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Chikuri, Rutendo

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THE MANAGEMENT OF PATIENTS WITH POLYTRAUMA DURING HOSPITALIZATION AND AFTER DISCHARGE AMONGST SOUTH AFRICAN PHYSIOTHERAPISTS

Rutendo Chikuri

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

Johannesburg, 2025

DECLARATION

I, Rutendo Chikuri, declare that this Research Report is my own work. It is being submitted to the University of the Witwatersrand, Johannesburg, South Africa in partial fulfilment for the degree Master of Science in Physiotherapy by coursework and research report, particularly in the field of Traumatology.

This work has not been submitted for any other degree or examination at this or any other university.

_____ _ **10/10/2025**_____

Rutendo Chikuri Date

ABSTRACT

Background: Trauma has been described as an “epidemic” in South Africa. It is a resource intensive and health and economic burden. Patients with polytrauma present with multiple orthopaedic injuries and long-term complications. Rehabilitation is the tool that has been employed to mitigate the injuries that patients with a traumatic injury present with. There is adequate reporting of rehabilitation of patients with a traumatic injury in developed countries. On the other hand, studies in these countries, that describe the physiotherapy management in patients with polytrauma are of a low level of evidence. There has been no reporting on physiotherapy management of patients with polytrauma in South Africa.

Aim: To describe the management that physiotherapists in South Africa provide to patients with polytrauma during their hospitalisation and after hospital discharge. The objectives were to a) describe the demographics of the physiotherapists and the patients that they treat, b) describe the respiratory and neuromusculoskeletal management of these patients during hospitalization, c) describe the neuromusculoskeletal management of these patients after discharge from the hospital, d) identify the outcome measures used by physiotherapists in patient care, and d) describe the barriers and facilitators that the physiotherapists encounter during patient management.

Methods: A descriptive cross-sectional study was done. A study-specific questionnaire was developed, and content and face validation were done. The questionnaire was captured on REDcap and the link to the questionnaire was circulated to members of the South African Society of Physiotherapy, Trauma Society of South Africa, Physiotherapy Association of South Africa, and the Izandla Consulting Physiotherapy Network by their respective secretariats. The inclusion criteria were physiotherapists who a) work at a trauma centre in the public or private healthcare sector in South Africa and b) frequently encounter and treat patients with polytrauma in centres not known to be formal trauma centres in South Africa. Purposive sampling was used and thereafter snowball sampling was used due to poor response rate to the initial survey invitation. The data collection duration was for ten months from July 2023 to May 2024. Descriptive statistics were used to summarise the data collected. Categorical data are reported as numbers and percentages. Continuous data are reported as median and interquartile range for non-normally distributed data. Missing data was treated as missing. Information obtained through participant responses to the open-ended questions in the questionnaire were analysed using an inductive approach to thematic content analysis.

Results: Sixteen questionnaires were received but only 12 questionnaires contained enough information to be included in the analysis. All participants were female and 83% worked in the private sector. Participants reported a median of 6.5 (3-13.8) years of experience working with patients with

polytrauma. All participants reported that they see more male than female patients who are admitted with polytrauma injury. Most of their patients are aged between 21 and 40 years. Fifty percent of the participants (n=6) reported that they 'always' managed patients with a chest injury. Most participants (n=5, 42 %) reported that they 'sometimes' manage patients with injuries to the abdomen, and most participants (n=7, 58 %) reported that they 'often' manage patients with injuries to the pelvis. Forty two percent of the participants (n=5) reported that they 'always' treat patients who are intubated. Whereas 50% of the participants (n=6) reported that they 'always' treat patients who have undergone surgical intervention.

Most participants (n=8, 67%) reported that they 'always' do active breathing exercises for pulmonary care of their patients. Positioning for ventilation-perfusion matching (n=8, 67%), suction (n=7, 58%) and incentive spirometry (n=7, 58%) were 'often' used by many participants in patient care. Most participants (n=8, 67%) reported that they 'never' used a cough assistive device or intermittent positive pressure breathing.

Most participants (n=9, 75%) reported that they 'often' use bridging for in-bed rehabilitation. Additionally, 50% of the participants (n=6) reported that they 'often' incorporate active assisted exercises and active exercises for the upper limbs and lower limbs. Whereas 33% of the participants (n=4) reported that they 'always' incorporate active assisted exercises in their treatment. Most participants reported that they 'always' include muscle strength training with a theraband (n=10, 83%) or the patient's bodyweight (n=11, 92%) as part of patient management. Factors that influenced participants' ability to mobilise their patients include type of injuries sustained, outcomes of discussions with the doctors, the patient's level of alertness, and time to surgery. Most participants (n=9, 75%) reported that they 'always' use sit-to-stand activities. In addition, 83% of the participants (n=10), reported that they 'always' include gait re-education as mobilisation strategies during in-patient care. Some participants (n=4, 33%) 'always' included education to the patient's family and education. Furthermore, 42% of the participants (n=5) 'always' pain management strategies in their patient management prior to hospital discharge. Some indicated that they educated their patients about their home exercise programmes (n= 2, 17%), attending follow up services after discharge (8%, n=1), and prevention of chronic pain.

Eight participants (67%) provided outpatient physiotherapy services for patients recovering from polytrauma. Four participants (33%) reported that they 'always' use gait re-education, balance re-education and range of motion exercises. Five participants (42%) reported that they 'always' use strength training as rehabilitation strategies in these sessions. Only 50% participants (n=6) reported that they 'always' assess the level of pain that their patients experienced. Thirty three percent of the participants (n=4) reported that they 'often' assess their patients' functional ability.

Seven barriers to patient care were identified namely language barriers, early discharge, limitation of funding, long distance between the patients' place of residence and the hospital, lack of equipment, delayed information on surgical plan, and infections.Eight enablers to patient care were identified as supportive members of the multidisciplinary team, well-equipped gym, early mobilisation, weaning from mechanical ventilation, ability to screen wards, family involvement in care, education and advocacy.

Conclusion: This study contributes new knowledge on the current physiotherapy management of patients with polytrauma in South Africa during their in-patient stay and after their discharge home. Findings should be interpreted with caution due to the low response rate. A foundation is laid for future research investigating the selection and efficacy of specific physiotherapy treatment interventions used in the management of these patients with polytrauma in South Africa, on their clinical and rehabilitation outcomes.

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LIST OF ABBREVIATIONS

ACBT	- Active Cycle of Breathing Technique
ADLs	- Activities of Daily Living
AIS	- Abbreviated Injury Scale
BMC	- BioMed Central
CAU	- Care As Usual
CPAP	- Continuous Positive Airway Pressure
CPAx	- Chelsea Critical Care Physical Assessment tool
CPD	- Continuous Professional Development
DBE	- Deep Breathing Exercises
FT	- Fast Track
FIM	- Functional Independence Measure
HREC	- Human Research Ethics Committee
IBM-SPSS	- Statistical Package for the Social Sciences
ICU	- Intensive Care Unit
IMT	- Inspiratory Muscle Training
IPPB	- Intermittent Positive Pressure breathing
IQR	- Interquartile Range
ISS	- Injury Severity Score
LL	- Lower Limb
MHI	- Manual Hyperinflation
MVA	- Motor Vehicle Accident
MDT	- Multi-disciplinary Team
NICE	- National Institute for Health and Care Excellence
NIV	- Non-Invasive Ventilation
OMT	- Orthopaedic Manipulative Therapy
PEP	- Positive Expiratory Pressure
PLoS ONE	- Public Library of Science ONE Journal
POP	- Plaster Of Paris
PVA	- Pedestrian Vehicle Accident
ROM	- Range Of Motion
SASP	- South African Society of Physiotherapy
SF-36	- Short-form health survey questionnaire
TRREE	- Training and Resources in Research Ethics Evaluation
TSSA	- Trauma Society of South Africa
UL	- Upper Limb
VHI	- Ventilator Hyperinflation
V/Q	- Ventilation-Perfusion

CHAPTER 1

1. INTRODUCTION

1.1 INTRODUCTION

A definition of polytrauma is needed to provide adequate resource allocation for the management of these critical patients (Pothmann et al. 2018). However, the definitions vary according to the geographical settings as well as their respective historical contexts (Butcher and Balogh, 2014). Although there is no agreement on an international definition for polytrauma, there has been debate regarding an approach towards it. This approach suggests that a definition of polytrauma should encompass the anatomical areas affected. It should also include a physiological component which will highlight the biological processes involved and the associated risk of mortality and morbidity (Frenzel et al. 2017; Rau et al. 2017; Butcher and Balogh, 2014). This definition is known as the Berlin definition, and it has been identified as having an improved interrater reliability due to the inclusion of the physiological aspect (Pothmann et al. 2018).

In this definition, the Abbreviated Injury Scale (AIS) is used to score the trauma severity in an anatomical region (Frenzel et al. 2017). The summation of these scores then gives rise to the Injury Severity Score (ISS). Therefore, a patient with an ISS of ≥ 16 and an AIS of ≥ 3 in two or more body regions is classified as a polytrauma patient (Butcher and Balogh, 2014; Rau et al. 2017; Hsieh et al. 2018). In addition, patients with polytrauma should have at least one or more of the following: hypovolaemic shock, reduced level of alertness, acidosis, and coagulopathy. Compromise of the body's physiological processes as well as multiple injuries places this population at a high risk of mortality. Much of the initial management in this cohort is thus directed towards limiting the mortality. However, their management can be complex requiring both a timeous response and a consistent involvement of the multi-disciplinary team at all levels of recovery (Butcher and Balogh, 2009).

Although the importance of rehabilitation of patients with a traumatic injury has been emphasised in developed countries, it is not the case in low to middle income countries (Reynolds et al. 2017). A systematic review investigated the interventions used to improve trauma care in low to middle income countries. It showed that, rehabilitation of patients who sustained a traumatic injury, was an area usually not reported on (Reynolds et al. 2017). In Africa, patients with traumatic injury often have unmet rehabilitation needs by discharge from the acute hospital setting (Christian et al. 2011).

In South Africa, some research evidence exists on the epidemiology, nature of injuries, and demographics of patients with a traumatic injury (Grey, Rodseth and Muckart, 2012; Moodley,

Aldous and Clarke, 2014). Polytrauma injury is one of the three leading causes of death in South Africa and occur due to interpersonal violence and road accidents (Moodley, Aldous and Clarke, 2014). The age group usually affected is between 21- 30 years old with a male dominance (Moodley, Aldous and Clarke, 2014). Patients with polytrauma are usually transferred to or directly admitted to tertiary hospitals because of a lack of specialist services, such as plastic surgeons or vascular surgeons, in secondary hospital settings in South Africa (Moodley, Aldous and Clarke 2014; Grey, Rodseth and Muckart, 2012; Corporate Communication, 2014). Trauma is a tremendous health and economic burden on the individual and on society.

Existing evidence that describes the physiotherapy management of patients with polytrauma are not of a high quality (Padovani, da Silva and Tanaka, 2017). Some research has emerged from the United States and Canada that focus primarily on the rehabilitation of their veteran soldiers and a multidisciplinary approach to the management of patients with polytrauma has been emphasised by these authors (Besemann, 2011; Padovani, da Silva and Tanaka, 2017; Armstrong, Champagne and Mortimer, 2019). It has also been recognised that early initiation of rehabilitation not only influences outcome but reduces the development of associated complications (Bloodworth et al. 2017). Patients with polytrauma have complex injuries which often leads to the need for long-term rehabilitation.

In the initial phase after injury, patients can be unstable with some of their injured anatomical structures requiring immobilisation to facilitate healing (Higgins et al. 2019; Padovani, da Silva and Tanaka, 2017). In addition, their physiological parameters can be unstable. Hence it is important for the physiotherapist to know when it is safe to initiate rehabilitation (Higgins et al. 2019). Early mobilisation of patients in the ICU has been supported by literature (Alaparthi et al. 2020; Jan, Shin and Shin, 2019). However, due to the variability of injuries that the patient with polytrauma presents with, it has been difficult to establish a mobilisation protocol for this population in an ICU setting. The physiotherapist should communicate with the treating orthopaedic and trauma surgeons to identify when to start mobilization (Higgins et al. 2019).

Thus, in this phase, the role of the physiotherapist is mainly directed towards prevention of respiratory complications (Padovani, da Silva and Tanaka, 2017). This is done through adequate positioning to promote V/Q matching and the appropriate use of chest physiotherapy strategies. Comprehensive chest physiotherapy is essential as a precursor to mobilisation (Padovani, da Silva and Tanaka, 2017). This is to ensure that mobilisation is safe as it places a demand on the respiratory system.

Progressive and appropriate mobilisation is then implemented once the precautions are established (Jan, Shin and Shin, 2019). Furthermore, the physiotherapist works in conjunction with the nursing staff to identify optimal positioning of the patients to prevent development of pressure sores (Padovani, da Silva and Tanaka, 2017). Maintenance of the range of motion of uninjured joints as well as their respective muscle strength is of importance (Padovani, da Silva and Tanaka, 2017).

During the process of rehabilitation, the patient should be the centre of focus. Joint effort between the multidisciplinary team and the patient should occur to identify realistic goals for rehabilitation (Armstrong, Champagne and Mortimer, 2019; Besemann, 2011). Discussions on discharge destinations as well as community reintegration should already be underway during the patient's in-hospital stay (Besemann, 2011). A qualitative study demonstrated the value of clear and concise communication between the health care professional and the patient (Braaf et al.2018). Good communication ensures good patient adherence and engagement which, in turn, reduces late-stage complications (Braaf et al. 2018). There is no reporting on the rehabilitation of patients with polytrauma in in-patient and out-patient settings in South Africa.

1.2 PROBLEM STATEMENT

Trauma is now emerging as a resource intensive, and a health and economic burden. This is because the affected population usually presents with long term complications. Since most of the affected population is of working class, this poses a huge financial burden on the economy. Less individuals may be able to return to employment soon after hospital discharge, or at all, to contribute to the economy and more cost is directed towards the care of this cohort. Rehabilitation is the tool that has been employed to mitigate the complications that patients with a traumatic injury present with. There is limited evidence that describe the rehabilitation that patients with polytrauma, receive. In addition, no existing studies of this nature in South Africa could be found**.**

1.3 RESEARCH QUESTION

What management do physiotherapists in South Africa provide to patients with polytrauma during their hospitalisation and after hospital discharge?

1.3.1 Aim of the Study

To describe the management provided by physiotherapists in South Africa to patients with polytrauma during their hospitalisation and after hospital discharge**.**

1.3.2 Objectives of the Study

- To describe the profile of participating physiotherapists in the survey.
- To describe the profile of polytrauma cases seen by physiotherapists in trauma centres in South Africa.
- To specify the management provided by physiotherapists to patients with polytrauma in trauma centres in South Africa.
- To specify the management provided by physiotherapists to patients with polytrauma after their discharge from trauma centres in South Africa.
- To identify the barriers and facilitators that impact on the physiotherapy management provided to patients with polytrauma during hospitalisation and following discharge from hospital.
- To identify the outcome measures used by physiotherapists to monitor the effect that their management has on patients with polytrauma.

1.4 SIGNIFICANCE OF THE STUDY

Trauma has been described as an “epidemic” in South Africa (Moodley, Aldous and Clarke 2014). There have been studies that have investigated the establishment of trauma systems in South Africa. These trauma systems are imperative to the quick and efficient response to the needs of these critically injured patients (Moodley, Aldous and Clarke 2014; Grey, Rodseth and Muckart, 2012). However, very little research has been directed towards the rehabilitation and physiotherapy management of patients with polytrauma in South Africa.

This study contributes new knowledge on the current physiotherapy management of patients with polytrauma in South African trauma centres and after their discharge. Having established physiotherapy practice in South Africa, a foundation is laid for future research investigating the efficacy of specific physiotherapy treatment interventions used in the management of these patients with polytrauma in South Africa, on their rehabilitation outcomes.

1.5 TYPE OF STUDY

A cross-sectional descriptive study was done by means of an electronic study-specific survey questionnaire.

1.6 WORKING DEFINITIONS SPECIFIC TO THIS STUDY

Polytrauma- An orthopaedic injury to two or more extremities with or without a respiratory complication. It may or may not include injury to the pelvic girdle (Pothmann et al. 2018). In this definition of polytrauma, traumatic injuries to the brain or spinal cord and injuries sustained from burns were not included for this study. The presence of a compromise to the physiological processes in the body was included.

CHAPTER 2

2. LITERATURE REVIEW

In this chapter we will be reviewing the current literature that describes the common practices that physiotherapists employ when they manage patients with polytrauma. To achieve this, the demographic of patients with polytrauma in South Africa, will initially be briefly described. Common physiotherapy management practices in this population will be discussed. The literature will also be analysed for any management that physiotherapists provide once the patients are discharged from hospital. Furthermore, any barriers and facilitators to the management of patients with polytrauma, will be scrutinized. An overview of the complications often incurred in this population, will be discussed. Lastly, outcome measures commonly used for this cohort will be described.

The following search engines were used to identify appropriate papers for this literature review: Google Scholar, CINHAL, Pubmed, PEDro and Cochrane database of systematic reviews. English articles published between 2013 and 2024 were sought. Various articles with differing levels of evidence were used. The types of studies included randomised controlled trials, experimental and observational studies, retrospective and prospective randomised studies, non-randomized controlled trials and mixed methods studies. A few search words were used, namely, rehabilitation, multiple traumas, polytrauma, respiratory techniques, mobilisation, physiotherapy management and outcome measures.

2.1 DEMOGRAPHICS OF PATIENTS WITH POLYTRAUMA IN SOUTH AFRICA

A study conducted in South Africa used retrospective methods to analyse records of patients who had a history of polytrauma at the Kalafong Tertiary Hospital from the 1st of July 2018 to the 31st of December 2019 (Tuswa et al. 2024). Although 208 files were collected only 191 files were included for the research (Tuswa et al. 2024). As the investigators perused through the files, they looked at the following details: patient demographics, details of the injury and mechanism of injuries. They excluded records of patients younger than 18 years of age and with an Injury Severity Score (ISS) <16 (Tuswa et al. 2024).

Upon analysis of the results they discovered that 62% of the patients who had severe polytrauma were male and 38% were female. The percentage of the patients that were black was at 81% (Tuswa et al. 2024). The prevalent ethnicity was possibly due to the clinical setting. The common age group of patients with polytrauma was 26-35 years. They constituted 36 % of the patients that were injured (Tuswa et al. 2024). Furthermore, the common mechanism of injury was motor vehicle accidents (MVA) which constituted 28% of

the injuries incurred. This was ensued by mob assault and pedestrian vehicle accidents (PVA) which were at 22% and 20% respectively (Tuswa et al. 2024).

These findings conform with the results obtained in a study done by Moodley, Aldous and Clarke (2014). It was a retrospective audit conducted in Pietermaritzburg in which mortuary reports from three government hospitals were appraised. They also appraised the reports of all trauma patients who were attended to at the outpatient departments in these state hospitals (Moodley, Aldous and Clarke 2014). In this study, they discovered that the age group usually affected was between 21- 30 years old. Eighty four percent of the patients with traumatic injuries were male. In addition, road traffic accidents constituted 75% of the aetiology of blunt trauma injuries (Moodley, Aldous and Clarke, 2014).

