomes (pain, reoperation, infection and physical function) based on the design of the nail to advocate for its use when managing extracapsular hip fractures.

In differing results obtained by Ma et al. (2014) comparing CMN, Gamma nail and DHS for extracapsular fractures, CMN fixation patients had less blood loss and a decreased rate of reduction instrument failure than DHS. DHS was linked with a lower proportion of operative fracture of the femur and reoperation, but caused more blood loss compared to the Gamma nail. Furthermore, the CMN group had a shorter hospital stay compared to the DHS group. Overall, the CMN appeared to provide better outcomes compared to the other methods.

Redshaw Jr (2015) looked at long CMNs against short CMNs for internal fixation of intertrochanteric fracture in patients 65 and older and established no difference in the rate of re-fracture or reoperation. Therefore both short and long CMNs are safe and have predictable outcomes for the intertrochanteric hip fracture.

CMN seems to be the better choice of internal fixation for hip extracapsular fractures, but other types of internal fixations offer nearly the same outcomes (hospital stay, pain, physical function, less blood loss) in selected patients.

2.7 Factors affecting physical function

Age, gender, pain levels, depression and cognition have been found to affect physical function, particularly in the elderly aged 65 years and older (Adam et al., 2016; Semel et al., 2010; Karam et al., 2013; Ray et al., 2015).

The level of activity following a hip fracture post surgery is important as it allows for independence and recovery. Semel et al. (2010) established numerous significant patient features that indicate a better functional outcome after hip fracture. Factors include female gender, younger age, lack of diabetes mellitus, non-dependent pre-

fracture mobility, shared living before fracture, and taking less medication that has an effect on falling during rehabilitation.

2.7.1 Gender

Arinzon et al. (2010) studied the link among variances in gender and geriatric rehabilitation following a traumatic hip fracture. A total of 99 elderly patients living in the community (older than 65 years), 64 women and 35 men, were included. The study found that both groups had significant Functional Independence Measure (FIM) motor subgroup scores on discharge. However, there was better functional recovery in men than in women. The authors concluded that, following a hip fracture, recovery largely rests on the pre-fracture health and functional capacity of the individual.

In a retrospective analysis, Endo et al. (2005) compared male and female differences in 983 successive patients (206 males and 777 females) who experienced a non-pathologic hip fracture, and who were monitored for a period of no less than 12 months. The study compared differences between males and females with regard to complications and mortality rates. There were statistically insignificant gender variances in patient age, fracture type, pre-fracture assistance level, mobility, or reliance in simple activities of daily living, place of discharge, and post-surgery regaining of mobility as well as simple and essential everyday activities. Postoperative complications and higher mortality rates at one-year post hip fracture were higher in males.

In a different study by Sprague et al. (2018) looking at baseline factors linked with physical health-related quality of life (HRQoL) in patients after a femoral neck fracture, being of female gender (-1.52; 95% CI -3.00 to -0.05; p=0.04) was associated with lower physical HRQoL than being of male gender. Conversely, Hawkes et al. (2006) noted that recovery following a hip fracture for males is possibly no different than for females. However, the researchers highlighted that males may need modifications to modalities planned to return function because of psychosocial influences, greater comorbidity, and improved rates of specific complications presenting in males.

In the study by Samuelsson et al. (2009), cognitive dysfunction was a more important factor in men rather than gender. Cognitive dysfunction was linked with an increased risk for loss of ambulation ability and death in men only. In this study, the most important factor for returning to pre-fracture function and own residence was cognitive function.

Holding a different view on gender variances and recovery following a hip fracture, Woodward et al. (2014) noted that some physical aspects play a role such as strength and balance, which have an impact on the different genders. However, these seemed to be complicated by body weight, age and/or cognition.

Whatever view is presented by different researchers, these findings may be used by clinicians to inform treatment and outcomes. Gender difference is a factor in recovery although some studies dispute this because of inconclusive evidence.

2.7.2 Age

As a consequence of the common complication of osteoporosis, hip fractures tend to affect elderly individuals (Holt et al., 2008b) and are uncommon under the age of 50 (Farooq et al., 2005).

In a study by Sprague et al. (2018) looking at baseline factors associated with physical HRQoL in patients after a femoral neck fracture, being of older age (-1.42 for every ten-year increase, 95% CI -2.17 to -0.67, 9<0.001) was associated with lower HRQoL.

Resnick et al. (2018) found that older age is one of the factors significantly associated with decreased lower extremity function. When it comes to mobilisation, in comparison to younger individuals, elderly individuals are less likely to be able to ambulate and climb stairs postoperatively (Buecking et al., 2015). Holt et al. (2008a) demonstrated that extremely elderly patients (over 85 years) presenting with poor health indicators (comorbidities, low activity level, obesity, depression) were less likely to be independently mobile. Hulsbaek et al. (2015) confirmed that being of greater than 80 years old was predictive of them not recovering their pre-fracture level of simple mobility.

Mortality is higher in older patients with a hip fracture. The older the individual gets, the higher the chances of hip fractures, and the less likely they will return to previous levels of mobility. When it comes to hip fracture treatment and functional outcomes, age is a factor and should inform how these patients are treated.

Kristensen (2010) confirmed age as an independent predictor of in-hospital outcomes in individuals with hip fractures who took part in a rehabilitation model utilising more than one modality.

2.7.3 Pain

Postoperative hip fracture pain is associated with long-term functional impairment, delayed ambulation, and increased hospital length of stay following a hip fracture (Morrison et al., 2003). Herr and Titler (2009) stated that the pain experienced by patients with a hip fracture is severe. According to Salpakoski et al. (2011), physical idleness in the elderly with a previous hip fracture is associated with pain. Furthermore, the functional capability of individuals with a hip fracture following discharge from hospital is primarily affected by pain (Kristensen, 2013). Therefore, using the appropriate pain management is vital.

Patients with a hip fracture and cognitive impairment have been reported to receive less analgesia than their cognitively unimpaired counterparts (Forster et al., 2000). This could be due to the inability of patients to verbalise their feelings and also health professionals misunderstanding cognitively impaired patients. Therefore, monitoring pain and treating with appropriate analgesia is very important and has been reported to improve postoperative functional outcomes (Zabari et al., 2012).

In a study by Resnick et al. (2018), pain was among the factors linked with low physical activity, physical function and physical performance in females, but was not linked with low physical and functional outcomes in males. This can be due to pain being perceived differently by different genders.

A valuable dimension for the prognostic evaluation of patients with hip fractures is the intensity of pain (Arinzon et al., 2007). To fully influence the patients' functional outcome, sustained periods of rehabilitation treatment, socio-economic effects, adequate early pain assessment and associated treatment thereof are vital (Arinzon

et al., 2007). To restore and sustain the level of physical activity after hip fracture, it may be important to manage pain, according to Salpakoski et al. (2011).

Deterioration in function and greater post-fracture pain are predicted by frailty before a hip fracture (Orive et al., 2016). Therefore, Orive et al. (2016) advise on encouraging exercise in older people to better the prognosis of hip fracture, as exercise programmes help prevent frailty. It is evident that pain affects hip fracture postoperative physical function and healthcare providers should be involved in strategies to address this impairment.

Salpakoski et al. (2011) propose additional follow-up and experimental research to discover the link between pain and physical activity as well as the importance of pain management and physical activity modalities in averting mobility limitation and disability among the elderly recuperating from a hip fracture.

Pain remains a major physical discomfort experienced by patients following a hip fracture. There should not be any general reason to refrain from prescribing opioids to these patients for fear of potential abuse or mortality (Lindestrand et al., 2015).

2.7.4 Psychological aspects

Foss et al. (2006) report that as many as 60% of patients with a hip fracture will develop delirium. Auron-Gomez and Michota (2008) define delirium as early onset interference in attention and cognition. Delirium is common, tenacious and independently linked with reduced functional recovery 30 days following a hip fracture (Marcantonio et al., 2000).

Lenze et al. (2004) indicate that injuries such as fractures of the hip and the feature of the physical disability that follows can result in an increased chance of depression. Depression is also one of the primary psychological conditions associated with hip fractures and tends to develop post-surgically (Sydney and Jo, 2014). A high postoperative depression score is related to both poor physical recovery and psychosocial status (Mossey et al., 1989).

Other psychological conditions associated with hip fractures include poor coping strategies (Roberto, 1992) and unrealistic expectations regarding outcomes (Borkan and Quirk, 1992).

A reliable predictor of quicker post-surgery functional outcomes is cognitive function (Adam et al., 2016). The results from a study by Dawson (2000) about cognitive status and hip fracture survival and regaining functional level undoubtedly show that the existence of cognitive deficits, either dementia or delirium, was linked with death or delayed recovery of ambulation.

2.7.5 Level of activity and community reintegration (participation)

Return to the patients' familiar community setting and regaining walking are the ultimate goal for patients who sustain hip fractures (Hagino et al., 2011). The factor of pre-fracture ambulation is a strong contributing factor towards the acute postoperative functional outcome (Adam et al., 2013) and predicts problems with discharge to home (Hagino et al., 2011). A hip fracture may result in a disability. In a study by Magaziner (2003), it was found that hip fracture patients had considerably more activities of daily living disability than that described by ageing over 24 months.

In a study by Ekegren et al. (2017) which looked at the return to work of 211 patients younger than 65 years of age, it was discovered that nearly one-third of patients had not gone back to work in 12 months after a hip fracture. Hip fracture is linked with a significant reduction in function and QoL (Ekegren et al., 2017).

In a sample of hip fracture patients, Salpakoski et al. (2014) found that there was a significant decline in walking in a large fraction of community-dwelling elderly patients recuperating from a hip fracture. This further exacerbates disabilities experienced by patients with hip fractures. A decline in walking and a decline in the level of function can negatively affect the patients' participation in social activities.

