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PERCEPTIONS OF PATIENTS WITH MAJOR THORACIC TRAUMA ON THEIR RECOVERY AFTER INJURY: A QUALITATIVE STUDY

Precious Segofatso Mnisi

Dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Physiotherapy

Johannesburg, 2025

DECLARATION

I, Precious Segofasto Mnisi, declare that this dissertation is my own work. It is being submitted for the degree of Master of Science in Physiotherapy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



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Precious Segofatso Mnisi

March 2025

DEDICATION

Dedicated to God, My daughter, Family, Friends, Colleagues and Patients

ABSTRACT

Background and Purpose: In South Africa, there is a high incidence of trauma. Blunt or penetrating forces to the thoracic wall are known mechanisms of injury. Existing evidence shows that the quality of life for some survivors of major thoracic trauma remains impaired by six months after hospital discharge. The purpose was to gain insight on the perceptions of patients with major thoracic trauma on their recovery after injury.

Methods: This qualitative study was conducted using a transcendental phenomenology approach. Adult patients with major thoracic trauma who were admitted to and managed at Netcare Alberton hospital and received physiotherapy treatment from Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice, and were discharged home, were eligible for participation. Individual participant interviews (in-person or online) were conducted using a semi-structured interview guide. Thematic content analysis was done using a deductive approach to analysis.

Results: A total of fourteen interviews were conducted. The six predetermined themes, based on the questions included in the semi-structured interview guide, were a) perceptions of physical recovery, b) perceptions of emotional health and cognitive function, c) perceptions about participation in family and society, d) perceptions about ability to return to work, e) perceptions about the role of physiotherapy in the journey to recovery, and f) reflection on recovery journey.

Conclusion: Survivors of major thoracic trauma perceived themselves to have acceptable recovery in the six months after hospital discharge; however, some reported limitations in physical recovery due to pain, discomfort and shortness of breath with activity, and lack of stamina; feelings of anxiety; limited integration into family and society and suboptimal return to employment. Physiotherapists are well-placed as members of the trauma healthcare team to assist in the long-term recovery of these patients.

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LIST OF ABBREVIATIONS

ADLs	- Activities of daily living
DSM	- Diagnostic and statistical manual
HRQOL	- Health-related quality of life
ICDSC	- Intensive care delirium screening checklist
ICU	- Intensive care unit
IQR	- Interquartile range
NIV	- Non-invasive ventilation
PT	- Physiotherapy
SD	- Standard deviation
VAS	- Visual analogue scale

CHAPTER ONE

1. INTRODUCTION

1.1 BACKGROUND

In South Africa, trauma is a leading cause of mortality, with thoracic trauma responsible for nearly a third of trauma-related deaths (Dippenaar and Wallis, 2019). Injuries such as rib fractures, pneumothorax, haemothorax, and pulmonary contusions are prevalent, often resulting from blunt or penetrating forces to the thoracic wall (Kim and Moore, 2020). About 70% of thoracic trauma admissions are due to blunt injuries, and 30% from penetrating trauma (Moodley et al., 2014).

Severe thoracic trauma frequently necessitates intensive care interventions like mechanical ventilation, often accompanied by sedation (Kim and Moore, 2020). These can trigger systemic complications and muscular deconditioning (Van Aswegen et al., 2011). Early mobilization plays a vital role in enhancing recovery, reducing mechanical ventilation duration, and improving outcomes in ICU patients (Gosselink et al., 2008; Van Aswegen et al., 2020). Early mobilisation is deemed to be safe in South African ICU settings (Tadyanemhandu, Van Aswegen and Ntsiea, 2021).

Globally, long-term recovery from thoracic injuries presents physical, psychological, and socio-economic challenges (Baker et al., 2021). Survivors often face delayed functional recovery and diminished quality of life, sometimes extending years beyond discharge (Orwelius et al., 2010; Ulvik et al., 2008). South African research also shows decreased emotional and physical HRQOL in trauma survivors, especially those with extended intubation (Schneiderman et al., 2013; Van Aswegen et al., 2011).

Chronic pain is a common consequence of thoracic trauma, especially where acute pain management was insufficient (Mohamed et al., 2020). Defined as pain lasting beyond three to six months (Treede et al., 2015), chronic pain contributes to diminished HRQOL, unemployment, depression, and increased healthcare needs (Lovisari et al., 2020). A Tunisian study reported chronic pain in 80% of thoracic trauma patients one year post-injury, with strong links to PTSD and disrupted daily function (Kahloul et al., 2020).

Post-intensive care syndrome characterized by physical, cognitive, and mental impairments may affect survivors of severe thoracic trauma (Kohler et al., 2019). Delirium, a common ICU complication, further exacerbates long-term cognitive deficits (Pandharipande et al., 2013). Marquetand et al. (2022) found a 22% incidence of delirium among trauma patients, which significantly increased the need for long-term care.

Despite physiotherapy's central role in managing patients with thoracic trauma within an acute care setting, there is limited evidence on post-discharge physiotherapy service delivery for these patients and their response to therapy in South Africa (Van Aswegen, 2020). Including patients' lived experiences can deepen understanding of recovery trajectories and inform more patient-centred care (Kleefstra and Sophia, 2016; Torain et al., 2021). Listening to survivors ensures that clinical decisions align with their values and needs, ultimately supporting a more holistic model of rehabilitation.

1.2 WORKING DEFINITIONS

For the purpose of this study, major thoracic trauma was defined as any piercing, sharp or blunt impact to the thoracic wall that resulted in a tension pneumothorax, open pneumothorax, flail chest injury, pulmonary contusion, haemothorax, open rib fractures, closed rib fractures, fractured sternum, and haemopneumothorax. This definition was adopted from the definition used by Van Aswegen et al. (2020).

1.3 RESEARCH QUESTION

What are the perceptions of patients with major thoracic trauma on their recovery after injury?

1.4 AIM OF THE STUDY

To gain insight on the perceptions of patients with major thoracic trauma on their recovery after injury.

1.5 OBJECTIVES OF THE STUDY

1.5.1 To explore the perceptions of participants who had major thoracic trauma on their recovery of physical function after six months of discharge from hospital.

1.5.2 To explore the perceptions of participants who had major thoracic trauma on their mental health status after six months of discharge from hospital.

1.5.3 To explore the perceptions of participants who had major thoracic trauma on their cognitive function after six months of discharge from hospital.

1.5.4 To explore the perceptions of participants who had major thoracic trauma on their reintegration into their family and society after six months of discharge from hospital.

1.5.5 To explore the perceptions of participants who had major thoracic trauma on their ability to return to work after six months of discharge from hospital.

1.5.6 To explore the perceptions of those who received structured post-discharge physiotherapy treatment to those who did not receive any post-discharge physiotherapy treatment, on their recovery.

1.6 PROBLEM STATEMENT

Patients admitted to an intensive care unit with penetrating thoracic trauma and who were mechanically ventilated for less than five days, recover adequately and spontaneously within three months of being discharged from the hospital (Van Aswegen et al. 2010). Conversely, those with penetrating thoracic trauma who were admitted to an intensive care unit and mechanically ventilated for more than five days showed severe impairments in exercise ability, muscle strength, and physical function aspects of health-related quality of life up to six month after being discharged (Van Aswegen et al. 2010). These patients were all between 20 and 40 years of age. Thoracic injuries usually result in severe and prolonged painful experiences which increase the risks of patients developing chronic pain (Mohamed et al. 2020). There is currently no set or structured outpatients' treatment programs offered to patients recovering from thoracic trauma after hospital discharge, although research has shown that these patients have a significant delay in their recovery (Van Aswegen et al. 2010). There is currently no research that describes patients' perceptions of their recovery post major thoracic trauma in South Africa.

1.7 SIGNIFICANCE OF THE STUDY

The findings of this study may improve healthcare providers' understanding of the on-going impact that major thoracic trauma has on patients' physical functioning, mental health status, cognitive function, and their ability to reintegrate into their family and society from their perspective, more than six months after hospital discharge. The findings fill the gap in the existing South African evidence on whether patients are able to return back to work after major thoracic trauma. Results provide insight on how the perspectives of patients who received physiotherapy treatment post discharge from the hospital differs or are similar to those of patients who did not receive any treatment after hospital discharge. It lays a foundation from which physiotherapists can develop a better appreciation for the experiences of survivors of major thoracic trauma as they recover from injury. The results may prompt physiotherapists to consider the implementation of post-discharge service delivery to this patient population to address their identified needs.

1.8 TYPE OF STUDY

This qualitative study was conducted using a transcendental phenomenology approach. This approach mainly aims to describe, understand, and explain a person's lived experiences in

the world (Neubauer, Witkop and Varpio, 2019). Therefore, a phenomenology approach best answers the objectives of this study. Individual participant interviews were conducted.

The next chapter will discuss the literature review.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 INTRODUCTION

This literature review explores the impacts of major thoracic trauma on physical function, mental health status, cognitive function, participation and reintegration, and ability to return to work from the patients' perspective.

Relevant data was sourced from different search engines including Google scholar, PubMed and Science Direct through the University of Witwatersrand library database. Specific terms that were used when searching included 'major thoracic trauma', 'trunk trauma', 'recovery from chest wall injuries', 'patients' perception on recovery', 'health related quality of life', 'physiotherapy management of thoracic injuries', 'chest wall injuries', 'patients' perception on recovery from thoracic injuries'. The search was limited to articles published in the last 20 years and published in the English language only. Articles relevant to this study were considered for inclusion in this review.

Trauma is the Greek word for wound and is defined as an injury to living tissue caused by an external force (Merriam-Webster dictionary 2024). In South Africa, there is a high frequency of trauma, which is accompanied by a high mortality rate (Dippenaar and Wallis, 2019). Nearly a third of all deaths are caused by thoracic trauma, with penetrating injuries accounting for 89 percent (Dippenaar and Wallis, 2019). Thoracic trauma is caused by blunt or penetrating injury to the thoracic cage (Van Aswegen, Battle, Hardcastle and Morrow, 2024). Blunt thoracic trauma is usually caused by motor vehicle crashes, physical assault and falls whereas penetrating trauma may be the result of gunshots and stab wounds (Van Aswegen, Battle, Hardcastle and Morrow, 2024; Nadir and Stumpefig, 2019). The presence and number of bone fractures, mechanical ventilation, co-existing injuries, hypotension, extra thoracic organ injury, and pre-existing chronic lung diseases are among the numerous risk factors that influence morbidity and mortality in patients with thoracic trauma injuries (Dogrul et al. 2020).

2.2 MANAGEMENT OF PATIENTS WITH MAJOR THORACIC TRAUMA

Patients with thoracic injuries present an additional challenge in clinical practice due to the high rate of underlying organ injury, associated pain, and respiratory complications (Baker et al. 2018). They may need admission to an intensive care unit for monitoring and intensive care, and in some cases, stabilisation after major surgery. This entails sedation, intubation and mechanical ventilation which may lead to a prolonged period of inactivity, depending on the patient's response to their injuries and the treatment received.

Penetrating thoracic injuries pose a high risk of serious injuries as the object breaks through the skin penetrating into the pleural space and other internal organs. This can cause subsequent loss of negative intrapleural pressure, causing the lungs to collapse as the air in the lungs will move towards the area of lower pressure (Van Aswegen, Battle, Hardcastle and Morrow 2024). Penetrating thoracic trauma injury may require explorative surgical intervention to identify and treat injuries to the internal organs (Van Aswegen et al. 2011). According to Birrer et al. (2020) 80% of penetrating thoracic injuries can be treated conservatively, however in selected cases 18% of the patients might need a thoracostomy and three percent of the patients might need a sternotomy or a thoracotomy. Depending on the size of a haemothorax or a pneumothorax, a patient might need an intercostal drain to manage the problem (Birrer et al. 2020).

Blunt thoracic trauma can result in injury to the thoracic wall, lung parenchyma, tracheobronchial tree, heart and great vessels of the chest, oesophagus and the diaphragm even though the skin on the thoracic wall is intact (Van Aswegen, Battle, Hardcastle and Morrow 2024). Blunt trauma injuries if accompanied by a haemothorax or a pneumothorax might need the insertion of an intercostal drain as part of the initial management (Mühling, 2017). In cases of isolated rib fractures no surgical intervention is needed and patients are managed by means of pain control and rest (Kuo and Kim, 2023). Rib fixation is indicated in cases of multiple fractured ribs, flail chest, respiratory failure and deteriorating respiratory function (May et al. 2016). The aim of rib fixation surgery is to stabilize the chest wall in order to restore respiratory mechanics and to reduce pain (May et al. 2016). Though emerging data has proven that rib fixation surgery can reduce the length of stay in the intensive care unit, its use is still limited in South Africa due to the cost of the operation. It costs R10 000 to plate each rib and usually patients require four to ten ribs to be plated (Oosthuizen et al. 2017).

Van Aswegen et al (2020) investigated the global physiotherapy management of patients who had suffered major thoracic injuries. The most commonly used treatment techniques reported by participants included active cycle of breathing, active coughing, deep breathing exercises, forced expiratory techniques, mobilisation and postural drainage (Van Aswegen et al. 2020). Early mobilization was shown 30 years ago to shorten the time it takes to wean patients from mechanical ventilation breathing, and it is now the foundation for functional recovery in critically ill patients (Gosselink et al. 2008) and those with major thoracic trauma (Van Aswegen et al., 2020). The majority of exercise prescriptions are dependent on the patient's clinical condition and how they respond to treatment. The dangers of moving a critically ill patient are evaluated against the dangers of immobility (Gosselink et al. 2008). Early mobilization and physical exercise of patients in intensive care units in South Africa has

been related with non-fatal and temporary adverse effects, confirming the safety of these therapies (Tadyanemhandu, Van Aswegen and Ntsiea, 2021). There have been no observed negative effects of these exercise therapies on the inflammatory status of critically ill individuals (Gosselink et al. 2008). Although there are a few treatment techniques that are commonly used in the treatment of patients with thoracic trauma, the effectiveness of each technique is unknown as most of these techniques are used in conjunction with each other.

Critical illness, prolonged mechanical ventilation and prolonged bed rest, leads to disruption of homeostasis, systemic inflammatory response syndrome, and muscle catabolism and weakness, which has a negative effect on patients' recovery (Van Aswegen et al. 2011).

The recovery of patients from thoracic trauma remains a big challenge, with high numbers of physical, psychological and socio-economic burdens being reported across England and Wales (Baker et al. 2021). Although a lot of these patients receive different physiotherapy treatment while in hospital, little is known regarding the post discharge physiotherapy intervention and treatment delivered to these patients in South Africa (Van Aswegen, 2020).

2.2.1 Physiotherapy Treatment

As members of the multidisciplinary team that treats patients with traumatic injuries, physiotherapists are crucial and essential in the management of patients with major thoracic trauma (Curtis et al. 2016; Kourouche et al. 2018; Unsworth et al. 2015). There is a scarcity of research evidence investigating physiotherapy management in patients who sustained chest wall trauma (Van Aswegen et al. 2020). Physiotherapy patient management appears to be mostly based on the physiotherapist's years of experience and clinical reasoning skills, as very little is currently known about the physiotherapy management provided to patients with major chest trauma both in hospital and post hospital discharge (Van Aswegen et al. 2020). Physiotherapy has been endorsed by the American College of Chest Physicians, the European Society of Thoracic Surgeons, and the European Respiratory Society. It is currently regarded as a crucial component of enhanced recovery protocols or "fast-track" protocols in thoracic surgery, which speed up postoperative patients' functional recovery and shorten their hospital stay (Ahmad, 2018).

2.2.2 The Role of Physiotherapy in the Treatment of Respiratory Related Effects of Major Thoracic Injuries

Adequate humidification of the airways, mobilization and removal of excessive retained secretions from the tracheobronchial tree, improvement of the patient's cough effort, restoration and increase in lung capacities, volumes, and compliance, improvement in

oxygenation, and strengthening of the respiratory muscles to help wean patients off mechanical ventilation support are the guiding principles of physiotherapy management for survivors of major thoracic trauma (Van Aswegen, Battle, Hardcastle and Morrow, 2024). Lung volume and functional residual capacity are decreased following major thoracic trauma as a result of anaesthesia, pain and discomfort in the chest wall, and/or immobility. This may result in lung atelectasis, decreased lung compliance and poor respiratory function. Clinical signs of lung atelectasis include progressive hypoxemia, dyspnoea, increased heart rate, decreased breath sounds, fine late inspiratory crackles (crepitation), dull note on percussion, and areas of opacification on a chest X-ray in addition to increased breathing frequency (Ahmad, 2018).

Following thoracic surgery, several physiotherapy procedures and adjunct therapies seek to enhance lung expansion and increase lung volume and capacity (Ahmad, 2018). According to Van Aswegen et al. (2020), the most commonly employed interventions (>80%) to maximize patients' respiratory system performance following thoracic trauma included forced expiratory technique, active coughing, active cycle of breathing technique, mobilization, and body positioning. These procedures don't need specialized equipment to be carried out, but patient participation is required. Van Aswegen et al. (2020) reported an intriguing discovery: physiotherapists employed in specialized trauma teams utilized breath stacking and mechanical insufflation exsufflation for patient management more frequently than their non-trained counterparts.