In the study done by Tuswa et al (2024), it was noted that patients involved in motor bike accidents had a mean ISS of 40 and ICU admission rate of 39% (Tuswa et al. 2024). On the other hand, patients involved in PVA had a higher ICU admission rate of 41% and a higher ISS (mean score of 45). However, a limitation of this study is that it did not provide details of the common regions of the body that were injured in each of the cases (Tuswa et al. 2024).

Another article that analysed the profile of patients with polytrauma injuries was from Ghana (Seidu, Alhassan and Buunaaim, 2024). This study was performed at a tertiary hospital in the northern region of Ghana. The number of polytrauma cases included in the study was 186. The research had a retrospective cross-sectional study design and data collection was done using electronic tools (Seidu, Alhassan and Buunaaim, 2024). Similar results to the study done by Tuswa et al. (2024), were obtained in this study. It was noted that most of the patients with polytrauma were male as they constituted 66% of the total cases.

The common age group and mechanism of injury were also congruent with the previously mentioned study done in South Africa (Tuswa et al. 2024). In the study conducted in Ghana, there were 356 extremity fractures in the 186 cases included (Seidu, Alhassan and Buunaaim, 2024). Lower limb fractures were more common than upper limb fractures. It was seen that 53 % of those fractures underwent surgical management (Seidu, Alhassan and Buunaaim, 2024). Twenty three percent of the fractures were managed conservatively with the plaster of Paris (POP). Facial injuries were more common than thoracic and abdominal injuries (Seidu, Alhassan and Buunaaim, 2024).

2.2 DEMOGRAPHICS OF PHYSIOTHERAPISTS AND MANAGEMENT STRATEGIES USED IN THE CARE OF PATIENTS WITH POLYTRAUMA

The next few studies that will be reviewed are regarding physiotherapy management in patients with trauma to the chest wall. The first one to be looked at is the one done by Van Aswegen et al. (2020). This research emerged because of the minimal literature detailing the physiotherapy management of patients in this cohort. Therefore, an online survey was developed to collate information regarding the common practises that physiotherapists employ whilst treating this cohort (Van Aswegen et al. 2020). It was a global survey where well-established physiotherapists from different parts of the world were invited to participate (Van Aswegen et al. 2020). The REDcap Data Management system was used with the primary host being the University of the Witwatersrand.

The survey was distributed to 96 known physiotherapists who worked at trauma centres around the world. The survey comprised of 20 questions and covered various aspects such as the demographics of the physiotherapists, surgical management, respiratory and musculoskeletal interventions and the outcome measures used by the physiotherapists (Van Aswegen et al 2020). The questions were either open or close ended. A 4-point Likert scale was used for the closed ended questions and the participants received weekly reminders to complete the survey (Van Aswegen et al. 2020).

In this study, 49 of the 96 physiotherapists who were invited, participated and they were from 13 countries across 5 continents (Van Aswegen et al. 2020). They had a median of 10 years work experience. Forty participants worked in the public sector whereas eight worked in the private sector (Van Aswegen et al. 2020). Additionally, four of the physiotherapists had a postgraduate qualification in traumatology. Fourteen participants reported that they had a specialised physiotherapist who treated trauma patients in their unit (Van Aswegen et al. 2020).

2.2.1 **Respiratory Physiotherapy Management**

The global survey noted that the role of physiotherapists is to optimize lung function and to prevent and treat pulmonary and extrapulmonary complications (Van Aswegen et al. 2020). Employment of musculoskeletal rehabilitation strategies may assist with management of patients' respiratory impairments (Van Aswegen et al. 2020; Battle et al. 2023). A recently published international expert consensus on the physiotherapy management of patients with rib fractures (Battle et al. 2023) confirms the role of the physiotherapist in patient management as outlined by Van Aswegen et al. (2020).

For instance, the common treatment strategies used included active cycle of breathing technique (ACBT), deep breathing exercises (DBE), active coughing, forced expiratory technique, endotracheal suctioning, mobility and positioning for optimal ventilation and perfusion matching (Van Aswegen et al. 2020). Interventions such as manual hyperinflation

(MHI), mechanical insufflation-exsufflation, intermittent positive pressure breathing (IPPB) and inspiratory muscle training (IMT) were either 'rarely' or 'never used' (Van Aswegen et al. 2020). However, according to Battle et al. (2023), these techniques are recommended for use in patients who are mechanically ventilated. Whereas the former techniques are recommended in patients who are not mechanically ventilated (Battle et al. 2023).

A three-round modified e-Delphi consensus study was conducted to establish a common ground for physiotherapy management of patients with blunt chest wall trauma (Battle et al. 2023). In patients with rib fractures that did not require mechanical ventilation, the authors recommended that early intervention is the best practice (Battle et al. 2023). The focus at this point would be to improve lung volumes and increase secretion removal. Thus, techniques such as active cycle of breathing, use of the incentive spirometer, bubble PEP, supported coughing, IPPB, NIV, CPAP and mobilization, were encouraged (Battle et al. 2023). Some of these techniques were mentioned in the study done by Van Aswegen et al. (2020) as seen above. Emphasis was placed on the importance of educating the patients so that there is an element of self-management.

Additionally, for patients that do require mechanical ventilation, the following was recommended; use of MHI, ventilator hyperinflation (VHI) and mobilization (Battle et al. 2023). For both categories of patients, mobilization is to be initiated in a graded format within the patient's tolerance limits and according to the patient's clinical picture (Battle et al. 2023).

Another study investigated the effects of chest physiotherapy on patients with blunt chest trauma (Alar, Gedik and Kara, 2020). The study was conducted in Turkey and was a prospective randomised study. Patients with rib fractures due to the blunt trauma, were included; however, no mechanically ventilated patients were included in the study. Forty-seven patients had more than three rib fractures whereas 67 patients had less than three rib fractures. They were subdivided into two groups. One group received analgesia (Group A), and the other group received chest physiotherapy in conjunction with analgesic treatment (Group B). These interventions were initiated within 24 hours of injury. There were 57 patients in each group (Alar, Gedik and Kara, 2020). Patients who were diagnosed with the 1st and 2nd rib fracture and patients with three or more rib fractures were hospitalised in the Thoracic surgery clinics. Therefore, 52 patients were admitted into the hospital from this cohort, the rest were treated as outpatients in the clinics in their catchment area.

The chest physiotherapy treatment modality used in this study was incentive spirometry. This was performed in conjunction with intentional coughs five times every hour (Alar, Gedik and Kara, 2020). The participants utilised a Triflow incentive spirometry device which they used

to perform inspiratory and expiratory manoeuvres five times every thirty minutes (Alar, Gedik and Kara, 2020). Moreover, mobilisation was done for fifteen minutes every three hours. Percussions and postural drainage were not included (Alar, Gedik and Kara, 2020). Patients who came to the outpatient clinics were also taught all the abovementioned treatment techniques (Alar, Gedik and Kara, 2020). They were given checklists as a reminder to ensure that they adhered to the treatment programme that they were given. The authors concluded that the chest physiotherapy treatment modalities outlined in their research, increased the incidence of a haemothorax in patients with three or more rib fractures, but did not influence the development of a haemothorax in patients with less than three rib fractures (Alar, Gedik and Kara, 2020). Findings suggest that chest physiotherapy has a positive impact on complications such as atelectasis and pneumonia in patients with a blunt thoracic trauma (Alar, Gedik and Kara, 2020).

Padovani, da Silva and Tanaka (2017) explored the physiotherapy care of patients with polytrauma. This study included a retrospective review of more than 6000 records of physiotherapy sessions done on patients with polytrauma over a two-year period and interviews with the multidisciplinary team (doctors, nurses and physiotherapists) responsible for the care of these patients. It was conducted in Brazil in an ICU at a public hospital with 17 beds (Padovani, da Silva and Tanaka, 2017). Patients included were 18 years and older with an ISS greater than 16. The authors extensively highlighted the various body regions that can be affected in patients with polytrauma and related them with the physiotherapist's role. Emphasis was placed on the importance of communication with the medical staff (Padovani, da Silva and Tanaka, 2017). The authors stressed the importance of intensive respiratory physiotherapy in patients with chest trauma and abdominal trauma.

They placed emphasis on deep breathing exercises for patients with abdominal traumas (Padovani, da Silva and Tanaka, 2017). This article also stated that the physiotherapist should review the precautions with the medical team. They should endeavour to identify whether an abdominal binder should be used when mobilising patients with the abovementioned condition (Padovani, da Silva and Tanaka, 2017).

Additionally, just as previously mentioned by Alar, Gedik and Kara (2020), caution must be exercised in patients with rib fractures (Padovani, da Silva and Tanaka, 2017). Manual techniques, such as percussions and vibrations, should not be performed over the fractured regions. The authors also suggested that a physiotherapist should review any imaging with the attending medical staff throughout treatment of patients with traumas to the chest wall (Padovani, da Silva and Tanaka, 2017).

2.2.2 Physiotherapy Management of the Neuromusculoskeletal System and Mobilisation

Details of the mobilization strategies were provided in the study done by Van Aswegen et al. (2020). These strategies included transfers such as sitting over the edge of the bed, sit to stand activities and walking with or without assistance. Balance exercises were rarely used in this cohort possibly due to the nature of the injury (Van Aswegen et al. 2020). Interestingly, it was noted that pain relief strategies were used more frequently in units with a dedicated trauma physiotherapist (Van Aswegen et al. 2020).

Surgical fixation of rib fractures was reported by some of the physiotherapy participants. They stated that this limited some of their strategies, particularly manual chest physiotherapy which was not to be performed on the surgical site a few days postoperatively (Van Aswegen et al. 2020). They also reported that the patient is not to roll to the side of the operation a few days post operatively (Van Aswegen et al. 2020).

The guidelines for management of patients with blunt chest trauma, published by Battle et al. (2023), described the exercises that could be done in patients with isolated rib fractures. It stated that the passive and active range of movement of upper limbs should be done within pain limitations, particularly in the earlier stages post admission (Battle et al. 2023). Furthermore, weight bearing is encouraged, and scapular stability exercises should be introduced especially if there is some instability. All this is to be done within pain limitations (Battle et al. 2023).

On the other hand, in the presence of fractures to the shoulder girdle complex, mobility is dictated by the presence of orthopaedic injuries (Battle et al. 2023). It is important to consult with the orthopaedic surgeons regarding the timing to initiate weight bearing activities and range of movement activities. Lastly the recommendation on how to manage these patients when they are being discharged home was also discussed briefly. They recommended that a written exercise programme should be given to these patients with an inclusion of exercises that will augment lung volume increase and secretion removal as well as pain management techniques (Battle et al. 2023).

A non-randomized controlled trial was done in the Netherlands. In this study, 132 patients were included over a period of 34 months, from 2009 to 2012 (Boumann et al. 2017). They had injuries that were complex and involved multiple parts of the body (Boumann et al. 2017). The inclusion criteria included an ISS of greater than 16, composite injuries on both lower limbs or an upper limb and a lower limb injury where either of these were not allowed weight bearing (Boumann et al. 2017). Lastly, the patients had to have a composite pelvic or acetabulum fracture. These patients were subdivided into two groups, namely: Fast Track

(FT) and Care as Usual (CAU). There were 65 patients in the Fast Track group and 67 patients in the Care as Usual Care group (Boumann et al. 2017). The main difference between the FT and the CAU approaches is that everything about the former approach was done earlier and more rigorously (Boumann et al. 2017). For example, the rehabilitation team was involved much sooner in the FT group as compared to the CAU group (Boumann et al. 2017). The rehabilitation team included for both groups involved physiotherapists, psychologists, speech therapists and social workers.

The other difference was that in the FT group, the patients were transferred to the rehabilitation centre at an earlier stage (Boumann et al. 2017). Patients were transferred within five days after being placed on a waiting list. Thus, several early mobilization protocols were developed and implemented (Boumann et al. 2017). One such protocol was regarding non-weightbearing mobilization where hydrotherapy was utilized. There was also increased communication between the doctors and the rest of the multidisciplinary team (Boumann et al. 2017).

The follow-up procedure was done over a 12-month period with the patient following up at 3-month segments. The primary outcome measures used were functional status and quality of life (Boumann et al. 2017). Forty of 65 patients completed the full FT intervention and 40 of the 67 patients completed the CAU programme (Boumann et al. 2017). Both approaches showed a positive impact on the functional status and quality of life of the participants; however, a maximal recovery of functional status was noted for the FT group at six months compared to the nine months in the CAU group. Lastly, there was no significant differences in the levels of anxiety and depression of the patients in the two groups (Boumann et al. 2017).

Although the study did not provide details of the intensity, duration and the type of exercises included, it did provide useful information (Boumann et al. 2017). It proved the importance of early rehabilitation and thorough communication amongst the various team members. It also placed emphasis on the development of rigorous treatment protocols to ensure that these patients received care within safe parameters (Boumann et al. 2017).

Communication is viewed as a pivotal aspect of the physiotherapy management of patients with polytrauma. In cases that involve injuries to the pelvis and the extremities, the physiotherapist should engage in discussions with the orthopaedic surgeons to help inform their approach of the rehabilitation programme (Padovani, da Silva and Tanaka, 2017). This article suggests that resistive exercises should be done to the upper limbs provided that the injuries are only limited to the lower limbs and the pelvic region.

Mobilization out of bed is only recommended once the doctors have cleared the patient (Padovani, da Silva and Tanaka, 2017). This article indicates the different types of out of bed mobilization for patients with polytrauma. This includes mobilisation into a chair, walking and use of a tilt table (Padovani, da Silva and Tanaka, 2017). Emphasis is placed on the physiotherapist's knowledge on the various contraindications and precautions posed by a patient's injuries. Physiotherapists should be able to identify deep vein thrombosis and compartment syndromes in the lower extremities and have the appropriate skill set to manage patients who have a vacuum dressing and soft tissue injuries (Padovani, da Silva and Tanaka, 2017).

Pain management in patients with polytrauma is important to ensure progression in rehabilitation (Padovani, da Silva and Tanaka, 2017). Emphasis is placed on continued communication between the physiotherapist, nursing staff and the treating physician. This is because if pain is not well controlled, it will impede the patient's recovery process and will delay progression of the rehabilitation (Padovani, da Silva and Tanaka, 2017).

2.2.3 Outcome Measures used by Physiotherapists in their Management of Patients with Polytrauma Injury

In the global survey by Van Aswegen et al. (2020), a few participants used outcome measures in their management of patients with chest trauma. They mostly used the six-minute walk test and the Chelsea critical care physical assessment tool (CPAx). These outcome measures formed part of in-hospital patient management (Van Aswegen et al., 2020).

The Functional Independence Measure (FIM) tool was used in the study by Boumann et al. (2017) to measure patients' functional level as they recovered from orthopaedic limb injury. Quality of life was assessed using the Short-form health survey questionnaire (SF-36). The Hospital Anxiety and Depression Scale was used as a secondary outcome measure to assess the anxiety and depression status of their patients over the 12-month follow-up period (Boumann et al. 2017).

2.3 PHYSIOTHERAPY MANAGEMENT OF PATIENTS WITH POLYTRAUMA AFTER HOSPITAL DISCHARGE

Only a small number of participants reported to provide outpatient services to patients recovering from major chest trauma (Van Aswegen et al., 2020). The purpose of these services is to provide strengthening and functional activities which is also supported by Battle et al (2023). They recommend that patients recovering from blunt chest trauma should be seen as outpatients if they still experience limitations in their ROM, respiration and mobility or if they are to return to heavy duty work or sporting activities. They recommend that patients should be directed on what to do if any pain persists for longer than six weeks and if they experience any breathing difficulties (Battle et al. 2023).

In South Africa, semi-structured interviews were held with patients with circular external fixators after traumatic injury (Crouse, Lord and Keller, 2024). Nine interviews were conducted, and it was noted that pain was a perceived barrier that affected their ability to function in their daily activities. Emphasis was placed on the importance of pain education and management (Crouse, Lord and Keller, 2024), like the recommendations made by Battle et al. (2023).

One of the modalities indicated to aid with pain management, was cycling which is a range of motion exercise (Crouse, Lord and Keller, 2024). Closed chain and weight bearing exercises were also noted as modalities that improve functionality (Crouse, Lord and Keller, 2024). These are done in the later stages of rehabilitation in patients with polytrauma.

Crouse, Lord and Keller (2024) stated that pain also affects the psychological wellbeing of patients. This is because their abilities to perform activities of daily living are severely impacted and they experience great difficulties in reintegrating back into the community. Similar findings were reported by Sobantu, Tshabalala and Chetty (2023). Pain is such a pivotal factor that it was reported that some patients resort to using illegal substances to curb its far-reaching effects (Sobantu, Tshabalala and Chetty, 2023).

Battle et al. (2023) mentioned that pain is a lingering impairment that can last up to two years post injury. Therefore, as physiotherapists it is important to assess the patient's quality of life post- discharge. Hence outcome measures such as the SF-36 questionnaire should be used as mentioned by Boumann et al. (2017). This quality-of-life questionnaire can be filled in at the first visit and then again at the final visit (Sobantu, Tshabalala and Chetty, 2023). Alternatively, they can be assessed at 3-month intervals as stipulated in the study done by

Boumann et al. (2017). This should be used to identify impeding factors and provide the patient with tools that will aid in alleviating their impact.

The study by Sobantu, Tshabalala and Chetty (2023) was done in Tshwane, South Africa and used a qualitative descriptive approach to explore the current practices utilized by healthcare professionals to provide care to patients with pelvic fractures. A semi structured interview was done on the health care professionals that worked at the Tshwane academic hospital (Sobantu, Tshabalala and Chetty. 2023). The multidisciplinary team members that participated were nurses, urologists, orthopaedic doctors, physiotherapists, dieticians, social workers, trauma surgeons, occupational therapists, orthotists, gynaecologists and psychologists.

Pelvic fractures are complex because they rarely occur in isolation as they result from high velocity motor vehicle accidents (Sobantu, Tshabalala and Chetty, 2023). Patients with pelvic fractures have longstanding impairments such as urinary incontinence and erectile dysfunction in men as well as chronic pelvic pain. This is something that should be taken into consideration whilst treating patients with polytrauma, particularly if they have pelvic fractures. If more clinicians are aware of this, the relevant referrals will be made and the patients will receive the care that they require, timeously. In addition, this study stated that more social workers are to be involved in assisting the patient to acclimatize to their home environment better. This will aid with facilitating community reintegration of these patients (Sobantu, Tshabalala and Chetty, 2023).

Common barriers to care highlighted by the participants included early discharge of patients, staff shortages, limited financial resources, limited rehabilitation centres for state run facilities, poor family support and lack of collaborative teamwork which results in poor referral structures (Sobantu, Tshabalala and Chetty. 2023). Some physiotherapists also reported that their subjective and objective assessments, and the use of outcome measures were limited and so they often missed out on key elements of patient care (Sobantu, Tshabalala and Chetty. 2023). The authors emphasized the importance of communication amongst the multidisciplinary team members, like the study by Padovani, da Silva and Tanaka (2017); however, these authors went further to describe the necessity of clear communication between the patient and the healthcare worker. Communication with the patient will help manage their expectations and thus increase their motivation to engage in physiotherapy sessions (Sobantu, Tshabalala and Chetty, 2023).