Some patients partake in sports activities after a total hip arthroplasty (THA) (Peters, 2003). Due to the high risk of falling and sustaining a fracture, caution against high impact and extreme endurance sports (skiing, soccer, rugby) should be exercised. However, when the sport was partaken in preoperatively, and an excellent physical condition is achieved postoperatively, the patient should be able to return to the sport (Peters, 2003).

According to Campenfeldt et al. (2017), three-quarters of patients with displaced femoral neck fractures reported good or excellent functional outcomes at 24 months, although they did not return to their pre-fracture level or HRQoL. In a study

Tidermark (2003), there was a good correlation between the QoL and outcome measures such as pain, mobility and independence in daily living. Hence the primary goal of rehabilitation during hospitalisation in the acute ward is to regain basic mobility following a hip fracture.

In a study by Magaziner et al. (2000), it was shown that being of low pre-fracture functional level was predictive of patients not regaining their previous level of basic mobility. However, this study also showed that over the first post-fracture year, most areas of functioning showed progressive independence to maximum levels in different areas of recovery with time.

Another indicator for poorer physical functioning up to two years post-fracture is increased use of healthcare resources (more hospitalisation) (Fox et al., 1996). These patients tend to decline in their ability to walk from six to 12 months post hip fracture.

In a qualitative study by Bruun-Olsen et al. (2018), eight frail older people recuperating following hip fracture (aged 69–91) were interviewed in their homes 16 weeks following their injury. The questions posed were based on issues linked to their experiences of facilitators and barriers throughout the various stages in the recovery route. The results showed that the patients' experiences of recuperation fell under three main themes: "Disruption from a normal life", "Feeling vulnerable", and "A span between self-reliance and dependency". A sense of dreariness and weakness persevered over time. Being in recuperation also affected levels of independence and dependency, led to an interrupted life due to the loss of mobility, and the impact of being older was prominent.

In a comparative study by Ziden (2008) comparing home rehabilitation and conventional rehabilitation, patients' experiences following hip fracture and their ideas of what affects the recovery course were investigated. The study was based on both quantitative and qualitative studies. In the qualitative study, 18 patients were interviewed four weeks and 12 months following discharge about their experiences of the recovery process and how they felt the impact of the hip fracture. The results from the interviews showed that the hip fracture caused social and personal problems in the individuals' live. The hip fracture was unexpected and resulted in an experience of a changed body and a more limited life. Patients were inclined to be

more careful and scared of falling again and hence they started living a more inactive and isolated life than before a hip fracture.

To improve QoL after a hip fracture, factors such as walking, return to previous home, pain levels, ability to climb stairs, independence in daily living activities, and cognitive function should be closely monitored and improved.

2.8 Mortality rate

Being male, increased comorbidities, a decreased functional state, and the development of any acute complication post surgery are the main factors linked with mortality (Gonzalez-Ferrer et al., 2013).

The mortality rate for in-hospital patients with hip fracture varies between 4% and 12% (Kirkland et al., 2011; Frost et al., 2011). A study by Gibson et al. (2014) found that admission to an intensive care unit (ICU) was linked with a four-fold increase in mortality in individuals with hip fractures. This was also confirmed before by Maravic et al. (2011) who found that ICU admission was associated with an increased mortality rate. Other determinants include being of age 85 years and older, being male, and the presence of particular chronic or acute diseases, mainly cardiovascular disease, hepatic disease, renal insufficiency, and infection. These were significant factors in hospitalised patient mortality.

Other researchers have found that sepsis, neurological disease, gastrointestinal and cardiac disease are related to poorer outcomes in older patients admitted to an ICU (Bagshaw et al., 2009). Ray et al. (2015) showed that patients between the age of 40 and 55 who suffer a hip fracture are at great risk of complications and mortality if there is a presence of comorbidities and excess alcohol intake.

Comparing women and men with hip fractures, Diamond et al. (1997) found that men have a higher mortality and more risk factors (alcohol abuse, malnutrition, age and eating disorders) for osteoporosis. Overall, poor outcomes were seen in women mainly due to pre-existing medical illness and fracture-related complications.

Although surgical intervention is the preferred method of treatment if not contraindicated, mortality in patients following hip fracture is increased during the 12

months after surgery (Gonzalez-Ferrer et al., 2013). However, those patients conservatively managed have a much higher likelihood of death.

2.9 Environmental issues

In a randomised control trial, Portegijs et al. (2013) looked at the effects of a 12-month multimodality intervention on perceived environmental barriers in hip fracture patients. The research intended to investigate increased mobility and function. The study had a sample size of 81: 41 in the experimental and 40 in the control group. Baseline measurements were taken and, in the experimental group, 48% perceived a minimum of one entrance-related barrier and 62% perceived a minimum of one outdoor barrier. In the control group, 37% of the patients perceived a minimum of one entrance-related barrier (e.g., indoor/outdoor stairs, floor planes, and storage for assistive devices) and 60% perceived a minimum of one outdoor barrier (poor street surface, hilly ground, long distances, and absence of relaxing places). In this study, half of hip fracture patients described barriers for mobility when entering the home or in the outdoor home environment.

Measurements were taken at three, six and 12 months. At the start, 62% and 60% reported at least one perceived outdoor barrier (POB), and 48% and 37% of the participants reported a minimum of one perceived environmental barrier (PEB) in the experimental and control groups, respectively. As time passed, only the experimental group had a noteworthy reduction in the number of PEBs (Friedman P = 0.037). In the main analyses, there was insignificant variation over time in POBs between the two groups ($P \geq 0.123$).

A prospective study was conducted by Shyu et al. (2004) three months after hospital discharge with 87 elderly patients with hip fractures that were surgically managed. After controlling for pre-fracture conditions, the study found that individual environmental barriers significantly reduced the ambulation capacity, self-care capacity, and routine of hip-fractured elderly persons.

This study showed that, even at three months to 12 months following the fracture, patients still reported barriers, particularly in the outdoor environment.

2.10 Rehabilitation

The ultimate goal of physiotherapy management is for the patient to return to the pre-fracture level of functioning and to an environment familiar to them (Carneiro et al., 2013). Early mobilisation on day one post surgery is standard practice in orthopaedic wards unless contraindicated (Oldmeadow et al., 2006). Physiotherapy treatment includes bed mobility exercises, range of movement exercises, lower limb strengthening exercises, patient education, and walking aid prescription (Carneiro et al., 2013). Post-surgery early physiotherapy treatment is linked with decreases in hospital stay and reduced medical costs (Huddleston and Whitford, 2001).

Good muscle strength of hip abductors and quadriceps of affected limb correlates with independent walking (Koval and Cooley, 2005). According to Tidermark (2003), patients' inability to finish physiotherapy on the first postoperative day is linked with a higher risk of poor return to simple mobility while in the hospital. This shows the significance of physiotherapy as a component of the interdisciplinary management team.

In a study by Lee et al. (2017), it was revealed that progressive resistance exercises after hip fracture surgery improved balance, activities of daily living, mobility, lower limb strength, and performance task outcomes; although a small sample size was used in this study.

Depending on the condition of the patient at discharge, continuing long-term physiotherapy is beneficial, whether it is in an orthopaedic treatment institution, a dedicated rehabilitation facility (subacute), or on an out-of-hospital basis (Auron-Gomez and Michota, 2008).

2.11 Conclusion

It appears that basic falls are the still main cause of a hip fracture. Most patients with a hip fracture are elderly, and often this community presents with osteoporosis and other comorbidities.

The incidence and prevalence of hip fractures are consistently biased towards woman, and survival is poor with increasing age following a hip fracture.

Primary psychological conditions associated with hip fracture include depression, dementia and delirium. These primary psychological conditions and other psychological conditions negatively affect functional recovery and are associated with poor rehabilitation outcomes.

Physiotherapy plays a major role in the rehabilitation of hip fracture patients to regain their pre-fracture level of independence and function.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter explains in detail the study design, participant sample, and the method in which the study was carried out. The method has been presented in chronological order and the details of all materials have been included. The procedure for data collection has also been presented.

3.2 Study design

An observational cross-sectional study was conducted.

3.3 Participants

Patients from Charlotte Maxeke Academic Hospital and Chris Hani Baragwanath Academic Hospital who were at six weeks post hip fracture surgery were invited to participate in this study. The inclusion and exclusion criteria used are presented below.

3.3.1 Inclusion criteria

- Patients who were 18 years and older, from all races, genders and nationalities.
- Patients who were six weeks post proximal hip fracture surgery (hemiarthroplasty, cannulated screws, proximal femoral nailing arthrodesis, DHS, and plate and total hip replacement).

3.3.2 Exclusion criteria

- Bilateral hip fractures and poly-trauma.
- Patients with uncontrolled comorbidities (e.g., uncontrolled hypertension, cancer, paraplegia, and cerebrovascular disorders).
- Patients with proximal hip fractures who were managed conservatively.

3.4 Sample selection and sample size

A non-probability, purposive sampling technique was employed for this study.

To compute the sample size required to ensure precision in confidence interval (CI) estimates, Excel Workbook was used (Sullivan, 2011). The confidence level was set

at 95%, alpha at 5%, and the margin of error at five. A sample size of 62 participants was thus included to participate in the study.

3.5 Instrumentation and outcome measures

Three standardised outcome measures and a self-developed demographic questionnaire (all instrumentation is in the English language) were used to collect data for this study. Table 3.1 objectives, variables and instrumentation.

Table 3. 1 objectives, variables and instrumentation

Objectives	Variables	Instruments
Objective 1: Participants' demographic profile	Personal and medical information	Self- developed demographic questionnaire
Objective 2: To establish the activity limitation among patients with a hip fracture six weeks postoperatively	Activity limitations	Lower Extremity Functional Scale
Objective 3: To establish the level of participation (restriction) among patients with a hip fracture six weeks postoperatively	ICF participation	Measure of Participation and Activities Screener
Objective 4: To determine the level of pain among participants	Levels of pain	Pain Verbal Rating Scale

3.5.1 Pain Verbal Rating Scale (VRS)

To measure pain, the VRS was utilised (Appendix C). This scale has been validated and is reliable in measuring postoperative pain following a hip fracture (Bech et al., 2015). It obtained a kappa-statistic measure of test-retest agreement of 0.68-0.78 in postoperative pain in hip fracture at rest and by induced pain using the straight leg raise test. Therefore, this can be interpreted as reliable in measuring changes in pain levels (Bech et al., 2015).