Individuals undergoing posterolateral thoracotomy lung surgery require greater physiotherapy involvement than patients undergoing video-assisted thoracoscopic surgery for the same degree of surgical lung resection (Ahmad, 2018). One of the most crucial aspects of postoperative care is positioning, which results in higher diaphragmatic excursion, better ventilation, higher lung volume and capacity, improved oxygenation with less need for supplementary oxygen, and improved forced expiratory flow (Ahmad, 2018). Research indicates that patients who underwent lobectomy recovered more from earlier mobilization, which involved sitting in bed for 30 minutes after surgery, followed by ambulation in the fourth hour, than from conventional mobilization, which involved walking on the first postoperative day (Kaneda et al. 2007).

Coughing is an essential part of physiotherapy patient management; however coughing might exacerbate discomfort at the rib fracture site or drain site if the patient has an intercostal drain. The physiotherapist may urge the patient to request a bolus of analgesia before starting treatment. Coughing has a number of drawbacks, one of which is that it increases intrathoracic pressure, which can cause incision discomfort that patients may find intolerable

(Ahmad, 2018). Additionally, in postoperative patients with unstable airways (such as those with co-existing chronic obstructive pulmonary disease or bronchospasm), the increased intrathoracic pressure may cause premature airway collapse and air trapping. This, in turn, may result in reduced forced expiratory flow and an inability to clear secretions (Ahmad, 2018). According to Van Aswegen et al. (2020), manual chest treatment techniques, manual hyperinflation, ventilator hyperinflation, intermittent positive pressure breathing, inspiratory muscle training, and non-invasive ventilation (NIV) were among the physiotherapy interventions that were reported to be less frequently employed (< 35%). Though there has been evidence to support the benefit of various physiotherapy treatment strategies in optimising respiratory function in survivors of major thoracic trauma, more detailed protocols need to be tested and researched.

2.2.3 The Role of Physiotherapy in the Treatment of Musculoskeletal Related Effects of Major Thoracic Injuries.

The guiding principles of physiotherapy management of the musculoskeletal system of patients with thoracic trauma include preventing joint stiffness by preserving or regaining passive and active joint range of motion of the trunk and shoulder girdle, regaining independence in functional activities, regaining muscle power in all limbs, and enhancing cardiorespiratory endurance during functional activities (Van Aswegen, Battle, Hardcastle and Morrow, 2024). Many patients experience pain on the side of the thoracic wall where the injury occurred and where the intercostal drain is inserted, which may lead them to immobilize the arm on the same side and may lead to decreased shoulder and trunk range of motion (Van Aswegen, Battle, Hardcastle and Morrow, 2024).

Auto-assisted or active range-of-motion exercises for the shoulder (such as arm elevation) and trunk should be initiated as soon as possible, paying special care to the chest tube insertion site. These activities are intended to improve the patient's thoracic cage mobility, facilitate deeper breathing, which will enhance lung volume, and prevent long-term limitations on thoracic wall expansion (Pryor et al. 2008; Van Aswegen, Battle, Hardcastle and Morrow, 2024).

Posture correction in patients with major thoracic injury is important, as patients often flex their trunk sideways toward the side of the injury lowering their shoulder and raising their hip on that side since it hurts less to do this. The patient is discouraged from assuming this protective posture. Additionally, patients should be taught to sit, stand, and walk with their trunks straight and both shoulders at the same level (Pryor et al. 2017). The majority of physiotherapists in the global survey on major thoracic trauma employed mobilization

techniques, such as sitting patients over the edge of the bed, sitting them out of bed, performing sit-to-stand exercises, and having them walk away from the bedside, as management strategies (Van Aswegen et al. 2020). Van Aswegen et al. (2020) found no statistically significant variations in the utilization of these mobilization actions across different countries. Fewer participants engaged in high-level exercise training, such as stationary cycling to address cardiorespiratory endurance, and targeted workouts of the shoulder and trunk to improve active range of motion and muscle power (Van Aswegen et al. 2020).

2.3 PHYSICAL RECOVERY AFTER THORACIC TRAUMA

The three major themes that emerged in literature when looking at the physical recovery of patients with traumatic injuries include: Fear of movement, pain with movement, and shortness of breath with movement (Edgecombe et al. 2023). Evidence in the general trauma population suggests that injury has a long-term impact on functional state, mental health, health-related quality of life, and return to a productive work life (Baker et al. 2018).

2.3.1 Fear of Movement (Kinesiophobia)

Major thoracic trauma injuries have a significant impact on an individual's physical and psychological wellbeing. A common consequence of major thoracic injuries is the fear to move following injury, which can hinder rehabilitation and prolong the recovery journey (Edgecombe et al. 2023). Baker et al. (2021) discovered that many patients with thoracic trauma believe that they need to stay immobile in order to be pain-free. This belief persisted up to six months following discharge. This misconception increases the risk for development of complications such as poor physical function, chronic pain and neuropathic pain significantly (Baker et al. 2021).

It has been reported that survivors of critical illness experience a delay in their physical function recovery for six months to five years post discharge (Orwelius et al. 2010; Ulvik et al. 2008; Hough and Herridge, 2012). A study by Baker et al. (2021) reported that individuals who have suffered thoracic trauma experienced significant fear avoidance beliefs, leading to reduced physical activity levels and an increase in disability from six months up to five years following injury.

Caragounis et al. (2016) investigated the long-term effects that surgical rib stabilization had on pain, physical function, health-related quality of life and lung function in patients with multiple rib fractures versus those who received conservative management. They reported that patients who had rib stabilization done were less likely to develop kinesiophobia compared to patients who were managed conservatively. They reported that 71% of patients who were conservatively managed experienced some limitations and disabilities including

kinesiophibia, prolonged physical function recovery and a decreased health-related quality of life after three months of being discharged compared to 48% patients who were operated. Physiotherapy plays an important role in addressing and preventing the fear to move following major thoracic trauma. A study by Butler et al. (2017) reported that graded exposure and cognitive behavioural therapy can effectively reduce fear avoidance beliefs and improve physical function. Graded exposure is a technique used by physiotherapists to gradually increase movement and activity levels in order to reduce anxiety and fear of movement (Butler et al. 2017). Another approach that helps individuals to identify and challenge negative thinking patterns that contribute to fear avoidance beliefs is cognitive behavioural therapy (Vlaeyen et al. 2016). Fear of movement post major thoracic trauma is a concern and a big contributor to further disability and increases the risk of individuals to develop secondary complications from their fear such as decreased chest expansion, accessory muscle breathing, decreased mobility of the thorax and reduced physical activity levels. This is a phenomenon that needs to be addressed as early as possible by promoting early mobilisation through patient education strategies that include education on the importance of mobilisation, expected pain with mobility and the adverse effects of immobilization.

2.3.2 **Pain with Movement (Chronic Pain)**

The sternum, rib cage, costal cartilage and intercostal muscles are the major components of the thoracic wall. The thoracic wall receives blood supply and innervation from neurovascular bundles. The parietal pleura makes up the inner lining of the thoracic wall; it receives somatic innervation from the intercostal nerves and therefore contains pain fibres (Edgecombe et al. 2023). Thoracic trauma is followed by painful experience which is caused by the acute stress reaction, psychological responses to trauma and physical damage or injury to the components of the thoracic wall (Reed and Schurr, 2020).

In the acute pain phase following thoracic trauma, it is very important that pain is addressed effectively to minimise the effects it can have on the patient in the long term (Blichfeldt-Eckhardt et al. 2018). A prospective observational study by Fabricant et al., 2013 that aimed to establish evidence-based expectations for pain and disability following rib fractures, and to Identify features of acute injuries that contribute to prolonged pain and disability following rib fractures. The study found that the severity of pain in the acute phase of injury was a predictor of prolonged pain and disability pass eight weeks of injury. The study found that the number of rib fractures and the bilaterality of the rib fractures does contribute to prolonged pain and disability, but the two factors do not seem to be independent predictors of prolonged pain and disability (Fabricant et al. 2013).

Injuries to the thoracic wall typically make breathing painful. Patients limit the volume of their inspiratory breath (splinting) to prevent pain when breathing. This can cause respiratory complications like atelectasis and hypoxemia, which can result in respiratory failure or distress (Weiser, 2024). A true multimodal approach to pain control in patients with traumatic injury includes early evaluation and consideration of techniques such as epidural anaesthesia as well as nerve and fascial blocks, chest physiotherapy, mobilisation, the use of non-opiate medications in addition to opiate medication, and early evaluation for uncontrolled stress, anxiety, and risk factors for post-traumatic stress disorder (Lovisari et al. 2020). Optimisation of analgesia together with early mobilisation and physiotherapy techniques such as deep breathing exercises and supported coughing are crucial to minimise and control pain in order to enhance the patients' recovery (Galvagno et al. 2016). Early pain control improves respiratory mechanics, lowers the risk of sequelae, and allows for more intensive physiotherapy (Lovisari et al. 2020).

Due to pain patients are unable to cough due to discomfort when their inspiratory capacity and pulmonary secretion clearance decrease; therefore, effective pain management is crucial to the expulsion of pulmonary secretions. In order to keep patients from developing atelectasis and to improve their functional residual volume and vital capacity, aggressive pain management is essential (Dogrul et al. 2020). There is a variety of analgesic treatment techniques that are available for patients with traumatic injury. Epidural analgesia remains the best studied modality in patients with traumatic injury in the acute phase of healing (Galvagno et al. 2016). Chest physiotherapy strategies including active cycle of breathing, deep breathing exercises, forced expiration, ambulation and body positioning are the most used techniques to treat and control pain and to prevent pulmonary complications such as respiratory failure in patients with traumatic injury (Van Aswegen et al. 2020). The introduction of local anaesthetics as early as possible can stabilize damaged neurons, speed up neuronal healing, and decrease the intensity of pain. Local anaesthetics can block pain signals at their origins therefore reducing the risk of long-term pain (Kahloul et al. 2020).

It is important to identify uncontrolled pain early to prevent adverse acute and chronic outcomes such as post-traumatic stress disorder, and pain transitioning from acute to chronic pain (Blichfeldt-Eckhardt et al. 2018). Severity of injury and poor pain management have been found to contribute to acute thoracic pain becoming chronic thoracic pain (Blichfeldt-Eckhardt et al. 2018). Patients who experience severe pain during the first days of the injury are more likely to end up with pain that lasts past the healing phase. The reason for that remains unclear. It is possible that the severity of the pain can cause changes to the nervous system which produces chronic pain. Another option is that some types of damages like nerve damage produce both acute and chronic pain (Blichfeldt-Eckhardt et al. 2018). The

severity of the injury, the presence of fractured ribs, the patient's age and pre-existing pain conditions are some of the risk factors for developing chronic pain following major thoracic injuries (Butler et al. 2017).

Treede et al. (2015) defined chronic pain as pain that persists beyond the typical healing stages and hence lacks the acute warning role of physiological nociception. When pain lasts for more than three to six months, it is considered chronic. Chronic pain affects approximately 40% to 60% of individuals following major thoracic trauma (Kvale and Lomo. 2018). According to Reyes et al. (2020), many individuals suffer from persistent discomfort as a result of thoracic trauma injuries. Chronic pain is believed to affect roughly 10% of all trauma admissions (Kahloul et al. 2020). Chronic pain is a leading cause of poor health-related quality of life, absence at work, loss of employment, increased health-care consumption, depression, and pain prescription misuse (Mohamed et al. 2020; Lovisari et al. 2020). Chronic pain is a common complication in patients with trauma injury with a pooled prevalence of 51% (Van der Windt et al. 2018). A study conducted by Kahloul et al. (2020) to investigate the prevalence, associated factors, and psychosocial impact of chronic pain following chest trauma reported that out of a study of 54 patients, 80% had chronic pain. The authors found a significant association between the development of post-traumatic stress disorder and chronic pain.

A telephonic survey was conducted by Shelat et al. (2012) on patients who had suffered traumatic rib fractures, one year after the traumatic injuries. The authors found that 19% of the patients made unplanned visits to the hospital in need of pain medication. The patients who still had pain after one year of hospital discharge had a mean pain severity of 3.7 over ten on the numeric pain scale (Shelat et al. 2012). A study that consisted of 185 participants with blunt thoracic trauma with a long term follow up of eleven years reported that 60% of the participants still experienced pain, with 41 % reporting mild pain, 12% reporting moderate pain, while 8% reported severe pain (Kelderman et al. 2024). A qualitative study that interviewed 14 participants about their recovery after thoracic trauma four and nine months after injury reported that most participants had to learn to live with pain as a way of learning to deal with the injury itself (Claydon et al. 2017). These studies do not mention the level of pain these patients experienced while in hospital and whether the pain was managed effectively in the acute phase of injury.

Considering the high risk that patients with traumatic injury have of developing chronic pain which can negatively impact their health-related quality of life, it is important that patients get appropriate treatment and education while in hospital and after discharge, to lessen the burden of the injury on the patients and their family and disabilities such as chronic pain,

respiratory disabilities and neuropathic pain that might be caused by the thoracic trauma (Kahloul et al. 2020). One needs to understand the risk factors that predispose patients to developing chronic pain which greatly affects the patient's health-related quality of life. Implementing effective management strategies can improve the patient's outcomes and enhance their health-related quality of life. Further research is needed to explore approaches for optimal management of chronic pain in survivors of major thoracic injuries.

2.3.2.1 **The role of physiotherapy treatment in management of pain**

Pain following thoracic trauma makes it difficult for the patient to cough or take deep breaths, which increases the risk of sputum retention and decreased lung capacity. Additionally, pain triggers sympathetic activation, which raises blood pressure, heart rate, and respiration rate and can compromise patients' hemodynamic stability. Furthermore, discomfort might limit range of motion in the shoulder and scapula, which can result in frozen shoulder. Lastly, pain makes people more anxious, disrupts their sleep, and makes them feel exhausted during the day (Ahmad, 2018).

Physiotherapists oversee using non-pharmacological therapies and educational tactics for self-empowerment to manage the pain of their patients (Weinberg et al., 2018). Information about pain neurobiology and pain management techniques including deep breathing, relaxing, and applying support to the intercostal drain site or surgical wound on the thoracic cage during coughing and sneezing should be included in patient education programs (Ahmed, 2018; Van Aswegen et al. 2020). According to Van Aswegen et al. (2020), the global survey results indicated that units with a dedicated trauma physiotherapist employed education tactics more frequently than units without one. Huffing causes forced expiration without the glottis closing, in contrast to coughing. When a patient finds coughing too uncomfortable, physiotherapists can use huffing as a substitute for coughing. Individuals with major thoracic injuries can tolerate it better than coughing since it requires less effort because the intrathoracic pressure created is lower (Ahmad, 2018).

When combined with adequate analgesic management as part of multidisciplinary care, deep breathing exercises have been linked to a decrease in the amount of pain experienced by patients with major thoracic trauma injuries (Kourouche et al. 2018). According to Van Aswegen et al. (2020), a small percentage of trauma physiotherapists with experience (6%), commonly use kinesiotaping as part of patient care after major thoracic trauma. Therefore, it is not possible to confirm if kinesiotaping is a successful pain management technique for patients with these injuries.

2.3.3 **Shortness of Breath**

Shortness of breath, or dyspnoea, is the subjective experience of uncomfortable breathing that is characterized by a range of feelings with different intensities (Hashmi et al. 2023). Millions of people experience this common symptom, which may be the main symptom of a systemic, respiratory, cardiac, neuromuscular, psychogenic, or a mix of these illnesses (Hashmi et al. 2023). Acute dyspnoea lasts for hours to days, whereas chronic dyspnoea lasts for more than four to eight weeks (Hashmi et al. 2023).

One of the most frequent symptoms that patients with thoracic trauma exhibit is dyspnoea (Legare and Sawatzky 2010). Studies suggest that shortness of breath affects approximately 50% to 70% of individuals following major thoracic trauma injuries, because of the insult to the structures of the thoracic wall, and the accumulation of air, blood or both in the pleural space which compresses the underlying sponge-like lung tissue. Patients tend to avoid deep breaths to minimise movement of the thorax in fear of pain. This leads to decreased chest expansion, the use of accessory muscles to breath which leads to shortness of breath in patients with major thoracic injuries (Kvale et al. 2018; Nielsen et al. 2019).

Shortness of breath is one of the most common symptoms that patients with thoracic trauma in the emergency department complain about. It is however very difficult to assess and quantify dyspnoea as it is subjective and is described using different adjectives (Smithline et al. 2010). Assessment of acute dyspnoea using a visual analogue scale (VAS) for dyspnoea is useful and may be a more valid approach as compared with using descriptors of intensity of breathlessness in the acute setting (Ekman et al. 2014). Dyspnoea may result as a sequela of pain. Research has shown that both may be processed via similar neurophysiological mechanisms and often resolve simultaneously, in this way dyspnoea occurring from pain can be treated by analgesia (Clark et al. 2014). The use of oxygen therapy in conjunction with other treatment modalities has proven to lessen and ease the feeling of shortness of breath or the sense of being “hungry for air” (Moore et al.2018). Managing patients’ pain avoids incorrect breathing patterns that lead to shortness of breath (Moore et al.2018).