2.4 CONCLUSION

The following was reviewed in this chapter; the demographics of patients with polytrauma as well as demographics of physiotherapists in the South African context, physiotherapy management of the neuromusculoskeletal system and mobilisation, respiratory physiotherapy management, outcome measures and management of patients with polytrauma after hospital discharge. There is very little to no research done in the South African context regarding respiratory and musculoskeletal physiotherapy management of patients with polytrauma. Hence research that was done, on the physiotherapy management of patients with trauma to the chest wall, was reviewed. However, the treatment strategies discussed could be inferred into the management of patients with polytrauma.

The importance of rehabilitation of this cohort is emphasized in the literature. However, it is important to consult with surgeons regarding the time to start any form of out of bed mobilisation. It was noted that, pain is a major factor in influencing the patient's functional outcome. Outcome measures are thus imperative in managing patients with polytrauma. Outcome measures include those that assess quality of life, pain and function.

In chapter three, the methodology used during the research process of discovering the physiotherapy management of patients with polytrauma, will be discussed.

CHAPTER 3

3. METHODOLOGY

This chapter comprises of a description of the study design that was employed to carry out this research. It also provides a step-by-step procedure that was followed to collate the data, the timeline followed, and any necessary amendments that were made along the way.

3.1 STUDY DESIGN

A descriptive cross-sectional study was done by means of an electronic study-specific survey.

3.2 PARTICIPANTS

Physiotherapists who treat patients with polytrauma in the public and private healthcare sectors in South Africa.

3.2.1 Source of Participants

Members of the South African Society of Physiotherapy (SASP) were invited to participate in the study. Initially, purposive sampling was used. However, after the researcher discussed with her supervisor, snowball sampling was used. This is a normal change in sampling strategy when there is a poor response rate to an initial survey invitation. These changes are well known in research and thus it did not require permission further from the ethics committee. From this, snowball sampling method, referrals were made to contacts who oversee the professional body called Izandla Consulting Physiotherapy Network**.** Thereafter, the members of this professional body were also invited to participate in the study.

3.2.2 Sample Size

At the time of the study, the SASP membership was approximately 4000. The survey questionnaire link was sent to all the SASP members by the SASP Secretariat. The total membership of the Izandla Consulting Physiotherapy Network at the time of the study was 100. The survey link was sent to these members by the administrative section of Izandla Network. A minimum response rate of 30% was anticipated for this survey, across the Izandla Consulting Physiotherapy Network and SASP (Nulty, 2008). The minimum response rate was therefore, anticipated to be 1230.

3.2.3 Sample Selection

Inclusion Criteria

- The physiotherapists who work at a trauma centre in the public or private healthcare sector in South Africa.
- The physiotherapists who frequently encounter and treat patients with polytrauma in centres not known to be formal trauma centres in South Africa.

Exclusion Criteria

- Unsuccessful communication attempts with individual physiotherapists and physiotherapy organisations
- A questionnaire with 80% of the questions unanswered
- A questionnaire with the physiotherapist demographic questions unanswered
- Student physiotherapists

3.3 INSTRUMENTATION AND OUTCOME MEASURES

A questionnaire for the survey was developed and consists of closed-ended and open-ended response options to questions posed (Appendix A). Most of the questions were close-ended questions where an individual provided a 'Yes' or 'No' response to the question or provided a preferred response on a Likert-type scale. The five-subscale in the Likert scale was employed (Josh et al., 2015).

The content of the questionnaire was developed with guidance from the supervisor and evidence from the existing literature and includes sections on demographic information of participants (Burns et al. 2018; De Michelis Mendonca et al. 2020); patient gender (Burns et al. 2018; Scott et al. 2020); mechanisms of injury (Scott et al. 2020); physiotherapy treatment strategies, respiratory system management (Padovani, da Silva and Tanaka, 2017; Bloodworth et al. 2017), pain management (Padovani, da Silva and Tanaka, 2017), exercise therapy (Bloodworth et al. 2017; Padovani, da Silva and Tanaka, 2017)); outcome measures (Scott et al., 2020; Alaparthi et al. 2020; Besemann, 2011; Higgins et al. 2019); rehabilitation services offered to patients after hospital discharge (Christian et al. 2011; Besemann, 2011); and barriers and enablers to physiotherapy service delivery (Johnson et al. 2017; Alaparthi et al. 2020).

It was difficult to obtain two experts in the field of physiotherapy in trauma for content validity of the questionnaire. Therefore, the instrument was sent to two physiotherapists who were not in the field of trauma. They assisted with ensuring that the questions were clear and concise (face validity). Additionally, they confirmed the length of time it took to complete the questionnaire. They both verified that it took them 10 minutes to complete. Hence, this information was included in the instructions provided to participants. Lastly, the researcher in conjunction with her supervisor, ensured that the questions covered different aspects of the topic (content validity).

After content and face validation of the questionnaire was completed, it was captured onto the Research Electronic Data Capture (REDCap) platform hosted by the University of the

Witwatersrand. This platform was used to collect all participants' responses and to protect all data that was gathered.

3.4 DATA COLLECTION PROCEDURE

Permission was initially requested from the president of the TSSA (Appendix B) and to PASA (Appendix C) to invite their members to participate in the survey. A communication was also sent to the Izandla Consulting Physiotherapy Network (Appendix D) and to the president of SASP (Appendix E and F) to invite their members to participate in the study. However, due to the lack of responses received from the abovementioned, only responses from the SASP and the Izandla Consulting Physiotherapy Network were collected.

Once permission was received from the SASP president, an email containing the electronic link to the REDCap questionnaire was sent to the secretariat of SASP, requesting that it be circulated to their members. A reminder was sent to the SASP members via SASP's secretariat. A study information sheet (Appendix H) was included as the first page of the electronic REDCap survey questionnaire and contained information on the inclusion criteria, relevance of the study to the clinical setting and aim of the study.

Participants were given the option to accept participation in the survey through clicking the 'accept' button on REDCap before the survey questions appeared on their screen. The survey was available to the members of the SASP from July 2023 to October 2023. Only two responses were received from the members of the SASP. Thus, there was an unexpectedly low response rate received from the SASP members.

Thereafter, from the end of November 2023, the researcher, with the assistance of her supervisor, opted to send the link to the survey to the supervisors' known contacts. These contacts were within the field of trauma physiotherapy. From these private contacts, the researcher sent emails, containing the link to the study, to two head of physiotherapy departments within the public sector. However, these communication attempts were unsuccessful. Eventually, the researcher was referred to the Izandla Consulting Physiotherapy Network through these private contacts. The researcher then sent an email containing the link to the study survey to the administrative section of Izandla and asked for it to be distributed to Izandla physiotherapy members. The researcher sent reminders to those abovementioned contacts once every three weeks. These reminders were sent in the form of emails to the administrative teams. In addition, the researcher sent an email containing the link to the study, to a physiotherapist who owns a practice. However, due to poor responses, the researcher requested for emails of the employees from this practice. Only one other physiotherapist agreed to participate. This communication is shown in

Appendix I. This was done from November 2023 to May 2024. The researcher also sent a message to one person from her own contacts.

Therefore, the total data collection duration was ten months from July 2023 to May 2024. At the end of the ten-month period, a total of 16 questionnaires were received. However, after sifting through them, four questionnaires were excluded as they did not meet the inclusion criteria. Thus, 12 questionnaires were included in data analysis.

3.5 ETHICAL CONSIDERATIONS

Permission was received from the University of Witwatersrand Human Research Ethics (Medical) committee to conduct this survey (certificate number: M211106) (Appendix G). Anonymity was ensured for all participants as no identifiable personal information was requested from participants and all completed questionnaires were coded automatically through the REDCap system. Electronic versions of the data set will be kept on REDCap indefinitely. The researcher familiarized herself with research ethics by completing the TRREE Module 1: Introduction to Research Ethics on https://elearning.trree.org/ and she submitted her certificate of completion to her supervisor and the Wits HREC (Medical) committee.

3.6 DATA ANALYSIS

Data were exported from REDCap and downloaded as an Excel spreadsheet. Data were then cleaned and imported to IBM® Statistical Package for the Social Sciences (SPSS) version 29 for analysis. Descriptive statistics were used to summarize findings. Categorical data are reported as numbers and percentages (e.g. gender, work environment, physiotherapy treatment interventions etc.). Continuous data are reported as median and interquartile range (e.g. years of work experience, and years of working with trauma patients). Missing data was treated as missing. Extensive missing data was defined as surveys with more than 80% information not completed and these surveys were excluded from analysis. Information obtained through participant responses to the open-ended questions in the questionnaire were analysed using an inductive approach to thematic content analysis.

3.7 CONCLUSION

This chapter describes the procedure that was employed whilst conducting the research. It includes the details of the source of the participants and the sample size estimation. Additionally, it details the main challenge encountered with participant recruitment which resulted in slight adaptations that needed to be made to the data collection procedure. It concludes with a description of the data analysis approaches used. Details of the findings of the study are described in Chapter 4.

CHAPTER 4

4. RESULTS

This chapter reviews the results that were obtained in this study. The results are portrayed in diagrammatic format, mostly in pie charts and tables. The key elements of these results are then indicated in a few sentences below the diagrams.

During the study period only 16 surveys were returned despite numerous attempts to source more responses. The flow of participant recruitment is summarized in Figure 4.1 below.

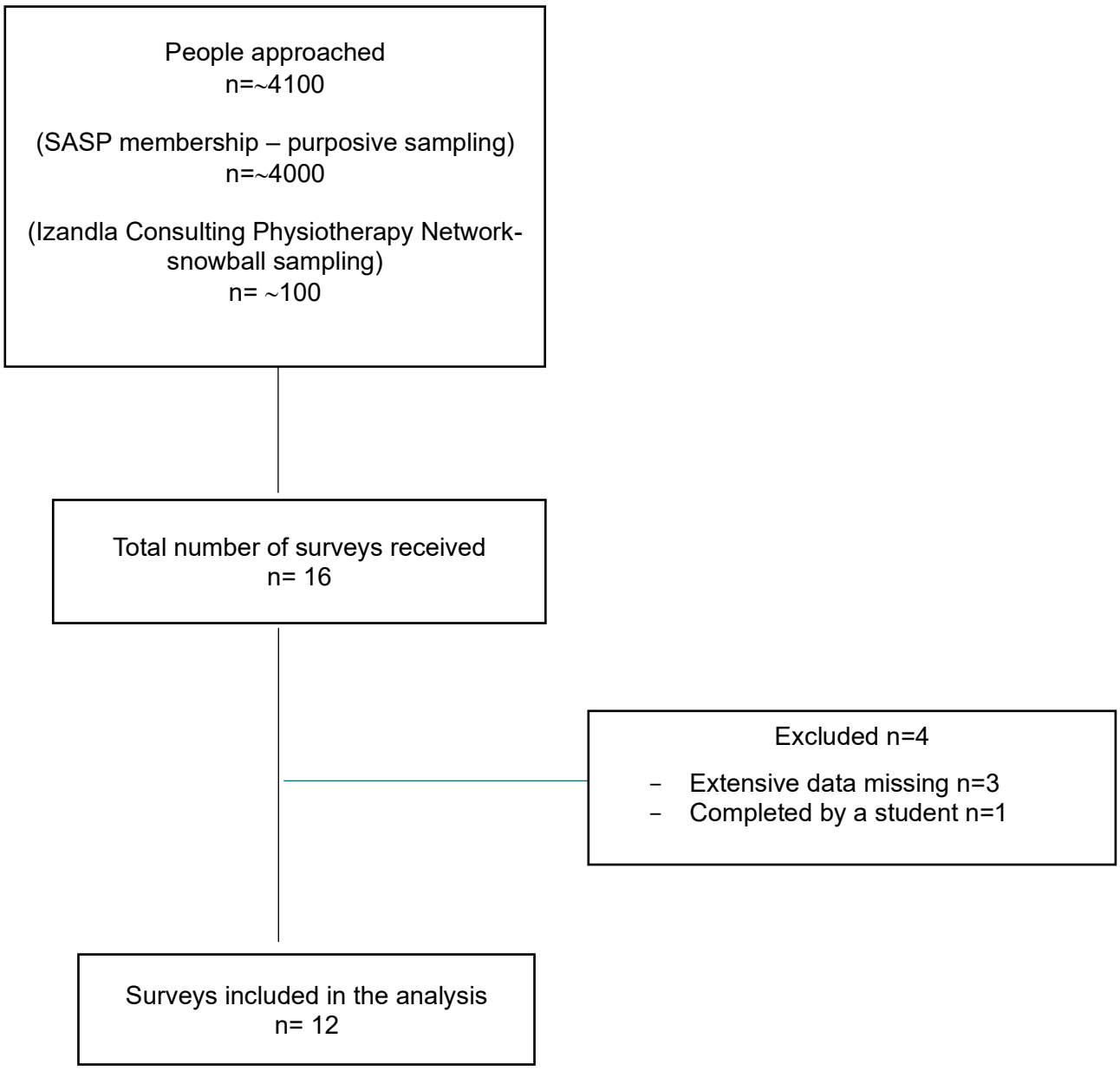


Figure 4.1: Flow of Participant Recruitment for the Study

4.1 PROFILE OF THE PHYSIOTHERAPISTS

Details of participants' demographic information, clinical experiences and qualifications are summarised in Table 4.1.

Table 4.1: Participants' Demographic Information and Clinical Experiences

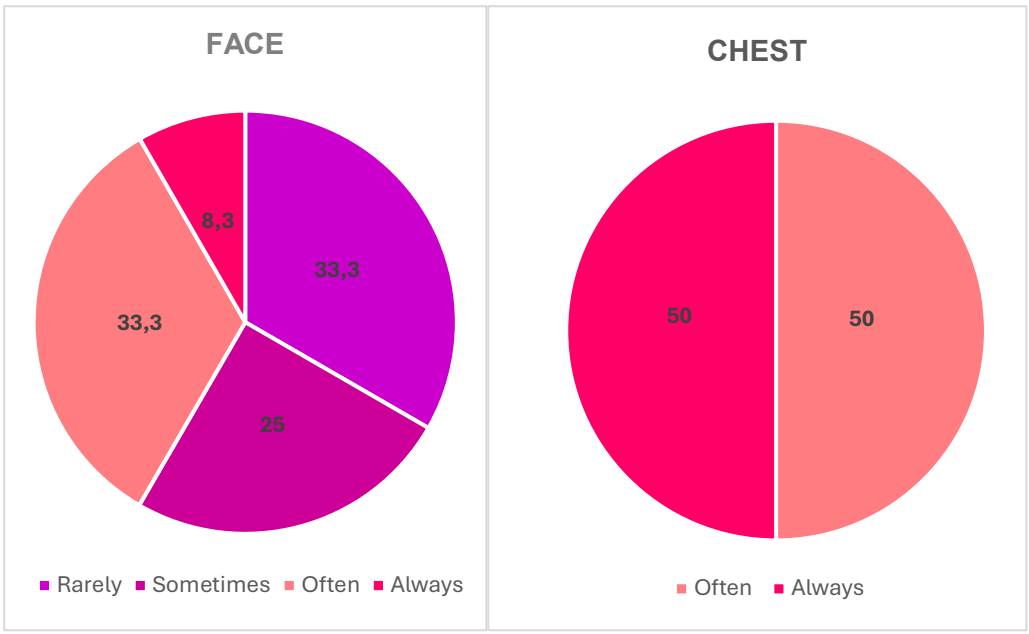
Variable	Findings
Gender (n, %) - Female - Male	 - 12 (100) - 0
Number of years worked as a physiotherapist (median, IQR)	9.5 (4.3-24.8)
Duration of working with patients with polytrauma (years) (median, IQR)	6.5 (3-13.8)
Postgraduate qualification (n, %) - Yes - No	 - 6 (50) - 6 (50)
Type of qualification (n, %) - MSc dissertation - CPD certificates	 - 3 (50) - 3 (50)
Work Setting - Private sector - Public sector	 - 10 (83) - 2 (17)

All participants were female. Two out of the six participants with a postgraduate qualification, obtained it in the field of orthopaedics, whereas three obtained their qualification in the field of critical care. One participant did not specify the area that their postgraduate qualification focused on. Lastly ten of the participants worked in the private healthcare sector.

4.2 PROFILE OF PATIENTS WITH POLYTRAUMA

The following diagrams show the patients' sites of injuries (reported as percentages) that the participants manage in their workplace (Figures 4.2 – 4.4).

Figure 4.2 shows the frequency with which the participants managed patients with injuries to the face and to the chest.

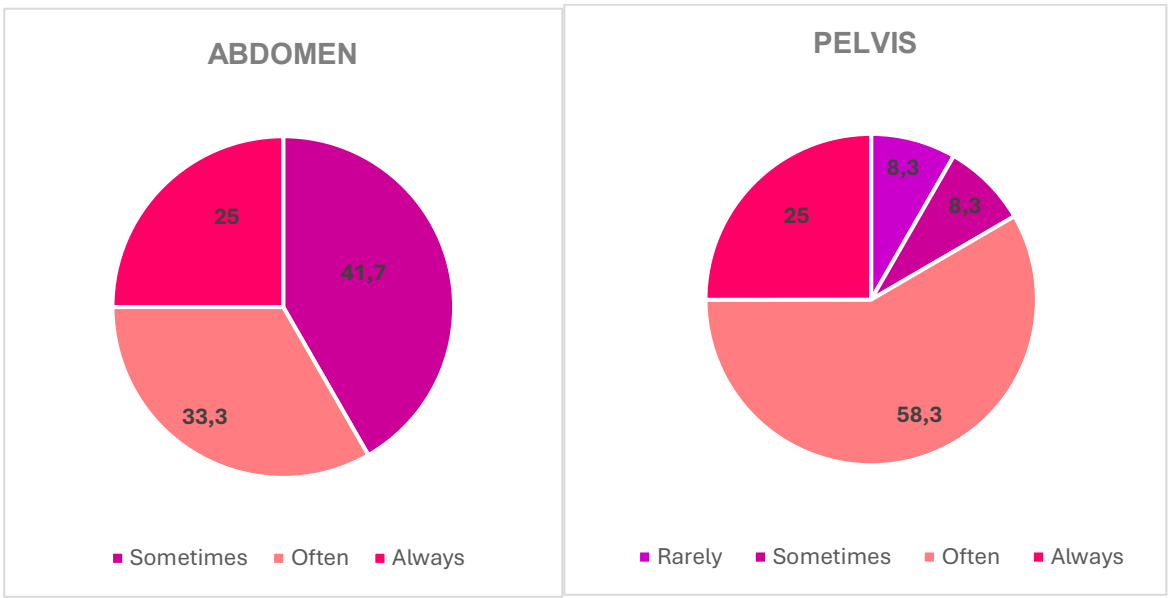


a) b)

Figure 4.2: Frequency of Physiotherapy Management of Patients with Injury to the Face (a) and Chest (b)

A third of the participants (n= 4, 33.3%) indicated that they 'often' managed patients with an injury to the face. Additionally, a third of the participants (n= 4, 33.3%) saw patients with such an injury 'rarely'. All participants (n= 12, 100%) reported that they 'often' and 'always' managed patients with a chest injury.

