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AN AUDIT OF THE PHYSIOTHERAPY MANAGEMENT OF PARAPLEGIC PATIENTS WITH SACRAL PRESSURE SORES.

Denisha Pather

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Physiotherapy.

Johannesburg, 2012

DECLARATION

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

----------- (Signature of candidate)

----------day of ----------, 2012.

DEDICATION

To my parents for their emotional support combined with unwavering love which enabled me to turn this dream into a reality.

ABSTRACT

Introduction:

Pressure sores are the most common complication post spinal cord injury. Pressure sores of the sacral area commonly occur and often lead to patients being placed on bed rest. Bed rest periods delay rehabilitation, and may lead to other complications associated with immobility. Physiotherapy is crucial for these patients to decrease complications and increase function. This study set out to establish the treatment interventions physiotherapists provide to patients with sacral pressure sores and the factors that they take into consideration when deciding whether the patient should receive physiotherapy in bed (in the ward) or in the gym environment.

Methods:

This was a cross sectional survey administered to physiotherapists working in neurological rehabilitation units around South Africa that treat patients with spinal cord injuries. A self-administered questionnaire was used for data collection. The questionnaires were sent to all eligible physiotherapists via email. All the data was captured onto an excel spread sheet. Data collected were presented as frequencies and percentages with the aid of tables, pie charts and bar graphs as was appropriate.

Results:

Thirty-nine physiotherapists responded which showed a response rate of 76%.The majority of the respondents were female (98%). There were 11 rehabilitation facilities represented in the study with the majority of the respondents being from the private sector (69%) and 31% from the public sector. The most common practice for patients with sacral pressure sores is to be placed onto bed rest (98%). Nineteen physiotherapists stated that they did not have set protocols for the treatment of patients with sacral pressure sores. The most common physiotherapy interventions (70%) when the patient is on bed rest are upper limb strengthening, lower limb passive movements, positioning into prone and side lying as well as upper limb passive movements and passive stretching. The same were done when the patient was brought to the gym except that bed mobility training then also formed part of

common intervention as well as the use of the tilt table for passive standing. The treatment environment was dependant mostly on doctors' orders and the size, grade and duration of the pressure sores. The choice of treatment techniques was guided mostly by past clinical experience or the successful experience of colleagues.

Conclusion:

There is a need for the development of standardised protocols when treating spinal cord injured patients with sacral pressure sores to possibly ensure maximal healing and rehabilitation.

Key words: Physiotherapy management of paraplegic patients, sacral pressure sores, bed rest

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List of Abbreviations

SCI	Spinal Cord Injury
LOS	Length of stay
NICE	National Institute of Clinical Excellence
NPUAP	National Pressure Ulcer Advisory Panel
ASIA	American Spinal Injury Association
RNAO	Registered Nurses Association of Ontario
AHCPR	Agency for Healthcare and Policy Research
HPVC	High voltage pulsed current
EPUAP	European Pressure Ulcer Advisory Panel
US	Ultrasound
UVC	Ultraviolet C
NMES	Neuromuscular electrical stimulation
EBP	Evidence based practise

CHAPTER ONE

1 INTRODUCTION

1.1 Background and Need

Spinal cord injuries remain a major health concern the world over. There have been many studies done on the secondary complications post spinal cord injury (SCI). Pressure sores have been found to be the most common complication post SCI (Aito, 2003).In South Africa, epidemiological data on pressure sores is limited. The national pressure ulcer advisory panel in America documented the incidence of pressure sores in SCI to be around 62.4% (NPUAP, 2001). The prevalence of pressure sores varies between 12.8 % (Aquilani et al., 2001) and 38% (Ash, 2002) in a rehabilitation setting. Twenty nine percent of patients are admitted to the hospital and rehabilitation setting with pre-existing pressure sores (Ash, 2002).

Limited activity, higher age, friction and shear forces while lying down or being seated are amongst the major factors associated with pressure sore development in a hospital setting (Wann-Hansson et al., 2007). This agrees in part to Lindgren et al. (2004)'s finding that immobility was the most important contributing factor to the development of pressure sores. Spinal cord injured patients' decreased level of activity, lack of neurological protective sensation (Rappl, 2008), progressive loss of muscle bulk and reduced vascular response to loading (Markhous et al., 2007) all contribute to their high rate of pressure sores.

About 46% of pressure sores are sacral sores (Ash, 2002). Similarly, Garber et al. (2003) found that two thirds of pressure sores were in the pelvic region i.e. affecting the sacrum, coccyx, Ischial tuberosities and trochanters. The high number of ischial tuberosity pressure sores among paraplegics is because they exert18.8mmHg higher interface pressure over the ischial tuberosities than unaffected people (Markhous et al., 2007).

Clinical guidelines state that "a client who has a pressure sore on a seating surface should avoid sitting" (Virani et al., 2002). The period of immobilisation may be prolonged as the wounds in patients with SCI are usually slow to heal although further research is still required to identify the exact cause of slow healing rates

(Rappl, 2008). In addition to the many physiological complications associated with immobilisation such as lung complications, decreased metabolism, decreased perfusion of tissues due to changes in control of autonomic nervous system and osteoporosis (de Boer et al., 2008; Brower, 2009; Norton et al., 2004), the prescription of bed rest leads to delays in starting the active rehabilitation of the patient. Early rehabilitation is associated with greater improvement in activities of daily living (Scivoletto et al., 2005).

The occurrence of complications such as pressure sores is associated with a longer hospital stay and this length of stay (LOS) has a strong positive correlation with the number of bed rest days prescribed (Post et al., 2005).The LOS for patients with a pressure sore was found to be 36.1 days more than patients without pressure sores. It was estimated that patients with pressure sores required an additional 42 to 59 days of inpatient rehabilitation or hospitalisation (New et al., 2004; Ash, 2002). The bed rest prescription also strongly correlates with poorer functional outcomes; thus patients who require longer stays in a rehabilitation unit or have been on bed rest have poorer functional outcomes.

The role of the rehabilitation team has been clearly outlined in terms of the prevention of pressure sores by means of different sitting protocols (Markhous et al., 2007), education (Rintala et al., 2008), nutritional adequacy (Cannon et al., 2004) and the importance of maintaining mobility as much as possible (Correa et al., 2006).The National Institute of Clinical Excellence (NICE) guidelines states that patients with grade I-II pressure sores should receive mobility, positioning and seating interventions, however these guidelines are not profession specific and do not give guidance on interventions for patients with pressure sores of grade III and above (NICE, 2005).

Guihan et al. (2009) found that standard practice for patients post spinal cord injury included prevention of sores, direct wound care and intervention post healing. However, the environment in which patients are treated may allow or limit certain physiotherapy interventions. Therefore, the exploration of the factors which affect the choice of treatment environment is essential towards best practice and functional outcomes of these patients.

1.2 Problem Statement

Patients with spinal cord injuries that have pressure sores would benefit from early rehabilitation intervention from a physiotherapist. However, a more standardised intervention from physiotherapists tends to be the prevention of pressure sores and intervention post pressure sore healing. Studies done globally show that the role of physiotherapists include the use of direct intervention measures such as electrotherapy and laser in managing pressure sores. However, no studies relating to either the direct or indirect intervention of patients with pressure sores has been done in South Africa. Therefore, an investigation into the nature of physiotherapists' intervention when managing a paraplegic patient with sacral pressure sores would be beneficial. This would establish whether adequate rehabilitation protocols are in place for patients with sacral pressure sores.

1.3 Aim of the Study

To determine how paraplegic patients with sacral pressure sores are being managed by physiotherapists.

1.3.1 Objectives of the study

- To establish how physiotherapists in South Africa are managing paraplegic patients with sacral pressure sores.
- To establish the factors that physiotherapists take into account when deciding upon which treatment environment to manage paraplegic patients with sacral pressure sores.

1.4 Significance of Study

When a patient develops pressure sores of grade II and above especially in the sacral region, the medical prescription of choice tends to be bed rest (Rappl, 2008; Virani et al., 2004). A prescription of bed rest is usually over a prolonged period of time due to slow healing rates of pressure sores (Rappl, 2008). Bed rest has been found to decrease a patients functional outcome and can have many severe complications due to prolonged immobility.

Giuhan et al. (2009) found that therapists lack standardised protocols when managing patients with SCI who have pressure sores. It is therefore essential that we establish the current practice by physiotherapists in South Africa when managing paraplegic patients that have developed sacral pressure sores so that further studies, if necessary, may then be done on the effectiveness of those interventions.

There are many factors that influence decisions on whether or not these patients receive treatment from therapists and whether the therapy is given in the bed rest position in the ward or in the gym environment. It is important for us to know the factors the physiotherapists in South Africa take into consideration when making these decisions. This will help us determine whether this is being based on sound reasoning or if there is a need for us to change so that the functional ability of paraplegic patients with pressure sores can be improved.

The results of this survey could also be used to motivate that best practise guidelines be developed for the management of patients with SCI who have pressure sores in order to ensure a uniform evidence-based approach by all physiotherapists.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

This chapter of the research report describes the literature that was used to provide insight around the objectives of the study. The aim of this review was to describe the impact of sacral pressure sores on paraplegic patients and how these pressure sores and associated factors then influence their physiotherapy management.

A definition of pressure sores and their grades will be discussed to explain the use of grade II and above pressure sores in the questionnaire. Following on from this, the incidence and prevalence of sacral pressure sores will give insight into the extent of this complication in paraplegic patients therefore indicating whether a study focusing on this particular patient group is beneficial. A brief review of the factors contributing to pressure sores in paraplegic patients will be done before discussing how characteristics of the pressure sore itself impact on physiotherapy. Various physiotherapy modalities that may be used to directly treat the pressure area, the efficacy of these modalities will be explored in the literature.

The search engines used for this literature review were the Cochrane database, Pub med, Google Scholar and Pedro Database and the search words that were used included paraplegia, sacral pressure sores, physiotherapy interventions, wound care management and bed rest

2.2 Definition and Classification of Pressure Sores

The National Pressure Ulcer advisory panel (NPUAP) defines a pressure sore as a “localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure with a combination of shear and/or friction” (NPUAP, 2007). There are stages in which pressure sores progress in severity. The

staging system used by the NPUAP was revised in 2007 and is used consistently in the literature and supported by many other guideline organisations. At stage I a patient will present with intact skin that has a localised area of non-blanchable redness, this area usually appears over a bony prominence (NPUAP, 2007; RNAO, 2007; NICE, 2007). Stage II will be indicated by a shallow open sore with a pink wound bed which results from partial thickness loss of the patients' dermis. An intact or ruptured serum-filled blister may be another indication of a stage II pressure sore (NPUAP, 2007; RNAO, 2007; NICE, 2007).A stage III sore has full thickness tissue loss but the bone, tendon and muscles are not exposed (NPUAP, 2007; RNAO, 2007; NICE, 2007). When bone, tendon or muscle is exposed it is a stage IV sore. At this stage slough may be present on the wound bed (NPUAP, 2007). Grade III-IV pressure sores are deep sores going into the chronic phase which have been shown to be unresponsive to conventional therapy (RNAO, 2007).

2.3 The Prevalence and Incidence of Pressure Sores

Sacral pressure sores which are located on the seating surface of the patient have been found to have a high prevalence amongst patients with SCI (Verscheruen et al., 2011; Vanglider, 2008; New et al., 2004). A study done in the Netherlands set out to determine the occurrence of pressure sores during the inpatient SCI rehabilitation phase by using a multicentre cohort study. Forty three percent of the 225 patients included in this study had pressure sores located on the sacrum (Verscheruen et al., 2011). Similarly, an international pressure sore survey carried out by Vanglider (2008) between 1989 and 2005 found that sacral pressure sores had the highest incidence.