The VRS comprises of a list of adjectives defining different ranks of pain experienced from “no pain” to “worst possible pain”. Individuals are asked to choose one of the six adjectives to choose the phrase that best defines their level of experienced pain on the scale. The adjectives are arranged from “no pain”, “mild pain”, “moderate pain”, “severe pain”, “very severe pain”, to “worst possible pain”.

The VRS is easy to administer, score and follow. Therefore, compliance with use is as good, if not better than, other scoring tests (Jensen et al., 1986).

3.5.2 Lower Extremity Functional Scale (LEFS)

The LEFS was utilised (Appendix A). The LEFS is utilised to assess the activity limitations of individuals with an impairment of one or both lower limbs. The LEFS is beneficial to assess physical function.

The LEFS theoretic structure and the scale are centred on the World Health Organization’s idea of disability and handicap. It is efficient to administer, tally, and for documenting in the medical record with regards to patient and health professional time. The LEFS is generalised to different patients with lower limb orthopaedic conditions, including patients with different levels of disability, diagnosis, management, and ages. The scale is appropriate for recording function on an individual patient basis as well as in groups, such as for medical outcomes evaluations and clinical studies’ purposes (Binkley et al., 1999).

Reliability has been established for the LEFS questionnaire with a test-retest score of 0.94 (Binkley et al., 1999). Construct validity was determined by matching the LEFS to the SF-36 (Short Form Health Survey) and the scale was found to be dependable with a sensitivity to adjust superior to the SF-36 (Binkley et al., 1999).

The LEFS comprises a list of questions asking 20 items about an individual’s capability to execute activities of everyday life. The LEFS is easily administered by the researcher and is applicable to a wide range of disability levels and conditions (Binkley et al., 1999). The scale can be utilised by clinicians to assess an individuals’ initial function, continuing advancement, and final outcome and can also be used to set functional targets (Binkley et al., 1999).

3.5.3 The Measure of Participation and Activities Screener (IMPACT-S)

The IMPACT-S was used in conjunction with the LEFS to evaluate the degree of ICF participation in this study (Appendix B). The IMPACT-S is a self-report measurement instrument to evaluate limitations in activities and participation experienced. The questions are based on features of daily life in which a person could possibly experience limitations as a consequence of their health or disability.

The 32 questions are distributed across nine scales, mirroring the nine activity and participation domains of the ICF. The IMPACT-S is the screener portion of the ICF Measure of Participation and Activities (IMPACT) comprising questions (Post et al., 2008). The measuring scale was intended to define functioning and disability independent of health disorders.

The IMPACT-S reflects nine activity and participation sections of the ICF (Post et al., 2008). The IMPACT-S measures nine scales of participation as follows:

- **Learning and applying knowledge**

  The scale has three questions based on participation in learning, applying the information that is learned, thinking, tackling problems, taking decisions and gaining expertise.
- **General tasks and demands**

  There are two participation items in overall dimensions of carrying out sole or numerous tasks, establishing habits, and withholding pressure while handling these tasks.
- **Communication**

  There are three communication participation items on the questionnaire looking at specific aspects of interacting by language, signs and symbols, as well as reception and production of messages and conversing.
- **Mobility**

  This aspect of the scale has the most questions (seven questions), and is based on altering body position or setting or by moving from different places, and handling, moving or controlling objects. There are also questions on

ambulation, running or ascending, and using different methods of transportation.

- **Self-care**

  Participation in self-care is about taking care of oneself, bathing and drying oneself, taking care of one's body and body regions, and putting on clothes, consuming food and drinking, and caring for one's health. The component has three questions.

- **Domestic life**

  These questions are about carrying out household and daily schedules and responsibilities. Areas of domestic life include obtaining a home to live, nourishment, clothing and other supplies, domiciliary cleaning and refurbishing, taking care of individual and other domestic objects, and helping others.

- **Interpersonal interaction and relationships**

  The scale has four questions based on accomplishing the activities and tasks essential for simple and complex interfacing with people (strangers, friends, relatives, family members and lovers) in a contextually and generally suitable custom.

- **Major life areas**

  Participation in major areas of life includes engaging in and executing the responsibilities and duties vital to perform in education, labour and occupation and financial transactions.

- **Community, social and civic life**

  Participation in community life includes the actions and tasks essential to be part of structured social life separate from family, in public, social and civic areas of life.

The questionnaire is a reliable and valid generic measurement of activity limitations and participation restrictions that fit the ICF. The IMPACT-S is valid, reliable and responsive to change. The internal consistency of IMPACT-S is substantial for all nine areas (0.75-0.92) and outstanding for the entire score (0.96). Test-retest reliability was good with a total score of 0.94 (Post et al., 2008).

3.5.4 Demographics details form

The demographic questionnaire was used to obtain personal and medical information (Appendix F and G). The tool captured background information such as gender, date of birth, age, nationality, race, diagnoses, and relevant medical history concerning date of admission and discharge, date of surgery, type of fracture, and surgical procedure. The data was collected from the patient's file.

3.6 Procedure

3.6.1 Pilot Study

The reasons for the pilot study were for the researcher to assess the methods and procedures of the data collection process before the main study was conducted.

3.6.1.1 Method

The pilot study began after ethical approval was granted by the Human Research Ethics Committee at the University of the Witwatersrand (Appendix L) and permission was granted to conduct research by the research committees of the hospitals identified (Appendix M).

Six participants (10% of the sample size) were selected for the pilot study during their six-week follow-up visit at the orthopaedic clinic at Chris Hani Baragwanath Academic Hospital. They were invited to participate in the pilot study. The study was explained by the researcher and informed consent was obtained from the participants before the questionnaires were administered (Appendix D and E). The participants also had an opportunity to ask questions if they required clarity regarding the pilot study.

Consent from all the participants was obtained before data collection. The researcher collected all the necessary data as per the data collection tools. It took two days to collect the data. The pilot study data was analysed and no challenges were found. Therefore, no changes were made before commencing with the main study. The language used to collect data was English.

3.6.2 Main Study

3.6.2.1 Study setting

Chris Hani Baragwanath Academic Hospital and Charlotte Maxeke Academic Hospital were identified for the main study.

3.5.2.2 Procedures of the main study

The researcher visited the hospitals four times a week and administered the questionnaires six weeks postoperatively when patients came to consult for their six-week follow-up evaluation at the orthopaedic clinic or department. As patients were waiting to see the orthopaedic surgeon in the clinic waiting area, the researcher introduced himself to all the patients and explained the purpose of the study. The researcher then screened the patients' files to identify patients with surgically managed hip fractures.

Once the potential study participants were identified, a description of the study was supplied and informed consent was acquired (Appendix D and E). Then background data and other relevant medical information were gathered by the researcher from the participants' hospital medical documents (Appendix F and G).

The other standardised outcome measures (Appendix A, B, C, F and G) were then administered. All the information was collected by the researcher. The questionnaires were completed by the researcher. The researcher explained the questionnaires and the responses to the participants and the participants then chose responses that were appropriate to themselves.

It took approximately 30 minutes to collect data from each participant.

3.7 Ethical considerations

Ethics approval was acquired from the Human Research Ethics Committee of the University of the Witwatersrand before the study commenced (Clearance Certificate Number M170530). Approval to carry out this study was issued in writing by the Chief Executive Officer of both hospitals. Participants' dignity, privacy and autonomy were respected at all times. Each participant was provided with an information sheet

detailing the aim, objectives and methodology of the study. Each participant was asked to give consent in writing.

Study results were made available to the orthopaedic clinic of the respective hospitals where the study took place.

3.8 Data analysis and data management

All information obtained was captured on an Excel spreadsheet. The STATISTICA program (version 31.1) for statistical analyses was used to analyse the data. The following table illustrates how the data were analysed.

Table 3. 2 Data statistical analyses

Objective	Outcome measure	Type of data	Statistical output and statistical test used
Participants' demographic profile	Demographic questionnaire	Ordinal and continuous	Range, mean, standard deviation
To establish the activity limitation among patients with a hip fracture six weeks postoperatively	LEFS VRS	LEFS ordinal data VRS ratio	Frequencies and percentages of the individual LEFS and VRS scores
To determine the level of pain among participants	VRS	VRS ratio	Frequencies and percentages of the individual VRS scores
To establish the level of participation (restriction) among patients with a hip fracture six weeks postoperatively	IMPACT-S	Ordinal data	Frequencies and percentages of the individual IMPACT-S scores
To find associations between participants' demographic profile and participants'	Demographic questionnaire IMPACT-S	IMPACT-S Ordinal data Demographic questionnaire	Multiple Regression Analysis

Objective	Outcome measure	Type of data	Statistical output and statistical test used
impairments, activity limitations, and participation restrictions		nominal data	

3.9 Conclusion

This chapter discussed in detail the study design, participant sample, and the method in which the study was carried out. The method was presented in chronological order and the details and objectives of all instruments included. The procedure for data collection was also presented. Ethical clearance was also approved.

CHAPTER 4: RESULTS

4.1 Introduction

The data collected in this study are presented and interpreted in this chapter. The pilot study results are briefly discussed. In section 4.3, the demographic data of the participants studied are described. Section 4.4 to 4.6 describes the VRS, LEFS, and IMPACT-S results. Multiple regression analysis results are explained in 4.7.

4.2 Pilot study results

The pilot study was conducted on six (10%) participants. The results were used to assess the feasibility of the main study. The demographics of the participants in the pilot study were similar to those participants who were in the main study. It took approximately 30 minutes to complete all questionnaires and no adjustments were made to the main study due to the reliability of the methodology. The data collected from the pilot study was incorporated in the main study.