Shortness of breath is prevalent long after blunt chest trauma and negatively influences overall and health-related quality of life (Kelderman et al. 2024). Optimal respiratory function is recognized as a critical factor in the prevention of respiratory complications following thoracic trauma (Baker et al. 2018). Shortness of breath is often a distressing complaint that impairs work efficiency, family life, and social relations (Worsham et al. 2021). Whether the mechanism be associated with simple fracture of the ribs or be due to a more life-threatening critical injury, the occurrence of significant discomfort in the smallest segment of the patient's vital resource, their lungs, demands attention and demands an understanding of the subtle

changes and the significant changes that the human respiratory system can manifest, and how to rectify these changes (Worsham et al. 2021). Failure to alleviate or to recognize the cause of the respiratory difficulty contributes greatly to the likelihood of more extensive therapy, disability and death (Legome, 2020). The incidence of post-injury dyspnoea was found to be 63% (n = 20) and 29% (n = 4), respectively, at a single variable point of follow-up after hospital discharge (Baker et al. 2018). The literature does not specify whether these patients experience shortness of breath with certain activities or at rest.

Kelderman et al. (2024) conducted a retrospective cohort study in Netherlands on patients recovering from blunt thoracic trauma over an 11-year period. The study comprised 185 patients with blunt thoracic trauma who were admitted between 1997 and 2019. The authors reported that 18% of patients still had breathing difficulties. They did not mention or take into account the pre-injury respiratory function of these patients but reported no statistically significant association of smoking or gender to the breathing difficulties reported. The authors concluded that pain and dyspnoea related to thoracic trauma are linked to decreased life expectancy and health-related quality of life (Kelderman et al. 2024). While the study concluded that pain and dyspnoea resulting from thoracic trauma are associated with reduced life expectancy and diminished health-related quality of life, the retrospective design and lack of baseline data weaken the strength of this conclusion.

A delayed haemothorax following physical trauma is uncommon, nevertheless research indicates a 30-day delay in the presentation of a haemothorax following thoracic injuries (Chen and Cheng, 2014). Patients with a delayed haemothorax following thoracic trauma present with what seems to be spontaneous severe shortness of breath, whereas in reality the shortness of breath is not spontaneous but rather a result of a delayed or missed haemothorax (Yap et al. 2018). The outcome of treatment depends on whether the chosen treatment technique is appropriate for each patient and where the treatment of choice addresses the main cause of the shortness of breath (Prins et al. 2021). Physiotherapist use techniques including deep breathing exercises, active cycle of breathing, incentive spirometer and posture correction to treat shortness of breath in hospital, however very little is known about the physiotherapy treatment for patients with traumatic injury post hospital discharge (Van Aswegen, 2020).

Shortness of breath can greatly affect an individual's quality of life following major thoracic injuries. With proper pain management, the use of oxygen therapy, respiratory physiotherapy and early identification of factors that influence or cause shortness of breath, shortness of breath following thoracic trauma can be managed or avoided.

2.4 EMOTIONAL HEALTH AND COGNITIVE FUNCTION

Definitive Healthcare (2024) defined emotional health as a person's ability to manage life's events, their sense of wellbeing, and their ability to recognize and accept their own and other people's emotions. A person who is in good emotional health is able to recognize and deal with the range of feelings they experience on a daily basis, rather than implying that they are always joyful. According to Morley et al. (2015), cognitive functioning includes the capacity to notice and respond, process and comprehend, decide, and formulate appropriate reactions to the outside world.

Consequences of major thoracic trauma can lead to significant emotional distress, including depression, anxiety and post-traumatic stress disorder (Kvale et al. 2018). The phrase "post-intensive care syndrome" describes the long-lasting functional deterioration that occurs following intensive care unit therapy. The syndrome is defined by physical impairment as well as limitations in cognitive function and mental wellness (Kohler et al. 2019). Kohler et al. (2019) reported that attention, memory and executive function are the main domains of cognitive function that are affected in patients after thoracic trauma. Critical illness can substantially impair cognitive function over time, making patients less able to deal with daily tasks and reducing their health-related quality of life (Kohler et al. 2019). Individuals with major thoracic trauma experience significant cognitive impairments, which persist after their physical recovery time (Butler et al. 2017). According to Kohler et al. (2019), 17–78% of patients with critical illness had cognitive deficits following discharge from the intensive care unit, and the majority had never experienced a cognitive deficiency prior to ICU admission. Cognitive impairment could last for years after discharge, but it usually improves over time. Delirium, a type of acute brain malfunction that occurs frequently during critical illness, has been linked to long-term cognitive impairments (Pandharipande et al. 2013). The use of sedatives and analgesic medication has been associated with the development of delirium and may independently contribute to long-term cognitive dysfunction (Pandharipande et al. 2013). Prolonged use of mechanical ventilation, a conservative or liberal fluid-management approach, hypotension, hypoxemia, sepsis, and the severity of the disease/injury are all linked to long-term cognitive dysfunction (Mikkelsen et al. 2012).

The neurobiological mechanisms underlying the effects of major thoracic trauma on emotional health and cognitive function are complex and multifaceted (Moore et al. 2018). Research suggests that the release of stress hormones such as cortisol, and the activation of the hypothalamic pituitary adrenal axis play a crucial role in the development of emotional and cognitive disturbance (Moore et al. 2018). Significant neuropsychological deficits can result from critical illness because of traumatic injury. Long-lasting neurocognitive deficits can have significant negative effects on health-related quality of life, return to work prospects,

general functioning capacity, and financial outlays (Marasco et al. 2015). Although the exact causes of the neurocognitive deficits are unknown, possible causes include delirium, hypoxia, glucose dysregulation, metabolic disturbances, inflammation, and the side effects of opiates and sedatives (Treede et al. 2019). These factors may have a greater impact on patients who already have pre-existing vulnerabilities to cognitive impairments, such as dementia, mild cognitive impairment, traumatic brain injury, or other comorbid disorders linked to neurocognitive impairments (Kohler et al. 2019).

According to Hopkins and Jackson (2006) between 35% and 90% of patients in non-ICU clinical settings exhibit neurocognitive impairment, which many doctors fail to identify or evaluate. One of the negative effects of surgery is cognitive impairment. When recovering from surgery, postoperative delirium and postoperative cognitive dysfunction become the most common signs of cognitive alteration (Vacas et al. 2021). These changes in cognitive function may lead to longer hospital stays, longer stays in intensive care units, a higher frequency of unfavourable medical events, higher odds of readmission to the hospital, and higher death rates (Vacas et al. 2021). Furthermore, the incidence of postoperative neurocognitive problems may also be strongly impacted by poorly managed postoperative pain (Park and Kim, 2019). Postoperative delirium is relatively common in patients after thoracic surgery, with a reported frequency of roughly 28%, older patients are more at risk of developing it with no statistical significance being reported with relation to gender (Khan et al. 2018). Numerous approaches, including the use of ketamine, dexmedetomidine, non-steroidal anti-inflammatory medications, melatonin, and non-pharmacological techniques such as early mobilization or reorientation, have been tried to lessen this type of postoperative delirium (Duning et al. 2021). It has been shown that nerve block can lower the incidence of postoperative delirium in surgeries (Li et al. 2022).

The presence of post-traumatic stress disorder greatly affects the individuals' emotional health and different aspects of an individual's cognitive function including their memory, attention span and autonomic arousal because of selective dysfunction in certain brain regions that are part of cortical networks and the limbic system (Dossi et al. 2020).

Major thoracic trauma can have a great impact on the emotional health and cognitive functioning of an individual. Further research is needed to explore interventions that can help prevent or manage the impact thoracic injuries have on an individual's emotional health and cognitive function.

2.5 PARTICIPATION IN FAMILY, SOCIETY AND SPORTING ACTIVITIES

Injury is one of the top five contributors to the global burden of disease and a leading cause of significant long-term disability (WHO, 2018). There is an increased number of survivors of trauma as a result of enhanced trauma systems, acute treatment, and rising injury hospitalization rates. This increases the demand of optimising function and lessening disability in these patients to ensure reintegration back to their pre-injury state (Ekegren et al. 2020). As a result, more people who have disabilities from injuries are living longer (James et al. 2018). The number of years spent living with an injury-related impairment worldwide has increased by 53% since 1990 (James et al. 2018). Disability is linked to increased rates of obesity, chronic illness, and physical inactivity, all of which can increase the risk of further disabling of an individual due to the primary disability caused by their injury (Froehlich-Grobe et al. 2016).

Significant aftereffects of severe lung injury include restricted exercise, physical and psychological symptoms, a decline in physical aspects of health-related quality of life, and higher medical expenses and service utilization which lead to increase participation limitations for survivors of severe lung injuries (Herridge et al. 2011). Ekegren et al. (2020) looked at **a**daptation, self-motivation and support services as keys to physical activity participation three to five years after patients sustained major trauma. They reported that given the perceived effects of trauma on their social lives, family roles, and overall health-related quality of life, many participants found limitations in their physical activity to be upsetting and frustrating. Numerous participants found that their social life was closely connected to their physical activity, and that ceasing to participate in physical activity had resulted in feelings of loneliness and isolation (Ekegren et al. 2020). Many expressed concern that they would not be able to continue in their roles as parents or grandparents in the future or the negative effects of physical activity limitation on these responsibilities. During the four-year interview, these topics were mostly discussed.

Limitations in functional and health-related quality of life outcomes are common among survivors of isolated rib fractures six to twelve months after isolated rib fracture injury (Heindel et al. 2022). Forty-three percent of patients without a pre-existing pain disorder reported new daily pain, and new chronic pain was associated with low resilience. Limitations in physical functioning and exercise capacity were reported in 56% and 51% of patients, respectively. Of those working preinjury, 28% had not returned to work. New limitations in activities of daily living were reported in 29% of patients older than 65 years. Older age, higher number of rib fractures, and intensive care unit admission were independently associated with higher odds of limitations in physical functioning (Heindel et al. 2022).

It has been demonstrated that physical injuries affect every facet of health-related quality of life in the overall major trauma population (Zwingmann et al. 2016). As a result, there have been detrimental effects on physical functioning, such as sleep quality, psychosexual function, and implications on employment, financial stability, and return to work (de Jongh et al. 2017). With high rates of persistent pain following a rib fractures, although most patients are able to manage their pain without compromising their health-related quality of life, some may need to use analgesics on a daily basis due to the limitations that chronic pain enforces on the patient's lifestyle or ability to work (Shelat et al. 2012).

2.6 ABILITY TO RETURN TO WORK AND PERFORMANCE OF ALL WORK DUTIES

Tengland (2011) described the ability to work using two concepts: one for specialized professions requiring specialized education or training, and another for jobs that most individuals can perform with a little practice. Assuming that the tasks are reasonable, and the work environment is acceptable, having work capacity in the first sense refers to having the occupational competence, the health necessary for the competence, and the occupational virtues necessary for handling the job tasks. In the second meaning, being able to work is defined as possessing the physical well-being, fundamental skills, and pertinent professional attributes necessary to oversee a certain type of job, provided that the responsibilities involved are reasonable and the workplace is suitable.

Mackenzie et al. (2011) examined the extent and rate of return to work in relation to some socio-economic and personal characteristics. The study included participants who had major traumatic injuries that lead to hospitalization, including patients with thoracic trauma injuries, patients with head injuries and patients with injuries to the lower and upper extremities. The authors found that personal income, educational attainment, and the presence of one or more confidants, and a sign of a strong social network, were significant predictors of the injured person's employment status after adjusting for the type and severity of the injury. Kvale et al (2018) reported that the rate of return to work after major thoracic trauma is significantly lower compared to other types of injuries. In the Western world, injuries are a major cause of mortality and disability. Most adult patients who are admitted to the hospital as a result of an injury may have to miss work or school, and some may not be able to go back to their previous jobs (Tøien et al. 2012).

Absence from work or school has a detrimental impact on one's health. Since many injuries happen to young adults, missing work has a significant negative economic impact on society and can cause patients to be disabled for many years (Tøien et al. 2012). There are several factors that can affect an individual's ability to return to work post major thoracic trauma. These key factors include severity of the injury sustained, the presence of chronic pain,

cognitive impairments, physical disability resulting from the injuries, and emotional distress that affect patients' readiness to return to work (Nielsen et al. 2019; Butler et al. 2017; Moore et al. 2018).

A study by Blythe et al. (2024) aimed to assess patients' eligibility for return to work after receiving surgical stabilization for acute rib fractures. The authors reported that of 1841 trauma patients with rib fractures, 66 had surgery to manage their fractures. Of the eligible patients, thirty-nine filled out the study questionnaires. The answers from before and after the injury were contrasted. Following surgery, the number of patients employed fell significantly from 22 to 16. There was a decrease in productivity scores and weekly hours worked but no difference in the number of hours missed for those who went back to work. There were noticeably more people receiving pain medication and experiencing pain. After surgery, the health-related quality of life score was lower. Factors connected to the severity of the patients' injury, as well as those related to longer hospital stay and admission to intensive care units were linked to delayed return to work for both patients who were treated conservatively and those who received surgery (Blythe et al. 2024).

Survival analysis revealed that patients with low socio-economic status, drug addiction, history of hospitalization in the intensive care unit, multiple and severe injuries, and severe disability had significantly longer times between admission and first return to work (Abedzadeh-Kalahroudi et al. 2017). Understanding factors that affect return to work and implementing effective intervention strategies can improve the rate of return to work in this population.

2.7 PHYSIOTHERAPY FOLLOW-UP PROGRAMS FOR PATIENTS WITH MAJOR THORACIC INJURIES AFTER HOSPITAL DISCHARGE

Hospital discharge is a time when patients can get ready to maximize their own recovery at home, marking the end of hospital care and the transfer of accountability for ongoing care needs to other healthcare providers (e.g. primary care, social care services, and domestic environments) (Johnson et al. 2012; Markiewicz et al. 2020; Waring et al. 2014). Although discharge is theoretically positioned as an opportunity for continuity of care (Johnson et al., 2012), there is limited empirical evidence evaluating how effectively this transition functions, particularly within under resourced healthcare systems.

Patients should be provided with a comprehensive home exercise program that they are expected to follow, after being discharged to facilitate their physical recovery (Van Aswegen et al. 2024). It is suggested that patients be followed up telephonically or face-to-face so that

issues with execution of exercises and adherence to the home training programme can be addressed. In addition, those patients who present with limitations in respiratory function, general mobility, or limited functional ability of the limbs at the time of hospital discharge, should be prioritised for post discharge follow-up by physiotherapy services (Van Aswegen et al. 2024). Reportedly only eight percent of physiotherapists globally provide patients who are recovering from thoracic trauma with physiotherapy after discharge from hospital (Van Aswegen et al. 2020). There is no research evidence about the effectiveness of rehabilitation provided to patients after discharge from hospital following major thoracic trauma on their clinical outcomes on a global level nor in South Africa (Van Aswegen, 2020).

Recovery after hospital discharge is still a difficult process for patients with blunt thoracic injuries worldwide (Marasco et al. 2015). It's likely that this patient population's load is exacerbated by inadequate supportive treatment in the early post-discharge phase. A study conducted by Baker et al. (2021) looked at the patients' perception of the discharge process and reported that the quantity of professional groups participating in discharge planning, according to participants, might be daunting at times. They frequently shared that these groups operated in isolation rather than as a team. Participants noted whether aspects of their hospital discharge could have been improved upon or handled better, as well as how the advice provided by these healthcare professionals either helped or hindered their ability to leave the hospital. Participants reported difficulty of overseeing their own rehabilitation and their dependency on others for day-to-day assistance. Many of the participants experienced decreased tolerance to lifting weights, limited mobility, and difficulty performing previously "simple tasks". For numerous individuals, even fundamental tasks like grooming, defecation, and clothing required a great deal of time, frustration, and agony (Baker et al. 2021).

The influence of the discharge procedure on patients following thoracic trauma injuries and their early self-management and recovery at home is not well covered by the current evidence base in South Africa. Clinicians are unable to maximize recovery for this patient group in the absence of a thorough understanding of what patients go through throughout this phase of recovery. More research is needed to identify the type of support that patients with major thoracic trauma need post hospital discharge. The limited local research on discharge processes in South Africa raises critical concerns about the cultural and systemic suitability of adopting global care models without contextual adaptation.

2.8 HEALTH RELATED QUALITY OF LIFE

Health-related quality of life (HRQOL) is a multi-dimensional concept commonly used to examine the impact of health status on quality of life (Yin et al. 2016). The following factors, predispose patients to a reduced HRQOL following major thoracic trauma: older age, female

gender, higher rate of injury severity, lower level of education attained, presence of mental illness and comorbidities, lengthier hospital stay, and high degree of disability (Lotfalla et al. 2024).

Studies have consistently shown that major thoracic trauma result in significant impairments in physical aspect of HRQOL (Kvale et al. 2018; Claydon et al. 2018). Pain, respiratory dysfunction and reduced levels of mobility are common sequelae that contribute to decreased physical aspects of HRQOL (Claydon et al. 2018). The views of patients who had multiple rib fractures during their recovery journey were investigated in a qualitative study (Claydon et al. 2018). The participants conveyed feelings of being fortunate to be alive, breathing difficulties, pain, and a sense of their lives being on hold. Major thoracic trauma also has a profound impact on psychological and emotional aspects of HRQOL (Claydon et al. 2018). Anxiety, depression and post-traumatic stress disorders are common comorbidities in patients who have suffered major thoracic trauma (Moore et al. 2018). This leads to patients struggling with day-to-day decision making, altered moods and disturbance in their sleeping patterns (Moore et al. 2018).