Verscheruen et al. (2011) found pressure sores of grade I and II to have the highest incidence. The incidence of grade I-II pressure sores during the acute rehabilitation phase was in turn to found to be the strongest risk factor for Grade III-IV pressure sores in the functional rehabilitation phase (Verscheruen et al., 2011). New et al. (2004) yielded different findings in their three year retrospective study of a spinal rehabilitation hospital which looked at the characteristics of pressure sores. Their study found grade III-IV pressure sores to have the highest incidence at both the

acute admission phase as well as the re-admission phases with 57% and 43% incidence rates respectively. Almost the same figure of 58% Grade III-IV pressure sores was found in the acute phase of a survey done throughout Germany in 2001 and 2002 of neurologically deficit patients (Lahmann, 2004).

Cardenas et al.(2004) examined the demographics of patients with SCI being re-hospitalised and the reason for re-admissions. In their study, they found pressure sores to be the most common reason for re-hospitalisation in patients with American Spinal Injury Association Scale (ASIA) A, B or C paraplegia in comparison to any level of those patients with tetraplegia (Cardenas et al., 2004) When focusing on patients that are currently in the in-patient SCI rehabilitation phase, Verscheruen et al. (2011) found their paraplegic patients to present with 26% occurrence of pressure sores.

There is no South African data available on pressure sore prevalence/incidence rates. However, the rate of trauma in certain countries in sub-Saharan Africa is ever increasing which may then contribute to increasing rates of spinal cord injuries (Silberg et al.,2006). The complications found post spinal cord injury are similar in both the developing and the developed countries with the developing countries displaying increased incidence rates (Rathore,2012). The lack of access to specialised technologies and medical and pressure risk assessment may be responsible for the increasing pressure sore risk in developing countries (Rathore, 2012). There are however many factors that contribute towards the development of worsening of pressure sores.

2.4 Factors Contributing Towards the Development or Worsening of Pressure Sores

There are many factors correlated with the development or worsening of pressure sores which may affect whether patients receive full rehabilitation in the gym or bed exercises in the ward. Pressure sores in the sacral area become more difficult to manage if a patient has urinary and/or faecal incontinence (Beldon,2008).Uncontrolled urinary incontinence leads to over hydration of the skin,

making the skin more vulnerable to friction and shearing forces. These forces then result in the development or worsening of pressure sores. If faeces remain on the skin during faecal incontinence, enzymes which lead to further skin irritation may be activated (Beldon, 2008). This may then lead to painful incontinence dermatitis and predisposition to pressure sore development. Local infections may delay the healing of pressure sores and therefore infection must be controlled (Teasell et al., 1993). Pressure sores must be protected from sources of contamination especially in the case of faecal contamination with sacral pressure sores (Virani et al., 2010).Infection may delay rehabilitation due to isolation periods.

Paraplegic patients suffering from personality disorders or depression have an increased risk of developing or worsening of pressure sores (Correa, 2006). It has been found that depression affects a patient's problem solving and coping strategies. This has been correlated with both an increased history of previous pressure sores and contributes to their chances of developing further pressure sores (Krause et al., 2004).Once a pressure sore has developed, there are accompanying psychological factors associated with fear, frustration and anxiety (Fox, 2002). Contributing to these psychological factors is the immense feeling of social isolation and loss of independence experienced by patients when placed on bed rest (Fox, 2002).

Deeper pressure sores are often assumed not to be painful, however a qualitative study looking at the experience of patients suffering from chronic wounds found pain to be a common theme (Fox, 2002). The pain resulting from the pressure sores contributed to a substantial amount of sleep disturbance. Patients placed on pain medication, analgesics or any other medication also have an increased risk of worsening pressure sores (Byrne et al., 1996). Sleep deprivation from physiological and psychological factors may have a negative impact on wound healing (Fox, 2002).

Spasticity is a common complication post spinal cord injury; it encompasses increased muscles tone, involuntary movements and primitive reflexes (Hasima, 2007). Therefore, spasticity may contribute towards increased levels of friction, shear and immobility. Spasticity has been found to be more common in those that develop pressure sores as opposed to those who do not but the causal relationship is not fully understood (Byrne et al., 1996).

Poor nutritional status or poor food and fluid intake is another factor contributing to pressure sores as it is associated with delayed healing (Verscheruen et al., 2011; Byrne et al., 1996). This may then lead to the patient not having the correct nutritional support to participate in rehabilitation. Early identification and intervention in order to correct malnutrition can alter the rate at which pressures sores heal. A multidisciplinary approach is essential when addressing nutritional goals in order to gain successful outcomes (Virani et al., 2010).

The severity of the spinal cord injury (in terms of the completeness of the injury) is also a factor that may contribute to causation or worsening of pressure sores. The completeness of the injury will affect both the level of mobility and therefore patients' ability to relieve pressure as well as the patients' level of sensation and patients' ability to detect unrelieved pressure (Byrne et al., 1996; Gelis et al., 2009; Verscheruen et al., 2011). The patients' level of mobility and subsequent modes of mobility may affect whether the patient is able to attend gym treatments. Pressure is the major causative factor in pressure sore formation (Virani et al., 2007); therefore the patients' seating pressure relief or bed pressure relief surfaces and availability or efficiency of these surfaces may also affect treatment interventions.

Pre-existing conditions in a patient may also contribute towards pressure sore development. Patients that smoke have an increased risk of developing pressure sores, however, this has not been found to be true for patients with alcohol or drug abuse (Gelis et al., 2009). The incidence of pressure sores has been found to be higher in patients with co-morbidities such as cardiac and pulmonary diseases, however, the casual factors are not fully understood (Byrne et al.,1996; Gelis et al.,2009).History of previous pressure sores has been found to be a risk factor for recurrent pressure sores (Gelis et al.,2009). The presence of another trauma to bones or internal organs was found not to be a factor during the acute and rehabilitation stages but is however a factor during the chronic stage of SCI (Gelis et al., 2009).

The National Institute of Clinical Excellence (NICE) states that all pressure sores of grade II and above should be documented as a local clinical incident (NICE, 2007). A clinical incident is an incident that may have significant harmful impact on the patient (NICE, 2007). Grade III and IV pressure sores have a high occurrence rate and

longer duration to achieve complete healing which often makes surgery an appropriate option (RNAO, 2007). Along with surgery comes postsurgical immobility. One of the guidelines for pressure sore management state that patients with a sore on the seating surface should avoid sitting unless pressure relief is possible (RNAO, 2007). This conservative management also brings about immobility. Therefore both conservative and operative management of Grade III and IV pressure sores will lead to some form of immobility when dealing with sacral pressure sores and the immobility can lead to further pressure sore development if not well monitored.

As the above factors may contribute to an increased risk or worsening of pressure sores, they may affect physiotherapists' decision making when deciding between treating patients in the gym setting or a more passive treatment session in the ward.

2.5 The Effects of Pressure Sores

The occurrence of sacral pressure sores has a negative impact on the length of hospital stay (Goodman et al., 1999). Goodman et al.'s (1999) study found that length of hospital stay was reflected by the time taken for the veteran patients with SCI to be rehabilitated to the stage of tolerating a sitting position for four hours at a time. Patients were initially placed on bed rest for an average period of six weeks before being allowed to commence a sitting programme and the length of stay averaged around 11.5 weeks (Goodman et al., 1999).

Another study by New et al. (2004) found similar results when reviewing patients admitted to a rehabilitation unit between 1995 and 1997. They found that patients with grade II and below sacral pressure sores were not confined to bed rest and therefore the sore did not impact on the patients LOS. Patients with higher grades of pressure sores had increased bed rest periods and therefore increased LOS, they required an additional 42 days of inpatient rehabilitation as opposed to patients without pressure sores (New et al., 2004). Therefore wound complications, especially deeper sacral wounds increase the amount of time before rehabilitation may begin (Goodmann et al., 1999; Ash, 2001; New et al., 2004; Post et al., 2005).

Substantial and significant increases in hospital costs have been found to go hand in hand with increased lengths of hospital stay (Allman et al., 1999; Bennet et al.,1994). A study in the UK estimated the cost of treating in patients with pressure sores. These costs included resources such as nursing time, dressing, diagnostics, antibiotics as well as the cost of support surfaces (Bennett et al.,2004). The cost of healing pressure sores was found to increase with the increasing grade of the pressure sore. This is because as the grade of the pressure sore gets higher, the length of stay and the incidence of complications increases. The costs increased as much as 300% from a grade I to a grade II pressure sore and these costs were found to be associated mainly with nursing time required to reposition patients, dress patients and constant monitoring of patients (Bennett et al., 1994). A European study found the average length of stay to be around 125 days which amounted to 119 Euros per episode while a study done in the estimated the length of stay to be around 155 days at a cost of 9650 pounds (Posnett et al., 2009; Bennett et al., 1994). When attempting to estimate the hospital costs of a patient with and without pressure sores using the same length of stay, hospital costs were found to be around 1899 dollars more for the patients with pressure sores (Allman et al., 1999). Unfortunately no studies on hospital costs have been done in South Africa and therefore one can only extrapolate that the costs relating to the management of pressure sores should be in keeping with the above studies.

Hasima (2009) revealed that there is a link between the physical fitness of a patient with SCI with both complications as well as duration of rehabilitation. The recovery of physical fitness was found to be negatively associated with bed rest (Hasima, 2009). Therefore, physical fitness is associated with the consequences of complications such as bed sores as opposed to the actual complication itself. This clinically suggests that as physiotherapists, if we are able to minimise bed rest as much as possible even in the presence of pressure sores, we may prevent a decline in physical fitness levels (Hasima, 2009).

Bed rest due to pressure sores may also lead to increased levels of bone loss and muscle atrophy which is from the decreased muscle activation and mechanical loading (Giangregorio et al., 2006).Clinically, the importance of minimising bed rest periods and providing assisted or passive standing interventions is emphasised as

these interventions have been found to increase lean mass and muscle area in patients with SCI (Giangregorio et al., 2006).

2.6 The General Management of Paraplegic Patients with Pressure Sores

The SCI Quality Enhancement Research Initiative (QUERI) developed a research agenda based on critical knowledge gaps regarding pressure sores in patients with SCI (Henzel et al., 2011). They held an evidence-based literature discussion and found that despite the complications associated with bed rest, this still tends to be the common practice for the treatment of pressure sores. The deconditioning effects of bed rest imply that it may be beneficial to allow a patient to mobilise before the pressure sore is completely healed (Henzel et al., 2011). However further research is required to guide standardised interventions of therapy by assessing what current practices are and then to determine the best practice to decrease complications of immobility. By determining the most effective treatment techniques, guidelines for the various inter-disciplinary teams may then be established (Henzel et al., 2011).The aims of treatment once a paraplegic patient reaches the rehabilitation phase are the adjustment of vasomotor control, self-care education and strengthening to promote functional independence (Bromley,2006). Exercise therapy done twice weekly with progressive resistance exercises is successful in increasing upper limb muscle strength as well as exercise therapy given in the form of self-care training, transfer skills, mat mobility and isotonic exercises (Kloostermann et al., 2009). This emphasis on upper limb musculature is required for functional independence.

Functional training is an important component in the rehabilitation phase which includes bed mobility, transfers and gait re-education (Somers, 2001). Standing interventions are important in patients with SCI to reduce bone mineral density loss in the lower limbs, short term reduction of spasticity as well as renal and digestive function benefits. These interventions are given either in the form of assisted standing using the tilt table and standing frame or gait training practices (Biering-Soering et al.,2009; Bromley, 2006). Limited activity is one of the factors associated with pressure sore development (Wann-Hansson et al., 2007).These interventions are important in the prevention of pressure sores as they will reduce immobility and in doing so reduce prolonged pressure from being exerted on the sacral area.

The Institution for Rehabilitation and Research published sitting guidelines which state that patients with Grade III and IV sacral pressure sores, should be placed in the prone position for weeks (Stal et al., 1983). According to this protocol, side to side motion and range of motion exercises may begin in the fifth week and a sitting programme begins at six to seven weeks (Stal et al., 1983).Prior to commencing the sitting programme, pressure mapping must be done to determine surface requirements. Thereafter, the patient begins with 30minutes of sitting twice a day and if there is no evidence of wound breakdown it is then increased to 45minutes twice a day. The sitting time is then increased by 15minutes twice a day until the patient is able to sit for two hours twice a day. They would then sit for two hours twice a day for two days before adding 15minutes until sitting time is four hours twice a day (Stal et al., 1983).