4.2.1 Pilot study conclusion

The pilot study was useful in familiarising the researcher with the three outcome measures. No changes were needed to be made to the main study after completing the pilot study.

4.3 Demographic details of the main study

4.3.1 Gender, age and ethnicity

Of the 62 participants studied, 43 (69.35%) were females and 19 (30.65%) were males, as illustrated by the pie chart in Figure 4.1. The minimum age was 18 and the maximum was 71 years. Table 4.1 shows that most of the participants (n=30; 48.39%) were in the 60-70-year range, followed by 25.81% (n=16) participants in the 51-59 age range. Only one participant (1.61%) was in the 70-79 age category. The mean age was 56.61 (SD±11.13).

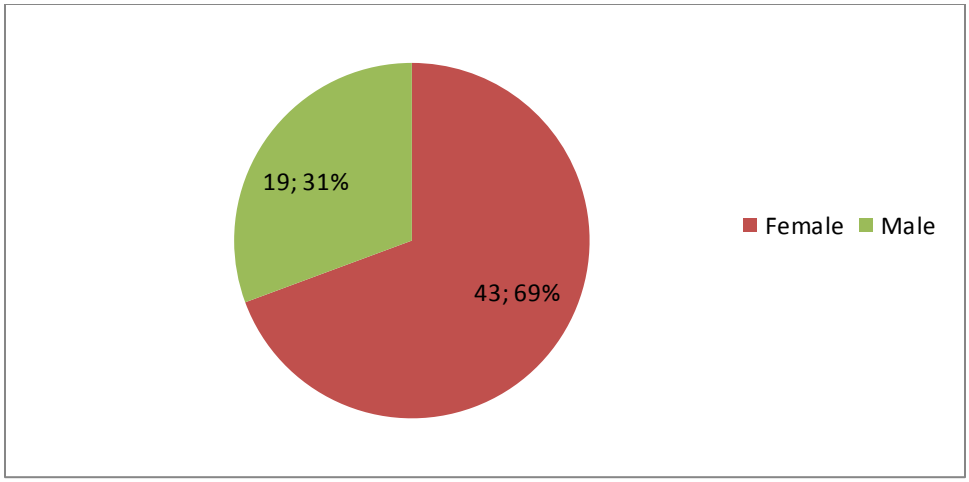


Figure 4.1 Gender (n=62)

Table 4.1 Age range by number of participants (n=62)

Age range	Number of participants	Percentage
18-30	2	3.23
31-39	5	8.06
40-49	8	12.9
50-59	16	25.81
60-69	30	48.39
70-79	1	1.61
Total	62	100

In this study, 45 (72.58%) participants were black, followed by 11 (17.74%) whites, and three (4.84%) Indian and coloured participants (Figure 4.2).

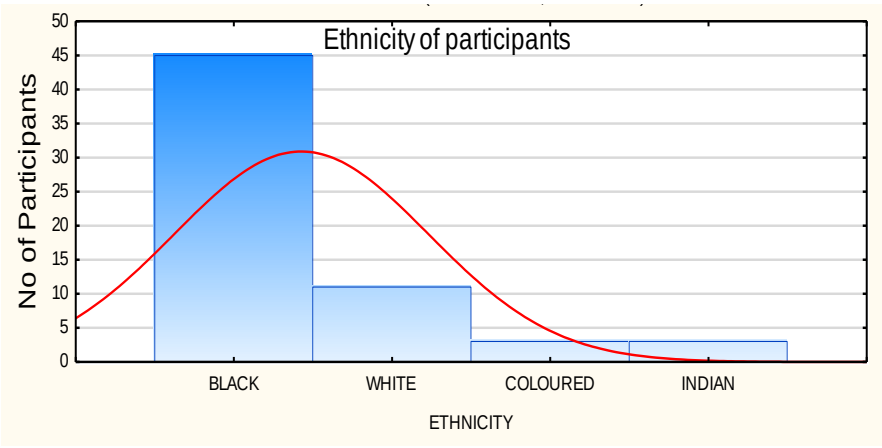
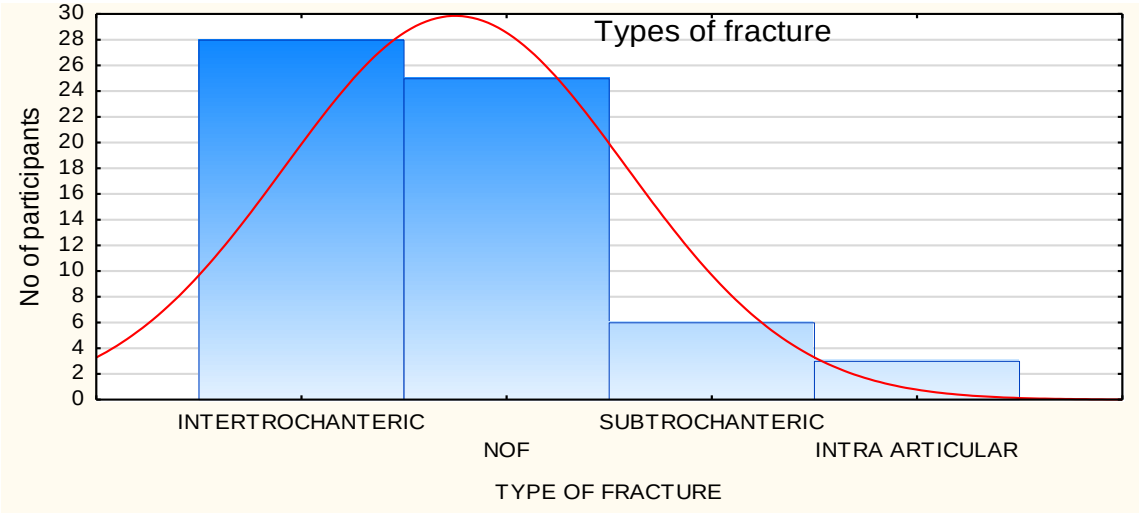


Figure 4.2 Racial groups (n=62)

4.3.2 Type of fracture

Figure 4.3 illustrates that an intertrochanteric fracture was the injury most frequently sustained by the participants (n=28; 45.16%) participants, followed by a neck of femur fracture among 25 participants (40.32%). The third-most frequently sustained fracture was a subtrochanteric fracture (n=6; 9.68%), and the least sustained fracture was the intra-articular fracture at (n=3; 4.84%).

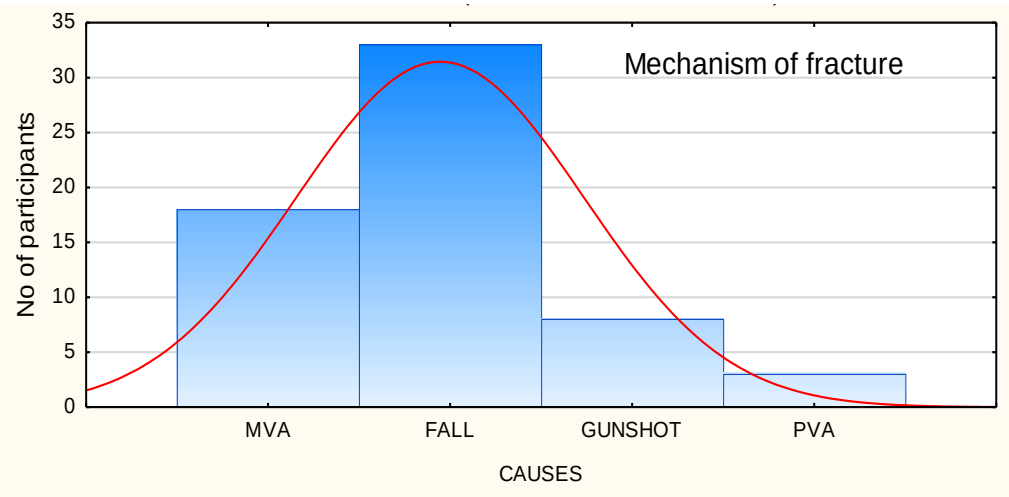


NOF- neck of femur

Figure 4.3 Type of fracture sustained (n=62

4.3.4 Cause of the hip fracture

Figure 4.4 illustrates that four causes of hip fracture were recorded in this study. The most common causes of hip fracture were falls and motor vehicle accidents (MVAs) at n=33 (53.22%) and n=18 (29.03) respectively. This is followed by gunshots at n=8 (12.90%), and the least common being pedestrian-vehicle accidents (PVAs) at n=3 (4.84%).

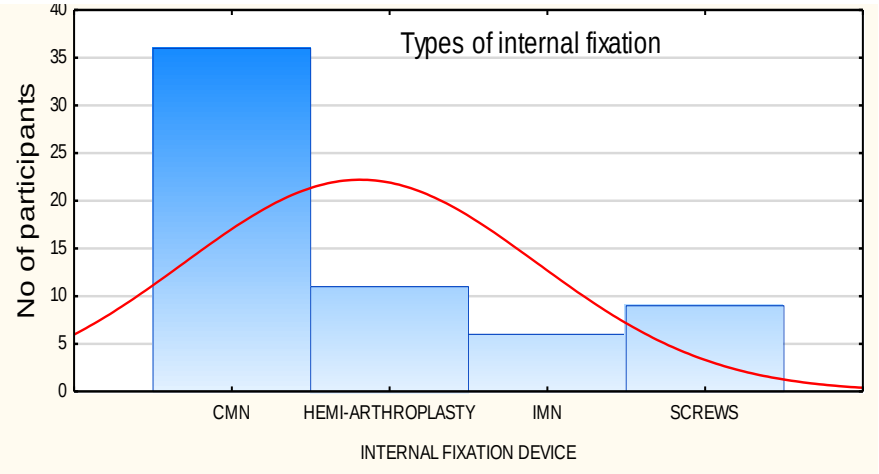


MVA- motor vehicle accident; PVA- pedestrian vehicle accident

Figure 4.4 Histogram for causes of hip fracture sustained (n=62)

4.3.4 Type of surgical management

Different types of internal fixation devices were used. The CMN was the most-often used (n=36; 58.06%) (Figure 4.5). The second-most used was the hemiarthroplasty (n=11; 17.74%), which was followed by screws (n=9; 14.52%). The least used method for fixation was the IMN (n=6; 9.68%).