Thoracic trauma-related pain and dyspnoea have been linked to decreased life expectancy overall and HRQOL (Kelderman et al. 2024). A study by Kelderman et al. (2024) that investigated how different factors affect an individual's HRQOL following major thoracic trauma, reported no statistical significance between males and females in relation to HRQOL. All groups who reported pain had noticeably worse HRQOL. Only the groups who reported mild or severe pain reported a significantly lower overall HRQOL. Patients with moderate pain scored 16 points and patients with high pain scored 27 points lower in overall HRQOL.

Dhillon et al. (2015) reported that patients with fractures of the first four ribs experience great decline in the physical aspect of their HRQOL two months following discharge. Patients with rib fractures involving ribs nine to twelve exhibit noticeably poor respiratory symptoms, including dyspnoea and declines in HRQOL associated with physical function (Dhillon et al. 2015). Major thoracic trauma injuries significantly impact HRQOL, encompassing physical, psychological, emotional, social and functional domains. Understanding the factors that influence HRQOL can inform targeted interventions by physiotherapists to enhance recovery and improve outcomes.

2.9 CONCLUSION

The literature reviewed has provided evidence of the long-standing challenges that patients with major thoracic trauma face. The evidence presented describes how major thoracic injuries affect different aspects of patients' lives including physical recovery, emotional and

cognitive function, their ability to reintegrate into family and society and their ability to return to work. Little is known about the post discharge physiotherapy treatment available to patients with major thoracic trauma in South Africa. To ensure the best quality physiotherapy treatment is given to patients recovering from thoracic trauma, clinicians need to understand how patients perceive their recovery journey, especially in the context of South African trauma care.

CHAPTER THREE

3. METHODOLOGY

3.1 QUALITATIVE APPROACH AND RESEARCH PARADIGM

A qualitative study was conducted using a transcendental phenomenology approach. This approach mainly aims to describe, understand, and explain a person's lived experiences in the world (Neubauer, Witkop and Varpio, 2019). Therefore, a phenomenology approach was best suited to answer the objectives of this study. Individual participant interviews were conducted.

3.2 RESEARCHER CHARACTERISTICS AND REFLEXIVITY

The researcher is part of a team of physiotherapists working at the Netcare Alberton hospital treating some patients in the trauma ICU. She therefore understands the seriousness of the symptoms experienced by patients with thoracic trauma injury. She was aware that there might be a possibility that some of the participants of this study had been treated by her while they were still in hospital. To avoid participants feeling the need to answer in a way that they thought might favour the researcher, they were given an option to be interviewed by a research assistant. The research assistant was a physiotherapist who works with orthopaedic outpatients in the same physiotherapy practice and had not previously treated any of the participants. Neither the researcher nor her supervisor ever experienced thoracic trauma themselves, so an outsider perspective in interpreting the injury-specific information obtained, exists.

3.2.1 Data Immersion

Because the researcher was conducting the interviews as well as analysing the data, she had an advantage of totally immersing herself in the data. This was beneficial because the researcher's interview experience informed data analysis. The researcher got to observe the elements that make up the interview context, such as unspoken body language, while conducting the interviews. Understanding the interview context added depth to data immersion and allowed for later analysis to fully account for the study setting beyond interview transcripts. To assist the researcher in analysing the data, the researcher reread interview transcripts and contextual data, as well as listened again to recordings of the interviews.

3.2.2 **Assumptions**

3.2.2.1 **Ontological assumptions**

Understanding the nature of knowledge is the foundation for ontological assumptions, which are made when the researcher immerses themselves in the investigation and tries to get as close to the study participants as possible (Brown, 2020). In this regard, absolute knowledge is certain and comes from authority. Since transitional information is only partially known, the researcher aimed to gain a deeper understanding of it. Because various people had diverse experiences that led to experienced knowledge, independent knowing is ambiguous. The evidence within the study's context is used to evaluate contextual knowledge (Palagolla, 2016).

The study of thoracic trauma survivors' perceptions of their healing experiences can only be represented by hearing what they have to say and how each participant experienced their recovery journey.

3.2.2.2 **Epistemological assumptions**

According to Brown (2020), determining the nature of reality even when the pertinent occurrences are not observable is one of the epistemological assumptions of inquiry. Regarding epistemological assumptions realism holds that there is no distinction between the physical and mental aspects of understanding and observation. The tenets of epistemological assumptions state that knowledge is acquired by man rather than created, and that all mental processes whether disordered or not come from and originate in the brain. When recognized, the forces of nature are not products of human creation; rather, they exist and would persist even in the absence of humans (Patil and Giordano, 2010).

The study made use of the iterative approach as it focused on studying patients with major thoracic trauma six months after their hospital discharge. Their words, perceptions, and beliefs were the main sources of information used to understand their perceptions about their recovery after injury. The researcher interviewed the participants one on one, the data collected was recorded and transcribed, and then the data was sorted into themes and codes.

3.2.2.3 **Axiological assumptions**

Axiological research assumptions examine prejudices that shape the story and interpretation of occurrences in addition to the part that societal values play in both. The axiological component takes into account the researcher's interpretations in addition to the aims, values, mission statements, objectives, beliefs, and views of the subjects of the study (Brown, 2020). According to Kulina (2016), axiological research presupposes that biases affect not only the

behaviours and actions of the subjects being studied, but also the researcher's observation and comprehension.

The researcher's worldviews and clinical experience influenced the types of questions that were asked in this study. To minimize the influence of the researcher's clinical experiences and worldviews when analysing the data collected, direct citations are quoted in the analysis to ensure that the participants' views and opinions remained undiluted.

3.2.2.4 **Methodological assumptions**

The research methodology, design, execution, and language selection were all considered by methodological assumptions. Before drawing any broad conclusions from observation, the researcher used specific information from the study to support or refute those conclusions. Three fundamental concepts are present in methodological assumptions namely a) people's preferences are determined by how much they think something is worth, b) people make the most out of their resources, and c) people behave independently of one another according to the knowledge they have access to (Popa, 2012). In this study, the interview questionnaire was made available in three different languages (e.g. English, Zulu and Sesotho). Each participant was interviewed in a language that they were comfortable with. In cases where the interview was not conducted in English, the interview was transcribed and then translated into English; the interview was then translated from English back into the original language to make sure that the true essence of the interview was maintained (Appendices 1, 2, 3). The study made use of a semi-structured open-ended questionnaire to allow participants to fully express themselves and to make room for new themes to emerge.

3.3 **CONTEXT**

Netcare Alberton hospital is a level 1 trauma centre in Alberton, Gauteng. It is currently one out of two level 1 trauma centres within the private sector in South Africa. Potential participants for this study were managed at Netcare Alberton hospital during the acute phase of their injury and subsequently discharged. The hospital offers specialised surgical, medical, maternity, paediatric, trauma, and neonatal services. The hospital consists of 427 beds with 135 as dedicated critical care beds (www.netcarehospitals.co.za).

3.3.1 **Study Population**

Study participants were admitted to the Netcare Alberton hospital for major thoracic trauma and received standard in-patient physiotherapy treatment from physiotherapists working for Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice. During their stay in the ICU and the trauma ward, these patients were treated by the practice personnel until they

were discharged from the hospital. Patients who were six months following hospital discharge, according to records held at the physiotherapy practice, were contacted to participate in this study. Some of the patients who were treated in the hospital also received follow up physiotherapy treatment as outpatients at the practice. There is no set treatment program for these patients; they are individually assessed and treated according to their own needs and the symptoms that they still present with. In addition, patients recovering from major thoracic trauma, who were participating in another research project at Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice rooms in Alberton, investigating the effects of myofascial release therapy and active exercises on their recovery (Blewitt and Van Aswegen, unpublished), were asked by K Blewitt if they would mind being approached to participate in this study. This was done after they completed their participation in that study at six months after hospital discharge. Only those who provided consent were approached by this researcher regarding participation and to obtain written consent. Participant recruitment for this study commenced on 9 February 2023 and was concluded on 30 November 2023.

3.4 SAMPLING STRATEGY

Purposive sampling was used to identify potential participants that fit the following stratification selected for this study: age categories (18-35 years; 36-50 years; 51-65 years); gender (male; female); physiotherapy rehabilitation after hospital discharge (yes; no). This strategy was employed to ensure that the results obtained were comparable and meaningful. Recruitment and interviews continued until no new themes emerged from the data, as at that point data saturation was attained.

3.4.1 Inclusion Criteria

3.4.1.1 Male and female patients who were between 18 and 65 and who suffered major thoracic trauma for the first time.

3.4.1.2 Patients with thoracic trauma who were discharged from Netcare Alberton hospital six months ago without any physiotherapy intervention post discharge.

3.4.1.3 Patients with thoracic trauma who completed the other post-discharge physiotherapy treatment research project at Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice rooms in Alberton.

3.4.2 Exclusion Criteria

3.4.2.1 Patients with known pre-injury cognitive impairments.

3.4.2.2 Patients with pre-injury and/or post-injury speech difficulties.

3.4.2.3 Patients with previous thoracic trauma injuries.

3.4.2.4 Patients that sustained traumatic brain injury or spinal cord injury or multiple orthopaedic injuries together with thoracic trauma.

3.5 ETHICAL CONSIDERATION

The researcher completed the TRREE course on Introduction to Research Ethics (Appendix 4). Ethical clearance was obtained from the University of the Witwatersrand Human Research Ethics Committee (certificate number: M220934) (Appendix 5). Permission was obtained from the practice owner of Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy to obtain information from their patients' data base to identify potential participants for the study that the researcher contacted and informed about the study (Appendix 6). Informed written consent for participation in the study as well as consent for video or audio recording was obtained from the participants (Appendix 7). Participants were notified that they could terminate their participation in the study at any time without any penalty towards them. The interviews were recorded, transcribed and coded to ensure participant anonymity. This information was kept safe in a password protected folder on the researcher's computer. Information was used for the purposes intended for this study. Raw data is stored according to University of the Witwatersrand policy (six years for unpublished data and two years for published data).

3.6 DATA COLLECTION INSTRUMENT

A semi-structured interview with open-ended questions (appendix 1) (informed by the literature review) and interview schedule (appendix 9) were used to assess the participants' perceptions of their recovery from major thoracic trauma at six months after hospital discharge. The semi-structured interview questions were reviewed by the study supervisor for suitability to adequately address the research objectives.

3.7 DATA COLLECTION PROCEDURE

The researcher identified potential participants that were treated in hospital by practice staff six months prior to the study's commencement date (09 February 2023). This was done using the records of patients kept at Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice rooms. The researcher contacted the identified potential participants and explained the study to them. If a patient was interested in taking part in the study, the researcher emailed a consent form to the participant, the participants signed the consent form and emailed it back to the researcher. In cases where the interviews were done in person telephonic consent was obtained and then the participant signed consent on the day of the interview. Arrangements were made for the interview to take place at a convenient date and time for them. For

participants who were already taking part in the other research study at the same physiotherapy practice (Blewitt and Van Aswegen, unpublished), the researcher of that study was asked to find out which of her participants were willing to take part in this research study. Interested participants were then contacted by this researcher to explain the purpose of the study to them again, see if they fit the inclusion and exclusion criteria for the study, and then obtained verbal consent for participation and audio- or video recording from them. The researcher then scheduled a date and time with each participant to conduct the online interview with them. There was a risk that the interview questions might evoke emotional distress due to the trauma that the participant experienced during their recovery. There was a psychologist who was available to counsel the participants should participating in this study cause any emotional distress (appendix 11). Her contact details are as follows, Anne Rademeyer counselling psychologist, tel: 0118673534, email address: anner862@gmail.com .

The interviews were done telephonically via Microsoft Teams or WhatsApp video call depending on the participant's preference; some of the interviews were conducted in person at the physiotherapy rooms. The interviews were allocated a time slot of 30 minutes. Field notes were kept in a journal in which the researcher recorded non-verbal body language cues that the participants displayed as they were being interviewed. A short summary was written up in the field notes diary after each interview to capture the essence of the interview.

After each interview the recordings were transcribed and typed out into a Word document by the researcher. The researcher listened to each recording and read the typed transcripts several times to immerse herself into the data. Codes were created from the data and with the codes, categories were formed. This process was repeated after each interview until no new codes were identified from the data. At this point data saturation was met and no more interviews were held.

3.8 DATA PROCESSING

When gathering and analysing data for this project, an iterative approach was used as a reflective process, which is critical for sparking insight and producing meaning (Srivastava and Hopwood, 2009). Following each interview, each transcript was read aloud, with special emphasis paid to repeating stories and connections between incidents. The data was given initial codes. With each interview, the cycle of reading, linking, coding, and categorizing was repeated. Interview transcripts were compared to one another, codes were sorted into categories, and categories were grouped into themes, and this cycle was repeated until no new topics emerged from the data.

3.8.1 Data Coding

The interviews were transcribed into a Microsoft Word document. The data was then entered into a Microsoft Excel spread sheet and coded under the following themes, derived in a deductive manner to answer the set research objectives:

- physical function
- mental health
- cognitive function
- reintegration into their family and society
- return to work
- did the participant receive physiotherapy treatment post hospital discharge
- participants' views on recovery

3.8.2 Creation of Categories

The researcher identified similarities or related data across transcripts and joined those to create categorizes within each overarching theme that spoke to the same topic or were contradicting in nature.

3.8.3 Identification of Themes

As described above, themes were derived in a deductive manner from the set research objectives.

3.9 DATA ANALYSIS

Participants' descriptive data were recorded in Excel and imported into IBM® SPSS® Statistics Version 27 for analysis. The Shapiro Wilk test for normality was used to assess the distribution of continuous data (e.g. age). Continuous variables were summarized as mean and standard deviation (SD) (normally distributed) or median and interquartile range (IQR) (not normally distributed). Frequencies and percentages were used to summarize categorical variables (e.g., gender; physiotherapy treatment received).

Although this study primarily adopted a qualitative approach, descriptive statistical analysis was used to summarize demographic variables such as age in order to better contextualize the participant sample (Pickering, 2017) . Continuous data were examined for normality using the Shapiro–Wilk test. This assessment guided the choice of summary statistics: data following a normal distribution were presented as mean and standard deviation (SD), while non-normally distributed data were summarized using median and interquartile range (IQR) (Pickering, 2017). This practice ensured clarity and transparency in reporting sample

characteristics and contributed to methodological rigor, without altering the exploratory and interpretive nature of the study (Mukherjee & Bhonge, 2025).

The researcher made use of the NVivo software to analyse the qualitative data. NVivo is a software program that assists qualitative researchers in organizing, analysing, and finding insights in unstructured or qualitative data such as interviews. The researcher and her supervisor independently coded participants' responses. Thereafter, a meeting was held to discuss the codes and categories to reach consensus. The frequency of codes was recorded. Higher frequencies suggest a more meaningful and relevant element related to participants' lived experiences.

3.10 TECHNIQUES TO ENHANCE TRUSTWORTHINESS

The four criteria developed by Lincoln and Guba in the 1980s to ease the description of rigor within qualitative research were used to attain trustworthiness and rigour. The criteria were dependability, confirmability, credibility, and transferability.

3.10.1 Credibility

A rapport was established prior to commencing the study, by calling the patients and explaining the study to their satisfaction and giving the participants a chance to speak to the researcher before commencing with the study. The researcher expressed compassion and empathy during all interviews. This built a trusting relationship between the participants and the researcher and therefore encouraged participants to be more willing to exchange information. Enough time was allocated for each interview so that the participants did not feel rushed. Interview transcripts were returned to participants for member checking, so that participants could check for accuracy and to confirm that the transcript resonated with their experiences.

3.10.2 Confirmability

Notes were recorded in a reflective journal by the researcher to reflect the true essence of the interview including the participants' body language, their hesitation or confidence in answering questions. The participants' demographic information was recorded. Direct quotations from participants have been included in the results to ensure that the findings accurately reflect the data gathered and is not skewed by the researcher.

3.10.3 Dependability

An audit trail is available that summarizes the study's methodology and processes.

3.10.4 **Transferability**

Purposeful sampling was used to identify potential participants that fit the stratification selected for this study. This strategy was employed to ensure that the results obtained were comparable and meaningful. Sufficient details with rich description of the study is documented so that study recreation may be possible.

In chapter 4 the results of this study are presented.