However, despite the pressure relieving effects of the prone position and its success in the treatment of pressure sores, the adverse effects of bed rest have been established. Hasima et al. (2007) demonstrated one of the effects of bed rest when measuring physical fitness levels in patients with SCI. This was assessed by measurements of peak oxygen uptake and peak power output during a specific exercise. The peak power output was found to be negatively associated with bed rest, and hence the recovery of patients' physical fitness was negatively associated with bed rest periods (Hasima et al., 2007). Muscle atrophy, lung complications, decreased digestive function and osteoporosis are amongst the other adverse effects of bed rest (de Boer et al., 2008; Brower, 2009; Norton et al., 2004).

Prescribed bed rest protocols which may be carried out by the physiotherapist such as positioning, upper and lower limb bed exercises, frequent position changes and incentive spirometry have been found to reduce bed complications (Schweinberger et al., 2010). However in this study, bed rest periods were a mean of 13 days and as mentioned earlier bed rest associated with sacral pressure sores is usually a much longer period.

The interface pressures placed between the ischial tuberosities and seating surfaces are higher while sitting than lying down and hence the use of bed rest to relieve pressure (RNOA, 2007). However both the National Institute of Clinical Excellence

(2007) and Agency for Healthcare and Policy Research (1994) guidelines state that a patient with pressure sores on a seating surface should be encouraged to sit after seating assessments have been done. A study carried out by Rosenthal et al. (2003) supports this guideline by indicating rapid healing of grade III-IV sores and better functional outcome in patients receiving four hours a day of sitting on an experimental total contact seat in comparison to patients on bed rest using a low air loss bed. Patients sitting on the chair showed significantly lower interface pressures as the seats were designed to re-distribute the weight from the ischial tuberosities and coccyx onto the lateral pelvis and lateral thighs thus shifting the downward pressure (Rosenthal et al., 2003). Therefore in clinical practice, seating on the correct surfaces may be beneficial towards improving healing rates.

When sitting, guidelines recommend regular pressure relief practices. Markhous et al. (2007) compared an automated method of pressure relief as opposed to wheelchair push-ups with regards to tissue perfusion. The results of this study found that the thigh areas are able to withstand higher pressures without injury as opposed to ischial areas. This therefore indicates that intermittent shifting of weight is a strategy that can be used to relieve pressure e.g. a lateral or forward lean. When doing push ups in the wheelchair, the study revealed that the amount of time required to achieve tissue perfusion adequate to prevent or treat pressure sores was in the range of 200to 300 seconds. The average pressure relief push time that the paraplegic patients were able to maintain was 49seconds. However, there was no insight gained as to how often push ups should occur (Markhous et al., 2007). It is also important to note that the amount of time and pressure relief carried out with a push up is difficult for patients' with SCI to sustain for an adequate amount of time (Regan et al., 2010).

The positioning checklist in the Registered Nurses Association of Ontario (2007) guidelines recommends a repositioning schedule. The AHCPR (1994) recommends repositioning every two hours whereas the NICE (2007) guidelines recommend positioning as appropriate to individualised patients. There is no published literature on protocol followed in South Africa regarding repositioning but from experience in South African hospitals, patients are turned on a regular schedule usually every two hours. In terms of staffing resources, positioning on a schedule would be most

efficient and organised method of ensuring turning is done. The 90 degree side lying position should be avoided as it has the highest pressures, instead a 30 degree lateral tilt position has the lowest pressures (Defloor, 1997). This position is achieved by placing a pillow at an angle under one buttock and placing a second pillow lengthways under each leg, the sacrum and heels are then both free from contact with the support surfaces (Defloor, 1997). This position is recommended by the European pressure ulcer advisory panel guidelines (EPUAP, 2009).

The use of repositioning for treating pressure sores is reasonable in practice as it avoids depriving the wounded area of oxygen (Moore, 2009). It should however be noted that there is no randomised controlled evidence that addresses its effectiveness on healing rates of pressure sores(Moore, 2009).Other systems of repositioning in bed for patients on bed rest existed in the past. Stryker beds are beds previously developed for patients who were required to remain in bed immobile and needed to be repositioned to prevent pressure sores (Ascoli, 1969). The bed is able to rotate along a longitudinal axis so that no shear or friction forces are involved for the patient to move from supine into prone. Similar to pack beds, the bed comprises of various segments and a gap is able to be created in the sacral region when in supine (Ascoli, 1969).

A study done on therapeutic beds in 1990 found that the Stryker beds involved considerable training for nursing staff which is time consuming and expensive (Ceccio, 1990). Complications such as occipital pressure sores and increased extension to the neck area due to decreased chin support may occur (Ceccio, 1990). No research was found during this literature review to determine whether therapists are still using these beds today, but information from some of the established therapists indicated their use many years ago.

Pressure mapping and the correct wheelchair cushion prescription is an important aspect of treatment in patients with pressure sores (Reagen at al., 2009). A study showed that pressure distributions for the SCI population are very sensitive to the support surface characteristics on which they are seated (Reagen et al., 2010). Other seating interventions involve the incorporation of specialised seating clinics (SSC). These clinics involve pressure education and recommendations for

appropriate seating systems. Evidence shows that attendance at these SSC increases the skin management abilities of individuals with SCI (Regan et al., 2010).

Pressure care education need not only be delivered in SSC setting. Through the use of an RCT, Rintala et al. (2008) tested the impact of a structured education and follow up intervention programme on patients with SCI after pressure sore surgery. Standard pressure education during hospitalisation comprised of: a) two hours of one to one discussion on general prevention topics such as nutrition and smoking cessation. b) Patients were given a manual and encouraged to read the section on pressure sores. c) Patients received a sitting programme according to the protocol mentioned earlier (Rintala et al., 2008) and the physiotherapist then provided information on wheelchair use, transfers and pressure relief. The experimental intervention then comprised of the patient receiving an additional four hours of individualised pressure education on top of the standard intervention (Rintala, 2008). It was divided into four interactive sessions in which there were discussions afterwards and for one of the sessions the family was present. This study found that patients' who received an enhanced education, showed more improvement on the pressure sore knowledge and retained more of this knowledge two years post intervention. They also had fewer recurrences of pressure sores (Rintala et al., 2008). Education should not only be limited to the time after injury because at this time patients and families are often experiencing information overload (Schubart et al., 2008). There is no one effective strategy to teach pressure care but rather the use of multiple methods should be explored e.g. formal and informal settings, text formats or multimedia (Schubart et al., 2008).

2.7 Physiotherapy Management of Pressure Sores

The above are guidelines and recommendations that are indirect interventions and are not discipline- specific. According to the RNOA guidelines, recommendation 3.6 states that a patient with grade III- IV pressure sores must be referred to a physiotherapist for electrotherapy (RNAO, 2007). Four different types of electrical stimulation exist to treat chronic wounds: Low intensity direct current, low voltage pulsed current, alternating current and transcutaneous electrical nerve stimulation

(Ramadan, 2008). In wound healing, low intensity direct current is used to avoid damaging healthy tissue and promotes healing via fibroblast and keratinocyte stimulation. Ramadan et al. (2008)'s review found that low intensity direct current was beneficial in the healing of chronic wounds. However they felt the need for more controlled trials to be done in order to prove merit in clinical practice. In a double blind randomised controlled study done to test electrotherapy in grade III sores, the difference between the placebo and treatment group was not significant and therefore emphasised the need for further studies (Adunsky et al., 2005). This study however did suggest that in addition to conservative wound care electrotherapy may be useful in accelerating healing of chronic sores (Adunsky et al., 2005).

A form of electrotherapy found to have significant results was that of high voltage pulsed current (HPVC) (Griffin et al., 1991). Their sample group was patients with SCI who have sores in the pelvic region; they received therapy for one hour a day over 20 days. The treatment group demonstrated significant decrease in sore sizes thereby implying that HPVC increased the healing rate of pelvic sores in patients with SCI (Griffin et al., 1991). In a review carried out by Regan et al. (2009), limited level 1 evidence was found to support different forms of electrotherapy on grades III-IV pressure sores in patients with SCI.

The other forms of therapeutic direct wound healing interventions are ultrasound (US) or ultraviolet C (UVC). UVC has an inhibitory effect on bacterial growth by working directly through bacterial DNA synthesis. US activates the release of chemical messengers during the inflammatory stage of wound healing which then affects the strength of the scar tissue. In Regan et al. (2009)'s review, it was found that US/UVC used in combination with wound care decreases wound healing time but there was no evidence to prove their benefits when used alone. It should however be noted that only two studies were addressed in this review. In a review carried out earlier by Reddy et al. (2008), six studies were reviewed regarding UVC/US. In this review they found the evidence insufficient to make any conclusions regarding the use of these therapies, including laser therapy in chronic wound healing. There is limited data to support the routine use of these expensive adjunctive therapies (Reddy et al., 2008).

The European Pressure Ulcer Advisory Panel (2009) as well as the AHCPR (1994) advises against massage over the bony prominences and the NPUAP (2007) advise that aggressive massage at all locations should be avoided. According to the guidelines, massage is contraindicated in the presence of inflammation and also at a site where there is a possibility of damaged blood vessels (EPUAP, 2009). They also state that vigorous rubbing of the skin may provoke an inflammatory reaction and mild tissue destruction (EPUAP, 2009). However, a literature review done in 2004 which investigated the effects of massage in the prevention of pressure sores found the results to be insignificant as the studies were very limited and of poor methodological quality (Duimel-Peters et al., 2004). The need for further research was therefore suggested.

A survey that was done in the Netherlands found that nurses beliefs did not always correspond to the guidelines as some nurses felt that in practice massage is an effective method and continued to use it. In the developing country of Ghana, there were similar findings (Jonsson et al., 2011). However in the survey all nurses practiced massage despite recommendations against this and found that nurses' knowledge was achieved through theory with no use of guidelines (Jonsson et al., 2011). The low level of research evidence may contribute to the decreased adoption of these guidelines (Duimel-Peters, 2006).

Chaves et al. (2010) set out to determine the quality of evidence in protocols with regards to pressure sore prevention. They studied 24 protocols being used in nursing homes in the Netherlands. Thirty eight percent of the protocols included ice friction/massage (Chaves et al., 2010). As mentioned earlier, guidelines advise against the use of massage but do not mention the use of ice when treating pressure sores. Other studies done on the general effects of cryotherapy, state that the application of ice reduces nerve conduction in sensory and motor nerves and had therapeutic effects such as reduction in pain and post-traumatic oedema. The prolonged application of ice may cause superficial nerve damage (Herrera et al., 2010). However, there is no evidence of this therapy in already established pressure sores.

There is a relationship between increased skin temperature and the development of pressure sores, as the resting skin temperature increases so does the tissue

metabolism thereby increasing susceptibility to ischaemic injury (Braden et al., 1987).It has been found that acute patients with SCI have a higher sacral area skin temperature due to impaired thermo-regulation as a result of disrupted neural pathways (Sae-Sia et al., 2007). Prolonged bed rest leads to heat accumulation between the mattress and the skin thereby further increasing the risk of pressure sores. However, during loading over the sacrum there is a marked decrease in blood flow and decrease in skin temperature in the area (Sae-Sia et al., 2007). The same is found in an already existing pressure sore. It can therefore be extrapolated that ice may be beneficial to prevent pressure sores but not in the treatment of pressure sores. However, the application of ice via massage would not be recommended according to the damaging effects stated in the guidelines (EPUAP, 2009).

A form of indirect therapeutic wound healing is neuromuscular electrical stimulation (NMES). NMES is used for rehabilitation purposes and is designed to increase strength and fatigue resistance of paralysed muscles by providing repetitive contractions (Bogie et al.,2003). A study done by Bogie et al. (2003) set out to investigate whether NMES may improve pressure distribution at the seating area by increasing muscle mass area. The study found that with regular application of NMES, regional vascularisation occurred and the pressure in the areas around the ischial tuberosities decreased significantly. Therefore, through hypertrophy of the stimulated muscle, there is improved cushioning over the ischia and a more even distribution of overall pressure (Bogie et al., 2003). All studies done looking at electrical stimulation looked at different forms of stimulation with different application protocols. It therefore follows that more research should be done to determine the most effective current and placement protocols for pressures sores post SCI.