CMN- Cephalomedullary nail ; IMN- Intramedullary nail

Figure 4.5 Type of internal fixation devices used (n=62)

4.3.5 Complications developed during hospitalisation

Eleven (17.74%) participants developed pressure sores and eight (12.90%) developed respiratory complications. No other complications were reported by the participants.

4.4 Pain perception

The majority of participants presented with mild pain (n=27; 43.55%), while 12 participants (19.35%) experienced the worst possible pain. Very severe pain was experienced by six (9.68%) participants. Moderate pain was experienced by five (8.06%), and severe pain experienced by three (4.84%) participants. No pain was experienced by nine participants (14.51%).

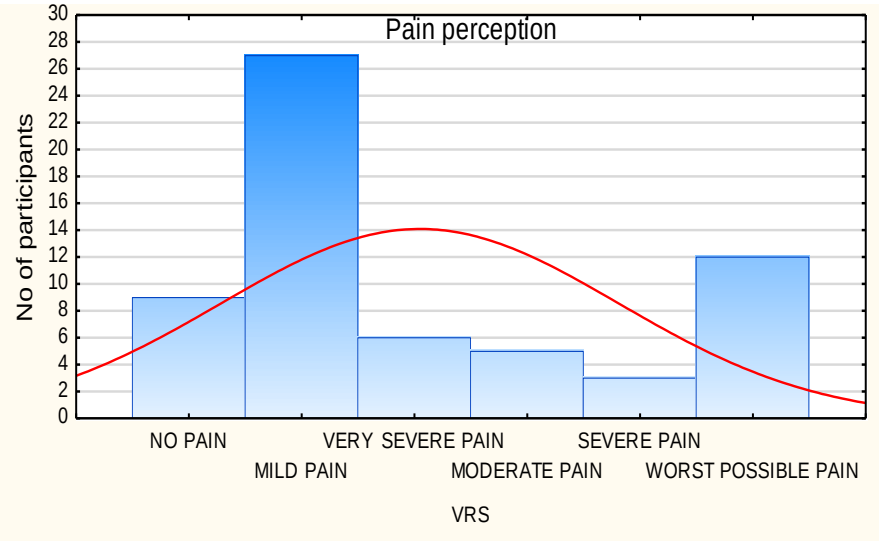


Figure 4.6 Participants' pain perception using VRS (verbal pain rating scale) (n=62)

Table 4.2 Participants' LEFS scores (n=62)

Item	Extreme difficulty or unable to perform activity	Quite a bit of difficulty	Moderate difficulty	A little bit of difficulty	No difficulty
a. Any of your usual work, housework or school activities	17.74%	9.68%	0.00%	6.45%	66.13%
b. Your usual hobbies, recreational or sporting activities	19.35%	11.29%	0.00%	1.61%	67.74%
c. Getting into or out of the bath	22.58%	8.06%	3.23%	3.23%	62.90%
d. Walking between rooms	17.74%	9.68%	0.00%	3.23%	69.35%
e. Putting on your shoes or socks	19.35%	11.29%	0.00%	6.45%	62.90%
f. Squatting	20.97%	11.29%	4.84%	19.35%	43.55%
g. Lifting an object, like a bag of groceries from the floor	20.97%	11.29%	1.61%	3.23%	62.90%
h. Performing light activities around your home	17.74%	12.90%	3.23%	17.74%	48.39%
i. Performing heavy activities around your home.	48.39%	27.42%	12.90%	11.29%	0.00%
j. Getting into or out of a car	20.97%	14.52%	4.84%	8.06%	51.61%
k. Walking two blocks (~160 metres)	19.35%	12.90%	1.61%	1.61%	64.52%
l. Walking a mile (~1609 metres).	24.19%	11.29%	9.68%	17.74%	37.10%
m. Going up or down ten stairs (about one flight of stairs).	20.97%	3.23%	0.00%	12.90%	62.90%
n. Standing for one hour	43.55%	37.10%	4.84%	8.06%	6.45%
o. Sitting for one hour	17.74%	8.06%	8.06%	4.84%	61.29%
p. Running on even ground	93.55%	6.45%	0.00%	0.00%	0.00%
q. Running on uneven ground	100.00%	0.00%	0.00%	0.00%	0.00%
r. Making sharp turns while running fast	100.00%	0.00%	0.00%	0.00%	0.00%
s. Hopping	74.19%	12.90%	6.45%	6.45%	0.00%
t. Rolling over in bed	17.74%	1.61%	1.61%	4.84%	74.19%

4.5 LEFS frequencies and percentages

Table 4.2 lists the percentage of item ratings in the LEFS questionnaire. Thirty (48.39%) participants had extreme difficulty or were unable to perform heavy activities around the home. Twenty-seven (43.55%) participants had extreme difficulty or were unable to stand for one hour. Only four (6.45%) had no difficulty standing for an hour. Fifty-eight (93.55%) participants had extreme difficulty or were unable to run on even ground.

All participants had extreme difficulty or were unable to either run on uneven ground or make sharp turns while running fast. All participants at six weeks post surgery were still using some form of assistive device, such as crutches, a wheelchair and walkers, to ambulate. Most participants either had no difficulty or a little bit of difficulty to do all other activities.

4.6 IMPACT-S frequencies and percentages

Table 4.3 illustrates the basic statistics of item rating in the IMPACT-S questionnaire. The mean score was 61.61 (+-SD 19.62). The range was 60, with the lower and upper quadrants at 53 and 87 respectively.

Table 4.3 IMPACT-S descriptive results (n=62)

Variable	Valid N	Mean	Std. Dev
IMPACT -S	62	61.61	19.62

The lowest IMPACT-S score was from 4.85% (n=3) of the participants who scored between 36 and 38 (37.5% and 39.58%) (Table 4.4). This indicates a poor level of participation.

The highest number of participants (n=45; 72.58%) scored more than 60% (>59 out of a total score of 92) on the IMPACT-S; this indicates a good to excellent level of participation. Fourteen (22.58%) participants scored between 39 and 53 (40.63% to 55.51%), indicating a fair level of participation.

Table 4.4 IMPACT-S scores percentages (n=62)

LEFS score range	Number of participants	Percentage of participants
36-38	3	4.85%
39-58	14	22.58%
59-92	45	72.58%
	Total=62	

4.7 Multiple Regression Analysis

4.7.1 Multiple regression analysis for lower extremity function

Table 4.5 Multiple regression analysis (n=62)

Six weeks post discharge									
Model Specification		**Regression results**					**Model Fit**		
Dependent Variable	Independent Variable	Regress Coefficient	95% CI for B	Standardised Regression Coefficient			Regression Analysis of Variance (ANOVA) Results		
		β		β	t-statistic	p-value	F-Statistic	p-value	Adj R-sqr
LEFS	Age	0.03	-0.49- 0.49	0.05	0.127	0.90	23.17	0.00	.97
	Gender	-0.08	-0.12- 0.03	1.25	-3.33	0.00			
	Pain	-0.90	-1.05- (-0.95)	0.33	-40.73	0.00			

A multiple regression analysis was computed to determine the associations between gender, age, and pain on the VRS and LEFS (Table 4.5). The regression analysis model predictor variables significantly predicted LEFS [f(3, 58)=616.2106; p<.0005 (p-value)], with an adjusted multiple correlation coefficient (R^2) of 0.9680. Only the variables gender and pain on the VRS added statistically significantly to the prediction, p<.05 [f(3.58)=616.2106; P<.0005, adjusted R^2=.97].

4.7.2 Multiple regression analysis for participation

A multiple regression analysis was done to determine the association between age, gender, and pain on the VRS and IMPACT-S, as shown in Table 4.6 below.

Table 4.6 Multiple regression analysis (n=62)

Six weeks post discharge									
Model Specification		**Regression results**					**Model Fit**		
Dependent Variable	Independent Variable	Regression Coefficient	95% CI for B	Standardised Regression Coefficient			Regression ANOVA Results		
		β		β	t-statistic	p-value	F-statistic	p-value	Adj R-sq
IMPACT-S	Age	-0.00	-0.07-0.06	4.26	25.08	0.00	295.50	0.00	.94
	Gender	-0.04	-0.71-0.62	0.06	-0.12	0.92			
	Pain	-0.98	-1.66- -0.29	1.43	-1.23	0.22			

The predictor variables statistically significantly predicted IMPACT-S. Only pain VRS was found to be statistically significant: $p<05$ [$F(3.58)=295.50$, $p<.0005$, adjusted $R^2=.94$].

4.8 Conclusion

In this study, participants were generally independent with most of the participants using walking aids to mobilise. At six weeks post surgery, the majority of participants presented with mild pain to no pain. When a multiple regression analysis was done, gender and pain significantly correlated with lower extremity function, but pain was the only variable which significantly correlated with participation.

CHAPTER 5: DISCUSSION

5.1 Introduction

The purpose of this study was to determine the level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg. This chapter will provide a detailed discussion of the results of the study. The inferences of this study, the limitations, and suggestions for future research will be included in this chapter.

5.2 Demographic representation

Of the 62 participants studied, most are females and were found to be older than 50 years. These findings are consistent with Jordan and Cooper (2002) who estimated that 75% of all hip fractures occur in women. In a population-based estimate in Minnesota, USA, it was estimated that, with an increase in age, a greater proportion of females (70%) are osteoporotic at the hip, which accounts for the gender differences.

This is confirmed by Fisher and Davis (2011) who found similar gender differences in Australia. The study found hip fracture rates rose from 1994 to 2001 by 80.5% in females and by 73.1% in males. There were gender- and age-related pathophysiological, behavioural and clinical factors underlying the differences in hip fracture epidemiology. These include low body weight, low physical activity, alcohol use, and calcium and vitamin D deficiency. No other studies were found in searches that had different findings.