Figure 4.3 shows the frequency that the participants managed patients with injuries to the abdomen and pelvis.

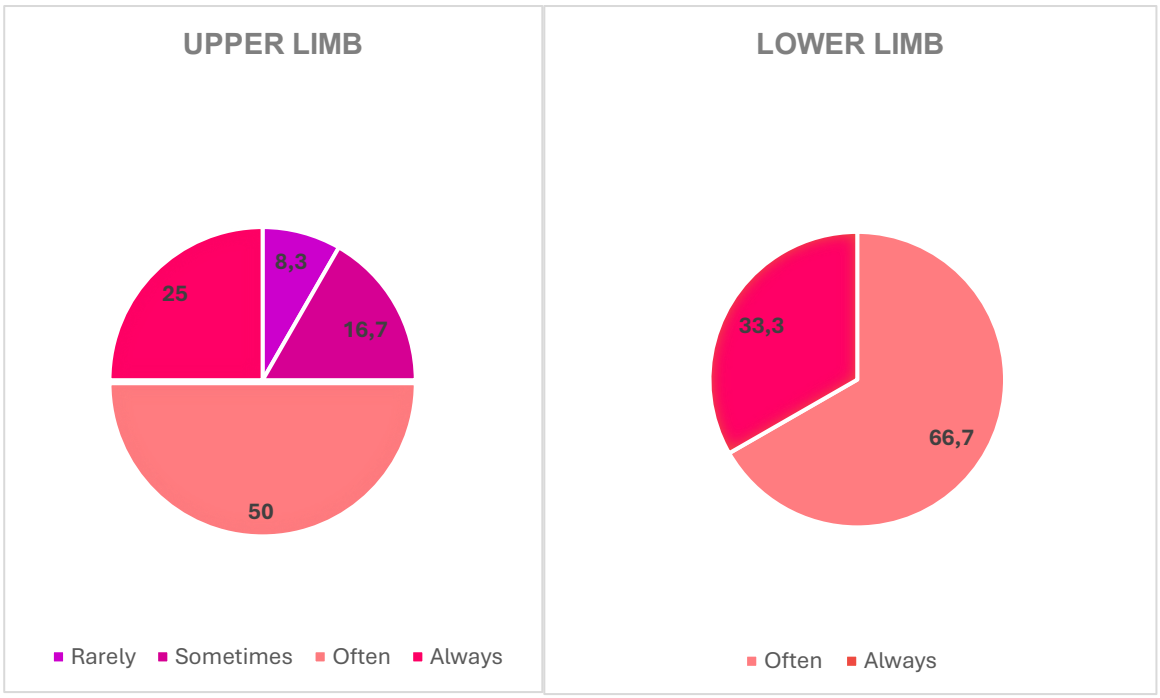


a) b)

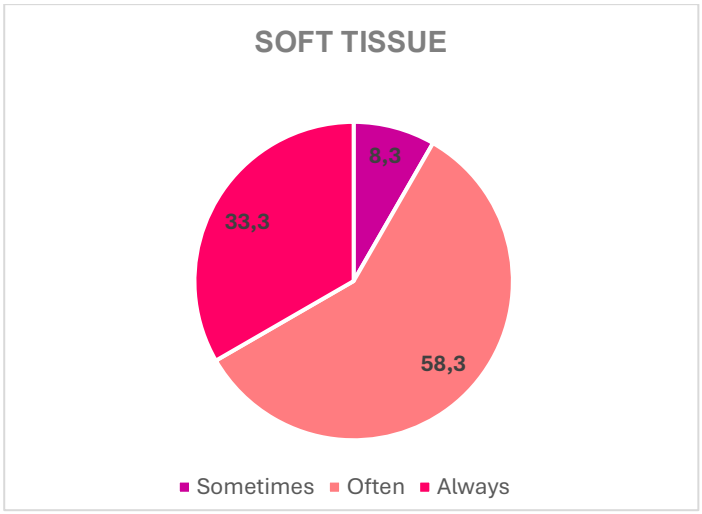
Figure 4.3: Frequency of Physiotherapy Management of Patients with Injury to the Abdomen (a) and pelvis (b)

Some participants (n=5, 41.7%), reported that they 'sometimes' manage patients with injuries to the abdomen. A quarter of the participants (n=3, 25%) reported that they 'always' treat patients with injuries to the abdomen. On the other hand, 58.3 % of the participants (n= 7) reported that they 'often' manage patients with injuries to the pelvis.

Figure 4.4 shows the frequency with which the participants managed patients with injuries to the upper limb and lower limb and soft tissue injuries.



a) b)



c)

Figure 4.4: Frequency of Physiotherapy Management of Patients with Injury to the Upper Limbs (a), Lower Limbs (b), and Soft Tissue (c)

Most of the participants reported that they 'often' manage patients with injuries to the upper limbs (n=6, 50%) and lower limbs (n=8, 66.7%). Most of the participants (n= 7, 58.3%) reported that they 'often' manage patients with soft tissue injuries.

4.3 PATIENT DEMOGRAPHICS AND CLINICAL PRESENTATION

All 12 participants reported that they see more male than female patients who are admitted to their place of work with polytrauma injury. Details of the average age range of patients managed by the participants are summarised in Table 4.2.

Table 4.2: Average Age Range of Patients with Polytrauma Injury Managed by Participants in Their Place of work.

Variable	Findings (n, %)
Average age range categories - 16-20 - 21-40 - 41-60 - >60	 - 1 (8) - 9 (75) - 1 (8) - 1 (8)

Most participants (n=9, 75%) reported that the patients that they treat are in the age range of 21-40 years old.

Details of the clinical presentation of patients with polytrauma that are managed by the study participants are summarised in Table 4.3.

Table 4.3: Clinical Presentation of the Patients with Polytrauma Managed by the Participants.

	Participant responses (n, %)				
Variable	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Intubated patients	0	1 (8)	2 (17)	4 (33)	5 (42)
Conservative Management	1 (8)	0	8 (67)	3 (25)	0
Surgical management	0	0	1 (8)	5 (42)	6 (50)

Most participants (75%) reported that they 'often' (n=9) and 'always' (n=11) treat patients who are intubated and have undergone surgical intervention.

4.4 PHYSIOTHERAPY MANAGEMENT OF THE PULMONARY SYSTEM OF PATIENTS WITH POLYTRAUMA

A Likert scale was provided for participants to indicate how frequently they used the listed physiotherapy interventions to maintain integrity of or treat complications related to their patients' pulmonary systems. Table 4.4 provides a summary of the participants' responses.

Table 4.4: Frequency of Use of Physiotherapy Techniques to Manage Patients' Pulmonary Systems.

	Participant responses (n, %)				
Variable	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Manual chest therapy	0	2(17)	3(25)	4(33)	3(25)
Active breathing exercises	0	0	0	4(33)	8(67)
Postural drainage	0	3(25)	4(33)	4(33)	1(8)
V/Q matching	0	1(8)	2(17)	8(67)	1(8)
Suctioning	0	1(8)	2(17)	7(58)	2(17)
Manual hyperinflation	2(17)	2(17)	6(50)	1(8)	1(8)
Ventilator hyperinflation	4(33)	3(25)	4(33)	1(8)	0
Incentive spirometry	1(8)	0	0	7(58)	4(33)
PEP	2(17)	3(25)	2(17)	4(33)	1(8)
Cough assistive device	8(67)	3(25)	0	1(8,3)	0
Mechanical vibromat	2(17)	1(8)	5(42)	2(17)	2(17)
Respiratory muscle training	1(8)	2(17)	3(25)	4(33)	2(17)
IPPB	8(67)	3(25)	0	1(8)	0

*V/Q, ventilation-perfusion; PEP, positive expiratory pressure; IPPB, intermittent positive pressure breathing.

Most participants (n=8, 67%) reported that they 'often' use V/Q matching as part of their techniques. On the other hand, 67% of the participants (n=8) reported that they 'never' use IPPB. Additionally, 50% of the participants (n=6) reported that they 'sometimes' use manual hyperinflation. Lastly, 67% of the participants (n=8) 'always' do active breathing exercises with their patients.

4.4.1 Participants' Responses to the Open-Ended Question

The survey question that was posed was, "Additional comments on type of respiratory management given". Three participants (25%) responded to this question. Two categories arose from these responses namely 'secretion clearance techniques' and 'mobilisation'. In the category of 'secretion clearance', an additional technique that one participant used in patient care is assisted coughing (manually) [Participant 8/female/30 years of work

experience with patients with polytrauma]. In the category of 'mobilisation', one of the participants shared "Early progressive mobilisation as soon as patient is able to start." [Participant 9/female/15 years of work experience with patients with polytrauma].

4.5 PHYSIOTHERAPY APPROACH TO REHABILITATION ACTIVITIES IN BED

A Likert scale was provided for participants to indicate how frequently they used the listed rehabilitation activities, performed in bed, to maintain the integrity of patients' musculoskeletal systems and their functional ability. Table 4.5 provides a summary of the participants' responses.

Table 4.5: Frequency of the Types of Bed Exercises/Bed Mobility Techniques used by the Participants for Patient Management

	Participant responses (n, %)					
Variable	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**	**Not completed**
Bridging	0	0	0	9(75)	2(17)	1(8)
Passive movements of the upper limbs	0	1(8)	2(17)	5(42)	3(25)	1(8)
Passive movements of the lower limbs	0	0	2(17)	5(42)	3(25)	2(17)
Active assisted upper limb movements	0	0	1(8)	6(50)	4(33)	1(8)
Active assisted lower limb movements	0	0	1(8)	6(50)	4(33)	1(8)
Active upper limb exercises	0	0	0	6(50)	5(42)	1(8)
Active lower limb exercises	0	0	0	6(50)	5(42)	1(8)
Rolling in bed	0	0	2(17)	5(42)	3(25)	2(17)
Moving from lie to sit	0	0	1(8)	7(58)	3(25)	1(8)
Muscle strength training	0	0	0	4(33)	7(58)	1(8)

Most participants (n=9, 75%) reported that they 'often' use bridging in their patient management. Additionally, 50% of the participants (n=6) reported that they 'often' incorporate active assisted exercises and active exercises for the upper limbs and lower limbs. Some participants (n=5, 42%) reported that they 'often' do rolling in bed and passive movements of upper limbs and lower limbs. More than half of the participants (n=7, 58%) reported that they 'often' incorporate movement from lying to sitting as part of their mobilisation strategies. Additionally, 58% of the participants (n=7) reported that they 'always' include muscle strength training as part of the management of their patients' musculoskeletal system.

4.6 MOBILISATION OF PATIENTS WITH POLYTRAUMA

Participants were asked to respond 'Yes' or 'No' to the timelines provided in the survey questionnaire to establish how long patients remained in bed prior to commencement of mobilisation activities. Findings are summarised in Figure 4.6.

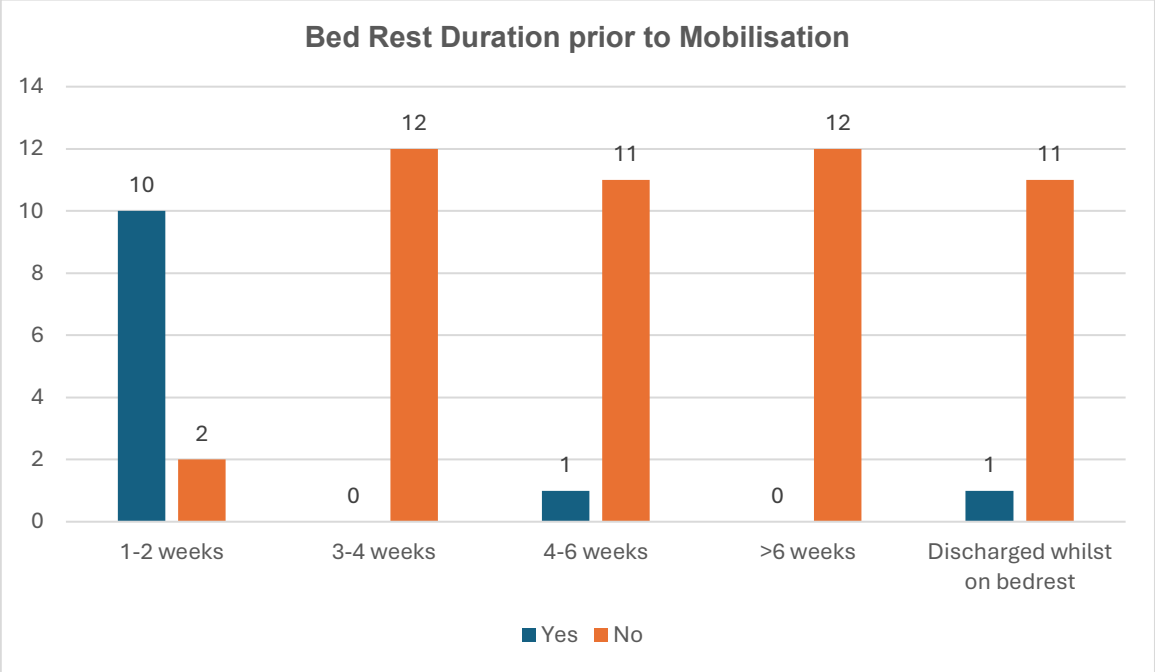


Figure 4.5: Participant Responses about the Duration of Bedrest that their Patients with Polytrauma Undergo prior to Commencement of Mobilisation Activities

Most participants (n=10, 83%) reported that their patients remain on bed rest for one to two weeks before they initiated mobilisation out of bed with them. One participant (8%) reported that patients are discharged home from their hospital while on bedrest.

4.6.1 Participant Responses to the Frequencies of the Strategies used when Mobilising Patients out of Bed

The following question was proffered for this section; "If mobilization is initiated during hospital stay, please tick the frequency with which you apply the following strategies during physiotherapy management." Thereafter, the participants that completed this section were encouraged to expand the answers they provided on the Likert scale, in the open-ended question that was below. The open-ended question for that was: "Elaborate on the length of time prior to mobilization and any strategies employed thereof." Nine participants (75%) responded to this question. However, two responses were unclear hence only the responses from seven participants (58%) were considered.

The main category in the responses of the determining factors that influence the length prior to mobilisation was clinical reasoning. The subcategories identified were the following: The type of injuries, discussion with the doctors, the patient's level of alertness, time to surgery and early mobilisation (Table 4.6).

Table 4.6: Participants' Responses to the open-ended Question about the Determining Factors that Influence the Bedrest Length Prior to Mobilisation

Category: Clinical Reasoning	
Subcategory	**Supportive Quotes**
The type of the injuries (n=1)	"We initiate mobilisation as soon as possible unless there are restrictions based on the patients' injuries" [Participant 6/ female/ 7 years of work experience with patients with polytrauma]
The patient's level of alertness (n =1)	"As soon as patient is awake and stable." [Participant 9/ female/ 15 years of work experience with patients with polytrauma]
Discussions with the doctors (n=1)	"clearing any orders with relevant surgeons" [Participant 2/ female/ 3 years of work experience with patients with polytrauma]
The time to surgery (n=1)	"This depends on the patients' injuries, time to surgery and clearance from doctors. For example, a patient with a femur fracture may wait on traction for 2 or 3 weeks for surgery, but once operated I will start mobilising day 1 post op" [Participant 4/female/6 years of work experience with patients with polytrauma]
Early mobilisation. (n=2)	"depends on the patient, early mobilisation is key." [Participant 1 /female / 10 years of work experience with patients with polytrauma] "as soon as possible" [Participant 12/ female / 18 years of work experience with patients with polytrauma]

Participants were asked to respond using a Likert scale to indicate how frequently they used the listed mobilisation activities during rehabilitation of their patients with polytrauma. Table 4.7 summarises participants' responses.

Table 4.7: Mobilisation Activities used by the Participants in the Management of Patients with Polytrauma during their Hospital Stay

	Participant responses (n, %)					Not completed
Variable	Never	Rarely	Sometimes	Often	Always	
Sit to stand	0	0	0	2(17)	9(75)	1(8)
Gait re-education	0	0	0	1(8)	10(83)	1(8)
Treadmill	6(50)	3(33)	1(8)	0	0	1(8)
Prescription of mobility device	0	1(8)	1(8)	4(25)	6(50)	1(8)
Motomed	7(58)	2(17)	0	1(8)	0	2(17)

Most participants (n=9, 75%) reported that they 'always' employ sit-to-stand activities. In addition, 83% of the participants (n=10) reported that they 'always' use gait re-education in their patient management. On the other hand, most participants (50% and 58%) reported that

they ‘never’ use the treadmill (n=6) and the Motomed (n=7) respectively, as mobilisation activities during in-hospital rehabilitation.

4.7 STRENGTH TRAINING STRATEGIES USED BY PARTICIPANTS FOR PATIENTS WITH POLYTRAUMA DURING HOSPITALISATION

Participants were asked to respond ‘Yes’ or ‘No’ to indicate which of the listed strength training strategies they use as part of their in-hospital rehabilitation for patients with polytrauma. Findings are summarised in Figure 4.6.

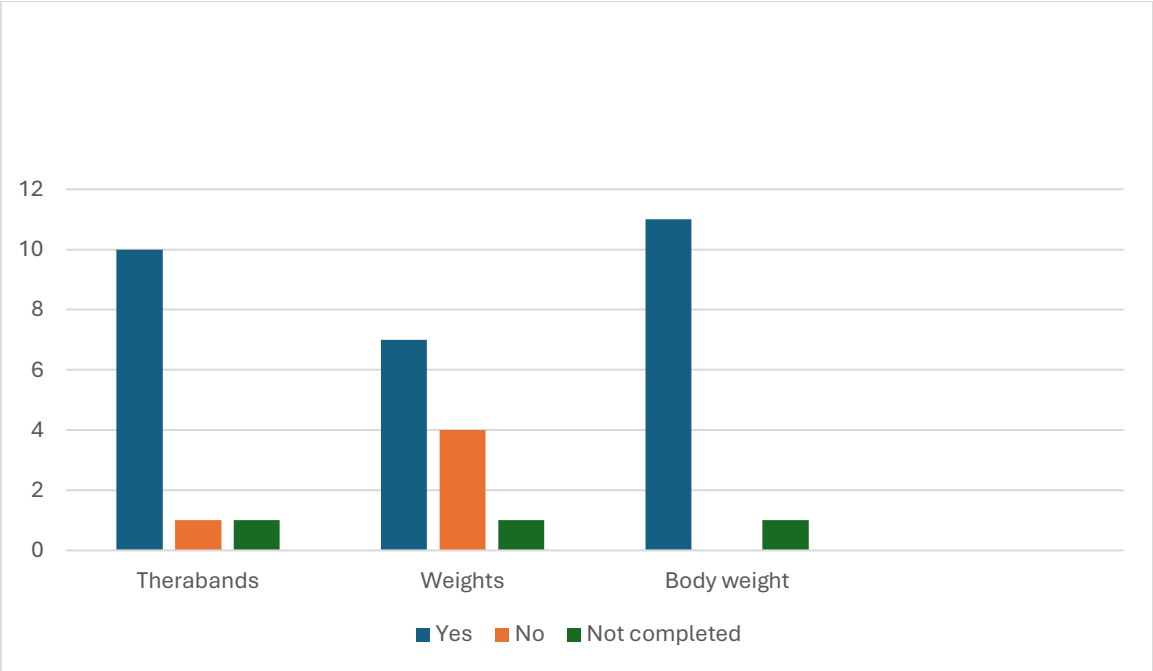


Figure 4.6: Participant Responses on the Types of Strength Training Strategies used during Inpatient Rehabilitation

More participants reported that they use TheraBand and bodyweight rather than free-weight training, for initial muscle strength training and progression of training during patient management.