A study done in 2009 which is similar to this study, looked at Physiotherapists and occupational therapists working with patients with SCI who have pressure sores in order to identify their role in managing the pressure sores (Guihan et al., 2009). The survey was done by means of a questionnaire. The results showed that generally the therapists' interventions were guided mostly by the doctors' orders for e.g. use of electrotherapy or by following protocol as certain wound sites have post-surgical protocols to follow. Seventy five percent of the physiotherapists reported being involved in direct wound care management with the majority of this intervention

being tissue mobilisation, high voltage electrical stimulation and being involved in the decision making process for dressings and topical agents (Guihan et al., 2009).Physiotherapists stated being involved in determining the cause of a wound but there was no standardised process. Forty five percent were involved in seating evaluation and 20% in pressure mapping. Physiotherapists' involvement after tissue healing appeared to be more standardised and included re-mobilisation, progression of sitting time, pressure relief practices and safe transfers. Seating evaluation and education were other practices carried out to prevent the reoccurrence of pressure sores (Guihan et al., 2009). In conclusion it was found that the most standardised intervention was the post healing intervention stage (Guihan et al., 2009).

2.8 Use of Evidence Based Practice in Managing Pressure Sores

Evidence-based medicine/ evidence-based practice (EBP) refers to the integration of clinical experience with the best available external clinical evidence from systematic research. As found by Jonsonn et al. (2011) and Duimel-Peters (2004) the low levels of evidence pertaining to guidelines when managing patients with pressure sores may result in the poor adoption of these guidelines. Guidelines may sometimes not be practical to assist clinicians at the bed side due to the fact that the guidelines mentioned above are not specially aimed at e.g. physiotherapists, they may have less following by physiotherapists (Keast, 2006). In the absence of strong evidence, physiotherapists may then rely on past clinical experiences or the long held beliefs of more experienced therapists (Guihan et al., 2009). A study investigating the gap between EBP and clinical practice noted that EBP is often global evidence and not always relevant in one's local settings (Hay et al., 2008). There is not always complete evidence to prove one's practice therefore an alternative is to make the best judgements based on available evidence combined with successful experiences (Hay et al., 2008). Hay et al. (2008) found that clinical experience is relatively neglected by the EBP movement and concluded that by rather combining global data and clinical experience there may be improved patient outcomes (Hay et al., 2008). There is limited evidence both globally and locally around the rehabilitation of paraplegic patients with pressure sores, therefore in this survey, questions were also

asked around where and how the physiotherapists were making clinical decisions regarding treatment interventions.

2.9 Conclusion

Pressure sores above grade II in the sacral area are a common occurrence in paraplegic patients, and are often the reason for re-hospitalisation. There are many factors which may cause either the delayed healing of these pressure sores or worsening of sores. These factors include bowel and bladder incontinence which may lead to over hydration, infection and skin irritation. Increased spasticity may lead to increased levels of shear and friction which would then decrease healing rates. Another factor of importance is the cognitive state of the patient, depression and personality disorders which may lead to decreased co-operation from the patient in general management as well rehabilitation. Depression may also cause poor eating habits which in turn would result in a poor nutritional status. Poor nutritional status will then decrease healing rates and affects the ability of the patient to perform optimally during rehabilitation.

Another factor which can lead to decreased co-operation is that of pain, pain may contribute to other problems such as sleep deprivation or side effects from analgesia which will all impact negatively on pressure sores formation and healing. The patient's level of mobility, sensation and completeness of the injury all have major impact on the development or worsening of the pressure sore depending on their ability to alleviate pressure from the area. Pre-existing conditions such as smoking habits and co-morbidities such as cardiac or pulmonary impairments also affect healing rates or contribute to the increased incidence of pressure sores although the causal factors are not fully understood.

The development of a pressure sore negatively impacts many aspects of the patients' recovery process. Firstly, it leads to increased length of hospital stays due to bed rest periods. These bed rest periods delay active rehabilitation which in turn cause decreased function and decreased mobility. Secondly, bed rest itself has many detrimental consequences such as muscle atrophy and bone loss.

The general rehabilitation management of patients with SCI includes education, strengthening and most importantly functional training through activities such as bed mobility, transfers and gait re-education. For patients with SCI who have sacral pressure sores, there are sitting protocols to follow, pressure mapping practices and various positioning and pressure relief techniques to be taught. Physiotherapists are also involved in direct treatment of the area itself through modalities such as electrotherapy and ultrasound.

Physiotherapy involvement appears to lack any standardised protocol during the healing phase of the pressure sore, however once healed there is standardised practices to follow. Guidelines are not always practical or profession specific and hence interventions are often based on past clinical experience or the experience of others.

CHAPTER 3

3 METHODOLOGY

3.1 Introduction

In this chapter the procedure which was followed to obtain the data will be explained. The method which was used to analyse the data will also be explained. Firstly, a breakdown of all the preparatory work done prior to the pilot study will be described. The process used for the validation of the questionnaire as well as the content of the questionnaire will be outlined in detail. The pilot study and how its outcome influenced the method in which the main study was done will be explained. The sample obtained as well as the methods employed to get this sample for the main study will be described, and lastly the ethical considerations will be mentioned.

3.2 Study design

A descriptive cross sectional design was used for data collection in this study.

3.3 Subjects

3.3.1. Source of subjects

Physiotherapists for this study were selected from physiotherapy hospitals/clinics/practices in South Africa that rehabilitate patients with spinal cord injuries. The physiotherapists were from the hospitals/clinics/practices listed in Table 3.1 below:

Table 3.1: Hospitals/practices whose physiotherapists participated in the study.

PROVINCE	CITY	HOSPITAL
Gauteng	Johannesburg	Life Kensington Rehabilitation Hospital
		Life Riverfield Lodge Hospital
		Netcare Rehabilitation Hospital
		Natalspruit Hospital
		Clayton House
	Pretoria	Tshwane Rehabilitation Hospital
		Eugene Marais Hospital
		Muelmed Jam Rehabilitation
KwaZulu-Natal	Durban	Phoenix Therapy and Assessment Centre
		Life Entabeni Hospital
Eastern Cape	Port Elizabeth	Aurora Hospital
	East London	St. Dominics Hospital
Western Cape	Cape Town	Western Cape Rehabilitation Centre
		Life Vincent Palloti Hospital
Free State	Bloemfontein	Life Pasteur Hospital

3.3.2 Sample Size and Selection

A sample of convenience consisting of all the physiotherapists working in the neurology / spinal sectors of the above practices/hospitals was used for this study.

3.3.2.1 Inclusion criteria

Physiotherapists were included in the study when they met the following criteria:

- Involved in the treatment of spinal cord injured patients.

3.3.2.2 Exclusion Criteria

Physiotherapists were excluded from the study if they were:

- Not involved in the treatment of spinal cord injured patients.
- Not permanent members of staff and were locums.

3.4 Instrumentation and Outcome Measures

3.4.1 Self- designed Questionnaire

A questionnaire was developed to establish the current interventions carried out by physiotherapists (See Appendix A). The questionnaire comprised of the following sections:

Section A: Questions 1-4

This section comprised of questions which determined the demographics of physiotherapists and their level of experience.

Section B: Question 5-6

These questions determined whether the various facilities had protocols in place for patients with pelvic pressure sores and if the grade of the pressure sore affected the protocols. If so, they were then asked to further elaborate on what these protocols were.

Section C: Question 7-8

The aim of these questions was to establish whether or not the participating physiotherapists were involved in direct wound care management of the sacral pressure sores.

Section D: Question 9

This question was to assess whether bed rest was often prescribed for pressure sores above grade II and the length of time this tended to be.

Section E: Question 10-11

These questions asked whether the patients were receiving treatment from the therapist when in the bed and if so, the therapists had to state the physiotherapy techniques that they used.

Section F: Question 12-13

These questions asked whether the paraplegic patients received treatment in the gym and if they did what mode of transport the therapists used to get the patients to the gym.

Section G: Question 14-14a

This question asked whether there was a form of pressure relief being used when transporting the patient to the gym and if so, a further description of the device used was requested.

Section H: Question 15

This question comprised of a list of tick boxes for the therapist to indicate which interventions were provided to the patient in the gym setting.

Section I: Question 16

This question was used to establish the factors that the therapists took into consideration when deciding how to manage paraplegic patients with sacral pressure sores, and also whether they would treat the patients in bed or in the gym.

Section J: Question 17- 22

These questions were used to establish whether physiotherapists' were using evidence based practice when managing patients once they have developed pressure sores.

3.4.2 Validity and Reliability of the Questionnaire

3.4.2.1 Content Validity

To establish the content validity of the self- designed questionnaire, a panel of experts of four physiotherapists in the field of neurology were brought together to analyse the questionnaire and provide their input. The group contained physiotherapists with years of experience in the field of spinal cord injuries as well as post graduate knowledge in the neurological field. The questionnaire together with the aims and objectives of the study were emailed to the participants so that they had time to read through the questionnaire prior to the meeting. All aspects of the questionnaire were discussed and recommendations were made. Once the recommended changes were made to the questionnaire, it was then emailed to all participants once more. Once all therapists responded had approved of the changes that had been made, the pilot study was commenced.

3.5 Procedure

3.5.1 Pilot Study

A pilot study was done to check whether the physiotherapists had a good understanding of the questionnaire. The pilot study was also used to iron out any unforeseen data collection difficulties.

A sample of all physiotherapists working in the Chris Hani Baragwanath Academic Hospital neurology department was used for the pilot study. After a meeting with the head of department, the email addresses of each member of the neurology team was availed. The questionnaire was then emailed to each physiotherapist together with a cover page which explained the study. The cover page stated that all responses were to be returned within two weeks.

3.5.1.1 Results of the Pilot Study:

Nine questionnaires were emailed to the email addresses obtained from the Head of Department. Of the nine questionnaires distributed, five were returned by the end of four weeks. The accompanying information letter stated that all questionnaires were to be returned within two weeks and two reminders had been sent out.

With regards to the understanding of the questionnaire, all questionnaires were completed correctly and physiotherapists had a good understanding of the information being asked of them. The pilot study highlighted the possible difficulties in terms of response rates due to incorrect email addresses, limited internet access and time constraints on the therapists. As this study was going to involve all the spinal rehabilitation centres in the country, emailing of the questionnaires was considered to be the best method of distribution.

3.5.2 Main Study

The head of each physiotherapy facility that treats patients with spinal cord injuries was contacted telephonically to inform them of the study. The aims and objectives of the study were explained and any questions they may have had at that point were addressed. The email addresses of each employed physiotherapist who fitted the inclusion criteria were then obtained.

The questionnaires were then emailed to all the study participants. The questionnaires contained a covering information letter which described the exact details of the study and it also stated that by completing the questionnaire they were consenting to participating in the study. It requested that all responses were to be returned within two weeks.

All questionnaires were to be returned to an email address of a fellow colleague that was not involved in this study, the colleague then printed out all responses and delivered them to the investigator. It was not possible to establish which physiotherapists had responded therefore after three weeks a first reminder was sent out to the email addresses of all the physiotherapists. After a further three weeks a second reminder was then sent out again to all email addresses.

3.6 Ethical Considerations

- Ethical clearance was applied for from the committee for Research on Human Subjects of the University of the Witwatersrand.
- Consent was obtained from all the physiotherapists.
- Confidentiality of all information collected was ensured as the questionnaires did not require that the health professional state their name or any identifiable data.
- Data were sent to a colleagues email address who then printed and gave the questionnaires to the researcher to ensure anonymity.