Sullivan et al. (2016) found that men are half as likely to sustain a hip fracture and, in agreement Wang and Bhattacharyya (2011), found that women have higher rates of hip fractures than men. As individuals grow older, they are more likely to sustain a hip fracture; women 85 years and above were 18.73 times more likely to sustain a hip fracture than those aged 65–69 (95 % CI 18.36; 19.10; $p < .001$) (Sullivan et al., 2016).

The study found different types of fractures presented among participants. The most-often sustained fracture was an intertrochanteric fracture, followed by a neck of femur fracture. Tanner et al. (2010) found that for all genders, the proportion of intertrochanteric hip fractures increases with age. This could be due to a combination

of factors, such as the prominence of the greater trochanter, decreased adipose tissue around the greater trochanter, and the likelihood of the greater trochanter to absorb the impact during falling. Similar findings by Wang and Bhattacharyya (2011) show that hip fractures typically occur in the femoral neck and intertrochanteric regions, but infrequently in the subtrochanteric region. The authors also found that women have higher rates of intertrochanteric hip fractures than men. The third-most sustained fracture in this study was a subtrochanteric fracture and the least-often sustained fracture was the intra-articular fracture.

Four causes of hip fracture were recorded in this study. The most common causes of hip fracture were, firstly, falls and MVAs, secondly. This is followed by gunshots and then PVAs.

In a retrospective study by Farooq et al. (2005), results from 33 patients aged between 20 and 60 years who sustained a femoral neck fracture between 1995 and 2000 were reviewed. The study participants represent 5.6% of the total femoral neck fracture cases admitted to the unit during that period. It was found that in 26 patients (78.8%) the fracture resulted from high-energy trauma. The normal changes of ageing, like poor eyesight or poor hearing, make older people more prone to falls (American Family Physician, 2000). Also, the aged are likely to present with illnesses and physical conditions that can affect their strength and balance. The side effects of some medication can affect their balance and make them fall.

Different types of internal fixation devices were used among participants. The CMN was mostly used for the patients participating in this study. In a study by Ma et al. (2014) comparing CMN, Gamma nail, and DHS for extracapsular fractures, the CMN group had less blood loss and a shorter length of stay.

CMN fixation patients also performed better than DHS patients, with less blood loss and a lower rate of fixation failure. The second-most used internal fixation was the hemiarthroplasty at 17.74% (n=11), which was followed by screws at 14.52% (n=9). Wani et al. (2014) showed that arthroplasty had better Harris hip scores and fewer patients required reoperation for intracapsular fractures.

The least used method for fixation was the IMN at 9.68% (n=6). All subtrochanteric hip fractures in this study were managed with an IMN. A South African study was conducted by Swanepoel et al. (2017) involving 51 patients (48 males and two

females). The mean age was 28 years (range 16-50 years) and the mean follow-up period was 24.8 weeks (range 2-40 weeks) in the study. The average time to union was 17.2 weeks (7-40 weeks). No cases of fixation device failure and non-union were reported.

5.3 Postoperative pain, function and participation level

5.3.1 Pain perception

In a study by Morrison et al. (2003), patients with higher pain scores at rest were significantly less likely to be ambulating by postoperative day three ($P<0.001$), took significantly longer to ambulate past a bedside chair ($P=0.01$), and had significantly lower locomotion scores at six months ($P=0.02$).

Pain experienced by patients with hip fracture is very severe (Herr and Titler, 2009). A valuable dimension for the prognostic evaluation of patients with hip fractures is the intensity of pain (Arinzon et al., 2007). In a study by Kristensen (2013), patients with an intertrochanteric fracture experienced a lot frequently with moderate to severe pain through evaluation ($P<.001$), with linked poorer carrying out on the timed up and go (TUG) test (29.4 +/-12.8 seconds versus 18.3 +/-8.5 seconds).

In a study by Dasch et al. (2008), 1541 patients (mean age of 78.4 and 76.1% female) were enrolled. The prevalence of fracture-related hip pain was 13.4% (206 out of 1541 participants). Dasch et al. (2008) found different results and a lower number of participants experiencing pain. This could be attributed to the fact that the data was collected six to 12 months after surgery, providing plenty of time for the surgical scar and bone healing to take place.

The majority of the participants in this study experienced some form of pain. In this study, patients with severe pain and very severe pain had lower LEFS scores. This is expected as pain limits function. The physical performance of patients with hip fractures on being released from hospital is affected primarily by pain (Kristensen, 2013). To restore and sustain the level of physical activity after hip fracture, it should be important to manage pain (Salpakoski et al., 2014).

5.3.2 Postoperative functional level

Postoperative functional level in this study reflects the ability of an individual to perform activities of daily living following surgical fixation after sustaining a hip fracture. In a Portuguese study, Costa et al. (2009) found that at six and 12 months post discharge 51.7% of males and 68.9% of females were bedridden and 44% of males and 32.8% of females were unable to walk again on their own. This could be due to the fact they were old and frail. These results of Costa et al. (2009) reflect poorer outcomes compared to that of this study. In a South African study by Adam et al. (2013) a total of 66.7% of participants were independent with mobility at release from hospital at six weeks following discharge. In this study, most participants (72.58%) had a little bit of difficulty or no difficulty to walk between rooms.

Most participants in this study had no difficulty carrying out their usual hobbies, recreational or sporting activities. Most participants in this study had no difficulty walking two blocks. Most participants in this study had no difficulty rolling in bed and the least number of participants had extreme difficulty or unable to roll in bed.

Most participants had extreme difficulty or unable to perform heavy activities around the home and run on even ground. Participants attributed these restrictions to pain onset while doing these activities.

In a study by Kim et al. (2012), the recovery rate to preoperative functional ability of elderly patients within two years of hip fracture surgery was 38.6%. In this study, most participants had extreme difficulty or were unable to do hopping. This could be due to the majority of participants still experiencing some form of pain and being older. All participants had extreme difficulty or were unable to run on uneven ground or to make sharp turns while running fast. All participants at six weeks post surgery were still using some assistive devices, such as crutches, a wheelchair or a walker to ambulate. The participants needed external support, and this could be the reason they were unable to run.

The majority of participants in this study had a good to excellent LEFS score and thus a good to excellent functional level. Only gender and pain VRS variables added statistically significantly to the multiple regression analysis prediction. Females were more likely than males associated with lower levels of activity. Similarly having

higher levels of pain was associated with lower levels of activity. This is consistent with Morrison et al. (2003) who found that postoperative pain is associated with long-term functional impairment. Similarly, postoperative pain is associated with long-term functional impairment, delayed ambulation, and increased hospital length of stay following a hip fracture (Morrison et al., 2003).

5.3.3 Postoperative participation level

The postoperative participation level examined in this study reflects the ability of an individual to be involved and partake in social life and the community post-surgical intervention after sustaining a hip fracture.

The majority of participants could partake in organised societal life outside the family, in public, societal and civic areas of life.

Despite having a fracture to the hip, the majority of participants had no restrictions in aspects of mobility in relation to changing body positions or locations or by transferring from one place to another, carrying, moving or manipulating objects. The majority could ambulate using one or two crutches or a walker. This was due to the fact that most participants felt they still needed external support to help in walking.

The majority of participants could carry out single and multiple tasks, even when under pressure while handling these tasks. The majority of participants could feed themselves, look after their health, and wash and dry themselves. A few participants had a low IMPACT-S score. Most participants scored more than 60% (>59) on the IMPACT-S score. This highlights that the majority of participants in this study had good to excellent participation levels. Only pain VRS variables added statistically significantly to the prediction, $p<.05$. Higher levels of pain were associated with low levels of participation.

In a literature search, there were no available studies on IMPACT-S scores on hip fracture patients postoperatively.

5.4 Limitations of the study

Although the research had reached its aims, there were two noteworthy limitations in this study. Firstly, the cross-sectional study collected data on the whole study population at a single point in time to examine different outcome variables and the

relationship between the variables of interest. This provided a snapshot of the variables. The outcomes studied might change with time. A longitudinal study would be more appropriate to follow up on the participants.

Secondly, many variables could not be standardised, such as the length of time to surgery, surgical experience of the surgeon, and length and quality of rehabilitation that ultimately have an effect on postoperative functional outcome.

5.5 Implications

The finding that gender and pain affect functional outcome and that pain affects participation level have important implications for clinical practice. Patients presenting with increased pain levels should be referred to their surgeons immediately as there should not be any general reason to refrain from prescribing opioids in these patients for fear of potential abuse or mortality (Lindestrand et al., 2015). Physiotherapy management for pain should also be initiated in these patients. Identifying these patients who are at risk of not improving in functional and participation levels postoperatively may require a different rehabilitation approach and strategy. The minority of patients whose return to function was not rapid enough should undergo more intensive rehabilitation.

5.6 Recommendations for practice and future studies

In this study, the majority of fractures were caused by falls, MVAs and PVAs. A fall prevention programme implemented at the primary healthcare level would positively impact on the prevalence of falls and hip fractures and the consequences thereof in South Africa. Most MVAs and PVAs are associated with a number of risky behaviours (Parkinson et al., 2013). Drunk driving is one of the biggest threats to road safety in South Africa and continuous education by different role players is of utmost importance to prevent such risky behaviours on our roads.

Currently, in South Africa, step-down rehabilitation facilities serve patients with neurological disorders rather than post-surgical orthopaedic conditions. Specialised rehabilitation units catering for orthopaedic conditions should be developed and

available to South Africans as a step-down unit following traumatic injuries in patients who are at risk of having poor functional and participation outcome levels.

A future longitudinal study investigating the functional and participation level at three months, six months, a year and two years would be greatly beneficial to health professionals in South Africa and abroad. This would allow researchers to observe any change in functional and participation levels over a long period rather than as a once-off event.