4.8 EDUCATION AS PART OF PATIENT MANAGEMENT

Participants were asked to respond using a Likert scale to indicate how frequently they used the two listed educational strategies as part of their management of patients with polytrauma. Table 4.8 summarises participants’ responses.

Table 4.8: Educational Strategies used as Part of the Physiotherapy Management of Patients Recovering from Polytrauma

	Participant Responses (n, %)					Not completed
Variable	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**	
Family education upon patient discharge	0	1(8)	2(17)	4(33)	4(33)	1(8)
Education about pain management strategies	0	0	3(25)	5(42)	3(25)	1(8)

Most participants (67%) included education of the patient's family (e.g. home exercise programme; attendance of outpatient physiotherapy appointments) prior to patient discharge from the hospital 'often' (n=4) or 'always' (n=4). More participants (n=5, 42%) reported that they 'often' use pain management strategies in their physiotherapy patient management. One participant left this question blank.

4.8.1 Participants' responses to the open-ended questions

The open-ended question was "Additional remarks regarding patient management given". Four participants (33%) gave a response to this question. Three of the participants' responses were used for the content analysis. One category identified was educational strategies. The following were the subcategories identified; education about home exercise programme; education about attending follow up services after discharge; and education about prevention of chronic pain.

The table below shows the participant responses classified under the education category (Table 4.9).

Table 4.9: Participants' Responses to the Open-Ended Question Pertaining to the Patient Management Given

Category: Education	
Subcategory	**Supportive Quotes**
Home exercises (n= 2)	"Home exercise programme" [Participant 7/ female/ 3 years of work experience with patients with polytrauma] "Home programme and advice" [Participant 12 / female/ 18 years of work experience with patients with polytrauma]
Follow-up (n=1)	"Education, follow up" [Participant 1/female/ 10 years of work experience with patients with polytrauma]

4.9 OUTPATIENT PHYSIOTHERAPY SERVICE DELIVERY TO PATIENTS RECOVERING FROM POLYTRAUMA

Eight participants (67%) confirmed that they provide outpatient physiotherapy services for patients recovering from polytrauma. Some participants provide these services once per month (n=2; 17%) while four participants didn't answer the question. Four participants (33%) indicated that duration of outpatient physiotherapy follow-up was 0-3. months, while five participants did not answer the question. Additionally, one participant (8%) responded to the open-ended aspect of the following question: "Frequency of out-patient physiotherapy intervention". The response that they provided was "as needed".

Eight participants (67%) provided responses of the frequency they see patients with polytrauma as outpatients. Six participants (50%) reported that they see patients with polytrauma 'often' whereas only 2 participants (17%) reported that they see these patients 'sometimes'.

Participants were asked to respond using a Likert scale to indicate how frequently they used the listed interventions as part of their outpatient management of patients with polytrauma. Table 4.10 summarises participants' responses.

Table 4.10: Various Treatments used during Outpatient Management by the Participants.

Variable	Findings (n, %)					
	Never	Rarely	Sometimes	Often	Always	Not completed
Prescription of assistive devices	1(8)	2(17)	2(17)	2(17)	1(8)	4(33)
Gait re-education	0	0	0	4 (33)	4(33)	4 (33)
Balance re-education	0	0	0	4 (33)	4(33)	4 (33)
Strength training	0	0	0	3(25)	5 (42)	4 (33)
Endurance exercises	0	0	1(8)	2(17)	5 (42)	4 (33)
ROM exercises	0	0	0	4 (33)	4 (33)	4 (33)
Pain management	0	0	1(8)	4(33)	3(25)	4 (33)
OMT techniques	1(8)	1(8)	1(8)	5(42)	0	4 (33)
Any focus on community re- integration	0	1(8)	4(33)	2(17)	1(8)	4 (33)

*ROM, range of motion; OMT, orthopaedic manipulative therapy.

All the participants that see patients for outkpatient follow-up reported that they 'often' and 'always' use gait re-education, balance re-education, ROM exercises and strength training in their sessions.

4.10 OUTCOME MEASURES USED BY PHYSIOTHERAPISTS IN PATIENT CARE

Participants were asked to respond using a Likert scale to indicate how frequently they used the listed outcome measures as part of their management of patients with polytrauma. Table 4.11 summarises participants' responses.

Table 4.11: Frequency of the use of Outcome Measures by Physiotherapists in their Management of Patients with Polytrauma

Variable	Participants' Responses (n, %)					Not completed
	Never	Rarely	Sometimes	Often	Always	
Level of pain experienced	0	0	2(17)	2(17)	6(50)	2(17)
Hospital length of stay	2(17)	1(8)	4(33)	2(17)	2(17)	2(17)
Exercise tolerance	2(17)	0	4(33)	3(25)	1(8)	2(17)
Functional ability	2(17)	2(17)	1(8)	4(33)	2(17)	2(17)
Cognitive status	0	2(17)	4(33)	2(17)	2(17)	2(17)
Occupational outcome	1(8)	3(25)	2(17)	3(25)	1(8)	2(17)
Psychological status	0	2(17)	5(42)	1(8)	2(17)	2(17)

Half of the participants reported that they 'always' assess the level of pain that their patients experienced. One third of participants reported that they 'sometimes' assess hospital length of stay, exercise tolerance and cognitive status of their patients in the outpatient setting. One third of participants reported that they 'often' assess functional ability. Few participants (25%) reported that they 'rarely' assess their patient's occupational outcome. Occupational outcome is related to the patient's ability to return to their former work and whether they had to make any adaptations to their workplace. Less than half of the participants reported that they 'sometimes' assess their patients' psychological status in the outpatient setting.

4.10.1 Participants' Responses to the Open-Ended Question

The question asked in this section of the survey was 'Do you have any additional remarks regarding the post discharge service that you provide?' Five participants (42%) gave responses to this question. Out of the five, one participant's response was not analysed as they gave 'n/a' as a response. Hence, four participants (33%) responses were used in the analysis.

The first category identified is 'rehabilitation facility'. Participants shared that the extent of their patients' injuries guides whether they are discharged to a rehabilitation facility for continued care with one stating: "Most of our trauma patients due to the extent of their injuries are discharged to a rehab facility." [Participant 3/ female /5 years of work with polytrauma patients]. This involves writing a report for the staff at the rehabilitation facility to guide their

patient management: “A lot of our patients go to a rehab facility and then we write a report to the rehab facility.” [Participant 6/female/7 years of work with polytrauma patients].

A second category was goal setting, and the participant shared: “Goal setting with the patient and managing expectations returning to normal daily activities/ sports/ hobbies” [Participant 7/female /3 years of work with polytrauma patients].
The last category identified was provision of final rehabilitation. The participant stated, “We usually get patients post discharge from rehab facilities for final rehab.” [Participant 9/female/ 15 years of work with polytrauma patients].

4.11 BARRIERS TO AND FACILITATORS OF PHYSIOTHERAPY MANAGEMENT OF PATIENTS WITH POLYTRAUMA

- Participants were given the opportunity to describe in their own words which barriers and facilitators they encountered at their place of work during their physiotherapy management of patients with polytrauma.

4.11.1 Barriers to Physiotherapy Management of Patients with Polytrauma Injury

The open-ended question was “What are the barriers that impact on the physiotherapy management that you provide to patients with polytrauma at your place of work?”. Ten participants (83%) gave a response to this question. However, responses from nine participants (75%), were used for content analysis because the one participant gave ‘na’ as their response. Under the theme of barriers there were seven categories that were identified. The following were the identified categories: language barriers, early discharge, limitation of funding, long distance between the patient’s place of residence and the hospital, lack of equipment, delayed information on surgical plan, and infections. Table 4.12 summarises the responses provided by the participants.

Table 4.12: Participants' Responses to the Open-Ended Question Pertaining to the Barriers Encountered whilst Treating Patients with Polytrauma.

Theme: Barriers	
Category	Supportive Quotes
Delayed information on surgical plan (n=1)	“Delayed information on surgical plan” [Participant 1/female/ 10 years of work experience with patients with polytrauma]
Infections (n=1)	“Secondary complications like infections” [Participant 1/female/ 10 years of work experience with patients with polytrauma]
Language barriers (n= 2)	“At times language barriers, lots of foreign pts” [Participant 8 /female/ 30 years of work experience with patients with polytrauma]

Theme: Barriers	
Category	Supportive Quotes
	"Language barriers" [Participant 2 /female/ 3 years of work experience with patients with polytrauma]
Early discharge (n=1)	"Long waits for surgery where patients spend a large amount of time in bed. Bed pressure - once patients are operated doctors want them discharged within a day or so which often proves difficult from a mobility point of view.' [Participant 4/female/ 6 years of work experience with patients with polytrauma]
Limitation of funding (n=3)	"Patients are not financially well off to afford transportation to physio or pay for their treatment." [Participant 12/female/ 18 years of work experience with patients with polytrauma] "Finances" [Participant 9/ female/ 15 years of work experience with patients with polytrauma] "Medical aid length of authorisation for length of stay within facility." [Participant 5/ female/ 3 years of work experience with patients with polytrauma]
Long distance (n=1)	"Once discharged, patients often live far away and therefore follow up may be affected" [Participant 6 /female/ 7 years of work experience with patients with polytrauma]
Lack of equipment (n=1)	"Lack of equipment" [Participant 7 /female/ 3 years of work experience with patients with polytrauma]

The table above shows that the common barriers reported were language barriers and limitations of funding.

4.11.2 Enablers of Physiotherapy Management of Patients with Polytrauma

The open-ended question was "What are the facilitators that enhance the physiotherapy management that you provide to patients with polytrauma at your place of work?". Ten participants (83%) gave a response to this question and these responses were used for content analysis. Under the theme of facilitators there were eight categories that were identified. The following were the identified categories: supportive members of the multidisciplinary team, well-equipped gym, early mobilisation, weaning from mechanical ventilation, ability to screen wards, family involvement in care, education and advocacy. Table 4.13 summarises the responses provided by the participants.

Table 4.13: Participants' Responses to the Open-Ended Question Pertaining to the Facilitators Encountered.

Theme: Facilitators	
Category	**Direct Quote**
Supportive members of the multidisciplinary team (n=7)	"Good referral network from the rehab hospitals and our facility is central" [Participant 1/female/ 10 years of work experience with patients with polytrauma] "Multi disp meetings and ward rounds" [Participant 1/female/ 10 years of work experience with patients with polytrauma] "Supportive nursing staff" [Participant 2/female/3 years of work experience with patients with polytrauma] "Physiotherapy assistant to help with maximal assistance transfers. Good MDT involvement for patient." [Participant 5/female/ 3 years of work experience with patients with polytrauma] "Great staff teamwork and multidisciplinary management." [Participant 7/female/ 3 years of work experience with patients with polytrauma] "Teamwork" [Participant 8/female/ 30 years of work experience with patients with polytrauma] "Good ethics" [Participant 10/female/ 10 years of work experience with patients with polytrauma]
Well-equipped gym (n=1)	"We have a gym" [Participant 6/female/ 3 years of work experience with patients with polytrauma]
Early mobilisation (n=3)	"Early mobility" [Participant 8/female/ 30 years of work experience with patients with polytrauma] "Early mobilisation" [Participant 1/female/ 10 years of work experience with patients with polytrauma] "And therefore we can start rehab at the acute stage." [Participant 6/female/ 7 years of work experience with patients with polytrauma]
Ability to screen wards (n=1)	"Screening of wards for early identification and early intervention to prevent weakness" [Participant 4/female/ 6 years of work experience with patients with polytrauma]
Family involvement in care (n=1)	"Open visiting times for families, that allows for joined therapy sessions and educational sessions." [Participant 5/female/ 3 years of work experience with patients with polytrauma]
Education (n=1)	"Clear comprehensive instructions to pt" [Participant 8/female/ 30 years of work experience with patients with polytrauma]
Advocacy (n=1)	"Letters of motivation to medical schemes and employers" [Participant 12 /female/ 18 years of work experience with patients with polytrauma]
Weaning from mechanical ventilation (n= 1)	"Active weaning as soon as able" [Participant 1/female/ 10 years of work experience with patients with polytrauma]

The table above shows that early mobilisation and teamwork are common facilitators encountered by the participants.

CHAPTER 5

5. DISCUSSION

5.1 INTRODUCTION

It has been identified that there is no reporting on the physiotherapy management and rehabilitation of patients with polytrauma within the in-patient and outpatient settings in South Africa. Consequently, this research sought to answer the following question: What management do physiotherapists in South Africa provide to patients with polytrauma during their hospitalisation and after hospital discharge?

In this chapter results from chapter four will be appraised and comparisons or correlations will be made between some of the findings in this research and any previous research that was conducted.

5.2 PATIENT AND PARTICIPANT DEMOGRAPHICS

All the participants in this survey were female. These participants had a median of nine and a half years of work experience as physiotherapists with some having less than five years and some having more than 24 years of work experience. Their reported experience in trauma care ranged from three years to 13 years with a median of six years. This is comparable to the results found in the study done by Van Aswegen et al. (2020), where the physiotherapists had a median of ten years of work experience in the trauma setting. Three participants (25%) had completed additional training in the field of critical care and obtained CPD certificates. Whereas eight percent of the participants in the study done by Van Aswegen et al. (2020), had post graduate qualifications in traumatology. Two completed a Master of Science degree in Physiotherapy in the field of orthopaedics. It is reasonable to conclude that most participants had adequate experience in trauma care to participate in this survey and provide meaningful information about their patient management.

The demographics of the patients with polytrauma, as reported by the physiotherapy participants, were analysed. According to previous studies most patients who sustain multiple injuries are male and they are in the 21-35 age range (Moodley, Aldous and Clarke, 2014; Tuswa et al., 2024). This correlates with the findings in this study where majority of the participants reported that their patients are male and in the 21-40 years category according to their recollection.

In this study, most participants reported that they ‘often’ and ‘always’ see patients who have undergone surgical intervention and are intubated. Patients with polytrauma have multiple injuries with a high injury severity that may be life-limiting, hence the need for airway

management through intubation and mechanical ventilation and timely surgery for control of bleeding, organ repair and internal stabilisation of fractures, is needed (Marsden and Tuma, 2023). Although formal assessment of ISS of patients seen by the participants was not possible due to the study design, it is reasonable infer that participants managed patients with moderate to high ISS in the hospitals they work in. This is congruent with the study done by Tuswa et al (2024), where it was noted that patients involved in motor bike accidents had a mean ISS of 40 and ICU admission rate of 39% (Tuswa et al. 2024). On the other hand, patients involved in PVA had a higher ICU admission rate of 41% and a higher ISS (mean score of 45). However, a limitation of the study is that it did not provide details of whether the patients were intubated during their ICU stay (Tuswa et al. 2024). Additionally, a study from Ghana discovered that 53 % of patients with fractures to their extremities, underwent surgical management (Seidu, Alhassan and Buunaaim, 2024). Although the current study did not collect information about patients' ISS after polytrauma injury, the reported rate of admission to ICU suggests that the severity of injury of patients with polytrauma, managed by the participants, may be comparable to the reports by Tuswa et al. (2024) in Gauteng and Moodley, Aldous and Clarke (2014) in KwaZulu Natal, due to high energy impact injury.

5.3 PROFILE OF INJURY OF PATIENTS WITH POLYTRAUMA

Polytrauma was defined for this study as an orthopaedic injury to two or more extremities with or without a respiratory complication. It may or may not include injury to the pelvic girdle. The participants were asked to provide information on the frequencies that they see patients with injuries to specific regions of the body. There was a greater variation in responses provided relating to the following body regions: the face, pelvis, upper limbs and soft tissues. In these instances, the participants marked the icons under 'rarely', 'sometimes', 'often' and 'always' on the Likert scale.

Many participants reported that they 'often' or 'always' managed patients with injuries to the chest wall, abdomen, pelvis, and/or lower limbs. Such injuries are associated with high energy impact events such as motor vehicle accidents and pedestrian vehicle accidents as reported by Moodley, Aldous and Clarke (2014) and Tuswa et al. (2024). Patients with polytrauma injury that include pulmonary contusion and rib fractures or flail chest injuries, have a high risk for 30-day mortality (Deng et al., 2022). Those who sustain abdominal injury and/or pelvic fractures are at risk of extensive internal bleeding due to organ damage and have a high risk of mortality; hence they have a higher admission rate to ICU (Pfeifer et al. 2009; Mirzamohamdi et al. 2024). These factors may explain why many participants reported that they manage patients who are intubated in ICU. Physiotherapy management of patients with thoracic trauma in ICU is appropriate to prevent the onset of complications such as atelectasis and ventilator-associated pneumonia (Van Aswegen et al. 2020; Battle et al.

2023). Types B and C pelvic fractures are often managed with several weeks of bed rest and in some cases surgical stabilisation (Plani et al. 2024). Physiotherapists play an important role in preventing complications of prolonged immobility such as deep venous thrombosis, muscle wasting, and decreased joint ROM (Plani et al. 2024) and is therefore appropriate to optimise patient outcomes.

5.4 PHYSIOTHERAPY MANAGEMENT OF PATIENTS WITH POLYTRAUMA

5.4.1 Physiotherapy Management of the Pulmonary System of Patients with Polytrauma

Participants reported that their patients with polytrauma are often intubated and mechanically ventilated in ICU. The aims of physiotherapy management of the pulmonary system of patients with polytrauma who are mechanically ventilated in ICU are to prevent secretion retention, lung volume loss especially in the posterior and basal lung segments, and decreases in chest wall and lung tissue compliance, and thereby to maintain good oxygenation (Plani et al. 2024). Interventions recommended for use to accomplish these aims of physiotherapy management in patients who are sedated include changes in body positioning to facilitate movement of retained secretions towards the trachea, manual chest therapy techniques such as percussions, chest wall vibrations and chest wall shaking (within the precautions and contraindications imposed by each patient's injuries), airway suctioning, and manual or ventilator hyperinflation, followed by body positioning for V/Q matching (within the limitations to movement imposed by each patient's injuries) (Plani et al. 2024). Many participants in this study reported using manual chest therapy techniques, body positioning for postural drainage, body positioning for V/Q matching, and suctioning 'often' or 'always' for patient management. Fewer reported using manual hyperinflation or ventilator hyperinflation 'often' or 'always'. One third reported incorporating respiratory muscle training into patient management. The frequent use of most of these techniques by participants seem to concur with the recommendations made by Plani et al. (2024) in management of patients with polytrauma who are sedated and not responsive.