3.7 Data Analyses

All response data were captured onto an excel spread sheet. All the collected data were analysed using descriptive statistics which were then either presented as numbers and frequencies in tables or were presented using graphs. This included categorical variables such as all the different interventions being implemented by the physiotherapists in different environments as well as the factors which affected therapists' choice of treatment environment which were described by use of frequency distribution tables.

CHAPTER FOUR

4 RESULTS

4.1 Introduction

The objectives of this study were to establish how physiotherapists in South Africa are managing paraplegic patients with sacral pressure sores and the factors that physiotherapists take into account when deciding how to manage these patients.

The results will be presented as follows: the response rate, the demographics of the study sample and the number of physiotherapists from the represented hospitals and provinces, the presence of protocols in physiotherapy practice, physiotherapy interventions directed at the patient and the pressure sore itself as well as the factors taken into consideration when choosing treatment modalities.

4.2 Response Rate and Hospital and Province Representation of the Sample

The physiotherapists in this study were from a total of 11 different spinal rehabilitation facilities/ hospitals in South Africa. There were a total of 51 questionnaires distributed amongst seven provinces. Thirty-nine completed questionnaires were returned; therefore a response rate of 76% was achieved.

Table 4.1 shows the number of questionnaires sent and received from each province

Table 4.1: Response rate from each province (n =39)

Province	Hospital	No. sent out	No. returned
Pretoria	Tshwane Rehabilitation	3	2
	Meulmed Hospital	4	3
Johannesburg	Netcare Rehabilitation	6	6
	Life Riverfield Lodge Rehabilitation	4	1
	Life New Kensington Clinic	1	1
	Clayton House	2	2
	Natalspruit Hospital	5	5
KwaZulu-Natal	Life Entabeni Hospital	6	6
	Phoenix Spinal Assessment Unit	1	1
Eastern Cape-Port Elizabeth	Life Aurora Hospital	3	2
Western Cape	Western Cape Rehabilitation Centre	7	4
	Life Vincent Pallotti	2	1
Eastern Cape-East London	Life St. Dominics Hospital	3	1
Free State-Bloemfontein	Life Pasteur Hospital	4	4

4.3 Demographics of the Study Sample

General demographic details of the physiotherapists in this study sample are shown below in Table 4.2.

Table 4.2: Demographic details of physiotherapists in the study sample (n =39)

Item	**Demographic Detail**	**n (%)**
Gender	Male	1 (2)
	Female	38 (98)
Years of Experience	Less than or equal to 1 year	12 (31)
	2-5 years	12 (31)
	5-9 years	5 (13)
	More than or equal to 10 years	10 (26)
Year of Qualification	Year 2010	7 (18)
	Year 2009- 2007	11 (28)
	Year 2006-2004	6 (15)
	Year 2003 and before	15 (39)

Thirty eight (98%) of the study participants were females. The majority of the sample ranged between physiotherapists with only one year's experience (31%) to ten or more years experience (26%).

Figure 4.1 below shows the provincial representation of the study sample.

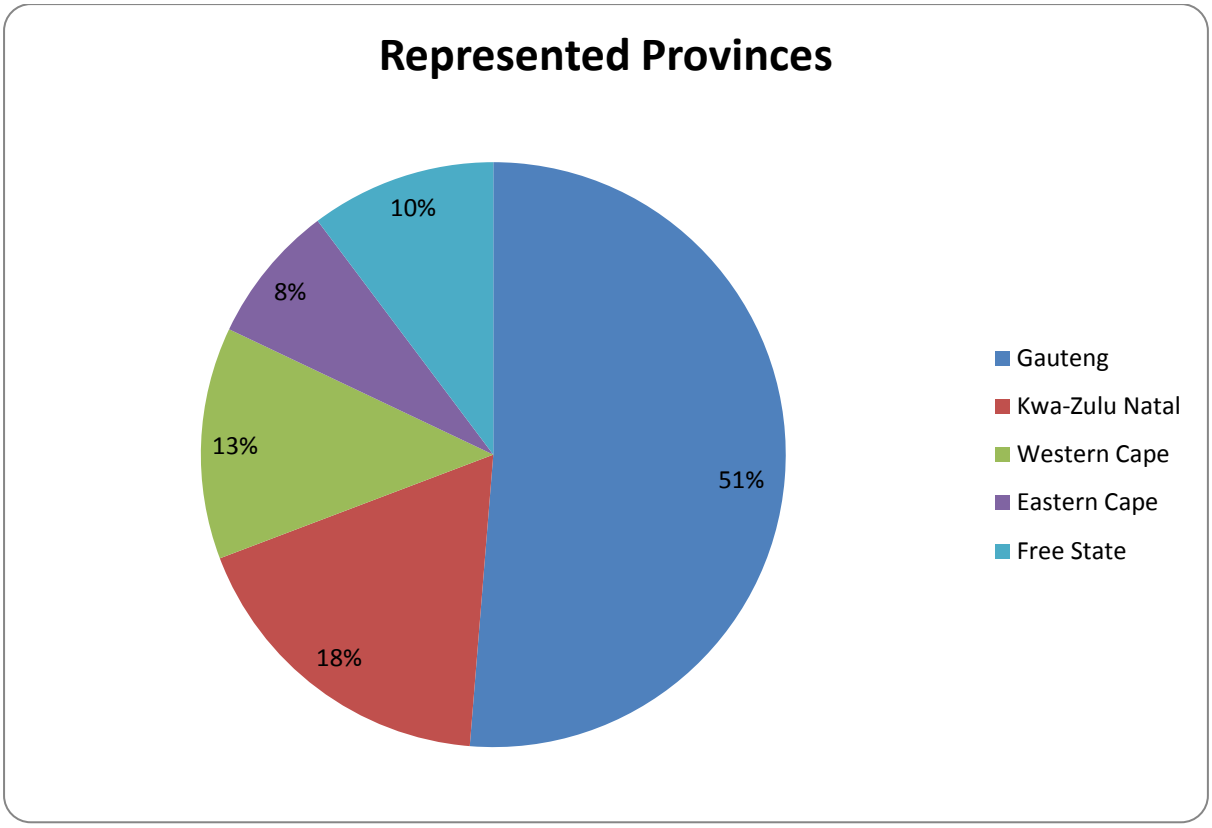


Figure 4.1: The provincial representation of the study sample (n = 39)

Gauteng was the province most represented (51%) as it had the largest number of Rehabilitation facilities and therefore the largest numbers of spinal physiotherapists. East London and Port Elizabeth which both make up part of the Eastern Cape contributed towards a small percentage (8%) of the study population.

The hospitals/ facilities included in the study comprised of both the government and the private sectors. There were 27 physiotherapists from the private sector (69%) and 12 physiotherapists from the government sector (31%).

4.4. Use of Protocols in the Rehabilitation Centres

Twenty physiotherapists (51%) stated that in their hospitals, physiotherapy protocols existed for the treatment of patients with sacral pressure sores and 19 (49%) stated that there were no protocols in place.

However, the comparison of protocol presence or absence in different hospitals was not possible as physiotherapists working in the same facilities provided different responses.

Table 4.3 below shows the difference in responses from physiotherapists working in the same hospital, the hospitals shown are the ones in which there were three or more physiotherapists from that hospital.

Table 4.3: Presence /absence of protocols in various hospitals (n = 24)

Hospital	**Presence of protocols**	**Absence of protocols**
Life Entabeni Hospital	4	1
Life Pastuer Hospital	2	2
Netcare Rehabilitation	4	2
Natalspruit Hospital	2	3
Meulmed Hospital	2	2

Two of the six physiotherapists at Netcare Rehabilitation Hospital said there were no protocols for the management of pressure sores.

The protocols followed by the various hospitals were placed into themes and are represented in Figure 4.2 below.

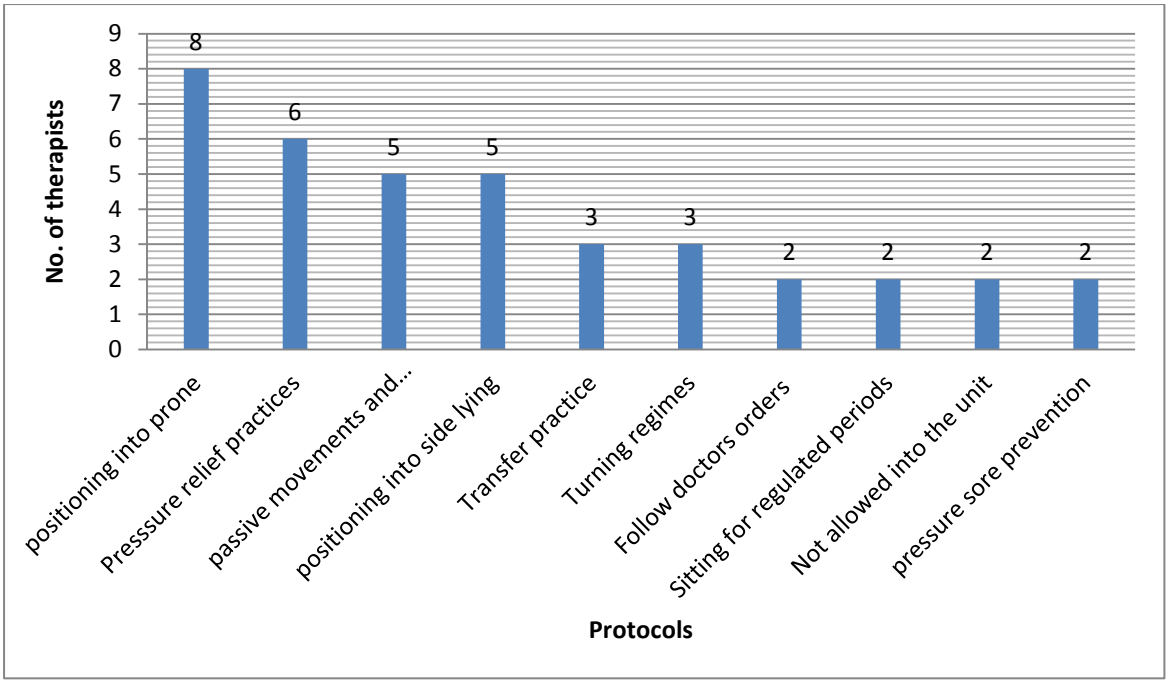


Figure 4.2: Protocols followed in hospitals by physiotherapists (n = 20)

Positioning in prone was the commonest (21%) protocol followed when managing pressure sores.

Out of the 20 physiotherapists who said they had protocols in place, nine physiotherapists (45%) said that these protocols vary depending on the grade of the pressure sore. Eight physiotherapists (40%) said that the protocols remain the same despite the grade of the pressure sore and 3 (15%) said that they are uncertain as to whether the protocols change with changing grades of pressure sores.

4.5 Physiotherapists' Involvement in Wound Care Management

The majority of the study sample (62%) stated that they were not involved in direct wound care management, while only 38% responded as being involved. Of the 15physiotherapists (38%) who were involved with wound care management, ultrasound (27%) and laser (27%) were the commonest modalities used. All direct wound care interventions from the study sample are as shown below in Figure 4.3 below.