CHAPTER FOUR

4. RESULTS

4.1 CHARACTERISTICS AND DEMOGRAPHIC INFORMATION OF PARTICIPANTS

A total of eighty-two patients with thoracic trauma were identified from the patient data base at Plani, Laidler, Fleishman and Associates physiotherapy practice in Alberton Johannesburg. Forty-six participants were excluded as they did not meet the inclusion criteria. Thirty-six participants met the inclusion criteria and were invited to participate in the study. Eight participants refused to be interviewed in the study and twelve participants were excluded as the researcher was unable to get hold of the participants to conduct the study. Sixteen participants agreed to participate in the study, two participants were subsequently excluded as they were unreachable at the set interview time. A total of fourteen interviews were conducted in the study. Continuous variables demonstrating a normal distribution were described using the mean and standard deviation (SD). Although the sample size was limited (n = 14), the use of these measures allowed for a clear and precise representation of central tendency and variability, consistent with established practices in the reporting of participant characteristics within exploratory and qualitative research contexts. All interviews were conducted by the researcher as she had been working in the cardiac unit and did not treat any of the trauma patients during their hospital stay. This data is represented in the flow chart below (Figure 4.1):

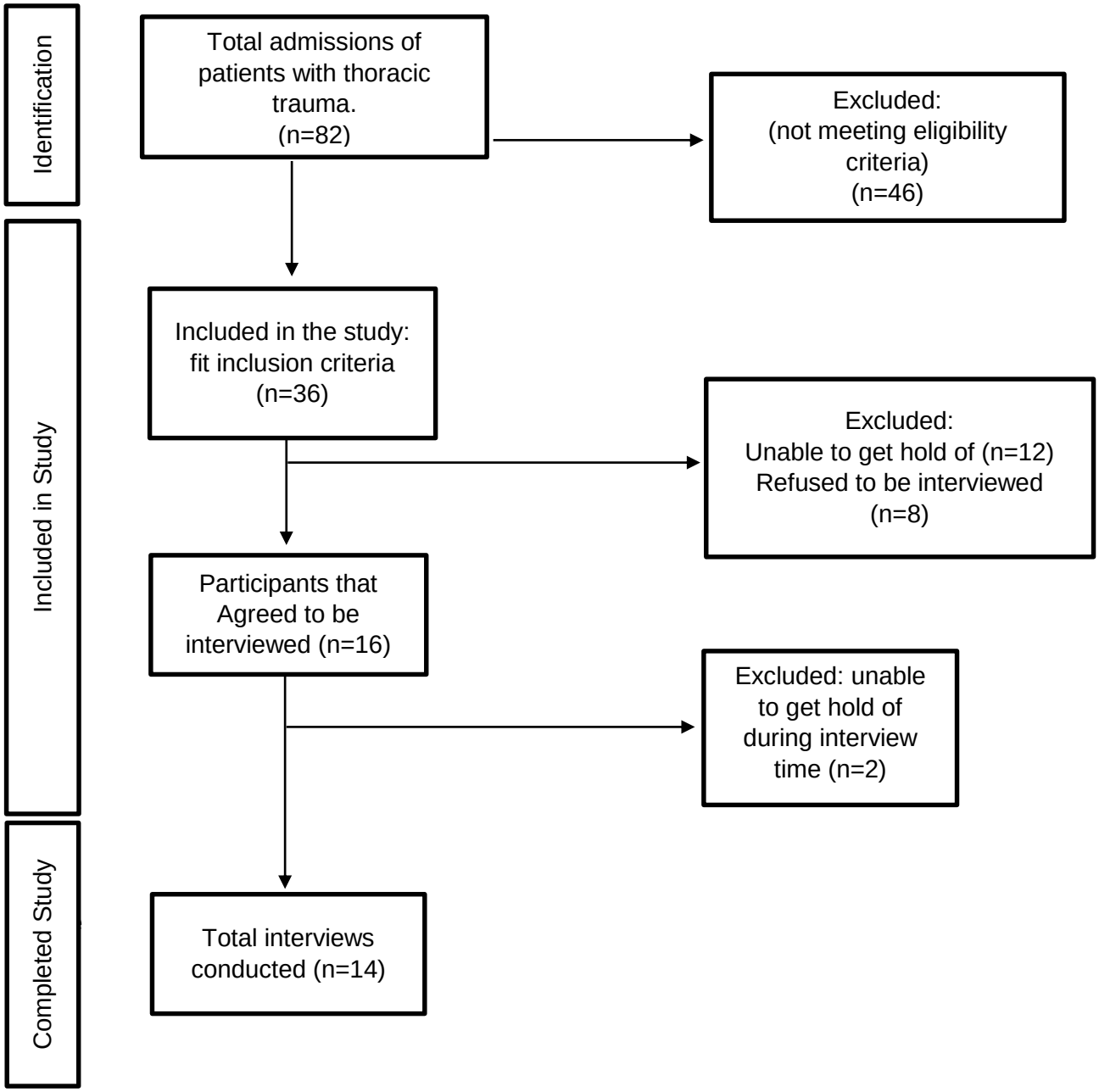


Figure 4.1: Flow of Participants through the Study

The demographic information and clinical profiles of participants are summarized in table 4.1 below.

Table 4.1: Demographic and Clinical Profiles of Participants (n=14)

Variable	Results
Age (mean, SD) (years)	43 (10)
Age categories (n, %) (years) - **18-35** - **36-50** - **51-65**	 2 (14) 8 (57) 4 (29)
Gender (n, %) - **Male** - **Female**	 13 (93) 1 (7)
Mechanism of thoracic trauma (n, %) - **Blunt injury** - **Penetrating injury**	 12 (86) 2 (14)
Type of major thoracic trauma (n, %) - **Fractured ribs and/or sternum** - **Pulmonary contusion** - **Pleural space involvement**	 10 (71) 6 (43) 5 (36)
Other injuries sustained (n, %) - **Limb fractures (pelvis and femur)** - **Soft tissue injury** - **Concussion (minor to mild concussions)** - **Joint dislocation (shoulder dislocation)** - **Spinal injury (fractured L2-L4 without any neurological fallout)**	 5 (36) 2 (14) 1 (7) 1 (7) 1 (7)
ICU admission (n, %)	10 (71)
Intubation and mechanical ventilation (n, %)	5 (36)
Admission only to ward setting (n, %)	4 (29)

Most of the participants were male, had sustained blunt thoracic trauma, and were admitted into ICU. Five participants had limb fractures which involved the pelvis and femur; one participant had a mild concussion. One participant suffered a spinal injury, which was a fractured L2-L4 without any neurological fallout.

The mean hospital length of stay was 45 (52) days. Participant five had the longest stay of 194 days as he was intubated and mechanically ventilated in trauma ICU and had a high injury severity (multiple rib fractures, injury to the pleural space, pulmonary contusion and a fractured pelvis). Participant eight had the shortest hospital stay of five days. This participant was admitted to the general ward after sustaining thoracic trauma that resulted in lung contusion and skin abrasions.

Table 4.2 summarises results for participant recruitment according to predetermined age categories and whether participants received physiotherapy treatment after hospital discharge or not.

Table 4.2: Participant Recruitment According to Predetermined age Categories and Physiotherapy Treatment received after Hospital Discharge

Age category (years)	Physiotherapy Treatment after Hospital Discharge	
	Yes (n)	No (n)
18-35	1	1
36-50	3	5
51-65	4	0
Total numbers	8	6

Slightly more participants received physiotherapy treatment after hospital discharge as they had just completed the research project by Blewitt and Van Aswegen (unpublished) at the time of recruitment for this study. The participants who did not receive post-discharge physiotherapy were between the ages of 36-50 years, which makes them younger than those who did receive post-discharge physiotherapy treatment.

4.2 PHYSICAL RECOVERY AFTER MAJOR THORACIC TRAUMA

To explore and better understand how the participants perceived their physical recovery over the six months after discharge from hospital, the following question was asked: “How do you feel about your physical activity levels as you are recovering from your chest trauma injury?” Five themes emerged from the question which are: physical activity levels, fear of movement, pain with movement, shortness of breath with movement, and discomfort with movement. These five themes of physical recovery are represented below (Figure 4.2).

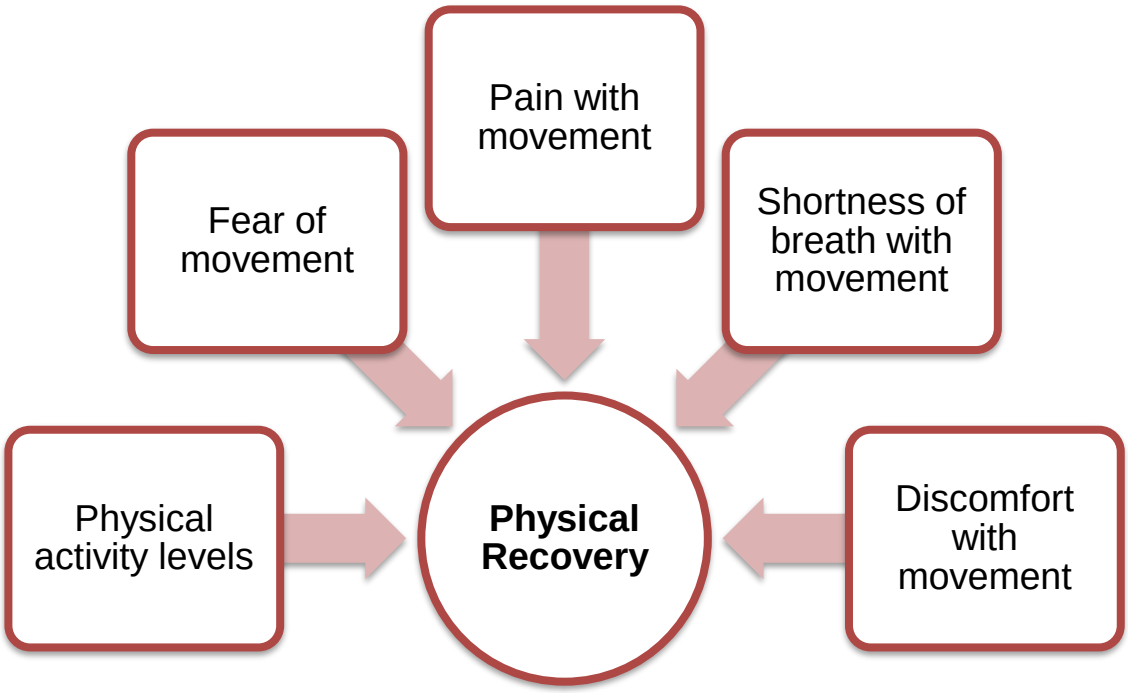


Figure 4.2: Physical Recovery Themes Identified for Participants recovering from Major Thoracic Trauma

4.2.1 Physical Activity Levels

The following data was collected under the theme "Physical activity levels". A total number of ten participants reported that they had good physical recovery, six months after hospital discharge, while three participants reported that they still had some limitations in their physical activity levels due to lack of stamina. One participant reported that he felt frustrated about the level of his physical activity recovery six months' post hospital discharge.

Table 4.3 below shows a summary of the participants' perceptions of their physical activity level six months' post hospital discharge.

Table 4.3: Participants' Perceptions of Recovery related to their Physical Activity Levels

Codes	Categories	Examples of Participant Quotes
Recovered well n=10	Good physical recovery	"I'm sure the Doctor would be so surprised to see me like this." (Participant 1/age 40/male/received PT/blunt trauma). "I think my physical recovery is very good" (Participant 11/age 41/male/no PT received /blunt trauma). "I have recovered very well, I feel like myself again" (Participant 12/age 36/male/PT received/blunt trauma). "I am okay, I am doing well. My body is back to normal" (Participant 3/age39/male/no PT received/blunt trauma).
Participation restriction n=3	Lack of stamina	"After a long day I can feel that my body is not the same." (Participant 13/age 32/male/no PT received/blunt trauma). "I cannot walk as fast as I used to before and I also struggle with sitting for long periods of time" (Participant 5/age 38/male/PT received/blunt trauma). "I have recovered well it's just a few minor things that still need to heal a hundred percent but I'm doing good, the minor things are things like my stamina and energy for long distance walking" (Participant 9/age 36/male/no PT received/blunt trauma).
Frustrations n=1	Inadequate and frustrated	"I am an active person, so being an active person, you expect that you will be able to do the things you were able to do before you went into the hospital. I feel inadequate." (Participant 6/age 60/male/PT received/penetrating trauma).

4.2.2 Fear of Movement

A total of eight participants reported that they are moving with ease and have no fear performing any physical movements. Four participants reported that specific activities limit their movements. Participant thirteen reported that he is still scared to drive and participant six reported that he finds that he does tend to hold back when it comes to certain activities like lifting heavy objects and driving long distances. Two of the study participants reported that their perception of pain impacts their movement. One participant reported that they have no pain physically, but the memory of pain lingers in their minds and affects their movement.

Table 4.4 below summarizes some participants' responses regarding fear of movement six months after hospital discharge.

Table 4.4: Participants' Perceptions Related to Movement

Codes	Categories	Examples of Participant Quotes
Doing everything n=8	Moving with ease	"I am not afraid of any challenge life throws at me because I have seen how strong I am" (participant 2/age 46/male/no PT received/ blunt trauma). "No I am doing everything like I was before "(Participant 1/age 40/male/received PT/ blunt trauma).
Specific activities limit movement n=4	Hesitancy	"I am reluctant to do certain activities like running and over-exerting myself" (Participant 4/age 59/male/PT received/blunt trauma). "I am somehow limited; I can carry an empty gas cylinder but once it's full I am not able to carry it anymore" (Participant 5/age 38/male/PT received/blunt trauma). "I don't have any pain when driving but I am very scared to drive as this reminds me of the accident" (Participant 13/age 32/male/no PT received/blunt trauma).
Pain perception impacts movement n=2	Memory of pain	"I am somehow still afraid of lying on my side even though I know it is not painful anymore" (Participant 14/age 38/female/PT received/ penetrating trauma). "I haven't pushed myself to extreme points" (Participant 10/age 58/male/no PT received/ blunt trauma).

4.2.3 Pain with Movement

Twelve participants reported that they are pain free with movement six months after hospital discharge. Two participants reported that they get intermittent pain with certain activities six months post hospital discharge. Table 4.5 summarizes participants' perceptions of their pain with movement six months post hospital discharge.

Table 4.5: Participants' Perceptions of Pain with Movement

Codes	Categories	Examples of Participant Quotes
Pain free movement n=12	No pain	"No pains at all" (Participant 2/age 46/male/no PT received/blunt trauma; and Participant 12/age 36/male/PT received/blunt trauma). "I don't have any chest pains" (Participant 8/age 56/male/PT received/blunt trauma).
Sometimes I feel pain n=2	Intermittent pain	"I feel some pain when I am doing the breathing exercise" (Participant 6/age 60/male/PT received/ penetrating trauma). "it comes and goes, mostly on cold days" (Participant 10/age 58/male/no PT received/blunt trauma).

4.2.4 Shortness of Breath

Most participants reported that they do not experience any shortness of breath with movement except participant 4 who reported shortness of breath when walking for longer distances: “When I walk long distances I have to stand and catch my breath” (Participant 4/age 59/male/PT received/blunt trauma).

4.2.5 Discomfort with Movement

Nine participants reported that they do not experience discomfort with trunk movements during their ADLs, while the other five participants reported that they still had some discomfort with thoracic movements when doing their ADLs six months’ post hospital discharge. Table 4.6 summarises participants’ responses.

Table 4.6: Participants perceptions about discomfort with movements

Codes	Categories	Examples of Participant Quotes
No discomfort n=9	No discomfort during ADLs	“I feel like myself” (Participant 7/age 27/male/PT received/blunt trauma). “I don’t have any discomfort” (Participant 8/age 56/male/PT received/blunt trauma).
Yes I feel discomfort n=5	Intermittent discomfort with ADLs	“In bed when I have to turn to the right side that is when I get some discomfort especially if I do it too quickly” (Participant 9/age 36/male/no PT received/blunt trauma). “I don’t get pain while working but at the end of the day I do sometimes feel some discomfort on my chest” (Participant 13/age 32/male/no PT received/blunt trauma). “Just the pain when sitting too long” (Participant 5/age 38/male/PT received/blunt trauma). “Slight discomfort sometimes, like when I am lying on one side for too long” (Participant 6/age 60/male/PT received/penetrating trauma).

4.3 EMOTIONAL HEALTH AND COGNITIVE FUNCTION

To explore and better understand how the study participants perceived their emotional health and cognitive function as they recover from major thoracic trauma, the following question was asked: “How do you feel about your emotional wellbeing as you are recovering from your chest trauma injury?” Four themes emerged from the question which are: emotional wellbeing, feelings of anxiety, ability to sleep, and memory and decision making. These four themes of emotional health and cognitive function are represented below (Figure 4.3):

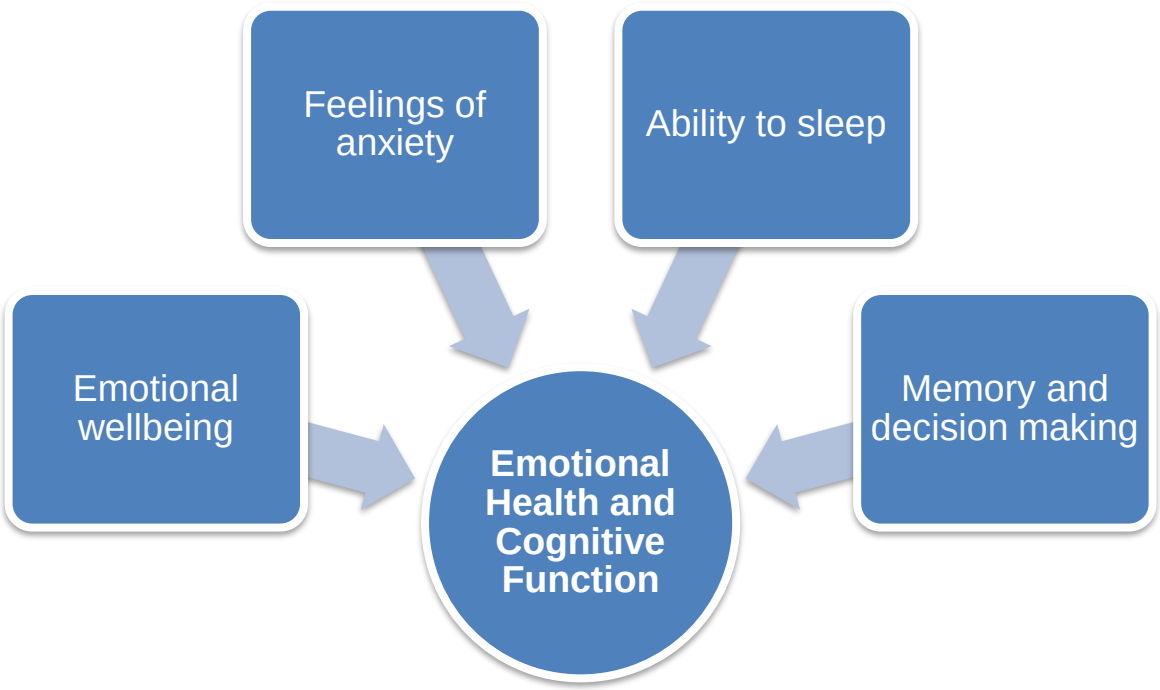


Figure 4.3: Emotional Health and Cognitive Function of Participants as they Recover from Major Thoracic Trauma

4.3.1 Emotional Wellbeing

Eight participants reported that they have fully recovered emotionally, while four participants reported a delay in emotional recovery, one participant reported that they feel scared and fearful, only one participant reported that he was not affected emotionally by the injury to his thorax. Table 4.7 below is a summary of the participants' responses with regards to their emotional wellbeing six months post hospital discharge.