CHAPTER 6: CONCLUSION

6.1 Conclusion

The results of this cross-sectional study to establish the postoperative functional and participation level in patients with a hip fracture indicate that the postoperative functional outcome following a hip fracture in the selected population in the public health system of South Africa is generally good. The factors that predict better functional and participation outcomes following a hip fracture in these patients are gender and pain level.

Hip fractures have different aetiologies at different ages. In this study, the young person or healthy adult, the fracture was caused by some form of impact (a high-energy blow) in the large majority of cases. Hip fracture is associated with a significant reduction in function and participation. Some of the most important interventions that can be offered to these patients by health care professionals are education and preventative measures to protect them from the trauma associated with a fall and subsequently a hip fracture. For those patients who sustain a hip fracture and are at risk of poor functional and participation outcomes, intensive rehabilitation is especially necessary.

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APPENDIX A: LOWER EXTREMITY FUNCTIONAL SCALE

Instructions

We are interested in knowing whether you are having any difficulty at all with the activities listed below **because of your lower limb problem** for which you are currently seeking attention. Please provide an answer for **each** activity.

Today, *do you* or *would you* have any difficulty at all with:

Activities	Extreme difficulty or unable to perform activity	Quite a bit of difficulty	Moderate difficulty	A little bit of difficulty	No difficulty
1. Any of your usual work, housework or school activities	0	1	2	3	4
2. Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
3. Getting into or out of the bath.	0	1	2	3	4
4. Walking between rooms.	0	1	2	3	4
5. Putting on your shoes or socks.	0	1	2	3	4
6. Squatting.	0	1	2	3	4
7. Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
8. Performing light activities around your home.	0	1	2	3	4
9. Performing heavy activities around your home.	0	1	2	3	4
10. Getting into or out of a car.	0	1	2	3	4
11. Walking 2 blocks.	0	1	2	3	4
12. Walking a mile.	0	1	2	3	4
13. Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
14. Standing for 1 hour.	0	1	2	3	4
15. Sitting for 1 hour.	0	1	2	3	4

16. Running on even ground.	**0**	**1**	**2**	**3**	**4**
17. Running on uneven ground.	**0**	**1**	**2**	**3**	**4**
18. Making sharp turns while running fast.	**0**	**1**	**2**	**3**	**4**
19. Hopping.	**0**	**1**	**2**	**3**	**4**
20. Rolling over in bed.	**0**	**1**	**2**	**3**	**4**
Columns totals					

APPENDIX B: THE IMPACT ON PARTICIPATION QUESTIONNAIRE

IMPACT-S

ICF-Measure of Participation and Activities

Screener

INSTRUCTIONS:

The following questions concern aspects of daily life in which you possibly experience limitations as a consequence of your health or handicap.

Each question starts with: As a consequence of your health or handicap do you experience any limitations.

For each question you can give one of the following answers:

No, no limitations whatsoever

- you perform this activity independently without difficulty and at a normal speed
- you experience limitations in performing an activity, but these are not a consequence of your health or handicap
- you do not perform this activity, but you do not experience this as a limitation

Yes, some limitations

- for example: the activity costs you more time, you have to pause and rest during the activity, you do the activity less often, or you do the activity for less long, et cetera

Yes, considerable limitations

- for example: you receive help during an activity, the activity costs you far more time, you frequently have to pause and rest, you do the activity far less often, you do the activity for less long, et cetera

Yes, I cannot do that at all

- you cannot carry out this activity at all
- due to your treatment or therapy you are not yet in a position to perform the activity

Important

1. For each question several examples of activities are given. It might well be the case that the activity which you perform in the area specified is not listed. You are advised not to base your answer exclusively on the examples given.
2. It might be the case that you experience no limitations with one example stated for a given question and yet with another example you do. In that case, base your answer on the example for which you do experience limitations.
3. It is possible that you use a medical device in a given situation, but that you do not feel limited as a result of this. In that case answer that you experience no limitations.

1. Do you experience any limitation in the use of one of your senses?
For example:

- Watching
- Listening
- Tasting
- Smelling
- Feeling (hot, cold, texture of substance)

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

2. Do you experience any limitation in (re)learning things?
For example:

- Learning to read, write or count
- Learning how to use an object or a new piece of equipment
- Learning a new sport or a game

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

3. Do you experience any limitation due to problems with your memory, concentration or when thinking things over?
For example:

- Remembering events or appointments
- Continuing to listen to what someone says
- Solving language or number problems
- Choosing what you will eat in the evening

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

4. Do you experience any limitation in the planning and realisation of certain activities in a quiet environment where no pressure is placed upon you?
For example:

- Starting something
- Finishing things off
- Organising time and tasks well
- Working with others
- Keeping to appointments

□No, no limitations whatsoever

Yes, some limitations
Yes, considerable limitations
Yes, I cannot do that at all

5. Do you experience any limitation in the planning and realisation of certain activities in a busy environment in which you are put under pressure?
For example:

- Starting something
- Finishing things off
- Organising time and tasks well
- Working with others
- Keeping to appointments

No, no limitations whatsoever
Yes, some limitations
Yes, considerable limitations
Yes, I cannot do that at all

6. Do you experience any limitation in understanding people or images if these want to make something clear to you?
For example:

- If people say something
- By means of their posture / gestures
- By means of images on traffic signs or cards
- By means of written messages

No, no limitations whatsoever
Yes, some limitations
Yes, considerable limitations
Yes, I cannot do that at all

7. Do you experience any limitation if you want to make it clear to others what you mean?
For example:

- If you say something
- By means of your posture
- If you write something down

No, no limitations whatsoever
Yes, some limitations
Yes, considerable limitations
Yes, I cannot do that at all

8. Do you experience any limitation in holding a conversation?
For example:

- Starting or ending a conversation

- Talking with several people at once
- Deeper conversations or discussing a subject
- Talking via a (mobile) phone or computer

□No, no limitations whatsoever
□ Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

9. Do you experience any limitation in changing or maintaining posture
For example:

- The act of sitting down, lying down or standing up
- Stooping, squatting or kneeling
- Remaining in a sitting, lying down or standing position for a longer period of time

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

10. Do you experience any limitation in lifting or carrying light or heavy objects?
For example:

- 1 litre bottle of water
- Full bucket of water
- Small child

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

11. Do you experience any limitation in moving objects using the legs or feet?
For example:

- Pushing round the pedals on a bike
- Pushing away objects
- Kicking a ball

□No, no limitations whatsoever
□Yes, some limitations
□ Yes, considerable limitations
□ Yes, I cannot do that at all

12. Do you experience any limitation in exerting precise control over the use of the hand?
For example:

- Doing up the buttons on a blouse

- Grabbing hold of a door knob
- Picking up or putting down coins

□ No, no limitations whatsoever
□ Yes, some limitations
□ Yes, considerable limitations
□Yes, I cannot do that at all

13. Do you experience any limitation in performing large movements with the hand or arm?
For example:

- Catching and throwing an object
- Pulling or pushing
- Picking up an object above head height

□ No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

14. Do you experience any limitation in walking, with or without the use of an aid?
For example:

- Walking indoors
- Walking outdoors
- Walking longer distances (more than 1 kilometre)
- Negotiating stairs (more than two steps)

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

15. Do you experience any limitation in using a mode of transport?
For example:

- Bike, scooter or moped
- Public transport
- Driving a car or riding a motorbike
- Passenger in a car or taxi

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

16. Do you experience any limitation when washing, taking a shower, having a bath or when getting dressed or undressed?
□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

17. Do you experience any limitation in maintaining your personal hygiene or in going to the toilet at home or outside of your home?
For example:

- Also: care associated with incontinence or with a stoma
- Caring for your skin, hair, teeth, fingernails or toenails

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

18. Do you experience any limitation in looking after your health?
For example:

- Being able to feed/drink yourself
- Ensuring a good physical condition
- Healthy lifestyle
- Avoiding excessive use of alcohol or drugs
- Avoiding cold or pain

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

19. Do you experience any limitation in doing your (daily) shopping?
For example:

- Selecting items
- Paying
- Transportation

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

20. Do you experience any limitation in performing household activities?
For example:

- □ Cleaning or tidying up in and around the house
- □ Cooking and washing up
- □ Doing the washing
- □ Changing the sheets

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

21. Do you experience any limitation in looking after your plants, animals or belongings?
For example:

- Repairing clothes

- Looking after animals/pets
- Looking after plants or the garden

□No, no limitations whatsoever
□ Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

22. Do you experience any limitation in helping other people?
For example:

- Helping with homework
- Taking care of ill family members
- Bringing up (grand)children

□ No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

23. Do you experience any limitation in acting towards other people in a socially acceptable manner
For example:

- Showing respect or appreciation
- Shaking hands /giving a pat on the back
- Hugging / kissing
- Controlling your emotions

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

24. Do you experience any limitation in initiating and maintaining formal relationships?
For example:

- With strangers
- With colleagues
- With shop staff

□No, no limitations whatsoever
□ Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

25. Do you experience any limitation in initiating and maintaining informal relationships or family relationships?
For example:

- With friends or acquaintances
- With parents or children
- With brothers or sisters
- With grandparents, uncles or aunts

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

26. Do you experience any limitation in initiating and maintaining intimate relationships?
For example:

- □ Romantic relationships
- □ Cohabitation relationships (marriage, stable partnership)
- □ Sexual relationships

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□ Yes, I cannot do that at all

27. Do you experience any limitation in following an educational programme, in your work or in finding employment (paid or unpaid)?
For example:

- Learning or studying, following a programme of study/course
- Finding employment, applying for a job or having a job
- Performing tasks that are a part of the job
- Working with other pupils, students or colleagues
- Transportation to or accessibility of buildings

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

28. Do you experience any limitation in managing money or other financial matters?
For example:

- Paying for shopping or purchases in the shop
- Managing a (savings) account
- Complex financial issues such as negotiating a mortgage

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

29. Do you experience any limitation in taking part in social activities?
For example:

- Participating in a club or organisation
- Attending weddings or funerals

□No, no limitations whatsoever
□Yes, some limitations
□ Yes, considerable limitations
□Yes, I cannot do that at all

30. Do you experience any limitation in taking part in recreational activities or leisure activities?
For example:

- Going out (cafe, show)
- Visiting people
- Hobby, (competitive) sport or game
- Travelling

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

31. Do you experience any limitation in taking part in religious or spiritual activities?
For example:

- Attending and participating in a church service, visiting a mosque, etc.
- Praying, meditating, etc.