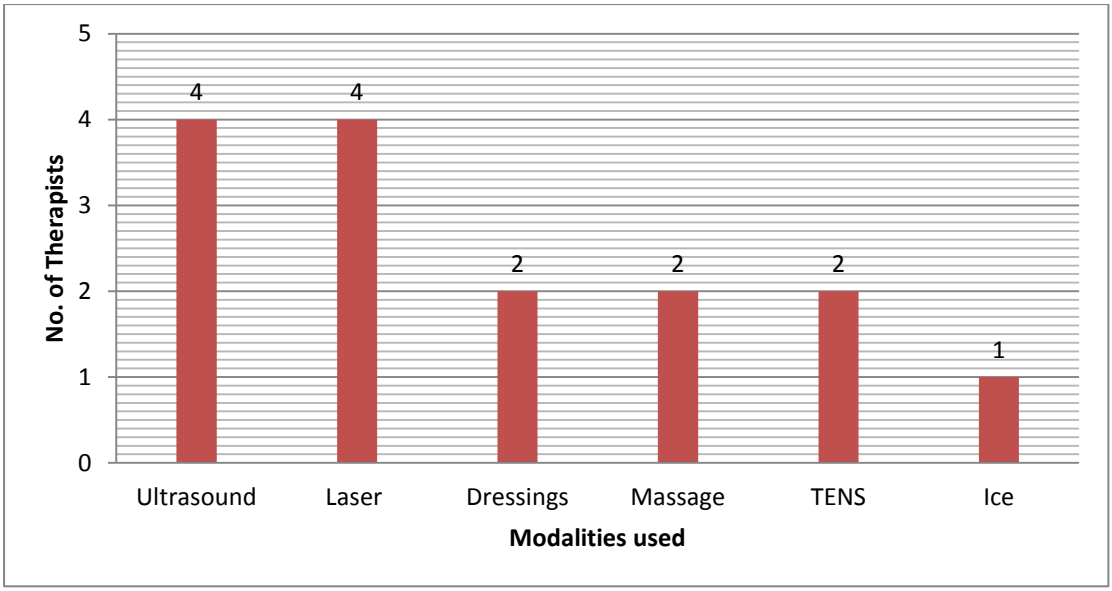


Figure 4.3: Direct wound care interventions (n = 15)

Ultrasound and laser were the commonest (54%) modalities used by physiotherapists to manage pressure sores.

4.6 Interventions Provided when Patients are on Bed Rest.

Ninety-two percent (n=36) of the physiotherapists stated that bed rest is commonly prescribed for paraplegic patients with sacral pressure sores and 98% of physiotherapists (n=38) stated that these patients who would have been prescribed bed rest then receive physiotherapy while confined to bed. The period of bed rest in the experience of the physiotherapists varied from hours (13%) to months (16%).

Table 4.4 below shows the interventions provided to paraplegic patients with sacral pressure sores while they are on bed rest.

Table 4.4: Interventions provided in bed (n = 38)

Intervention Given	**n**	**%**
Upper Limb Strengthening	36	94
Prone Positioning	35	92
Passive Movements of Lower Limbs	35	92
Positioning into Side Lying	35	92
Passive Movements of the Upper Limbs	30	78
Passive Stretching of all limbs	30	78
Active Stretching	28	73
Bed Mobility Training	25	65
Lower Limb Strengthening	23	60
ADL practice in bed	17	44
Sitting Balance Re-education	8	21
Pain Treatment Modalities	8	21
Positioning into supine	6	15
Positioning into high sitting	6	15
Group Therapy	2	5
Laser	2	5
TENS	1	2

Upper limb strengthening is the most common intervention (94%) provided to paraplegic patients while they are on bed rest.

4.7 Interventions Received When Patients are in the Gym.

One physiotherapist (2%) reported not providing patients with sacral pressure sores treatment in the gym, while 98% stated that their patients received treatment in the gym setting as well as in the ward.

Table 4.5.below shows the modes of transport used to transport paraplegic patients with pressure sores to the gym.

Table 4.5: Modes of transport used to transport paraplegic patients with pressure sores to the gym (n = 38)

Mode of transport	**n (%)**
Hospital bed	21 (55%)
Wheelchair	12 (31%)
Combination of both wheelchair and bed	6 (16%)

Most of the physiotherapists (55%) transported patients to the gym on a bed, while others used a combination of a bed and a wheelchair.

All the 18 (47%) physiotherapists who reported using wheelchairs to transport patients to the gym also reported using a form of pressure relief on the wheelchairs. Ten of these physiotherapists (56%) stated that they use a wheelchair pressure relief cushion although they did not distinguish which type. The use of ring cushions and Roho cushions were each stated by four physiotherapists (22% for each).

Table 4.6: below shows the treatment interventions paraplegic patients with pressure sores received when in the gym.

Table 4.6: Interventions provided in the gym (n=38)

Interventions Given	**n**	**%**
Upper Limb Strengthening	38	100
Lower Limb Passives	37	97
Prone Positioning	34	89
Bed Mobility Training	28	73
Tilt Table	27	71
Lower Limb Strengthening	25	65
Mobility Training	25	65
Pressure Relief Exercises	25	65
Standing Frame	21	55
ADL Practice	21	55
Upper Limb Passives	19	50
Sit to Stand exercises	16	42
Pain Treatment Modalities	9	23
Pack Beds	1	2

More than 70% of the physiotherapists did upper limb strengthening, lower limb passive movements, prone positioning, bed mobility training and passive standing by use of the tilt table in the gym.

4.8 Factors Which Inform Decisions on Whether Patients are Treated in the Gym or Ward Environment

Table 4.7 below shows the factors that physiotherapists felt influenced their decision on whether to treat in the ward or the gym.

Table 4.7: The factors that physiotherapists felt influenced their decision on whether to treat in the ward or in the gym. (n = 39).

Factor	**n**	**%**
Doctors 'orders	28	71
Grade of pressure sore	19	48
Duration of pressure sore	19	48
Co-morbidities present	17	43
Size of pressure sore	16	41
Pain levels	12	30
Psychological status	11	28
Urinary and bowel incontinence	7	17
Spasticity	6	15
Past medical history	6	15
Infections	3	7
Wall suction dressings or vacuum dressings	2	5

The majority of physiotherapists (71%) found that the doctors' orders hugely influenced them when deciding whether the patient would receive treatment in the gym or the ward.

4.9 Rationale behind Physiotherapists' Intervention

Figure 4.4 below shows the different background rationale physiotherapists used when choosing physiotherapy interventions.

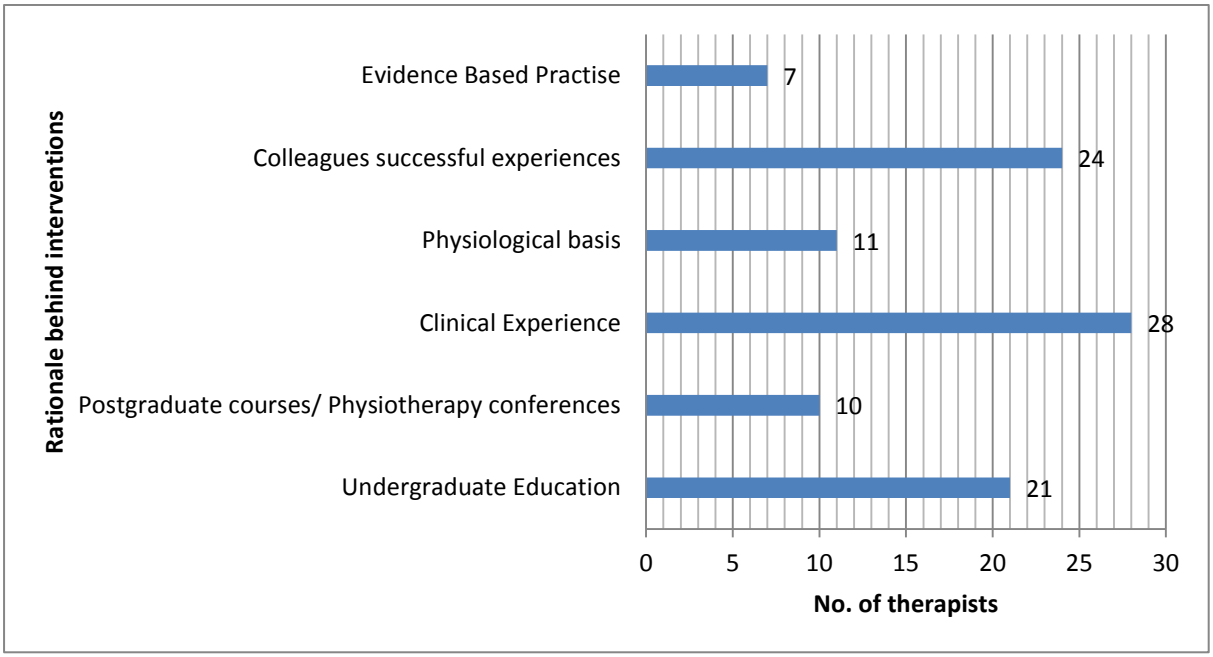


Figure 4.4: Background Rationale physiotherapists used when choosing treatment modalities (n=39)

The choice of physiotherapy modality to use when managing paraplegic patients with pressure sores was guided by their past clinical experience (71%) and through the successful experiences of their colleagues (61%).

The table below shows how many articles the study sample of physiotherapists had read regarding the physiotherapy management of a patient with pressure sores.

Table 4.8: The number of articles read on the physiotherapy management of a patient with pressure sores (n=39)

No. of Articles	n (%)
0 articles	15 (38%)
1-5 articles	20 (51%)
6-10 articles	1 (2%)
11-15 articles	1 (2%)
>20 articles	2 (5%)

More than half of the physiotherapists (53%) had not read any articles on pressure sore management and 15 (38%) had not read anything on the physiotherapy management of a patient with pressure sores.

4.10 Physiotherapists' Perceived Level of Knowledge of Pressure Sore Management

Only 12physiotherapists (30%) felt their knowledge regarding the management of patients with pressure sores was adequate whereas the majority of physiotherapists, 27 (69%), felt they did not know enough regarding the management of patients with pressure sores.

Figure 4.5 below shows reasons why physiotherapists felt their knowledge was inadequate.

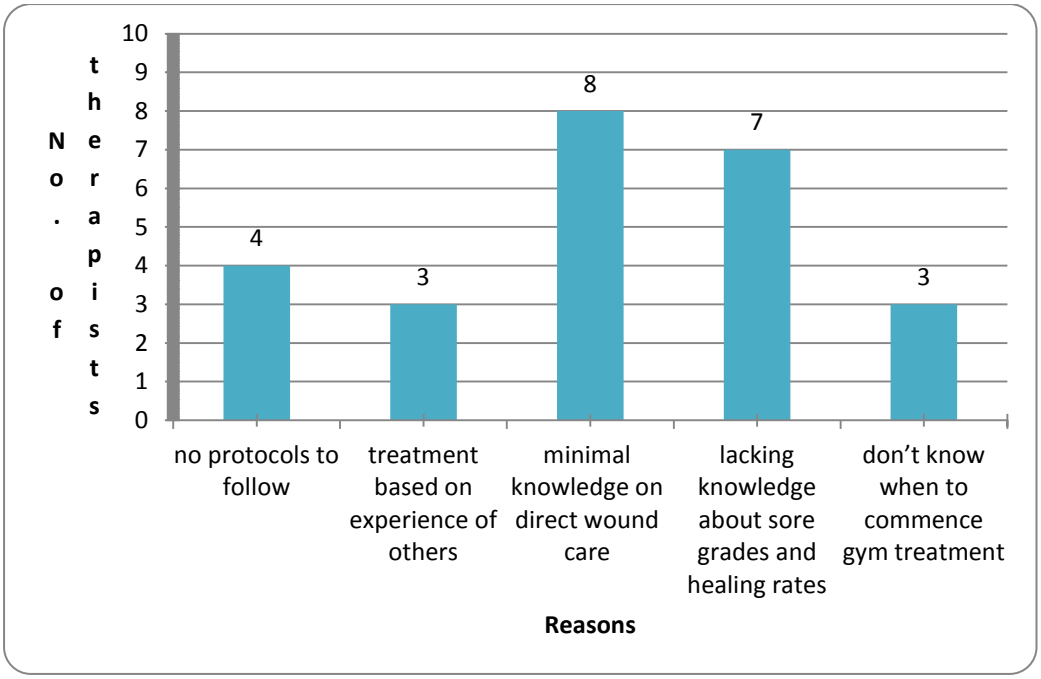


Figure 4.5: Reasons why physiotherapists felt their knowledge was inadequate (n =27)

The most common reason given for feelings of inadequate knowledge was having minimal knowledge on direct wound care management.

The following chapter (Chapter 5) will now discuss the research findings in detail.

CHAPTER FIVE

5 DISCUSSION

5.1 Introduction

This study set out to answer two objectives: to establish the interventions being used by physiotherapists in South Africa to manage paraplegic patients with sacral pressure sores and to establish the factors physiotherapists take into consideration when deciding how to manage the patients with pressure sores. The findings on these two objectives including the study sample are discussed below.