Table 4.7: Participants' Perceptions of their Emotional Wellbeing Six Months after Hospital Discharge.

Codes	Categories	Examples of Participant Quotes
I feel good n=8	Full recovery emotionally	"I feel good man, even from the time of the accident I just told myself that I have to be strong and positive in order to overcome this" (Participant 9/age 36/male/no PT received/blunt trauma). "I am very strong, and I feel this made me even stronger. I am at my best in my life, physically, emotionally and financially" (Participant 2/age 46/male/no PT received/blunt trauma). "I am very good compared to when I was in the hospital" (Participant 1/age 40/male/received PT/blunt trauma).
I am struggling to heal n=4	Delayed emotional recovery	"I get frustrated at the limitations I have now" (Participant 6/age 60/male/PT received/penetrating trauma). "Recovering physically seems like a walk in the park compared to the battle you

Codes	Categories	Examples of Participant Quotes
		need to overcome mentally" (Participant 12/age 36/male/PT received/blunt trauma). "The physical pain is gone but now I continue to fight my mind" (Participant 14/age 38/female/PT received/ penetrating trauma).
I am a little bit scared n=1	Feeling scared and fearful	"I am a little bit scared and a little bit tense when I think about what I went through" (Participant 4/age 59/male/PT received/blunt trauma).
It did not affect me n=1	No effect on emotional well-being	"It did not affect me emotionally at all, I mean it's an accident and I have had a few of them, it can happen to anyone" (Participant 10/age 58/male/no PT received/blunt trauma).

4.3.2 Feelings of Anxiety

Eight participants reported to be free of anxiety, four participants reported unresolved anxiety, while two participants reported anxiety related to their employment. The data is represented in table 4.8 below.

Table 4.8: Participants' Perceptions of Anxiety after Six Month of Recovery from Thoracic Trauma.

Codes	Categories	Examples of Participant Quotes
I don't have any feelings of anxiety n=8	Free of anxiety	"Not anymore, I was anxious when I was still in the hospital because I did not know what to expect "(Participant 1/age 40/male/received PT/blunt trauma). "There was anxiety while I was in hospital but it's much better now, I had good back up from my wife" (Participant 6/age 60/male/PT received/penetrating trauma).
A little, it comes and goes n=4	Unresolved anxiety	"I think too hard about the accident and how I could have died that day. That leaves me very anxious and uneasy" (Participant 14/age 38/female/PT received/penetrating trauma). "It comes and goes but I try to keep calm and take it as it comes" (Participant 4/age 59/male/PT received/blunt trauma).
I get anxious when I am at work n=2	Anxiety related to employment	"I fear going back to work, I work in a manufacturing factory so now I'm scared I won't be able to perform like I use to" (Participant 5/age 38/male/PT received/blunt trauma). "I get anxious when I am at work and I see one of the horses getting angry" (Participant 3/age39/male/no PT received/blunt trauma).

4.3.3 **Ability to Sleep**

Ten participants reported to having a good night's sleep, three participants reported interrupted sleep, and one participant reported that they struggle to fall asleep. The participant who reported that they struggle to fall asleep also reported recurring dreams about his accident. One of the three participants who reported to have interrupted sleep also reported to have recurring dreams and nightmares. Participants' perceptions on their ability to sleep are summarized in table 4.9 below.

Table 4.9: Participants' Perceptions on their Ability to Sleep after Six Months of Recovery from Major Thoracic Trauma

Codes	Categories	Examples of Participant Quotes
I'm sleeping well n=10	Getting a good night's sleep	"I sleep like a baby" (Participant 12/age 36/male/PT received/blunt trauma). "I sleep like a happy baby" (Participant 1/age 40/male/received PT/blunt trauma). "I'm sleeping better now that I am at home" (Participant 4/age 59/male/PT received/blunt trauma).
I am not able to sleep throughout the night n=3	Interrupted sleep	"I am not able to sleep throughout the night. I still have nightmares about the accident "(Participant 13/age 32/male/no PT received/ blunt trauma). "I prefer not to sleep for long hours, sleep is for the dead" (Participant 2/age 46/male/no PT received/blunt trauma). "I am able to sleep on the side but it gets uncomfortable if I do it for too long" (Participant 11/age 41/male/no PT received /blunt trauma).
Struggle to fall asleep n=1	Struggling to fall asleep	"I struggle to fall asleep at night. I get like flash images that come and go of me in the hospital" (Participant 6/age 60/male/PT received/penetrating trauma).

4.3.4 **Memory and Decision Making**

Two participants reported limitations in their memory and decision making, while one participant reported a recovery in his memory during the recovery period of six months after hospital discharge. Eleven participants reported that their injuries did not affect their memory or decision making at all (Table 4.10).

Table 4.10: Participants Perceptions of Memory and Decision making Six Months after Major Thoracic Trauma.

Codes	Categories	Examples of Participant Quote
I think I have memory loss n=2	Limitations in memory and decision-making	"I forget a lot" (Participant 5/age 38/male/PT received/blunt trauma). "I think I have memory loss sometimes "(Participant 7/age 27/male/PT received/blunt trauma).
Memory has recovered n=1	Recovery of memory and decision-making	"When I first got home, I would forget even the smallest things, and I still can't remember the accident but everything else is fine now my memory is back" (Participant 11/age 41/male/ no PT received/blunt trauma).
Memory was not affected n=11	Memory not affected	"My memory was not affected I am still as sharp as before" (Participant 4/age 59/male/PT received/blunt trauma). "My memory is still good" (Participant 2/age 46/male/no PT received/blunt trauma).

4.4 PARTICIPATION WITHIN FAMILY AND SOCIETY

To understand the participants' perceptions on their participation in their families and society as they recover from major thoracic trauma, the following question was posed to the study participants "Do you feel you are able to participate in your family and society like you used to do before the injury?" Two themes emerged from the question, namely: full participation in family and society, and participation restriction. Results are presented in table 4.11 below.

Table 4.11: Participants Perceptions of Level of Participation in Society and Family Six Months after Thoracic Trauma.

Codes	Categories	Examples of Participant Quotes
I am back to normal n=10	Full participation in family and society	"I feel I have a better appreciation for my family, now I value being able to spend time with my family and being able to contribute and play an active role in keeping my family happy" (Participant 12/age 36/male/PT received/blunt trauma). "I am back to myself, and I am able to do everything that I want to do with my family and community, even at church I am back to the choir" (Participant 1/age 40/male/received PT/blunt trauma). "Nothing has changed for me" (Participant 7/age 27/male/PT received/ blunt trauma).
I am more reserved now n=4	Participation restrictions	"Physically I am okay but mentally; I just can't do that anymore" (Participant

Codes	Categories	Examples of Participant Quotes
		6/age 60/male/PT received/penetrating trauma). "feel I can not relate to my friends anymore because before we would sit and drink together but now I want nothing to do with alcohol; as it reminds me of the accident" (Participant 13/age 32/male/no PT received/blunt trauma). "I have only interacted with a few members of my family" (Participant 4/age 59/male/PT received/blunt trauma). "I use to be able to play soccer with my son before but now I can't stand for too long and I get tired" (Participant 5/age 38/male/PT received/blunt trauma).

4.5 ABILITY TO RETURN TO WORK AND PERFORMANCE OF ALL WORK DUTIES

When the following question was asked: "Have you been able to return to work?", 78% participants (n=11) reported that they had returned to employment, 14% (n=2) reported that they were unable to return to work, and 7% (n=1) reported to be unemployed. All participants reported that they were employed before their traumatic injuries. Participant 14 is currently unemployed; however, he was a contract worker when he got injured and lost his job with the company because he was not permanently employed there. The results are represented in table 4.12 below.

Table 4.12: Participants Perceptions of their Ability to Work and Perform all Work Duties Six Months after Thoracic Trauma.

Codes	Categories	Examples of Participant Quotes
Returned to employment n=11	Restrictions in performing work related duties (n=5)	"I am not doing all my responsibilities but I am doing most of them, I am just taking it slowly" (Participant 11/age 41/male/no PT received /blunt trauma). "I am not able to work as hard as I did before, my body gets tired now" (Participant 13/age 32/male/no PT received/blunt trauma).
	Fully resumed all work duties (n=6)	"I work even better than what I did before, I am more motivated now" (Participant 2/age 46/male/no PT received/blunt trauma).
Unable to return to work n=2	Not yet recovered for work	"I went back in January but I was just not coping, now I am booked off until next year February" (Participant 5/age 38/male/PT received/blunt trauma).

Codes	Categories	Examples of Participant Quotes
Unemployed n=1	Lost job	"I lost my job" (Participant 14/age 38/female/PT received/penetrating trauma).

4.6 PHYSIOTHERAPY TREATMENT

The study participants were asked "Did you receive any physiotherapy treatment after being discharged from the hospital?" Fifty-seven percent of participants (n=8) reported that they did receive physiotherapy treatment post discharge, while 43% of participants (n=6) did not receive any physiotherapy post hospital discharge. Table 4.13 below represents some of the participants' remarks on the physiotherapy treatment they received and the role it played on their recovery journey.

Table 4.13: Participants Perceptions of Physiotherapy Treatment Received post Hospital Discharge and the Role it Played on their Recovery Journey Six Months after Major Thoracic Trauma

Codes	Categories	Examples of Participants Quotes
Recovered well **n=5**	Post discharge physiotherapy	"The Physiotherapy treatment helped me reach my full recovery "(Participant 7/age 27/male/PT received/blunt trauma). "Physiotherapy treatment has really helped me to reach my goals" (Participant 12/age 36/male/PT received/blunt trauma). "It was very beneficial, to be honest with you I think the rehab I was sent to was a complete waste of time, if I was sent home and came for physio straight after being discharged from the hospital, I would be very far with my recovery now and I would have recovered quicker" (Participant 5/age 38/male/PT received/blunt trauma). "It helped" (Participant 4/age 59/male/PT received/blunt trauma).
I can move freely **n=3**	Received post discharge physiotherapy	"After the physio sessions I am able to move my body freely without any pains" (Participant 8/age 56/male/PT received/blunt trauma). "Physiotherapy helped me to correct my posture "(Participant 14/age 38/female/PT received/penetrating trauma). Participant 14). "It helped to loosen my body and it also helped me a lot with my endurance" (Participant 1/age 40/male/received PT/blunt trauma).
I did not need physiotherapy **n= 5**	No post hospital discharge physiotherapy treatment	"I did not need physiotherapy anymore" (Participant 2/age 46/male/no PT received/blunt trauma).

Codes	Categories	Examples of Participants Quotes
		"I used YouTube videos and the incentive spirometer I received in the hospital, I did not see the need to go for physio" (Participant 11/age 41/male/no PT received /blunt trauma). "I didn't need any more help from the physio" (Participant 13/age 32/male/no PT received/blunt trauma). "I was fine when I left the hospital, I did not need physio anymore" (Participant 9/age 36/male/no PT received/blunt trauma).
Travel costs too high n=1	No post hospital discharge physiotherapy treatment	"I lived too far and the traveling costs were too much for me" (Participant 3/age39/male/no PT received/blunt trauma).

4.7 RECOVERY JOURNEY

The study participants were asked "Is there anything else you would like to tell me about your recovery journey?" Three themes emerged from that question, namely: recovered quickly, delayed recovery and challenge yourself towards full recovery"

The results on the participants' responses are represented by table 4.14 below.

Table 4.14: Participants Perceptions of the Recovery Journey Six Months after Major Thoracic Trauma

Themes	Codes	Examples of Participant Quotes
Recovered quickly (n=11)	Quick recovery	"I expected my recovery time to be much longer" (Participant 4/age 59/male/PT received/blunt trauma). "Gratitude to all the medical experts who made sure it was possible" (Participant 7/age 27/male/PT received/blunt trauma). "It requires a positive and strong mind" (Participant 10/age 58/male/no PT received/blunt trauma). "You really need to apply yourself" (Participant 8/age 56/male/PT received/blunt trauma).
Random bad days n=2	Delayed recovery	"There will be random days that you get a bad day" (Participant 5/age 38/male/PT received/blunt trauma). "It has been a shock to my system, I really did not expect it. From being a fully developed person and being independent and having to relearn everything like a baby" (Participant 6/age 60/male/PT received/penetrating trauma).
Challenge yourself towards full recovery n=1	Push yourself	"You need to push yourself physically and mentally" (Participant 14/age 38/female/PT received/penetrating trauma).

4.8 PROMINENT EMOTION WITH REFLEXION ON HEALING JOURNEY

When asked “Reflect for a moment on your recovery journey, and tell me what is the most prominent emotion that you feel?”, all the study participants expressed gratitude using different positive words to express themselves, two reported that they feel thankful, six said they are grateful, two reported that they are feeling blessed, two expressed themselves as being at peace and two reported to be happy. The participants’ most prominent emotions are present in figure 4.4 and table 4.15 below.

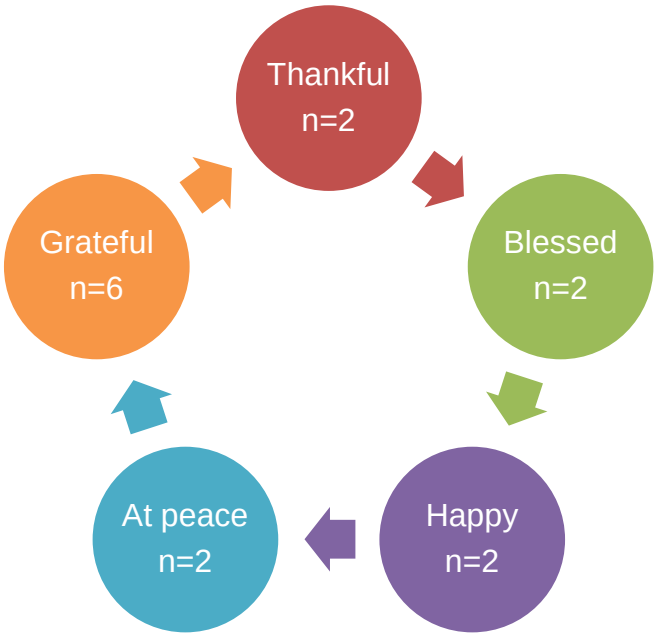


Figure 4.4: Prominent Emotion Six Months after Thoracic Trauma

Table 4.15: Prominent Emotion Experienced Six Months after Major Thoracic Trauma

Category	Examples of Participant Quotes
Grateful n=6	“I am grateful to my family and my wife for the support and love they have showed me throughout this whole journey. I am very grateful to be alive” (Participant 8/age 56/male/PT received/blunt trauma). “I am very grateful to be alive, I feel like I want to do more with my life with everything that I do now. I want to do everything to the fullest, like I feel like I want more in life so much more.” (Participant 13/age 32/male/no PT received/blunt trauma). “I am very grateful, I don’t know how to put it but I feel I have been reborn much better and much stronger.” (Participant 2/age 46/male/no PT received/blunt trauma).
At peace n=2	“I feel much better, I am starting to feel like myself again and that is the best feeling for me after everything I have been through. I feel at peace and calm now” (Participant 4/age 59/male/PT received/blunt trauma).
Blessed n=2	“I feel blessed and very lucky, although to be honest with you for some reason I was just very strong during this journey and it never crossed my mind that I could have lost my life” (Participant 9/age 36/male/no PT received/blunt trauma).
Thankful n=2	“Wow I am thankful for this second chance in life and I don’t want to waste it” (Participant 1/age 40/male/received PT/blunt trauma).

Category	Examples of Participant Quotes
Happy n=2	"I am just happy that I am alive and well, things could have gone south for me but it is nice to see that God still cares about me and still wants me on the earth" (Participant 10/age 58/male/no PT received/blunt trauma).