□No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

32. Do you experience any limitation in fulfilling your role as a citizen?
For example:

- Participating in elections, voting
- Attending meetings
- Participating in demonstrations
- (Active) membership of a political party

□ No, no limitations whatsoever
□Yes, some limitations
□Yes, considerable limitations
□Yes, I cannot do that at all

APPENDIX C: PAIN VERBAL RATING SCALE

APPENDIX D: INFORMED CONSENT

I, the patient, have been fully informed of what the study entails and what will be required of me. I have read the information sheet and any question that I had concerning the study has been answered to my satisfaction. I understand that my participation is voluntary and that my personal information will remain confidential. By signing this document, I give consent to participate in this study.

Name of patient: _____

Signature of patient: _____

Date: _____

APPENDIX E: CONSENT FORM: USE OF CLINICAL INFORMATION

Dear Patient

Thank you for participating in this study. For this study I require to extract information from your hospital file. The use of such information is subject to:

1. Approval from the Human Research Ethics Committee of the University of Witwatersrand.

2. Anonymity i.e. -the identity of the patient whose file information is extracted is never revealed to anyone but the researcher.

I would like to obtain your consent to use information from your file for the purpose of research. If you choose to not give consent, this will not compromise your treatment in any way.

Should you wish to contact the researcher at any stage regarding this consent, contact Masilo Motloutsi at 073 945 7285

I, _____ hereby give consent for my records to be used as per the above mentioned conditions for the purposes of research:

Signature

_____

Date:

_____

APPENDIX F: DEMOGRAPHIC QUESTIONNAIRE

Diagnoses	
Age	
Nationality	
Race	
Gender	

APPENDIX G: RELEVANT MEDICAL HISTORY

Date of fracture:_____

Type of fracture: _____

Date of admission: _____ Date of surgery: _____

Type of surgical procedure performed: _____

Date of discharge: _____Number of physiotherapy sessions: _____

Development of in-hospital complications:
_____
_____
_____
_____
_____
_____

Medication prescribed:

_____
_____
_____
_____
_____
_____

APPENDIX H: LETTER TO HOSPITAL STAFF

Dear Colleagues

I, Masilo Motloutsi, am doing my physiotherapy masters dissertation on the "Level of physical impairment, function and participation six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg."

In order to carry out the above study, I will require patients who meet the following inclusion criteria:

- Patients who were admitted to Chris Hani Baragwanath Academic Hospital/ Charlotte Maxeke Johannesburg Academic Hospital
- Patients managed with any of the following: a cannulated screws, hemiarthroplasty, proximal femoral nailing arthrosis, dynamic hip screw and plate and total hip replacement following a first time unilateral traumatic hip fracture.

When a patient that meets the above criteria is seen at the orthopaedic clinic or physiotherapy department, I would appreciate it if you could inform me. Please see below for my contact details.

Thanking you,

Masilo Motloutsi

0739457285

masilomj@yahoo.co.uk

APPENDIX I: ACCESS LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH

University of the Witwatersrand

School of Therapeutics

Department of Physiotherapy

Khanya Building

7 York Road

Parktown

The Hospital CEO and research committee

Chris Hani Baragwanath Academic Hospital/ Charlotte Maxeke Academic Hospital

Date

Dear Ms/Mr

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

I am a registered Master's student in the Department of Physiotherapy at the University of the Witwatersrand. My supervisors are Mr. Siyabonga Kunene and Ms. Vaneshveri Naidoo

The proposed topic of my research is:

Level of physical impairment, function and participation six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg.

The objectives of the study are to determine:

1 To determine the participants' demographic profile
2 To determine the participants' physical impairments
3 To determine the participants' activity limitations

4 To determine the participants' physical participation restrictions

5 To determine the level of pain among participants

6 To find association between participants' demographic profile and other variables (physical impairment, activity limitation, participation restriction and pain).

I am hereby seeking your consent to do the study in your hospital. I have attached to this letter:

(a) A copy of an ethical clearance certificate issued by the University

(b) A copy the research instruments which I intend using in my research

(c) A copy of the research proposal

Should you require any further information, please do not hesitate to contact me or my supervisors. Our contact details are as follows:

Siyabonga Kunene 011 717 3707 siyabonga.kunene@wits.ac.za

Vaneshveri Naidoo 011 717 3729 vaneshveri.naidoo@wits.ac.za

Masilo Motloutsi 073 945 7285 masilomj@yahoo.co.uk

Results of this study will be available via publication.

Your permission to conduct this study at your facility will be greatly appreciated.

Yours sincerely,

Signature

Masilo Motloutsi

APPENDIX J: PARTICIPATION LETTER

Dear Patient

I, Masilo Motloutsi, am doing my physiotherapy masters dissertation on the "Level of physical impairment, function and participation six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg."

In order to carry out the above study, I will require your participation if you meet the following inclusion criteria:

- You were admitted to Chris Hani Baragwanath Academic Hospital/ Charlotte Maxeke Johannesburg Academic Hospital
- You had surgery and were managed with any of the following: a cannulated screws, hemiarthroplasty, proximal femoral nailing arthrosis, dynamic hip screw and plate and total hip replacement following a first time unilateral traumatic hip fracture.

If you meet the above criteria and are interested in taking part in the study and are seen at the orthopaedic clinic or physiotherapy department, I would appreciate it if you could inform me. Please see below for my contact details.

Masilo Motloutsi 073 945 7285 masilomj@yahoo.co.uk

Thank you,

Masilo

APPENDIX K: INFORMATION SHEET

Study title:

Level of Physical Function Six Weeks Post Hip Fracture Surgery Among Patients In Two Public Hospitals In Johannesburg.

Greeting:

Hello

Introduction:

My name is Masilo Motloutsi, I am a physiotherapist and a masters student in physiotherapy, University of the Witwatersrand. For my masters I am doing research on the Level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg. Research is a way of finding an answer to a question. In this study, I want to learn what is the level of participation and physical function six weeks post hip fracture surgery among patients in two public hospitals. This study is not routine for all patients who come to the hospital.

Invitation to participate:

I am inviting you to be a part of this research study.

What is involved in the study:

If you agree to part take, I will come interview you at your six week orthopaedic clinic visit after hip surgery. This assessment will comprise of one interview that you will need to partake in and it should take approximately 20 minutes. The questions will be directed at your function after the hip fracture (when you broke your hip). This assessment will not require you to do any activities that may cause you any sort of pain or discomfort.

You will still receive the usual care that the hospital offers; this will include physiotherapy treatment by the hospital physiotherapist. After this assessment you will be able to return home.

Risks:

There are no risks involved in participating in this study. During your assessments I will be there to provide you with additional answers to any questions related to the study.

Benefits:

There are no benefits of being in the research study. By participating in this study you will help future therapists and health care professionals to improve the way in which they care for persons with hip fractures.

Alternative:

If you chose to not be a part of this research study you will receive the usual treatment. You will not lose the benefits you are otherwise entitled to as a result of the refusal, you will not

be penalised for refusal. Participation in this study is completely voluntary and you may withdraw at point during the study without having to explain yourself.

Reimbursements:

There are no reimbursements to partake in this study as you will be interviewed during your scheduled six week orthopaedic clinic visit.

Confidentiality:

Efforts will be made to keep all personal information confidential. Your name will not be mentioned in any of the data, a participant code will be allocated to you to maintain anonymity.

Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law. Organisations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the Research Ethics Committee.

Contact details or researcher:

If you would like to contact me at any time, you can reach me on 073 945 7285.

Contact details of REC administrator and chair:

If you have any complaints that you would like to report, you can contact Prof Cleaton-Jones (Chairman of the Research Ethics Committee) on 011 717 1234

Thank you,

Mr Masilo Motloutsi

073 945 7285

APPENDIX L: ETHICAL APPROVAL FROM THE UNIVERSITY OF THE WITWATERSRAND HUMAN RESEARCH ETHICS COMMITTEE

R14/49 Mr Masilo Motloutsi

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170530

NAME: (Principal Investigator)	Mr Masilo Motloutsi
DEPARTMENT:	Physiotherapy Charlotte Maxeke Johannesburg Academic Hospital Chris Hani Baragwanath Academic Hospital
PROJECT TITLE:	Level of Physical Function Six Weeks Post Hip Fracture Surgery among Patients in Two Public Hospitals in Johannesburg
DATE CONSIDERED:	26/05/2017
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Siyabonga Kunene and Vanesbveri Naidoo
APPROVED BY:	Professor A. Woodiwiss Co-Chairperson, HREC (Medical)
DATE OF APPROVAL:	08/09/2017

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 Research Office Secretary in Room 10004,10th floor, Senate House/3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the conditions under which I am/we are authorised 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 to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially review May and will therefore be due in the month of May each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX M: PERMISSION FROM THE RESEARCH COMMITTEES OF THE HOSPITALS IDENTIFIED

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Mr. Johannes Maepa
Office of the Clinical Director
Tell: (011) 488-3365
Email:johannes.maepa@gauteng.gov.za
01 August 2017

Dear Mr. Masilo Motloutsi

STUDY TITLE: Level of physical function six weeks post hip fracture surgery among patients in two public hospitals in Johannesburg.

Permission to conduct the above mentioned study is provisionally approved. Your study can only commence once Ethics approval is obtained. Please forward a copy of your ethics clearance as soon as the study is approved by the Ethics committee for the CEO's to give you the final approval to conduct the study.

Supported / ~~not supported~~

Dr. M.I. Mofokeng
Clinical Director
DATE: 2/8/2017

Approved/not approved

Ms G. Bogoshi
Chief Executive Officer
Date: 10-8-2017