5.2 The Demographics of the Study Sample

The response rate of this study was 76%, which can be considered adequate for a study that utilised a questionnaire for data collection. This was the best that could be attained despite two reminders being send to the rehabilitation facilities for the physiotherapists to sent back the questionnaires.

From the 39 physiotherapists who responded, 38 (98%) of the respondents were female. This finding of an increased number of female physiotherapists is similar to that found by Puckree et al. (2002). Puckree et al. (2002) also used a convenience sample of physiotherapists from both government and private sectors in Durban to carry out a survey and found 84% of respondents to be female and 16% male. The South African Physiotherapy Society (SASP) group for physiotherapists with an interest in neurological physiotherapy consisted of only 3 males out of 182 members in 2011 (SASP NRPG, 2011). One can therefore postulate that there are generally more female physiotherapists than males which translate to there being more female physiotherapists working in hospitals for spinal injury rehabilitation.

Of the 11 spinal rehabilitation facilities represented in this study 69% of the respondents were from the private sector and 31% from the public sector. The opposite was found in Puckree et al. (2002)'s sample group, in which 61% were from the public sector and 39% from the private sector. Puckree et al. (2002)'s study included all physiotherapists in Durban and not specifically those involved in spinal

rehabilitation. This could therefore indicate that in general that there is a higher number of physiotherapists employed in the government sector, however the number of spinal rehabilitation units based in the private sector are more. The majority of newly qualified physiotherapists are found in the government sectors, this is because in 2003 the department of health introduced a year-long community service in order to address the problem of misdistribution and fragmentation in the healthcare system (Gounden, 2002). In this study sample, it was found that of the 71% of the physiotherapists that qualified in 2010 were currently working in the government sector. The majority of respondents were from South Gauteng as it has the highest number of specialised rehabilitation private hospitals. Similarly the SASP database of neurological physiotherapists in 2011 consisted of 30% membership from South Gauteng which together with the Western Cape represented the largest proportion (SASP NRPG, 2011).

5.3 Use of Protocols and Involvement in the Treatment of Patients with Sacral Pressure Sores

Fifty one percent of respondents stated that they had protocols they followed whereas 49% stated that there were no protocols. However the presence or absence of protocols varied between the different respondents from the same facilities which indicate a lack of set protocols or different interpretations of the word protocols. A protocol usually consists of a set of best-practice guidelines which are to be followed for certain conditions. The respondents may have taken hospital protocol to mean the same as individual principles followed. Principles for the healing of pressure sores such as relieving pressure and reducing friction are followed by all therapists however protocols in terms of: at which stage the patient is able to sit and for what time periods, the different positions the patient can assume and direct treatment interventions etc. do not appear to be set out in the various hospital environments. It is therefore possible that the 51% of physiotherapists that stated that they used protocols may not be an accurate percentage . The incongruence within hospitals on the ‘yes’ and ‘no’ responses to use of protocols may indicate lack of protocols with regards to the rehabilitation and management of patients with sacral pressure sores.

A small percentage (38%) of the study sample reported being involved in direct wound care management. This differs to Guihan et al. (2009)'s findings where they reported more than 75% of the physiotherapists to be involved in direct wound care. Eighteen percent of the respondents from this study used electrotherapy to manage pressure sores, however, the form in which electrotherapy was administered was not elaborated on. This is similar to Guihan et al. (2009) where they established that direct wound care intervention was usual practice, but the modalities used were not very well defined with the most commonly used modalities being tissue mobilisation and high voltage electrotherapy Direct current electro stimulation has been suggested to be useful in wounds of grade III and above when used in conjunction with other conservative wound care interventions (Adunsky et al., 2005). However Adunsky et al. (2005)'s study was done on geriatric patients where healing generally tends to be slower. Other studies done on patients with SCI have found minimal evidence that electrotherapy is beneficial (Regan et al., 2009). The modalities most commonly used by the respondents were that of ultrasound and laser. However, the use of both laser therapy and ultrasound has not been shown to have conclusive benefits (Regan et al.,2009; Reddy et al., 2008). Ultrasound and laser were both only used by 36% of the respondents and are therefore not modalities that may be defined as common practice. It therefore appears as if direct wound care management is not a common practice by physiotherapists in South Africa when managing paraplegic patients with pressure sores.

5.4 Physiotherapy Interventions for the Paraplegic Patient with Sacral Pressure Sores

As stated by 98% of the respondents, it appears to be common practice that patients with sacral sores are placed on bed rest. This appears to be a global practice as similar bed rest periods as a consequence of grade II and above sacral pressure sores have been found in other studies (Goodman et al., 1999; New et al., 2004; Post et al.,2005). There is no set period of bed rest as common experience was that bed rest periods vary according to the characteristics of the wound, which corresponds with other observations (Ash, 2002; New et al., 2004; Post et al.,2005).

Despite patients being prescribed bed rest, the majority of the respondents (98%) stated that the patients still received treatment in both the ward and gym settings.

Interventions that were carried out by 70% or more of the physiotherapists were taken to represent common practice, which is fairly similar to the benchmark of 75 % which was set as usual practice in Guihan et al.(2009)'s study. Seventy percent of the physiotherapists indicated carrying out the following interventions when the patient is in bed: upper limb strengthening, lower limb passive movements, positioning into prone and side lying as well as upper limb passive movements and passive stretching. Interventions indicated to be done in the gym setting were the same as for when on bed rest except for bed mobility training and the use of a tilt table for passive standing.

The strengthening of upper limb is in keeping with general rehabilitation principles that are carried out during the rehabilitation phase of a patient with SCI (Bromley, 2006; Somers, 2001). However upper limb strengthening in the form of functional training is needed to gain functional independence, i.e. in the form of transfers, bed mobility and gait re-education (Kloostermann et al.,2009; Somers, 2001). In this sample, functional upper limb strengthening does not appear to be common practice except for bed mobility practice which occurs in the gym (73%).

Standing interventions are an integral component of the rehabilitation phase post SCI to improve bone mineral density, reduce spasticity, improve digestive function and also to further prevent sacral pressure sores by removing pressure from the sacrum (Bromley, 2006; Wann-Hansson et al., 2007; Biering-Soering et al., 2009). However standing interventions for a patient with SCI who has a sacral pressure sore do not appear to constitute common practice in this study sample for the patients being treated in the ward environment. However, in the gym setting, the use of the tilt table constituted common practice (71%). Other standing interventions such as the use of the standing frame (55%) and sit to stand practice (42%) did not form part of common practice. In the ward setting, no standing interventions were indicated.

Twenty-one percent of the physiotherapists indicated sitting balance re-education being done in the ward and 15% indicated the positioning of the patient into high

sitting which was very low indicating poor practice. This is not in keeping with the AHCPRs (1994) guidelines which state that a patient with a pressure sore should still be encouraged to sit once a seating assessment has been done. Rapid healing of grade III-IV pressure sores occurs when patients with sacral sores are seated correctly in positions that encourage weight shift onto the thighs and off the sacrum, i.e. upright or forward lean positions (Rosenthal, 2003).

Forty-six percent of the physiotherapists put the patients into sitting for the short period of transportation from the ward to the gym. The support surfaces on which the patients were seated are very important for the correct re-distribution of weight in the seated position (Regan et al., 2010; Regan et al., 2009). The physiotherapists in this study follow this principle as all physiotherapists who reported using wheelchairs to transport patients also used pressure relief cushions. Whether pressure mapping is done prior to the selection of the cushion was not established in this survey. In Guihan et al. (2009)'s study, 20% of the physiotherapists were involved in pressure mapping as it was found to be mainly an occupational therapist's role. The use of ring cushions was mentioned by 22% of the physiotherapists. This however goes against the practice guidelines stated by EPUAP (2009) which states that doughnut-type devices should not be used. Doughnut-nut type devices have been shown to cause venous congestion and oedema in the area inside the circle therefore making them more likely to worsen pressure sores than to assist in healing (Bergstrom et al., 1994; Jones, 2009).

Physiotherapists in Guihan et al. (2009)'s study were also routinely involved in the prevention of new pressure sores by means of pressure education. Eight percent of this sample indicated being involved in group therapy and education, however, this was not a category that was stated in the tick boxes and was individually added under the 'other' category and may therefore be the reason for the small percentage.

5.5 Factors Taken into Consideration When Deciding the Environment in which to Manage Paraplegic Patients with Sacral Pressure Sores.

As stated earlier, 98% of the physiotherapists stated that their patients were brought to the gym either by means of a bed or wheelchair. Ninety-eight percent of the

physiotherapists also stated that their patients were treated in the ward setting meaning that on certain occasions their patients were treated in the gym and on others they were treated in the ward. In the gym, more functional practices such as bed mobility training and standing interventions can be carried out implying more comprehensive rehabilitation interventions than what can be achieved in the ward environment.

The majority of the physiotherapists (71%) stated that doctors' orders were a huge factor in deciding whether patients should be taken to the gym or not and hence what can be accomplished with the patients. Similar findings were found where direct wound care involvement was only done on the doctor's orders, although other interventions such as sitting periods were guided by protocols (Guihan et al., 2009). This is in keeping with interviews done with doctors, physiotherapists and occupational therapists with regards to their role in the spinal rehabilitation team (Pellatt, 2007). The doctors' role was to supervise and co-ordinate the work of the rest of the team, their input then became less and less as the patient became more medically stable (Pellatt, 2007). The study sample found the reasons for doctors usually prescribing bed rest being included the presence of infection, the patient being attached to a wall suction unit or if the patient has vacuum dressings in situ. Patients with infections would need periods of isolation and a patient attached to a wall suction unit would not be able to be moved.

The participants took the grade, duration and size of the pressure sore into account before taking the patient to the gym. Pressure sores are associated with increased levels of pain and as spinal rehabilitation may already be perceived to be painful by patients (Pellatt, 2007), a physiotherapist would think twice before taking a patient that is already in pain down to the gym as this would then affect their compliance with therapy. This is in keeping with the fact that pain may contribute to the worsening or causation of further pressure sores (Byrne et al., 1996).

Emotional stress, depression and decreased co-operation have been listed as potential psychological risk factors for the worsening or causation of pressure sores (Byrne et al., 1996;Gelis et al., 2009). Physiotherapists in this study stated that when a patient displayed signs of depression this was more reason for them to be taken to the gym for a change of scenery and encouragement from peers.

Fifteen percent of the physiotherapists indicated that they also consider a patient's past medical history and levels of spasticity prior to transporting them to the gym environment. The presence of other trauma does not contribute towards the development of further pressure sores (Gelis et al., 2009), it is however a factor that would require precaution from the therapist in terms of medical stability. A patient's pre-morbid condition such as lung or heart conditions also requires precaution in terms of physiotherapy intervention and may therefore influence whether a patient is treated in the gym or ward environment.

Spasticity interferes with functioning in patients leading to further reduction in activity (Hasima et al., 2007). This decrease in the level of mobility is then a factor which contributes to the worsening or development of further pressure sores (Gelis et al., 2009; Rodriquez et al., 1994; Bryne et al., 1996). This is in keeping with the caution exercised by physiotherapists when deciding whether treatment should be done in the gym or in the ward when spasticity is present. Spasticity may lead to increased levels of shear and friction which would impose limits on patient transfers in order to prevent worsening the pressure sore.

Eighteen percent of the physiotherapists indicated that the continence of a patient's bowel and bladder is another factor which is taken into account. The fact that the type of pressure sores in discussion are the ones in the sacral area make them more difficult to manage due to the fact that the skin may become over hydrated and more susceptible to shearing and friction forces (Beldon, 2008). Therefore, uncontrolled urine or faecal incontinence will affect treatment environment options as it is a factor which is widely mentioned in the literature as risk factors for the development of pressure sores (Gelis et al., 2009; Rodriquez et al.,1994; Byrne et al.,1996; Beldon., 2008).