4.9 FIELD NOTES

Field notes were taken with each interview. Table 4.16 summarises the field notes

Table 4.16: Field notes taken during individual participant interviews

Participant	Field notes
P1	The participant was happy, confident and seemed very comfortable with all the questions.
P2	The participant was very proud of himself, it felt like he wanted to prove that he was well and fully recovered. The participant derailed from answering most questions and often had to be asked to answer the given question with a direct answer.
P3	The participant seemed very comfortable. He seemed very grateful when he was reflecting on his recovery journey. The participant has a very positive outlook on life. The participant was very forth coming with information and willing to elaborate more and expand his answers.
P4	The participant was happy, confident and was willing to share and expand his responses.
P5	The participant seemed very grateful and is in a very good space. The interview was done in person and initially the participant was sitting on a plinth without any back support. By the end of the interview the participant wanted to lie down to rest as he was tired. He said he was tired because he went out to a party last night but I think it also ties in with what he reported that he cannot sit for too long.
P6	The participant shared a lot of personal things that are happening in his life currently, but he still looked very happy and comfortable with his healing journey.
P7	The participant was very confident when he was asked most questions and answered all the questions quickly and with ease, although with some of the

	questions, the participant would just answer quickly as if he is not really giving much thought to the questions.
P8	The participant was happy, confident and seemed very comfortable with all the questions.
P9	The participant was very comfortable and very forth coming with the information. The participant did seem uncomfortable when talking about the accident as he would mention it but did not give a clear image of what actually happened. It was as if the participant forgot what happened in the accident or is just blocking it out and does not like dwelling much on the specifics of the accident. The participant was offered an appointment with the psychologist but he refused, laughing the matter off.
P10	You could see that the participant is frustrated by the fact that he has not been able to return to work as yet and that he is struggling with being at home and not doing much. His frustration can be observed when he is talking about how he is still off work.
P11	The participant was very relaxed and full of life; the participant does not speak much so he needed prompting for some of the questions in order to provide more details.
P12	The participant was relaxed and answered the questions without any hesitation.
P13	The participant seemed comfortable and answered the questions with ease.
P14	The participant seemed very sincere and very eager to share her experiences.

Although most of the participants seemed comfortable sharing their experiences, the researcher believed participant nine and ten could benefit from psychology treatment after the interview as participant ten seemed to be frustrated with his current limitations physically and participant nine seemed to avoid dwelling into his accident. The services were offered and explained to the participants but they both refused and reported that they do not need psychological support.

In the next chapter the findings from this study will be compared and contrasted with the existing body of evidence related to the study topic.

CHAPTER FIVE

5. DISCUSSION

5.1 DISCUSSION

The findings from this study begin to address the gap in the existing evidence in South Africa about adult patients' perceptions of their recovery from major thoracic trauma. Physiotherapy plays an important role in the rehabilitation of patients following traumatic injury, not only during their in-hospital stay but also after discharge from hospital to ensure that longer-term rehabilitation goals can be successfully achieved to prevent ongoing pain and disability (Van Aswegen et al. 2020). Although many participants perceived themselves to have had a good recovery in physical activity, emotional health, integration back into family life and society, and return to work, some participants were not so positive about their recovery journey.

Physical recovery remains a challenge for some participants following major thoracic trauma. Lack-of-stamina was identified as one reason why some participants felt that their recovery of physical function was not optimal by six months after discharge. They reported that they found it difficult to walk long distances. This was reported by three males in the study who suffered blunt thoracic trauma, with an average age of 35 years. Out of the three male participants who reported that lack of stamina delaying their physical recovery, only one received structured follow up physiotherapy treatment post hospital discharge.
A study by Baker et al. (2022) that focused on patients' experiences after discharge, found that pain, fatigue, and limited physical capacity were common hurdles in the early recovery period. Patients often struggled with managing medications, coping at home, and regaining independence, all of which contributed to reduced stamina (Baker et al., 2022). There is no evidence in the existing literature that shows how the lack of stamina following thoracic trauma could be managed.

This study found that some participants experienced discomfort with activities of daily living like turning in bed, lying on the injured side or after a long day at work six months following hospital discharge. Reyes et al. (2020) reported that individuals suffer from persistent discomfort around the area of injury with certain activities that require excessive movement of the thoracic region as a result of thoracic injury. Healing that takes place following fractured ribs involves an inflammatory stage during which hematomas form, a fibro cartilaginous callus forms, and then bone remodelling occurs, during which mature bone tissue eventually replaces the original soft callus. During and after the healing phase following rib fractures, discomfort with movement and pain can be caused by improper healing [in which the bones do not align properly ("malunion"), or no healing occurred ("nonunion")], damage to the surrounding muscles, irritation of the nerves around the injury site, or the ongoing sensitivity

in the injured area long after the bone has healed, which is frequently made worse by deep breathing or movement (Reyes et al. 2020).

Studies suggest that shortness of breath affects approximately 50% to 70% of individuals following major thoracic injuries, because of the insult to the structures of the thoracic wall, and the accumulation of air, blood or both in the pleural space which compresses the underlying sponge-like lung tissue (Kvale et al. 2018; Nielsen et al. 2019). Patients tend to avoid deep breaths to minimise movement of the thorax in fear of pain. This leads to decreased chest expansion, the use of accessory muscles to breathe which leads to shortness of breath in patients with major thoracic injuries (Kvale et al. 2018; Nielsen et al. 2019). The reported reason or cause of shortness of breath following major thoracic injuries has been the nature and severity of the injuries as well as the presence of pain (Moore et al.2018). Proper management of pain in the initial state of injury can help reduce shortness of breath and promote proper breathing pattern (Moore et al. 2018). A 59-year-old male participant who received post hospital discharge physiotherapy treatment for blunt thoracic injuries, reported that he still experiences some shortness of breath after walking long distances. The pre-injury respiratory function of the participant is unknown; although the participant reported to be a smoker when he was younger, he had stopped smoking years ago. The participant reported that he was in a lot of pain while he was in the hospital but reports that his pain has greatly decreased with follow up physiotherapy post hospital discharge treatment. This poses a question on whether the participant developed abnormal breathing patterns while still in the hospital due to pain, which now contributes to his shortness of breath? With abnormal breathing patterns the primary respiratory muscles are not used correctly and this together with injury to the thoracic region contributes to weakening of the respiratory muscles (Kvale et al. 2018). These muscles play a crucial role in regulating breathing during activities of daily living like walking (Kvale et al. 2018). Kelderman et al. (2024) conducted a retrospective cohort study in Netherlands on patients recovering from blunt thoracic trauma over an 11-year period. The study comprised 185 patients with blunt thoracic trauma who were admitted between 1997 and 2019. The authors reported that 18% of patients still had breathing difficulties. They reported no statistically significant association of smoking or gender to the breathing difficulties reported. The authors concluded that pain is linked to dyspnoea following thoracic trauma (Kelderman et al. 2024). A person's quality of life after suffering major thoracic injury can be significantly impacted by shortness of breath.

Based on the discussion above, it is reasonable to assume that the lack of stamina reported by those participants recovering from blunt thoracic injury could have been influenced by discomfort on the chest wall with movement during activities such as walking for exercise

and feelings of being short of breath caused by abnormal breathing patterns enforced by the injuries sustained and lingering pain.

Another reason why some participants felt that their physical recovery was delayed, was their experience of intermittent pain. Traditionally it is thought that pain and disability from rib or sternal fractures resolve between four to six weeks after injury (Fabricant et al., 2013). This notion is refuted as it is now known that uncontrolled pain early after injury, severity of the initial injury and the presence of nerve pain are important causes of persistent chronic pain in the months after injury (Blichfeldt-Eckhardt et al. 2018). The narrative review by Baker et al. (2018) confirms this finding and Kvale and Lomo (2018) suggest that approximately 40% to 60% of individuals will be affected by chronic pain following major thoracic trauma. Patients who were on pain medication before sustaining injury to the thorax are more likely to not respond well to pain medication, which can lead to the development of chronic pain and lasting negative outcomes in the patients' physical recovery and health-related quality of life (Baker et al.,2018).The perception of intermittent pain and belief that certain activities or movement will bring about pain contributed to a delay in physical recovery that some participants with major thoracic trauma reported in the current study. This study did not evaluate the participants pain levels and how the pain was managed in the acute stage. A study by Fabricant et al. (2013) reported that although the severity of the injury predisposes the patient to the likelihood of developing chronic pain, the severity of injury alone is not a predictor of chronic pain.

Avoiding activities that might cause pain was a third reason identified by some participants for why their physical recovery is delayed. Some of the participants in this study reported on how the perception of pain still limits and hinders them physically. A female participant with penetrating thoracic injuries who received follow up physiotherapy treatment, reported on how the memory of the pain she had during the acute phase of her injuries still plays a role on how she moves and the activities she can do, because although she has no actual pain presently the memory of pain causes fear avoidance. This supports the findings of a study by Nielsen et al. (2019) that reported that individuals who have suffered thoracic trauma experienced significant fear avoidance beliefs, leading to reduced physical activity levels and an increase in disability from six months up to five years following injury. Kvale et al. (2018) reported that fear of movement is one of the common consequences of major thoracic trauma, which can hinder rehabilitation and prolong the recovery journey.

Recovery from thoracic trauma, especially blunt thoracic trauma, is a complex and prolonged process because most patients do not receive specialist trauma follow-up on an international level (Baker et al. 2021) or locally in South Africa (Van Aswegen et al., 2011; Van Aswegen,

2020). Patients reporting poor physical function at six months after injury are more likely to report poor physical function at one year and have greater odds of reporting poor physical function at two years after injury (Baker et al. 2018). Early identification of patients with severe thoracic injuries and the potential of developing chronic pain, together with continued multidisciplinary treatment involving physiotherapy treatment post hospital discharge was suggested by Baker et al. (2018) as key elements to better improve physical recovery levels in survivors of major thoracic trauma. The role of physiotherapy in the treatment of pain in thoracic trauma patients has been studied and proven to be very beneficial in reducing pain and reducing the likelihood of disability as patients recover from injury (Galvagno et al. 2016). More recently, an international expert consensus statement was published about rehabilitation of patients with rib fractures (Battle et al., 2023). These experts recommend that patients who present with limitations in respiratory function or general mobility at the time of hospital discharge, should be provided with physiotherapy follow-up services to address such limitations (Battle et al., 2023). The delay in physical activity recovery that some participants in the current study reported at six months after hospital discharge suggest that they need physiotherapy rehabilitation as proposed by Baker et al. (2018) and Battle et al. (2023).

Cognitive functioning includes the capacity to notice and respond, process and comprehend, decide, and formulate appropriate reactions to the outside world (Morley et al. 2015). Two participants reported impairments related to their ability to remember things even at six months after discharge from hospital. One of the participants that reported a decline in memory was a 38-year-old male who sustained blunt thoracic injury and was admitted in the intensive care unit and intubated and mechanically ventilated. He had the longest hospital stay of six months and two weeks in this study group. According to Kohler et al. (2019), 17-78% of patients with critical illness had cognitive deficits following discharge from the intensive care unit, and the majority had never experienced a cognitive deficiency prior to ICU admission. Cognitive impairment could last for years after discharge. Van der Windt et al. (2018) reported that attention, memory and executive function are the main domains of cognitive function that are affected in patients after thoracic trauma. The neurobiological mechanisms underlying the effects of major thoracic trauma on emotional health and cognitive function are complex and multifaceted (Moore et al. 2018). The release of stress hormones such as cortisol, and the activation of the hypothalamic pituitary adrenal axis play a crucial role in the development of emotional and cognitive disturbance (Moore et al. 2018). Significant neuropsychological deficits can result from critical illness because of traumatic injury. Long-lasting neurocognitive deficits can have significant negative effects on health-related quality of life, return to work prospects, general functioning capacity, and financial outlays (Marasco et al. 2015). Those who report impairments in aspects of cognitive function

months after discharge from hospital may benefit from referral to healthcare professional services such as occupational therapy or psychology.

Many participants in this study experienced some disturbance in their emotional wellbeing following major thoracic trauma. One third of the participants reported a delay in emotional recovery six months' post hospital discharge. The event of an accident followed by injury to one's body and the experience of being in hospital is very traumatic and can lead to post traumatic stress disorders (Marasco et al. 2015). A 35-year-old male participant who received follow up physiotherapy treatment after sustaining blunt thoracic injuries reported that "Recovering physically seems like a walk in the park compared to the battle you need to overcome mentally". Given that the majority of participants were within a working-age demographic, the consequences of thoracic trauma may extend beyond physical symptoms to include significant psychological and socio-economic implications. The loss of functional capacity during a younger or productive stage of life may disrupt career trajectories, financial stability, and sense of identity, all of which are known to affect emotional health (Kim et al., 2017).

Most treatment in the hospital setting is aimed at treating the physical injuries that the patient has and sometimes the emotional impact of the physical injuries is forgotten and little to no attention is paid to the emotional or mental state of the patient. According to Hopkins and Jackson (2006) between 35% and 90% of patients in clinical settings exhibit neurocognitive impairment and emotional distress which many doctors fail to identify or evaluate. This highlights the need for emotional support and treatment that survivors of major thoracic trauma need in hospital and post hospital discharge. There is very limited research present in the South African context about the in-and-out of hospital support and management given to this population group. Although all the participants in this study population were seen by a trauma counsellor at least once prior to their discharge from hospital, as part of standard in-patient care provided at the participating hospital, there is no standard follow up counselling program offered to patients post hospital discharge.

Some participants reported that they still experienced a degree of anxiety relating to their accident. Some of these participants also reported that they still struggle to fall asleep or have recurring dreams and nightmares of their accident and time in the hospital. Consequences of major thoracic trauma include significant emotional distress, such as depression, anxiety and post-traumatic stress disorder (Kvale et al. 2018). Typical signs and symptoms of post-traumatic stress disorder include reliving the event such has having flashbacks and recurring dreams about the event, social isolation, self-harm behaviour, disturbances in sleeping patterns, hypervigilance (like being easily startled), negative feelings

such as being ashamed, sad or being angry (Marasco et al. 2015). All the participants of this study had one or more typical signs of post-traumatic stress disorder though none of them have been clinically diagnosed or treated for post-traumatic stress disorder. A referral for psychology or occupational therapy assessment may be appropriate for those who present with signs of post-traumatic stress disorder that impact on their emotional well-being.

Although most participants had returned to work, only some had resumed their full responsibilities at work. Approximately one third of participants were still on light duty as they were not physically able to cope with their workload; few participants reported that they had not returned to work. Kvale et al. (2018) reported that the rate of return to work after major thoracic trauma is significantly lower compared to other types of injuries. The authors suggested that the severity of the injuries, socio economic background and personality traits were the main reasons for low rate of return to work post major thoracic trauma. Similarly, Prada et al. (2012) reported that personal income, educational attainment, and the presence of one or more confidants, and a sign of a strong social network, were significant predictors of the injured person's employment status after adjusting for the type and severity of the thoracic injury. The extent to which these factors played a role in return to work for this study's participants is not known. More research is needed within the South African context to explore the factors that influence patients' return to work as they recover from major thoracic trauma.

Participation in family and society following major thoracic trauma remains problematic to some participants recovering from their injuries. One third of participants reported that they are more reserved in their interactions with others now after their injury. One participant reported that mentally he cannot keep up with long conversations and big groups. Some of the participants mentioned how their physical activity limitations now restricted their participation with family. An example is participant five who is a 38-year-old male that sustained blunt thoracic injuries reported that he cannot play soccer with his son due to his reduced endurance. Ekegren et al. (2020) looked at adaptation, self-motivation and support services as keys to physical activity participation three to five years after patients sustained major trauma. They reported that given the perceived effects of trauma on their social lives, family roles, and overall health-related quality of life, many participants found limitations in their physical activity to be upsetting and frustrating. Numerous participants found that their social life was closely connected to their physical activity, and that ceasing to participate in physical activity had resulted in feelings of loneliness and isolation (Ekegren et al. 2020). Exploration of patients' perceptions of their recovery after major thoracic trauma was limited to six months after hospital discharge for this study and therefore it is not possible to show whether these participants, who expressed limited ability to interact with their family and to

reintegrate into society, will develop feelings of loneliness and isolation. Baker et al. (2021) reported how some of their participants felt more fearful to do things later in their recovery journey as the reality of their injuries started to kick in and the participants realised how much of an ordeal they have overcome. Although patients understand that recovery takes time, after some months of being patient with themselves, some patients tend to feel discouraged by the prolonged recovery journey (Baker et al. 2021). This should be explored further in future qualitative research projects.

Some participants received structured physiotherapy treatment post hospital discharge. Of these participants, several reported that the post hospital discharge treatment helped them reach their full recovery. This was possible because they felt that the physiotherapy interventions helped “loosen” them allowing them to move more freely. Evidence suggests that auto-assisted or active range-of-motion exercises for the shoulder (such as arm elevation) and trunk should be initiated as soon as possible after injury. These activities are intended to improve the patient's thoracic cage mobility and facilitate deeper breathing, which will enhance lung volume changes during these exercises, and prevent long-term limitations on thoracic wall expansion (Pryor et al. 2008; Van Aswegen, Battle, Hardcastle and Morrow, 2024). Physiotherapy patient management appears to be mostly based on the physiotherapist’s years of experience and clinical reasoning skills, as very little is currently known about the physiotherapy management provided to patients with major chest trauma both in hospital and post hospital discharge (Van Aswegen et al. 2020). A global survey study on the physiotherapy management of patients with major thoracic trauma showed that only 8% of physiotherapists who participated, provided follow-up physiotherapy service to these patients after hospital discharge (Van Aswegen et al., 2020). There is a gap in the South African research space on physiotherapy service provision for patients with thoracic injuries and, although very little research is available on post hospital physiotherapy treatment programs for this population, this study’s findings support the need for continued physiotherapy treatment after hospital discharge for some survivors.