Not all participants reported that they 'always' used manual chest therapy techniques in patient management. The use of manual chest therapy techniques such as percussions, vibrations and chest wall shaking are not advised in the treatment of patients with thoracic trauma or where surgical stabilisation of rib fractures was done (Padovani, da Silva and Tanaka, 2017; Van Aswegen et al., 2020). Most participants stated that they often managed patients with thoracic trauma. Thus, it can be inferred that participants who encounter patients with rib fractures more frequently, are less likely to employ manual techniques in patient management.

The less frequent use of manual hyperinflation and ventilator hyperinflation by participants in this study, seems contradictory to the international expert consensus recommendations published by Battle et al. (2023). These recommendations emphasize the importance of use of manual or ventilator hyperinflation in the management of patients with blunt thoracic trauma who are mechanically ventilated to optimise lung volumes, increase chest wall and lung tissue compliance, and mobilise retained secretions for removal from the airways. Thus, in this study one could deduce that the varied responses are due to some participants seeing a combination of non-mechanically ventilated and ventilated patients. Alternatively, some participants might not feel confident enough or skilled in applying manual hyperinflation or ventilator hyperinflation as part of patient care. In a report on scope of practice of physiotherapists in ICU in South Africa, participants stated that they only sometimes used manual hyperinflation as part of patient management (Lottering and Van Aswegen, 2016). The reasons why manual and ventilator hyperinflation are not used as part of routine patient care by physiotherapists working in ICU should be explored further in future studies.

After successful extubation from mechanical ventilation, interventions such as ACBT, deep breathing, active coughing, incentive spirometry, PEP therapy, IPPB, cough assist therapy may be used to maintain or improve oxygenation and ventilation in patients who are cooperative and able to follow instructions (Plani et al. 2024). For those with thoracic trauma, mechanical vibrations of the chest wall with a vibromat device is recommended (Van Aswegen et al. 2024). Most participants in this study reported using active breathing exercises and incentive spirometry ‘often’ or ‘always’ in patient management. Most reported ‘rarely’ using the cough assist device and IPPB devices. Reasons for non-use of these treatment strategies should be explored further in future studies. Most reported that they ‘never’ use the cough assist device and IPPB devices which is like what was found globally in a survey done by Van Aswegen et al. (2020).

The frequent use of incentive spirometry in this study is similar to that reported by Alar, Gedik and Kara (2020) who showed that the most common chest physiotherapy treatment modality used for their patients with thoracic trauma was incentive spirometry. This was performed in conjunction with intentional coughs five times every hour (Alar, Gedik and Kara, 2020). Participants in this study used deep breathing frequently in patient management which conforms with the recommendations made by Plani et al. (2024) for those with polytrauma and by Padovani, da Silva and Tanaka (2017) for those with abdominal injury. Additionally, active cycle of breathing technique (ACBT), deep breathing exercises (DBE), active coughing, endotracheal suctioning, forced expiratory technique, mobility and positioning for optimal ventilation and perfusion matching were common strategies used by physiotherapists

on a global level in their management of patients with thoracic trauma (Van Aswegen et al., 2020).

Lastly, in this study, three participants (25%) provided additional comments regarding the respiratory management that they give to patients. They placed emphasis on secretion clearance techniques and mobilisation. One participant reported that they manually assist the patient with coughing as part of their secretion clearance techniques. One of the participants also reported that they do early progressive mobilisation. This means that the participants recognised that secretion clearance techniques and mobilisation concurrently improve lung volumes. This correlates strongly with what has been observed in the literature for patients with abdominal or thoracic trauma (Battle et al. 2023; Padovani, da Silva and Tanaka, 2017; Van Aswegen et al. 2020).

A deeper exploration into physiotherapists' choice of treatment interventions used in the management of their patients' pulmonary system impairments (e.g. manual or ventilator hyperinflation, cough assist device and IPPB) will provide valuable information regarding the nuances of clinical practice in the context of polytrauma.

5.4.2 Physiotherapy Approach to Rehabilitation Activities in Bed

Early mobilisation has been viewed in literature as having favourable effects on individuals who have sustained traumatic injuries. Once a patient sustains injuries to their body, an inflammatory cascade is elicited. In this cascade, there is an increase in the production of cytokines which have a catabolic effect on muscles (Van Aswegen and Myezwa 2008). Furthermore, patients with traumatic injuries are inevitably subjected to bedrest, initially to facilitate healing. However, bedrest causes an adaptation to the cardiovascular system which causes the blood pressure to decrease, it also causes osteoporotic changes to the bones due to the lack of weight bearing forces (Van Aswegen and Myezwa, 2008). The breakdown of muscles that happens due to the catabolic processes and the deconditioning that occurs with immobilisation have compounding effects and cause muscle atrophy. According to Van Aswegen and Myezwa (2008), exercise plays a pivotal role in reversing these deleterious effects.

Exercise has multiple effects on the body. It has a direct impact on the cardiovascular system, the respiratory system and the musculoskeletal system. It conditions the muscles and impedes the process of atrophy as it improves blood flow to the muscles and joints. Exercise has different components namely aerobic, strengthening and flexibility (Van Aswegen and Myezwa, 2008). The techniques that were most popularly used in this study were the following: muscle strength training, bridging, active upper limb exercises and active lower

limb exercises. Nine participants (75%) and two participants (17%) respectively stated that they ‘often’ and ‘always’ use bridging. Seven participants (58%) reported that they ‘always’ use muscle strength training. Whereas four participants (33%) reported that they often use muscle strength training. On the other hand, upper limb and lower limb exercises was reported to be used ‘often’ by six participants (50%) and used ‘always’ by five participants (42%). This means that these techniques are simple and effective in aiding the patients to regain their strength.

Additionally, according to Morrow, Wright and Van Aswegen (2024), exercise should be tailored to suit the following: the level of alertness of the patient, their injuries and their general condition. Physical activities should be done in a graded manner to cater for the patient’s condition (Morrow, Wright and Van Aswegen 2024). Moreover, the aims of mobilisation are to increase oxygenation at tissue level, to improve functional residual capacity in the lungs, to encourage bone ossification and to improve bowel and bladder function (Morrow, Wright and Van Aswegen, 2024).

In this current study, the third most popular categories of mobilisation activities include passive movements of lower limbs and upper limbs and rolling in bed. Patients with polytrauma are often initially sedated and require ventilation. This is due to the extensive nature of their injuries (Plani, et al. 2024). They may have sustained fractures that require initial stabilization to allow for adequate healing. The initial role of the physiotherapist is to maintain the ROM of the unaffected joints and elevate the affected limb within the confines of the sustained injuries (Plani, et al. 2024). Since the patient will initially be sedated, the sessions will initially be passive. In these instances, the physiotherapists will perform passive movements of the unaffected joints to full range (Plani, et al. 2024).

In this current study two participants (16%), reported that they await any orders from surgeons before initiating any mobilisation or movement. Another participant (8%) also elaborated that the types of injuries that the patient has will determine how soon mobilisation can be initiated. These findings are also supported by literature. According to Plani et al., (2024), movement to the affected limbs should only be initiated under the guidance of the treating orthopaedic surgeon. Any movement to the affected limbs is also dependent on the site, nature and stability of the fractures. Once the patient is awake and cooperative, more functional activities can be incorporated into the sessions (Plani et al., 2024). These activities include, rolling, modified bridging and sitting over the edge of the bed. Caution must be exercised in patients with pelvic fractures especially when it is unstable (Plani et al., 2024). In these instances, it is contraindicated for the patient to sit up in the first three weeks (Plani

et al., 2024). However, it is important to be in communication with the treating orthopaedic surgeon.

Another category of activities that were commonly used were the following: active assisted exercises of upper limbs and lower limbs, movement from lie to sit. According to Morrow, Wright and Van Aswegen (2024), active assisted exercises should be incorporated for muscle groups that have less than grade three in muscle strength. Strength training and in-bed activities are supported in literature as they aid in the conditioning of the musculoskeletal system (Battle et al. 2023; Van Aswegen et al. 2020). Furthermore, participants in this study were asked to elaborate the strength training strategies that they use during in-patient rehabilitation. They reported that they use body weight (92%), therabands (83%) and weights (58%). This is also supported by Morrow, Wright and Van Aswegen (2024) who stated that addition of resistance is a form of progression of the exercises and should be done for muscle groups that are at a grade three strength or more.

The participants were asked to provide information on the length of time the patients spent on bedrest prior to mobilisation out of bed. Ten participants (83%) reported that they wait one to two weeks prior to mobilisation. This is relatively short and suggests that the physiotherapists receive referrals post operatively and so the surgeons could possibly instruct that patients start mobilising within the first two weeks. This correlates with the responses that the participants provided when they were asked for the clinical presentation of the patients with polytrauma that they treat. Under this section, eleven participants (92%) reported that they 'always' treat patients who are intubated and have undergone surgical management. Thus, most participants in this study saw patients who had undergone surgical intervention.

Moreover, some of the participants gave responses to the determining factors that influence bedrest length prior to mobilisation. The main category of responses was clinical reasoning. The participants stated that mobilisation was largely dependent on the nature of the patient's injuries, the patient's level of alertness and stability. In addition, they stated that they must be in consistent communication with the surgeons. This conforms with what is in the literature. According to Boumann et al. (2017) thorough communication is crucial in facilitating early rehabilitation within safe parameters. Padovani, da Silva and Tanaka (2017) reported that mobilization out of bed should be initiated upon the recommendation of the doctors.

5.4.3 Physiotherapy approach to Rehabilitation Activities Out of Bed

In this current study, ten participants (83%) reported that they initiate early mobilisation out of bed as part of their management. Out of those ten, three participants (25%) commented

on the importance of early mobilisation. This importance has been emphasized in literature. According to Plani et al. (2024), early mobilisation is favourable, however it should be done under the guidance of the surgeons. It is also important to consider that mobilisation out of bed is a team effort particularly due to the extensive injuries that patients with polytrauma have (Plani et al. 2024). Seven participants (58%) indicated the importance of the involvement of other members of the multidisciplinary team. One participant (8%) further expounded on this and indicated the involvement of a physiotherapy assistant during maximal transfers of patients. Additionally, one participant (8%) reported that mobilisation is initiated once the patient is alert and stable. As previously mentioned, once the patient is awake, they can start off with active assisted exercises and progress to active exercises against gravity. This can then be progressed to resisted exercises using weights and therabands. Plani et al. (2024) highlighted the importance of pre-gait training. This incorporates strengthening of the gluteus maximus and the quadriceps muscles particularly if one of the limbs are permitted to weight-bear. This can start off as isometric exercises and progressed to active assisted exercises and eventually active exercises (Plani et al. 2024). Bridging can be done to strengthen the gluteus maximus, it can also be modified to be single legged bridging. At this stage the patient is taught how to do transfers. All exercises and activities should be done within the confines of the patient's pain and comfort (Plani et al. 2024).

On the other hand, if one of the upper limbs is also affected a modified version of the sitting pivot transfer may have to be used. In the different scenarios, all affected limbs must be well stabilised to prevent unnecessary movement at the fracture site (Plani et al. 2024). Mobilisation out of bed can be done in different forms. It can involve mobilising into a chair, sit to stand, walking and transferring onto a tilt table (Padovani, da Silva and Tanaka, 2017). In this current research, participants were also asked to provide details on the mobilisation activities out of bed during their hospital stay. Most participants reported that they employ sit to stand activities, gait re-education and they prescribe a mobility device. Two participants (17%) reported that they 'often' do sit to stand, and nine participants reported that they 'always' do sit to stand. Sit to stand is a closed chain and a weight bearing exercise which was noted by Crouse, Lord and Keller (2024), as a modality that improves function. It is pivotal in ensuring that the patient regains independence as supported by literature (Van Aswegen et al. 2020).

The weightbearing status should be confirmed with the orthopaedic surgeons prior to performing any gait re-education and sit to stand activities. If the patient begins gait re-education during their hospital stay, mobility aids should be issued depending on the patient's requirements (Plani et al. 2024). Gait re-education was reported to be used 'always' by ten

participants (83%) in this study. Lastly, four participants (33%) ‘often’ prescribe a mobility device and six ‘always’ prescribe the devices. This indicates that most of the physiotherapists see patients with lower limb injuries as stated above. Use of mobility devices in gait re-education is important in the acute stages of rehabilitation (Padovani, da Silva and Tanaka, 2017). The mobility device is important in aiding adherence to the weightbearing status. In this manner the precautions and contraindications of the conditions are being considered (Padovani, da Silva and Tanaka, 2017).

The mobilisation activities that were least used were the treadmill and the motomed during in-hospital rehabilitation. This was perhaps due to weight bearing restrictions based on the complexities of their injuries. A study was done by Kim et al. (2020) where they assessed the impact of antigravity treadmill training on patients who sustained femur fractures. This is a device that uses a pressure-controlled system to alleviate the pressure on the affected limb whilst the patient weight bears (Kim et al. 2020). It was found to be beneficial as it increased the strength in quadriceps muscles and in turn improved the patient’s functional outcome and walking abilities (Kim et al. 2020). However, this device is not easily accessible in our setting. Additionally, there is little research on treadmill training on patients with polytrauma in the acute setting. Furthermore, the use of the motomed has been described in the literature for patients with stroke. Hu et al. (2022) noted that using the motomed improved the patients’ walking ability and their lower limb function. However, its use in patients with polytrauma has not been adequately described in the literature.

5.4.4 **Education**

Another aspect of physiotherapy management that was investigated was patient education and education on pain management strategies. According to previous research, education plays a critical role in patient management. Education should be directed towards the patient and their family members or primary caregivers (Sobantu, Tshabalala and Chetty, 2023; Crouse, Lord and Keller, 2024). Sobantu, Tshabalala and Chetty (2023), reported that patient education helps to manage the patient’s expectations and will help increase in their engagement in physiotherapy sessions. According to NICE (2024), the physiotherapist must include the patients and their caregivers in their setting of goals for rehabilitation as a means of education.

In this current study eight participants (67%) reported that they ‘often’ and ‘always’ do family education upon patient discharge. This means that the participants valued the importance of the family. Educating the family will ensure continuity of care once the patient is at home (Sobantu, Tshabalala and Chetty, 2023). The participants in this study were also asked to expand on the education strategies that they employed during patient care. They reported

that they educated their patients on home exercise programmes and on the importance of attending follow-up services after discharge. This is all in conformity with the findings in literature. Battle et al. (2023) recommend that a written exercise programmes should be given to patients and should be initiated during their hospital stay and continued post discharge as needed. Crouse, Lord and Keller, (2024) also emphasize the importance of comprehensive education during patient care.

Additionally, eight participants (67%) in this current study ‘often’ and ‘always’ assess the level of pain experienced. Assessment using outcome measures should precede treatment and should be used at different stages to ascertain the effectiveness of the management (Morrow, Wright and Van Aswegen, 2024). It is therefore important to ensure that pain is assessed and treated regularly throughout the patient’s rehabilitation process (Parker, Naidoo and Salloo, 2024).

Pain management is also important when treating patients with polytrauma. This is because pain has a lingering effect, (Battle et al. 2023) and its presence can impede an individual's progress (Sobantu, Tshabalala and Chetty, 2023; Crouse, Lord and Keller, 2024). In this study, 67% ‘often’ and ‘always’ use pain management strategies. According to Parker, Naidoo and Salloo (2024), pain is multidimensional. They state that pain has an emotive element where high stress levels worsen the pain levels whereas happier moods lower the levels of pain. Additionally, certain unpleasant memories can also trigger the pain symptoms (Parker, Naidoo and Salloo, 2024). This shows that the brain has a huge role to play in the pain mechanism process and the interpretation thereof. Thus, the brain is the main target for a lot of the pain management strategies (Parker, Naidoo and Salloo, 2024). The physiotherapist must endeavour to establish a good rapport with the patient (Parker, Naidoo and Salloo, 2024). This will include reassuring them that the presence of pain does not indicate danger. The establishment of a good relationship will also inspire the patient’s adherence to the treatment programmes (Parker, Naidoo and Salloo, 2024).

During pain management, the physiotherapist should also be aware of the following: the time since the injury, presence of inflammation and any signs of hypersensitivity (Parker, Naidoo and Salloo, 2024). This will in turn inform the direction of the treatment sessions. It is important to consider that pain has a timeline and a mechanism. For instance, acute pain is pain that has been present for up till six weeks and subacute pain is pain that has been present from six weeks to three months (Parker, Naidoo and Salloo, 2024). Any pain that persists beyond three months is now past the normal tissue healing phase and is considered as chronic (Parker, Naidoo and Salloo, 2024). There are three types of pain mechanisms. These include, nociceptive, neuropathic and nociplastic (Parker, Naidoo and Salloo, 2024).

In trauma injuries, the main pain mechanism is nociceptive since there is actual or potential tissue damage in an otherwise healthy nervous system. It can also be neuropathic if there is a lesion to the sensory nerve (Parker, Naidoo and Salloo, 2024). However, if this pain is not adequately managed in the initial phases of tissue healing, it causes a dysregulation of the central nervous system, and the pain becomes more nociplastic in nature. This is where pain is generated with no evidence of actual tissue damage. In this instance, the pain has become chronic. However, not all nociplastic pain is chronic (Parker, Naidoo and Salloo, 2024).

In this current study, the participants included education on the prevention of chronic pain when they expanded on the types of the education strategies that they adopt. This is further supported by the literature as Battle et al. (2023) reported that patients should be educated on what to do if the pain persists for longer than six weeks. This is also echoed by Crouse, Lord and Keller (2024) who emphasized the importance of pain education. In this current study, four participants (33%) reported that they 'often' incorporate pain management into their sessions. This correlates with literature because the presence of chronic pain is debilitating, and the physiotherapist must endeavour to alleviate the pain symptoms during the normal tissue healing stage to prevent pain's lingering effect which was mentioned above (Parker, Naidoo and Salloo, 2024; Crouse, Lord and Keller, 2024).

This current study did not explore the types of pain management strategies that the physiotherapist can use whilst treating patients with polytrauma. Nevertheless, seven participants (58%) reported that they 'often' and 'always' employ pain management techniques in their sessions. There have been studies that provide elaborate information on the different types of strategies that can be used (Parker, Naidoo and Salloo, 2024). According to Parker, Naidoo and Salloo (2024), it is important that the physiotherapy sessions are timed at least 30 minutes after the patient has received analgesics, during the acute phase. Although this was not mentioned in this current study, it is still important to consider it when managing patients with polytrauma during their hospital stay as this will help with their engagement during the therapy sessions (Parker, Naidoo and Salloo, 2024). Additionally, other modalities such as TENS, cryotherapy, thermotherapy and strapping also lessen pain by targeting the spinal cord mechanisms. Although this study did not elaborate on these different pain modalities, they can be used in the later stage of rehabilitation to manage patients with polytrauma (Parker, Naidoo and Salloo, 2024).