All these medical factors will affect whether a patient is able to come to the gym or will be treated in the ward and consequently the type of treatment that can be given to the patient. Other factors that could also affect the decision making process include the physiotherapists' past clinical experiences (Hay et al., 2008) or various levels of post graduate education especially in the absence of clinical practice

guidelines. The majority of physiotherapists in this sample indicated that their treatment interventions for paraplegic patients with sacral pressure sores were guided by past clinical experiences and the successful experiences of their colleagues. Only eighteen percent of the physiotherapists reported the use of evidence based practice, which could be due to the lack of external clinical evidence or the lack of individual research. Fifty three percent of the sample of physiotherapists had read no articles on the treatment of pressure sores within the last year and 38% of the physiotherapists in this sample had never read any articles regarding the management of patients with pressure sores. This would then explain the high number of physiotherapists whose rationale of treatment came from clinical experience and the experience of others.

5.6 Study Limitations

- A more elaborate explanation of the term protocol could have been provided within the questionnaire to aid in the completion of the questionnaire by the respondents. Respondents from the same rehabilitation centres gave different responses and part of this may be due to misinterpretation of the term protocol.

- The questionnaire could have asked every respondent to elaborate on the factors taken into consideration when deciding to bring the patient to the gym or to treat them in the ward as some respondents merely indicated which factors affect decision making but did not clarify in which way their decision making was affected.

- A qualitative component to the study might have added more in-depth understanding of the management of spinal injured patients with sacral pressure sores by physiotherapists.

- The use of self administered questionnaires might have induced some re-call bias among the physiotherapists which does have the potential to produce better results than they actually are.

CHAPTER SIX

6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

- Less than half of the participants in this study sample did not have set treatment protocols to guide their management of patients with sacral pressure sores and involvement in direct wound care was not common practice among the physiotherapists.

- The commonest practice post pressure sore development was bed rest. When patients were on bed rest, their physiotherapy consisted of upper limb muscle strengthening, lower limb passive movements, positioning into prone and side lying as well as upper limb passive movements and passive stretching.

- The physiotherapy intervention in the ward was the same as that received in the gym with the only addition being bed mobility training and in the gym the use of the tilt table was incorporated for passive standing.

- Treatment interventions were guided mostly by past clinical experience and the successful experience of colleagues with the use of evidence based practice being very minimal due to possibly lack of clinical evidence and research.

- Whether patients were treated in the gym or in the ward was largely depended on the doctors' orders, the size, grade and duration of the pressure sores.

6.2 Recommendations

6.2.1 Clinical Recommendations

- Direct management of pressure sores using electrotherapy modalities such as laser appear to be less utilised in South Africa than in other parts of the world, improved education regarding the benefits and applications of direct wound care modalities needs to be implemented to physiotherapists either during undergraduate education or with postgraduate courses.

- Gait re-education and ADLs were shown not to be regularly practiced by patients with SCI who have sacral pressure sores, which may contribute towards increased length of stay and decreased functional abilities. Passive standing was only common practice in the gym environment and standing forms an integral part of rehabilitation. Therefore, standardised programmes should incorporate the above in order to possibly maximise healing and rehabilitation as well as to try aim for treatment in the gym environment as often as possible as opposed to being treated in the ward.

- As opposed to doctors' orders limiting active rehabilitation and advocating for bed rest periods, the physiotherapists and doctor should work together to determine a goal for these patients with a programme that eliminates pressure but at the same time does not reduce function. This may be done with positions such as upright or forward lean sitting and standing. If bed rest periods are decreased and a regular rehabilitation programme is followed to a certain degree, we may then be able to minimise immobility and improve circulation and function thereby contributing towards the healing of the pressure area as shown from literature.

6.2.2 Recommendations for Further Research

- The findings of this study suggest that there is need for further clinical research to be done in South Africa with regards to the management of sacral pressure sores in order to develop guidelines to follow when treating patients with sacral pressure sores which will be evidence based.
- A qualitative approach to this study might add greater understanding of the management of spinal injured patients with sacral pressure sores.

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APPENDICES

Appendix A: Questionnaire

Questionnaire on the physiotherapy management of paraplegic patients with sacral pressure sores:
Investigator : Denisha Pather

1. Which hospital are you working at?

_____

2. What gender are you? Male ☐ Female ☐

3. When did you qualify as a physiotherapist?

2010	☐	2006	☐
2009	☐	2005	☐
2008	☐	2004	☐
2007	☐	>2003	☐

4. How many years have you worked with spinal cord injured patients?

</= 1	☐	6	☐
2	☐	7	☐
3	☐	8	☐
4	☐	9	☐
5	☐	>10	☐

5. Are there any physiotherapy protocols in place for patients with sacral pressure sores?
Yes ☐ No ☐
If yes to the above, please state what these protocols are?

_____
_____
_____
_____
_____
_____

6. Do the protocols vary according to the grade of the pressure sore?

Yes ☐ No ☐
Uncertain ☐

7. Are you involved in wound care management? Yes ☐ No ☐
8. If yes, please check the modalities you use from the list below:

Ultrasound	☐
TENS	☐
Ice Massage	☐
Dressings	☐
Other Specify	☐

_____
_____
_____

12. Do patients with sacral pressure sores receive treatment in the gym? ☐ Yes ☐ No

13. If yes, how is the patient transported to the gym?

- ☐ Transported on a bed
- ☐ Transported in a wheelchair

14. If transported in the wheelchair, are there any pressure relieving surfaces/devices used on the wheelchair?

☐ Yes ☐ No

14a. If yes, state which pressure relieving surfaces/devices are used?

_____

15. Please state the treatments received in the gym:

- ☐ Pain treatment modalities (massage,heat,TENS)
- ☐ Positioning into prone position
- ☐ Passive movements of upper limbs (done in side lying or prone)
- ☐ Passive movements of lower limbs (done in side lying or prone)
- ☐ Strengthing of upper limbs (done in side lying or prone)
- ☐ Strengthing of lower limbs (done in side lying or prone)
- ☐ Bed mobility training on the plinth
- ☐ Tilt table, if there is any specific degree of tilt, please state: _____
- ☐ Standing frame (depending on the site of pressure sores)
- ☐ Sit to stand exercises from the plinth
- ☐ Mobility practice in parallel bars/ appropriate walking device
- ☐ Stryker beds
- ☐ Pack beds
- ☐ Pressure relief exercises on the plinth
- ☐ ADL practice in the gym
- ☐ Other. Please specify: _____

9. To your knowledge / expierience, do you find that bed rest is often part of the treatment prescribed for pressure ulcers above Grade 2?

Yes ☐ No ☐

If yes, to the above do you know (approximately) how long the bed rest period usually is?

_____

INSTRUCTION : All the following questions are relating to patients with paraplegia who have pressure ulcers of grade II and above in the sacrum area:

10. Do these patients receive treatment in the bed?

Yes ☐ No ☐

11. If yes, please state the treatments received in bed. (Please tick all that apply)

- ☐ Bed mobility training
- ☐ Positioning of patient into prone position
- ☐ Passive movements of upper limbs (done in side lying or prone)
- ☐ Passive movements of lower limbs (done in side lying or prone)
- ☐ Strengthing of upper limbs (done in side lying or prone)
- ☐ Strengthing of lower limbs (done in side lying or prone)
- ☐ ADL activities practiced in bed as possible e.g. Bathing
- ☐ Passive stretching of limbs (done in side lying or prone)
- ☐ Active stretching as is possible (done in side lying or prone)
- ☐ Sitting balance re education
- ☐ Positioning of patient in supine in bed
- ☐ Positioning of patient in side lying in bed
- ☐ Positioning of patient into high sitting in bed
- ☐ Pain treatment modalities (massage, heat, TENS) etc. Specify : _____
- ☐ Other: _____

16. From the list below please tick the factors that affect your decision making with regards to whether you treat the patient in the bed or gym?

(Please tick all that apply and supply details on lines provided below each tick box)

- ☐ Doctors' orders prevents you from removing patient from the bed _____
- ☐ Amount of spasticity patient is presenting with. _____
- ☐ Grade of the sacral pressure sores. _____
- ☐ The size of the sacral pressure sore _____
- ☐ Duration the patient has had the pressure sore for. ie. acute and chronic _____
- ☐ Amount of pain the patient is presenting with at the site of the pressure area. _____
- ☐ Psychological status of the patient ie. depression leading to decreased compliance during treatment _____
- ☐ If the patient presents with other co-morbidities. e.g. Hypertension, cardiac impairments, nutritional status _____
- ☐ Patients' past medical history. i.e. previous fractures _____
- ☐ Urinary and bowel incontinence _____
- ☐ Wether patient has a suprapubic catheter, colostomy or self catherises _____
- ☐ Other _____

17. What is your rationale for using each of the modalities you stated for managing patients with pressure sores?

- ☐ Undergraduate education
- ☐ Postgraduate courses/ physiotherapy conferences
- ☐ Clinical expierience
- ☐ Physiological basis
- ☐ Through colleagues success with treatment modality/ modalities
- ☐ Evidence based literature
- ☐ Other, please specify _____

18. Is the grade of the wound an important consideration when formulating a treatment plan for patients?

☐ Yes ☐ No ☐ Unsure

19. Approximately how many journal articles have you read in the last year which are relevant to pressure sore management?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ >4

20. How many journal articles have you read about the physiotherapy management of a patient with pressure sores?

☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ >20

21. If you have read articles, how did you obtain the articles?

☐ Journal Subscription: Names:

☐ University Database

☐ From a friend

☐ The internet

☐ Other, Please specify: _____

22. Do you feel your level of knowledge about the managemnt of paraplegic patients with pressure sores is adequate? Specify.

Yes ☐ No ☐

_____

_____

_____

Thank you for taking the time to complete this questionnaire.

APPENDIX B: INFORMATION SHEET FOR PHYSIOTHERAPISTS

Title of Study: **An audit of the physiotherapy management of paraplegic patients with sacral pressure sores.**

Dear Colleagues,

My name is Denisha Pather. I am currently completing my MSc in physiotherapy at the University of the Witwatersrand. I am doing a study to establish whether or not physiotherapists are treating paraplegic patients that have sacral pressure sores. If so, what is the nature of the treatment given?

This study will also establish which factors are taken into account when devising a treatment plan for these patients in order to reduce the effect of patient pressure sores.

I am inviting physiotherapists that are currently working with spinal cord patients to complete this questionnaire.

This information will be used to review current practices of Physiotherapists in South Africa when managing paraplegic patients with sacral pressure sores.

All you will be required to do is answer the following questions regarding how it is that you would manage a patient with paraplegia that has been complicated with sacral pressure sores. Questions also ask whether you are aware of any protocols in your hospitals regarding the management of these patients.

You are not obliged to take part in this study, it is voluntary. You will not be paid for agreeing to take part in the study. Refusal to take part in the study will not affect you in any way.

This questionnaire should take a maximum of 15 minutes to complete.

It will be greatly appreciated if all questionnaires to could be completed and returned within two weeks of being received to the following email address: tung.shaz@googlemail.com.

Your survey responses will be strictly confidential and data will be coded to ensure confidentiality. . All responses will be received via the email address of a colleague with no involvement with this research, this colleague will then print out all responses and then return it to myself which ensures that I am unable to access the email addresses from which the responses are received. Data collected from this survey will be used for research purposes only and no personal identification should be put on the data collection forms.

If you need to get in touch with me at any given moment please use the details provided below. This study is been done under the supervision of Dr Witness Mudzi.

Thank you for your help

DenishaPather

073 296 2262 (c)

011 432 5296 (h)

denishapather@hotmail.com

APPENDIX C : ETHICAL CLEARANCE FORM

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Miss Denisha Pather

CLEARANCE CERTIFICATE	**M10809**
PROJECT	The Physiotherapy Management of Patients with Paraplegia That have Been Complicated by Pelvic Pressure Sores
INVESTIGATORS	Miss Denisha Pather.
DEPARTMENT	Department of Physiotherapy
DATE CONSIDERED	27/08/2010
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 28/09/2010 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr W Mudzi

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...