Furthermore, self-management techniques such as movement pacing in activities and protective techniques such as supportive coughing can be used. Patients should be taught how to support incision sites not only when coughing but also during global movements such as rolling and going from lie to sit (Parker, Naidoo and Salloo, 2024). As previously

mentioned, the brain should be the main target during the treatment sessions. Therefore, strategies such as mindfulness, relaxation techniques and deep breathing are often used to address the severity and the effect of pain (Parker, Naidoo and Salloo, 2024). This is relevant to this study because five participants (42 %) indicated that they treat patients with abdominal trauma, 'sometimes' and they would have to employ these strategies. However, details of these techniques were not provided in this study which is a limitation of this research.

5.4.5 Outpatient Physiotherapy Service Delivery to Patients Recovering from Polytrauma

Rigorous rehabilitation is supported by a study done by Boumann et al. (2017). This study also supported early rehabilitation as they saw that the group which was exposed to it had a better functional status and quality of life compared to those that had rehabilitation later (Boumann et al. 2017). Four participants (33%) in this current study reported that they do not see patients with polytrauma as outpatients. This is possibly because they refer their patients out to a rehabilitation facility. This was seen in the responses that they provided to the open-ended questions about post discharge services. Some of them stated that the patients they see have extensive injuries which require longer rigorous rehabilitation. This is provided at a rehabilitation facility and not the acute care facility, hence the transfer of patients as reported by some participants. This correlates with Battle et al. (2023) who stated that patients should be referred for more therapy if they have persistent impairments on discharge from the acute setting.

In this study, the participants reported that their patients' present with extensive injuries. This requires outpatient physiotherapy after discharge from the acute setting. According to Plani et al. (2024), patients with multiple traumatic injuries present with various limitations to their mobility and increased dependence on others for assistance with ADLs. Therefore, patients with polytrauma will need to be seen after discharge from the hospital settings (Plani et al. 2024). Patients can be seen as outpatients at the physiotherapy department at the acute hospital, alternatively they can be seen at a rehabilitation centre (Plani et al. 2024), or they can receive physiotherapy services within the community as part of an outreach programme (Plani et al. 2024; Sobantu, Tshabalala and Chetty, 2023). Additionally, according to NICE (2024) a detailed hand over should be provided when the patient is being transferred to a different facility or to a different physiotherapist. This will ensure continuity of care.

Rehabilitation should be specified for each patient for it to have a meaningful effect (Plani, et al. 2024). It should be comprehensive since the patients have multiple impairments. It should address limitations in ROM, muscle strength, balance and endurance (Morrow, Wright and Van Aswegen, 2024). Weightbearing should be initiated as early as it is feasible and safe to do so (Plani et al. 2024). According to Crouse, Lord and Keller (2024), assistive devices can

be used to facilitate weightbearing. At this stage some patients would have already started with gait retraining whilst they were in- patients. Therefore, this is continued and the weight bearing in affected lower limbs is increased. Balance re-education becomes more emphasized. In this study, all the participants (n= 8, 67%) that see patients for outpatient follow-up reported that they 'often' and 'always' use gait re-education, balance re-education, ROM exercises and strength training in their sessions. Balance re-education should be implemented in conjunction with the other functional activities which include sit to stand activities, walking and stair climbing (Morrow, Wright and Van Aswegen, 2024). When balance retraining is done it will facilitate the weaning process from assistive devices (Crouse, Lord and Keller, 2024).

Endurance exercises should be within 60 to 70% of heart rate maximum once the patient is out of the ICU setting (Morrow, Wright and Van Aswegen, 2024). It can take various forms which include marching on the spot, jogging on the spot, cycling and eventually, running (Morrow, Wright and Van Aswegen, 2024). These sessions can initially be 30 minutes long that can be repeated twice a day. This can be progressed to one continuous session that is 60 minutes long (Morrow, Wright and Van Aswegen, 2024). Seven participants (58%) reported that they 'often' and 'always' employ endurance exercises. This study did not obtain information on how this was applied.

There was a variation in responses when it came to OMT techniques and community reintegration. The variation in responses given for OMT could be because of multiple reasons. It could be dependent on the type of training that the physiotherapists received. This influences whether they used OMT techniques or not. Additionally, OMT techniques were viewed as a modality which not only improves joint ROM but also alleviates pain and reduces any associated anxiety. Therefore, these techniques can also be used in patients with polytrauma in the subacute phase, to improve ROM and to alleviate pain (West and Huzij, 2024). The varied responses given for community reintegration could be based on the different contexts of the patients' work settings. Community reintegration is important as it assists the individuals in return to work and continuing with their family roles (Critchfield et al. 2019).

On the other hand, in a study done by Sobantu, Tshabalala and Chetty (2023) it was noted that rehabilitation facilities are limited for orthopaedic cases within the public sector in South Africa. Hence patients within the public sector with traumatic injuries are often prematurely discharged to the home setting (Sobantu, Tshabalala and Chetty, 2023). In this study most of the participants (n= 10, 83%) worked in the private sector which meant that the patients that they treated had better chances of going to rehabilitation facilities. This is in conformity

with Hardcastle's (2021) findings who indicated that rehabilitation is not prioritised by the government in the South African public healthcare setting. Thus, there are fewer state-run rehabilitation facilities and patients have poorer functional outcomes and are unable to return to work compared to their counterparts who receive care in the private facilities (Hardcastle, 2021).

5.4.6 **Outcome Measures**

The participants were asked to provide more details of the outcome measures that they use during the management of patients. The use of outcome measures has been well documented in the literature. This is because outcome measures assess the effectiveness of treatment strategies on patients (Van Aswegen et al. 2020; Boumann et al. 2017). There is a wide variety of outcome measures that have been documented and described in literature. However, the most common outcome that is measured in the trauma population is level of function (Morrow, Wright and Van Aswegen, 2024). This is because function is almost always impaired in these patients. However, this slightly differed with the findings in this research as only 50% (n=6) reported that they 'often' and 'always' assess function. Interestingly, some participants (n=4, 33%) reported that they 'never' and 'rarely' assess functional status. Nonetheless, a study done by Van Aswegen et al. (2020) stated that the CPAX tool and the six- minute walk test was incorporated in in-patient management of patients with thoracic trauma. Sobantu, Tshabalala and Chetty (2023) stated that outcome measures were poorly used during physiotherapy sessions due to limited time of these sessions and reduced access to the outcome measures. In this current study, a possible reason for the reduced use of outcome measures may be due to time constraints.

In this study the participants commonly assessed the level of pain experienced. Sixty seven percent (n=8) reported that they 'often' and 'always' assess pain. This displays the importance of pain and the impact that it has on not only patient but also on the type of physiotherapy management that they receive. This is supported by Morrow, Wright and Van Aswegen (2024).

There were varied responses to the use of the following outcome measures to assess patient responses to physiotherapy intervention: hospital length of stay, exercise tolerance, cognitive status, occupational outcome and psychological status in this study. These are considered as secondary outcomes. This is shown in the study by Boumann et al. (2017) who reported that anxiety and depression outcomes, for instance, are secondary. However, Morrow, Wright and Van Aswegen (2024) reported that patients who survive after polytrauma have long term psychological problems. Thus, it is still important to assess these secondary outcomes to ensure that patients are referred to the relevant disciplines timeously for further management.

5.5 BARRIERS AND FACILITATORS TO PHYSIOTHERAPY MANAGEMENT

In this study, the participants were asked to explain the types of barriers and facilitators that they encounter during patient management. The following were found to be barriers: language barriers, early discharge, limitation of funding, long distance between the patient's place of residence and the hospital, lack of equipment, delayed information on surgical plan, and infections. Early discharge and long distance from hospital which reduces the patient's abilities to come for appointments and limited finances were also indicated in the study done by Sobantu, Tshabalala and Chetty (2023). In the study done by Sobantu, Tshabalala and Chetty (2023) they stated that patients are discharged immediately after they have undergone any surgical management. They reported that this was due to the high demand on beds which places mounting pressure on the doctors to discharge quickly (Sobantu, Tshabalala and Chetty, 2023). This correlates with what was reported by one participant (8.3%) in this study.

Sobantu, Tshabalala and Chetty (2023) also reported that the patients don't always have the finances to come back to appointments as outpatients. This correlates with the findings in this study as the most common barrier was limitation of funding. This was reported by three participants (25%). One participant noted that they treat patients with limited finances. Additionally, another participant stated that the length of stay in the hospital is determined by the medical aid funds available.

The second most common barrier was language barrier. One participant noted that they treat lots of patients who are foreign and may have limited ability to understand and speak English. According to Hunter-Adams and Rother (2017) language barrier is a prominent problem within the South African context. This is because South Africa is a multi-cultural and multi-lingual country and a common destination for migrants who seek better opportunities. In addition, they indicated that language is vital in ensuring that healthcare is accessible to everyone (Hunter-Adams and Rother, 2017).

As previously stated, the participants were also asked about any facilitators to patient management. The following were noted as facilitators: supportive members of the multidisciplinary team, well-equipped gym, early mobilisation, weaning from mechanical ventilation, ability to screen wards, family involvement in care, education and advocacy. This is contrary to what was found in another study done by Sobantu, Tshabalala and Chetty (2023). The authors reported that they often encountered patients with poor family support, and there was lack of collaborative teamwork which resulted in poor referral structures (Sobantu, Tshabalala and Chetty, 2023). This study was conducted in the South African public

sector at a hospital in Pretoria (Sobantu, Tshabalala and Chetty, 2023). This possibly explains why the findings in this study are different. As previously stated, most of the participants work in the private sector. Thus, it can be deduced that the context played a big role in the types of facilitators and barriers encountered. On the other hand, a qualitative descriptive study was done by Naidoo and Ennon (2018) in a rural area in Kwazulu Natal. The authors highlighted that having a good referral system and having a positive experience at the physiotherapy sessions were the common facilitators (Naidoo and Ennon, 2018). This is consistent with the findings of this study.

5.6 LIMITATIONS TO THE STUDY

Recruiting participants to complete this survey was more challenging than expected during the planning phase of the study. Initially, purposive sampling was used for members of the South African Society of Physiotherapy (SASP), Trauma Society of South Africa (TSSA) and Physiotherapy Association of South Africa (PASA). Due to the poor response rate from members of these professional bodies, snowball sampling was used especially through the researcher's and supervisor's known contacts to source more participation. From this snowball sampling, the researcher was able to get in contact with a professional body called Izandla Consulting Physiotherapy. Disappointingly, only a small number of completed questionnaires were received despite numerous attempts made to recruit more participants and the extended data collection period. Additionally, most participants (n=10, 83%) worked in the private sector, which created some bias in the types of results obtained. As a result, the findings presented in this research report should be viewed as preliminary. A limitation of the content of the survey questionnaire is that questions did not explore the reasons why participants did not use some of the treatment interventions listed on it. Another limitation of this study is that the researcher relied on the recollection of the participants to provide information on the patients' injury profile, rather than retrieving this information directly from the hospitals. However, this study was nationwide, hence it would not have been feasible to get information from the various hospitals to access their patient records.

CHAPTER 6

6. CONCLUSION

This study used a descriptive cross-sectional survey design to describe the management that physiotherapist in South Africa provides for patients with polytrauma in the in-hospital period after they sustained injury and after hospital discharge. The findings are preliminary due to the low response rate to the survey. Nevertheless, this study contributes new knowledge about this topic which has not been explored to date in the South African context.

The in-hospital physiotherapy management provided to patients with polytrauma seems to conform with the limited evidence available and the opinions expressed by authors of chapters in the available handbook on physiotherapy management of patients with traumatic injury in acute care settings. Physiotherapy practice seems to deviate from recommendations by others regarding the use of manual and ventilator hyperinflation, cough assist therapy and IPPB therapy for patients with thoracic trauma.

Physiotherapy rehabilitation of patients after hospital discharge is focused on gait re-education, balance retraining, joint ROM exercises, and strength training. This conforms with recommendations made by others. Education formed part of physiotherapy management and focused on pain management strategies and to a lesser extent on revision of home exercise programmes.

Participants prioritised assessment of their patients' level of pain but fewer prioritised assessment of their patients' level of function, exercise capacity, cognitive ability, mental health status, and return to employment. Facilitators to physiotherapy management such as, having supportive members of the multidisciplinary team, well-equipped gym and early mobilisation were identified. Barriers such as, early discharge, language barriers and delayed information on surgical plan of patients with polytrauma were identified.

The following recommendations are made based on the findings of this study:

6.1 RECOMMENDATIONS FOR CLINICAL PRACTICE

- Participants highlighted that some patients have limited funding that prevents them from continuing with rehabilitation after discharge from hospital. They also added that patients live a long distance away from the hospital site and physiotherapy rooms. These were indicated as barriers to provision of patient care. Not all participants prioritised education on home exercise programmes with their patients. Considering these specific barriers to physiotherapy patient management after hospital discharge, physiotherapists are

encouraged to prioritise patient education regarding their home exercise programmes. Physiotherapists should consider telephonic follow up with their patients after hospital discharge to establish patient adherence to their home exercise programmes and provide advice on amendment and progression of exercises as appropriate. Referral of patients to a physiotherapy service closer to where they stay should also be considered.

- Community service and inexperienced physiotherapists who work in trauma wards and ICUs may find the preliminary findings of this study useful as a guide to patient care seeing that participants in this study are experienced in the field of trauma care.

- Most participants reported that their patients are often intubated and that their injuries are managed surgically. High level evidence in the field of rehabilitation for patients that survived an episode of critical illness emphasizes that patients' recovery of cognitive function, mental health, and reintegration into society and return to work is delayed for several months and in some cases years after discharge from hospital (Gravante et al. 2024). Few participants prioritised assessment of these outcomes in their patient management. Physiotherapists are therefore encouraged to act as advocates for their patients in taking a more holistic approach to patient care through prioritizing assessment of patients' cognitive function, mental health, reintegration into society and return to work. If their patients experience difficulties with any of these outcomes, they should be referred to other members of the healthcare team such as occupational therapists, social workers, or psychologists, as appropriate.

6.2 RECOMMENDATIONS FOR RESEARCH

- Due to the nature of this research there were some areas that were not investigated and hence necessitate further studies. For instance, a similar study targeting the public sector is necessary as this would give more detailed information on the types of management proffered by physiotherapists.
- Another suggestion is for a prospective cohort study to be done to investigate the effect of usual care physiotherapy on patients' clinical outcomes.
- Lastly, another recommendation is that there is a need for a qualitative study to do a deeper exploration of barriers and facilitators of physiotherapy service delivery to patients with polytrauma in-hospital and after hospital discharge.

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APPENDIX A

- **QUESTIONNAIRE**

SECTION 1
PROFILE OF PHYSIOTHERAPISTS

1. What is your gender? Tick the one which applies
   o Male
   o Female
   o I prefer not to say

2. How many years have you been working as a physiotherapist?

3. How long have you been working with patients with polytrauma?

4. What setting do you work in?
   o Public sector
   o Private sector
   o Both sectors (as a locum in the Private sector)

5a. Do you have a postgraduate qualification?
   o Yes
   o No

5b. If your answer to the above question is yes, then please tick what applies to you
   - o Postgraduate Certificate
   - o Postgraduate Diploma
   - o Masters by research and coursework
   - o Masters by dissertation
   - o PhD

6a. Is the above postgraduate qualification in the field of physiotherapy in critical care?
   o Yes
   o No

6b. Is it in the field of physiotherapy in orthopaedics?
   o Yes
   o No

SECTION 2

1. **Profile of polytrauma patients regularly seen**
   Please tick how regularly you see patients with the following types of injuries (Tick all those that apply)

   Never Rarely Sometimes Often Always

Face
Chest
Abdomen
Pelvis
Upper Limb
Lower Limb
Soft Tissue

a. What is the average age range of patients that you frequently see? o 16-20
o 21-40
o 41-60
o >60
o other

b. Please tick the most appropriate response to your setting
- o I see more males than females
- o I see more females than male patients
- o I see approximately an equal number of female patients and male patients

c. How often do you see patients with polytrauma in the following categories?
Never Rarely Sometimes Often Always

Intubated patients
Patients who receive any form
of surgical management
Conservative management
Additional comments on profile of patients seen

SECTION 3

MANAGEMENT THAT PHYSIOTHERAPISTS PROVIDE TO PATIENTS WITH POLYTRAUMA IN TRAUMA CENTRES

1. Types of chest physiotherapy techniques used to maintain or restore optimal respiratory function as the patient recovers from their injuries.

Never Rarely Sometimes Often Always

Manual Chest Therapy Techniques (e.g. chest wall percussion, vibrations and shaking)
Active breathing exercises
Body positioning for postural drainage
Body positioning to optimise V/Q matching
Suctioning
Manual hyperinflation
Ventilator hyperinflation
Incentive spirometry
Positive expiratory pressure therapy (eg using bubble PEP bottle)
Cough assistive device (Mechanical Exsufflation and insufflation)
Mechanical Vibromat

Respiratory muscle training
Intermittent positive pressure breathing (IPPB e.g., Bird device)
Additional comments on type of respiratory management given

2. **Types of bed exercises/ bed mobility techniques that are used to facilitate maintenance or restoration of neuromusculoskeletal function**

Never Rarely Sometimes Often Always

Bridging
Passive UL
Passive LL
Active assisted UL
Active assisted LL
Active UL exercises
Active LL exercises
Rolling
Lie to sit
Muscle strength training

3. **Length of time before initiating mobilisation out of bed. Tick all that apply.**
   - o 1-2 weeks
   - o 3-4 weeks
   - o 4-6 weeks
   - o >6 weeks
   - o Patient is discharged home whilst on bedrest

If mobilisation is initiated during hospital stay, please tick the frequency with which you would apply the following strategies during physiotherapy management

Never Rarely Sometimes Often Always

Sit to stand
Gait re-education
Treadmill
Prescription of mobility device (e.g. walking frame, crutches, etc)
Motomed
Elaborate on the length of time prior to mobilization and any strategies employed thereof:

4. **Progression of exercises by addition of the following**:

Use of Therabands
o Yes
o No

Use of weights
o Yes
o No

Use of bodyweight
o Yes
o No

5. Please tick what applies to your management of patients recovering from polytrauma

Never Rarely Sometimes Often Always

Family education upon discharge
Use of pain management strategies
Additional remarks regarding patient management given

SECTION 4:
MANAGEMENT PROVIDED TO PATIENTS WITH POLYTRAUMA AFTER HOSPITAL DISCHARGE

1. Do you see patients with polytrauma as out- patients at your place of work?
   o Yes
   o No

   If your answer is yes, please answer the questions below:

   Never Rarely Sometimes Often Always

2. How often do the patients come for their scheduled follow-up appointments?

3. Types of interventions frequently used in the out-patient setting:

   Never Rarely Sometimes Often Always
   Prescription of assistive devices
   Gait re-education
   Balance re-education
   Strength training
   Endurance exercises
   ROM exercises
   Pain management
   OMT techniques
   Any focus on community re- integration
   Use of pain management strategies
   Frequency of out-patient physiotherapy intervention
   - 1-2 times a week
   - Once every two weeks
   - Once a month
   - Other

   Duration of out-patient physiotherapy intervention
   o 0-3 months
   o 4-6 months
   o >6 months

Do you have any additional remarks regarding the post discharge service that you provide? (For example, transfer to a rehabilitation facility)

SECTION 5
BARRIERS AND FACILITATORS FACED DURING MANAGEMENT OF PATIENTS WITH POLYTRAUMA

1. What are the barriers that impact on the physiotherapy management that you provide to patients with polytrauma at your place of work?

2. What are the facilitators that enhance the physiotherapy management that you provide to patients with polytrauma at your place of work?

SECTION 6

1. Indicate the frequency with which you use the listed outcome measures to assess your patients' responses to physiotherapy intervention provided:

Never Rarely Sometimes Often Always

Level of pain experienced

Hospital length of stay

Exercise tolerance (e.g., step-test, 6MWT, modified upper limb test)

Functional ability (e.g., Functional Status Score for ICU (FSS-ICU); Barthel Index; Chelsea Critical Care Physical Assessment (CPAx) score, etc)

Cognitive status

Occupational outcome (e.g., return to work)

Psychological status (e.g., anxiety and depression)

APPENDIX B

- **PERMISSION LETTER TO THE PRESIDENT SOUTH AFRICAN TRAUMA SOCIETY OF SASP**

Dear Mr Nicol

I hope this email finds you well. My name is Rutendo Chikuri, and I am registered as a postgraduate student at the University of the Witwatersrand Faculty of Health Sciences. I will be conducting research on the management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists. This study will be conducted by means of a questionnaire- I am writing to request permission to circulate this questionnaire (via the secretary) to the members of your society.

It will entail a combination of open and close- ended questions. These questions will range from demographic information of the participants (such as their age, postgraduate qualification, and their years of experience), to the physiotherapy techniques used for their patients with polytrauma from in-hospital to post hospital discharge. Participants will be given the option to accept participation in the survey through clicking a button on Research Electronic Data Capture (REDCap) before the survey questions appear on the screen through the University of the Witwatersrand. This platform will be used to collect and protect all data that is gathered.

Very little research has been directed towards the rehabilitation and physiotherapy management of patients with polytrauma. Hence, this study will create new knowledge on the current physiotherapy management of patients with polytrauma in South African trauma centres and after their discharge home.

I look forward to a favourable response from you.

Thank you in advance

Yours sincerely
Rutendo Chikuri

APPENDIX C

- **PERMISSION LETTER TO THE PRESIDENT OF PASA**

Dear Sir/Madam

I hope this email finds you well. My name is Rutendo Chikuri, and I am registered as a postgraduate student at the University of the Witwatersrand Faculty of Health Sciences. I will be conducting research on the management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists. This study will be conducted by means of a questionnaire - I am writing to request permission to circulate this questionnaire (via the secretary) to the members of your society.

It will entail a combination of open and close- ended questions. These questions will range from demographic information of the participants (such as their age, postgraduate qualification, and their years of experience), to the physiotherapy techniques used for their patients with polytrauma from in-hospital to post hospital discharge. Participants will be given the option to accept participation in the survey through clicking a button on Research Electronic Data Capture (REDCap) before the survey questions appear on the screen through the University of the Witwatersrand. This platform will be used to collect and protect all data that is gathered.

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I look forward to a favourable response from you.

Thank you in advance

Yours sincerely
Rutendo Chikuri

APPENDIX D

- **REFERRAL EMAIL TO IZANDLA CONSULTING PHYSIOTHERAPY NETWORK AND PERMISSION LETTER TO THE PRESIDENT OF THE IZANDLA CONSULTING PHYSIOTHERAPY NETWORK**

Email containing the referral to the Izandla Consulting Physiotherapy Network

From: Natascha Plani <taschplani@gmail.com>
Sent: Wednesday, November 22, 2023 4:38 PM
To: Helena Van Aswegen <Helena.VanAswegen@wits.ac.za>
Subject: Re: Polytrauma patient physiotherapy management - research survey

Hi Heleen

all good here - frantic rush to the end of the year! Hope you are well too.

Happy to assist with this. She can contact me😀

Perhaps she should send it to Izandla too? There are many people who have not rejoined SASP this year and there will probably be many more next year with their very steep increase in membership fees.. that might also broaden her catchment area

Keep well

Natascha

Email showing the permission letter to the Izandla Consulting Physiotherapy Network

R

Rutendo Chikuri <victoriachikuri94@gmail.com> Tue, Nov 28, 2023, 4:28 AM

to info

Good Day

I hope this email finds you well. My name is Rutendo Chikuri and I am a physiotherapist pursuing a Masters degree at the University of the Witwatersrand.

I will be conducting a research on the management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists.This study will be conducted by means of a questionnaire – I am writing to request permission to circulate this questionnaire (via the secretary) to the members of your company.

Please find attached my ethics certificate.

I look forward to a favourable response from you. Thank you in advance.

Kind regards

Rutendo Chikuri

Email showing the response from the Izandla Consulting Physiotherapy Network

re: Permission to conduct study Inbox ×

Rutendo Chikuri Tue, Nov 28, 2023, 4:28 AM

Good Day I hope this email finds you well. My name is Rutendo Chikuri and I am a physiotherapist pursuing a Masters degree at the University of the Witwatersran

Moira Wilson <chair@izandla.org.za> Tue, Nov 28, 2023, 12:08 PM

to shanu, me

Good afternoon

I have retired from practice on 28/02/23 the new p[ractice owner is Shanu Ramanand

I have cc her in this response to you

Best regards Moira

Moira Wilson

Chairperson: iZandla

MSc London UK

iZandla Consulting (RF) (Pty) Ltd

Physiotherapy Business Solutions

Tel: 011 340 9100

Rutendo Chikuri Mon, Mar 18, 2024, 7:26 PM

Good Day I hope this email finds you well. My name is Rutendo Chikuri and I am a physiotherapist pursuing a Masters degree at the University of the Witwatersran

shanu ramanand <shanu1872@gmail.com> Mon, Mar 18, 2024, 7:28 PM

to me

With pleasure.

Please forward the questionnaire to admin1@srphysio.co.za.

Kind regards

Shanu

•••

re: Permission to conduct study

Rutendo Chikuri <victoriachikuri94@gmail.com> Mon, Mar 18, 2024, 7:32 PM

to shanu1872

Good Day

I hope this email finds you well. My name is Rutendo Chikuri and I am a physiotherapist pursuing a Masters degree at the University of the Witwatersrand.

I will be conducting a research on the management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists.This study will be conducted by means of a questionnaire – I am writing to request permission to circulate this questionnaire (via the secretary) to the members of your company.

Please find attached my ethics certificate.

I look forward to a favourable response from you. Thank you in advance.

Kind regards

Rutendo Chikuri

One attachment • Scanned by Gmail

APPENDIX E

- **EMAIL SENT TO SASP**

Rutendo Chikuri <victoriachikuri94@gmail.com> Wed, May 24, 2023, 11:49 PM

to SASP

Good Day

I hope this email finds you well. My name is Rutendo Chikuri and I am a physiotherapist pursuing a Masters degree at the University of the Witwatersrand.

I will be conducting a research on the management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists.This study will be conducted by means of a questionnaire – I am writing to request permission to circulate this questionnaire (via the secretary) to the members of your society.

Please find attached my ethics certificate and the letter seeking permission to conduct research.

Thank you in advance.

Kind regards

Rutendo Chikuri

APPENDIX F

- **PERMISSION LETTER TO THE PRESIDENT OF SASP**

Permission letter to the President of SASP

Dear Ms L Jacobs

I hope this email finds you well. My name is Rutendo Chikuri, and I am registered as a postgraduate student at the University of the Witwatersrand Faculty of Health Sciences. I will be conducting research on the management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists. This study will be conducted by means of a questionnaire- I am writing to request permission to circulate this questionnaire (via the secretary) to the members of your society.

It will entail a combination of open and close- ended questions. These questions will range from demographic information of the participants (such as their age, postgraduate qualification, and their years of experience), to the physiotherapy techniques used for their patients with polytrauma from in-hospital to post hospital discharge. Participants will be given the option to accept participation in the survey through clicking a button on Research Electronic Data Capture (REDCap) before the survey questions appear on the screen through the University of the Witwatersrand. This platform will be used to collect and protect all data that is gathered.

Very little research has been directed towards the rehabilitation and physiotherapy management of patients with polytrauma. Hence, this study will create new knowledge on the current physiotherapy management of patients with polytrauma in South African trauma centres and after their discharge home.

I look forward to a favourable response from you.

Thank you in advance

Yours sincerely
Rutendo Chikuri

APPENDIX G

- **ETHICS CERTIFICATE**

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research and Innovation)

TO: Ms R Chikuri
School of Therapeutic Sciences
Department of Physiotherapy
Medical School
University

E-mail: 733859@students.wits.ac.za

CC: Supervisor: Professor H van Aswegen
<Helena.vanAswegen@wits.ac.za>
and <HREC-Medical Research Office@wits.ac.za>

FROM: Mr Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 2022/05/31

REF: R14/49

PROTOCOL NO: **M211106** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)

PROJECT TITLE: *The management of patients with polytrauma during hospitalization and after discharge amongst South African physiotherapists*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Ms R Chikuri

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M211106

NAME: (Principal Investigator) Ms R Chikuri

DEPARTMENT: School of Therapeutic Sciences
Department of Physiotherapy
Medical School
University

PROJECT TITLE: *The management of patients with polytrauma during hospitalization and after discharge amongst South African physiotherapists*

DATE CONSIDERED: 2021/11/26

DECISION: Approved unconditionally

CONDITIONS:

NOTE: If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>

SUPERVISOR: Professor H van Aswegen

APPROVED BY: Dr CB Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 2022/05/31

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and therefore reports and re-certification will be due in the month of **November** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator

05/06/2022
Date

APPENDIX H

- **STUDY INFORMATION SHEET**

STUDY INFORMATION SHEET

The management of patients with polytrauma during hospitalisation and after discharge amongst South African physiotherapists.

Dear participants

My name is Rutendo Chikuri, and I am registered as a postgraduate student at the University of the Witwatersrand Faculty of Health Sciences. I would like to invite you to participate in this study which will investigate the management of patients with polytrauma among South African physiotherapists. Very little research has been directed towards the rehabilitation and physiotherapy management of patients with polytrauma. Hence, this study will create new knowledge on the current physiotherapy management of patients with polytrauma in South African trauma centres and after their discharge home.

Trauma is now emerging as a resource intensive, and a health and economic burden. This is because the affected population usually presents with long term complications. Since most of the affected population is of working class (younger age and male gender), this poses a huge financial burden on the economy. Less individuals are then able to return to employment soon after hospital discharge, or at all, to contribute to the economy and more cost is directed towards the care of this cohort. Rehabilitation is the tool that has been employed to mitigate the complications that patients with a traumatic injury present with.

Polytrauma Definition

In this study, polytrauma is defined as an orthopaedic injury to two or more extremities with or without a respiratory complication. It may or may not include injury to the pelvic girdle. The presence of a compromise to the physiological processes in the body can be included. However, traumatic injuries to the brain or spinal cord and injuries sustained from burns are not to be included.

Who is eligible to take part in this study?

The physiotherapist who works at a trauma centre in the public or private sector in South Africa.
The physiotherapist who frequently encounters and treats patients with polytrauma injury in centres not known to be trauma centres.

What is the aim of the study?

To describe the management that physiotherapists in South Africa provide to patients with polytrauma during their hospitalisation and after discharge.

What is involved in the study?

A study questionnaire will be used in this study. It will include a combination of open-ended and close-ended questions. Most of the questions will be close ended, where you may provide a yes or no response to the question posed. In addition, the five subscale Likert scale, with a selection of responses, will be used. The content of the questionnaire will include sections on your demographic information; patient gender; mechanisms of injury; physiotherapy treatment strategies (respiratory system management, pain management, exercise therapy); outcome measures; rehabilitation services offered to patients after hospital discharge; and barriers and enablers to physiotherapy service delivery.

You will be given the option to accept participation in the survey through clicking a button on Research Electronic Data Capture (REDCap) before the survey questions appear on the screen through the University of the Witwatersrand. This platform will be used to collect and protect all data that is gathered.

Any risks or costs involved?

Participation in this study will be completely voluntary, and you may withdraw from the study at any point if you wish to do so. There will be no risks implicated. You will use a small portion of your data to complete this questionnaire. However, there will be no other costs incurred.

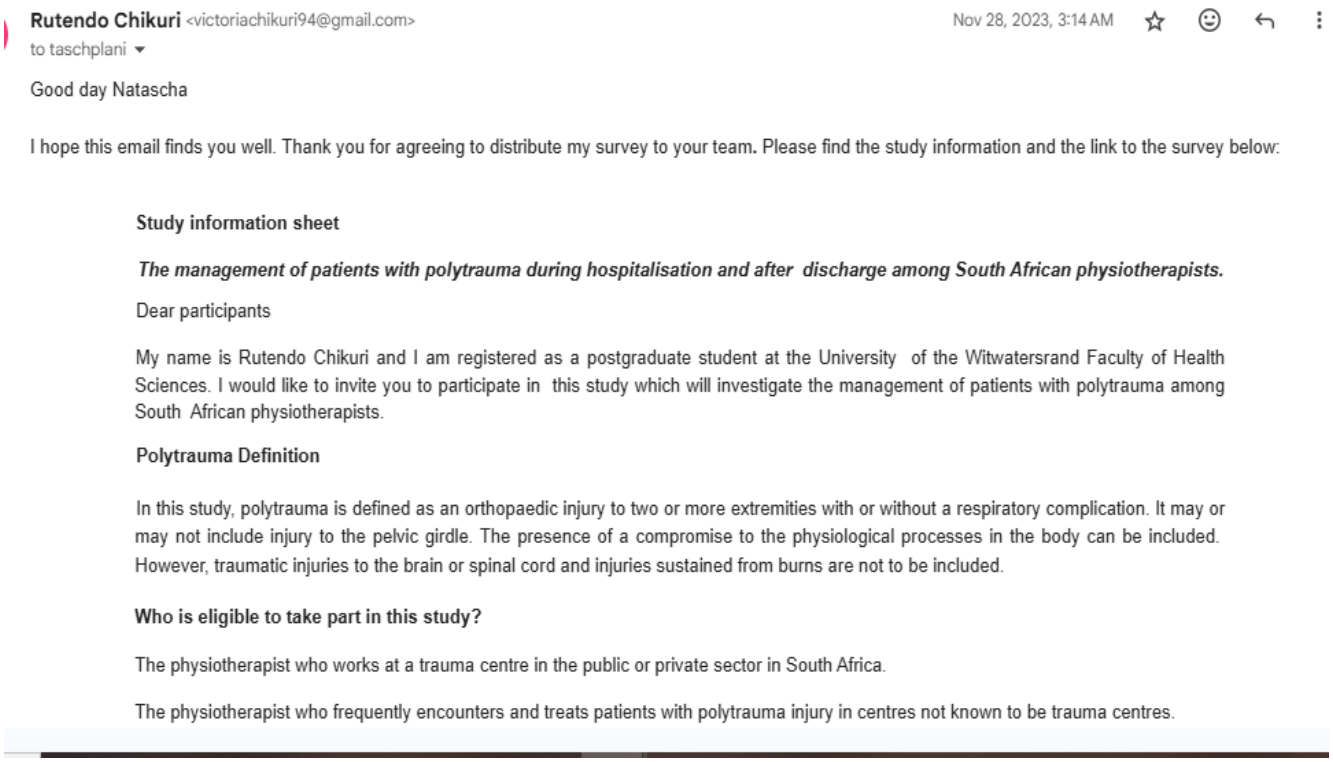
Privacy and confidentiality?

Personal information will be protected through anonymous completion of the online questionnaire and coding of completed questionnaires received.

More information regarding this questionnaire will be made available upon request at victoriachikuri94@gmail.com. If you have any concerns about how this survey is conducted, you can contact the Wits University Human Research Ethics (Medical) Committee Chairperson: Prof Clement Penny at clement.penny@wits.ac.za or 011 717 1234. The email addresses of the Wits Ethics committee secretariat are: Zanele.ndlovu@wits.ac.za and Rhulani.mkansi@wits.ac.za.

APPENDIX I

- **EMAIL TO THE PRIVATE PRACTISE OWNER**



Rutendo Chikuri <victoriachikuri94@gmail.com> Nov 28, 2023, 3:14 AM

to taschplani

Good day Natascha

I hope this email finds you well. Thank you for agreeing to distribute my survey to your team. Please find the study information and the link to the survey below:

Study information sheet

The management of patients with polytrauma during hospitalisation and after discharge among South African physiotherapists.

Dear participants

My name is Rutendo Chikuri and I am registered as a postgraduate student at the University of the Witwatersrand Faculty of Health Sciences. I would like to invite you to participate in this study which will investigate the management of patients with polytrauma among South African physiotherapists.

Polytrauma Definition

In this study, polytrauma is defined as an orthopaedic injury to two or more extremities with or without a respiratory complication. It may or may not include injury to the pelvic girdle. The presence of a compromise to the physiological processes in the body can be included. However, traumatic injuries to the brain or spinal cord and injuries sustained from burns are not to be included.

Who is eligible to take part in this study?

The physiotherapist who works at a trauma centre in the public or private sector in South Africa.

The physiotherapist who frequently encounters and treats patients with polytrauma injury in centres not known to be trauma centres.

What is the aim of the study?

To describe the management that physiotherapists in South Africa provide to patients with polytrauma during their hospitalisation and after discharge.

What is involved in the study?

A study questionnaire will be used in this study. It will include a combination of open-ended and close-ended questions **which will take approximately 10 minutes to complete.**

Most of the questions will be close ended, where you may either select a yes or no response or a five subscale Likert scale, with a selection of responses. The content of the questionnaire will include sections on demographic information; inpatient and outpatient physiotherapy management; outcome measures; and barriers and enablers to physiotherapy service delivery.

You will be given the option to accept participation in the survey through clicking a button on Research Electronic Data Capture (REDCap) before the survey questions appear on the screen through the University of the Witwatersrand. This platform will be used to collect and protect all data that is gathered.

Any risks or costs involved?

Participation in this study will be completely voluntary and you may withdraw from the study at any point if you wish to do so. There will be no risks implicated. You will use a small portion of your data to complete this questionnaire. However, there will be no other costs incurred.

Privacy and confidentiality?

Personal information will be protected through anonymous completion of the online questionnaire and coding of completed questionnaires received.

More information regarding this questionnaire will be made available upon request at victoriachikuri94@gmail.com. If you have any concerns about how this survey is conducted, you can contact the Wits University Human Research Ethics (Medical) Committee

APPENDIX J

- **TURNIT-IN REPORT**

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Turnitin Originality Report

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Research Report By Rutendo Chikuri

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