In contrast, some participants did not receive any post hospital discharge physiotherapy as most felt they did not need it but one participant stated that transportation was a problem. None of the participants who received no post discharge physiotherapy were between the ages of 51-65 years, which makes them younger than those who did receive post-discharge physiotherapy treatment. All the participants who did not receive any post hospital discharge treatment were male. The two participants who had penetrating thoracic injuries received post-discharge physiotherapy treatment. The majority of participants that were admitted in the general ward, who were younger than 35 years of age, with a hospital stay of less than

two weeks, did not see the need for follow up physiotherapy treatment post hospital discharge. It is reasonable to conclude that physiotherapy follow-up service may be prioritised for those who are older, have blunt thoracic trauma and a longer hospital stay than two weeks. This recommendation should be tested in future trials.

Major thoracic trauma is a hard experience to recover from, as it affects different aspects of an individuals' life, from its injuries physically, being admitted to a hospital, to the impact that major trauma injuries have on ones' mental health, emotions and cognitive function. The involvement in an accident or a traumatic event reminds the person affected on how precious life is and how one can lose their life in an instant. When the participants of this study took some time to reflect on their recovery journey, the participants used different words to express their gratitude "Thankful, Blessed, Happy, At peace, grateful". This is similar to what was reported by Van Aswegen et al. (2011) where survivors of penetrating thoracic injuries reported that they were glad to be alive after their ordeal. Patients feel a sense of cheating death that brings about a state of mental high (Van Aswegen et al., 2011). Despite many participants expressing relief at being alive, the ensuing limits in physical functioning put their "life on hold" and left them uncertain about when their symptoms would get better (Baker et al. 2021). This study has shown how major thoracic trauma can impact different aspects of an individuals' life, and that the recovery needs of these patients move past their time in hospital. Patients who suffered major thoracic trauma injuries require continued treatment for their physical injuries, pain management, mental and emotional treatment after hospital discharge.

Specialist trauma follow-up can make a significant difference in a patient's recovery journey after major thoracic trauma.

- **Early identification of complications**: Regular follow-up allows clinicians to identify issues like chronic pain, respiratory dysfunction, or psychological distress before they worsen (Wake, Ranse and Marshall, 2022).
- **Tailored rehabilitation**: Follow-up care helps design individualized rehabilitation plans, improving functional outcomes. Functional independence has a positive impact on quality of life (Wake, Ranse and Marshall, 2022).
- **Improved quality of life**: Patients who received structured follow-up showed better long-term outcomes in mobility, self-care, and emotional well-being (Wake, Ranse and Marshall, 2022).
- **Continuity of care**: Specialist follow-up bridges the gap between hospital discharge and full recovery, ensuring that patients don't fall through the cracks, especially those with complex injuries or comorbidities (Wake, Ranse and Marshall, 2022).

In short, it's not just about healing the body, it's about restoring the person.

5.2 Strengths and Limitations to Study

This qualitative study included 14 participants from diverse backgrounds, levels of education and geographical areas, and differing injury severities. The diversity in background and geographical location of participants and type of thoracic injury sustained are strengths in this study allowing a greater understanding of the complexities of participants' recovery journeys. Participants in this study were treated in a level one private trauma hospital by a group of physiotherapists with experience in the treatment of patients with multiple traumatic injuries. This poses a limitation to the study as the treatment received by the participants of this study in and out of hospital might be slightly different to what a patient with thoracic injuries might get in a state hospital that is not specialised in the treatment of patients with thoracic trauma. This study has highlighted several important challenges that patients have to overcome during their recovery after major thoracic trauma injuries and remains one of only a small number of qualitative studies that have been done in South Africa exploring the experiences of recovery in this population. Participants were interviewed after six months; this could impact on their recollection of events. Within the analysis of this data, the assumption has been made that the participant recall are true events as they occurred. The recordings were listened to and transcribed, the transcribed interview was sent back to the participant to make sure the context of the interview was carried accurately. When reporting on the results of the interviews direct quotes were used to keep the essence of the interview and to reduce interviewer bias. Some potential participants who were identified initially for the study, were unreachable during the interview process due to network issues, incorrect contact details being filled in while patients were in the hospital. Another limitation to the study is self-selection bias, which occurs when individuals decide to participate based on personal traits, making the sample not a true representative of the wider study population.

The following chapter will conclude the research study.

CHAPTER SIX

6. CONCLUSION

6.1 CONCLUSION

This chapter summarizes the main findings of this research study in respect to the research question and aims and shares how it adds value and contributes to the limited existing knowledge about the recovery of patients with major thoracic trauma who were discharged from a private healthcare level 1 trauma center in Johannesburg. The chapter will also suggest recommendations for clinical practice and recommendations for future research.

The study aimed to gain insight about the perceptions of adult patients with major thoracic trauma on their recovery six months after injury. Some participants recovering from major thoracic trauma shared that they experienced a delay in their physical functioning, which was influenced by decreased stamina, pain with movement when doing certain activities, and that the memory of pain hindered their physical movement.

All the participants reported some disturbance in their emotional wellbeing during different phases in their recovery journey. Although some participants had recovered from the emotional distress caused by their injuries, some still struggled with parts of their emotional wellbeing. All the participants had one or more signs of emotional distress such as disturbances in sleeping patterns, withdrawals from participating with family and friends, feelings of frustration to one's new limitations in physical functioning, recurring dreams about the accident and the time in hospital.

Some participants reported impairments in their cognitive function and memory six months after hospital discharge. They reported that they lack the sharpness in their memory and cognitive function they used to have before injury and that they tend to be more forgetful. Findings from this study suggest that although some patients are able to return to work following major thoracic trauma, majority of the patients do not return to their full workload six months' post hospital discharge. Participants recovering from major thoracic injury might experience some limitations in participation with family and within society due to a delay in their physical or emotional recovery. Participants who received structured physiotherapy treatment after hospital discharge perceived it as beneficial to their full recovery from injury. The participants of this study used different words to express their gratitude for having survived a great ordeal, and reflecting on their recovery journey allowed participants to better

appreciate the progress they have made. Survivors of major thoracic trauma injuries feel like they have cheated death and have been given another chance at life.

The study has provided some insight on the recovery journey of patients with major thoracic trauma, six months after the event, from the patients' perspective. Patients who suffered major thoracic injuries may present with decreased physical functioning, lingering pain, and disturbance in their emotional and mental functioning beyond the expected recovery time. Reintegration into family life and society and return to work is prolonged for some even at six months after major thoracic injury.

6.2 RECOMMENDATIONS

6.2.1 Recommendations for Research

Researchers are encouraged to:

- Extend the scope of this study by exploring the perceptions of survivors of major thoracic trauma who were managed in a public healthcare setting, on their recovery several months following hospital discharge. A mixed methods study design could be used to assess health-related quality of life alongside patients' perceptions of their recovery to portray a more holistic picture of the rehabilitation needs of this patient population.
- Explore the perceptions of survivors of major thoracic trauma about their recovery journey at one to two years after hospital discharge.
- Explore the psychological needs of patients who suffered major thoracic injuries and the factors that hinder their ability to reintegrate into society and return to full employment before six months after hospital discharge.
- Develop a screening tool to identify adults with major thoracic trauma who are at risk of experiencing delayed recovery in the six months after major thoracic injury.
- Investigate the impact of a formalised post-discharge physiotherapy rehabilitation programme on patients' ability to recover from injury.

6.2.2 Recommendations for Clinical Practice

- Results from this study show that the burden of thoracic injury lasts beyond six months for some participants. Physiotherapy clinicians should consider providing a post-discharge screening service that includes assessment of patients' pattern of breathing and respiratory muscle strength and lingering pain with movement. This should help identify those patients who could benefit from rehabilitation focused on breathing retraining and respiratory muscle strength training to overcome feelings of fatigue and lack of stamina in their everyday lives. Such a screening service could assist with identification of patients at risk of developing chronic pain following thoracic trauma and the provision of appropriate rehabilitation to reduce this risk.

- A screening service at six months after hospital discharge could assist with identification of patients with symptoms of post-traumatic stress disorder and facilitate referral of these patients to healthcare professionals equipped to manage this condition.
- Holistic care: Interprofessional teams bring together expertise from surgery, nursing, physiotherapy, and mental health. Even when formal psychological services are limited, this collaborative approach helps identify emotional distress early and integrate basic psychosocial support into routine care.
- Improved communication and coordination: Studies show that poor communication is a major contributor to medical errors in trauma settings. Interprofessional teamwork enhances shared decision-making and ensures that no aspect of a patient's recovery, physical or emotional, is overlooked.
- Lastly, patient education on their injuries and the expected recovery journey ahead of them is essential in equipping them for the reality associated with their recovery journey.

In conclusion, major thoracic trauma is a type of injury often seen in patients admitted to the trauma ICU and wards of Netcare Alberton hospital. Younger adults who did not require admission to ICU reported that they did not feel the need to attend physiotherapy after hospital discharge and that they recovered well in the six months after discharge. Older adults who were managed in ICU and subsequently had a longer hospital stay, reported that physiotherapy after hospital discharge was very beneficial to their recovery journey. Some participants reported intermittent pain as well as sensitivity over the fractured areas at six months which led to discomfort and shortness of breath and impacted on their ability to endure physical activity. Physiotherapists are well-placed as members of the trauma healthcare team to assist patients who experience limitations in their physical recovery with appropriate management in the longer term after hospital discharge. They should also be advocates for their patients by referring them to other healthcare professionals such as pain specialists, psychologists, social workers, and occupational therapists, as needed, to address lingering limitations that hinder optimal recovery from major thoracic injury.

REFERENCES

Ahmad AM. (2018) Essentials of Physiotherapy after Thoracic Surgery: What Physiotherapists Need to Know. A Narrative Review. *The Korean Journal of Thoracic and Cardiovascular Surgery*, 51(5):293-307. doi: 10.5090/kjtcs.2018.51.5.293. Epub 2018 Oct 5. PMID: 30402388; PMCID: PMC6200172.

Baker, E., Xyrichis, A., Norton, C., et al. (2021) Challenges associated with recovery from blunt thoracic injuries from hospital admission to six months after discharge A qualitative interview study. *Elsevier,*101045

Baker, E., Xyrichis, A., Norton, C., Hopkins, P., and Lee, G. (2018) The long-term outcomes and health-related quality of life of patients following blunt thoracic injury: A narrative literature review. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 26(1):67

Baker, E., Xyrichis, A., Norton, C., Hopkins, P., & Lee, G. (2022). The processes of hospital discharge and recovery after blunt thoracic injuries: The patient's perspective. *Nursing Open, 9*(3), 1832–1843.

Battle C, Pelo C, Hsu J, Driscoll T, Whitbeck S, White T, Webb M., (2023) Expert consensus guidance on respiratory physiotherapy and rehabilitation of patients with rib fractures: An international, multidisciplinary e-Delphi study. *Journal of Trauma and Acute Care Surgery,* 94(4):578-583

Blichfeldt-Eckhardt, M.R. Andersen C, Ørding H, Licht PB, Toft P. (2018) 'From acute to chronic pain after thoracic surgery: the significance of different components of the acute pain response'. *Journal of Pain Research*, 11:1541-1548. doi: 10.2147/JPR.S161303

Birrer, D., Edu, S., Nicol, A., Neuhaus, V. (2020) 'Penetrating chest trauma'. *Journal of Visualized Surgery*, 6: 2221-2965

Butler, D. S., Moseley, G. L., and Jones, M. A. (2017) The effects of illness on cognitive function and return to work. *Journal of Pain Research*, 10:1275-1285

Blythe, R., Parsons, R., Barnett, A.G., Cook, D., McPhail, S.M. & White, N.M., 2024. *Prioritising deteriorating patients using time-to-event analysis: prediction model development and internal–external validation*. *Critical Care*, 28(1), Article 112.

Caragounis, E.C., Fagevik Olsén, M., Pazooki, D., Granhed, H. (2016) Surgical treatment of multiple rib fractures and flail chest in trauma: a one-year follow-up study. *World Journal of Emergency Surgery*, 14:11:27. doi: 10.1186/s13017-016-0085-2. PMID: 27307787; PMCID: PMC4908779

Claydon, J., Maniatopoulos, G., Robinson, L., et al. (2018) Challenges experienced during rehabilitation after traumatic multiple rib fractures: a qualitative study. *Disability Rehabilitation*, 40(23): 2780-2789

Curtis, K., Asha, S. E., Unsworth, A., Lam, M., Goldsmith H., Langcake M., et al. (2016) ChIP: an early activation protocol for isolated blunt chest injury improves outcomes, a retrospective cohort study. *Australasian Emergency Nursing Journal*, 19(3):127-132. 10.1016/j.aenj.2016.06.002 [DOI] [PubMed] [Google Scholar]

Dippenaar, E., and Wallis, L. (2019). Pre-hospital intercostal chest drains in South Africa: A modified Delphi study. *African Journal of Emergency Medicine*, 9(2):91–95.

Dogrul, B. N., Kiliccalan, I., Asci, E. S., Peker, S.C. (2020) Blunt trauma related chest wall and pulmonary injuries: an overview. *Chin J Traumatol*, 23(3):125-138

Edgecombe, L., Sigmon, D. F., Galuska, M. A., Angus, L. D. Thoracic Trauma. 2023 May 23. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 30521264

Fabricant, L., Ham, B., Mullins, R., Mayberry, J. (2013) Prolonged pain and disability are common after rib fractures. *The American Journal of Surgery,* 205(5):511-516

Galvagno, S. M. Jr., Smith, C. E., Varon, A. J., Hasenboehler, E. A., Sultan, S., Fox, A. D., Alley, D. E.R., Ditillo, M, Joseph, B. A., Robinson, B. R. H, Haut, E. R. (2016) Pain management for blunt thoracic trauma: A joint practice management guideline from the Eastern Association for the Surgery of Trauma and Trauma Anaesthesiology Society. *Journal of Trauma and Acute Care Surgery*, 81(5):936-951 | DOI: 10.1097/TA.0000000000001209

Gosselink, R., Bott, J., Johnson, M., et al. (2008) Physiotherapy for adult patients with critical illness: recommendations of the European Respiratory Society and European Society of Intensive Care Medicine Task Force on Physiotherapy for Critically Ill Patients. *Intensive Care Medicine,* 34:1188–99.

Hashmi, M.F., Modi, P., Basit, H. & Sharma, S., 2023. Dyspnea. In: StatPearls. [online] Treasure Island (FL): StatPearls Publishing.

Hough, C.L., Herridge, M.S. (2012) Long term outcome after acute lung injury. *Current Opinion in Critical Care,* 18:815.

Kahloul, M., Kacem, I., Mehcli Sboui, M., et al. (2020) Chronic pain following chest trauma: prevalence, associated factors, and psychosocial impact*. Hindawi Pain Research and Management*,

Kaneda, H., Saito, Y., Okamoto, M., Maniwa, T., Minami, K., Imamura, H. (2007) Early postoperative mobilization with walking at 4 hours after lobectomy in lung cancer patients. *General Thoracic and Cardiovascular Surgery*, 55(12):493-8. doi: 10.1007/s11748-007-0169-8. Epub 2007 Dec 11. PMID: 18066640.

Kim, D., Shin, H.J., Kim, S.W., Hong, J.M., Lee, K.S. and Lee, S.H., 2017. *Psychological problems of pneumothorax according to resilience, stress, and post-traumatic stress*. Psychiatry Investigation, 14(6), pp.795–800.

Kim, M., and Moore, J. E. (2020). Chest trauma: current recommendations for rib fractures, pneumothorax, and other injuries. *Current Anaesthesiology Reports*, 10(1):61–68

Kuo, K., Kim, A.M. Rib Fracture. (2023). In: Stat Pearls. Treasure Island: https://www.ncbi.nlm.nih.gov/books/NBK541020/

Kohler, J. Borchers, F.Endres, M. et al. (2019). Cognitive deficits following intensive care. *DEUTSCHES ÄRZTEBLATT INTERNATIONAL* 116: 627-34.

Kourouche, S., Buckley, T., Munroe, B. and Curtis, K. (2018) Development of a blunt chest injury care bundle: an integrative review. *Injury*, 49(6):1008–1023. 10.1016/j.injury.2018.03.037 [DOI] [PubMed] [Google Scholar]8;2020:1030463

Legare, C. & Sawatzky, J.V., 2010. *Identifying the key predictors for retention in critical care nurses*. *Journal of Advanced Nursing*, 71(10), pp.2315–2325.

Lovisari, F., Favorato, M., Giovannini, I., et al. (2020) chest wall pain management after chest wall trauma. *Journal of Visualized Surgery*, 6(0):1-9.

Marasco, S., Lee, G., Summerhayes, R., Fitzgerald, M., Bailey, M. (2015) Quality of life after major trauma with multiple rib fractures. *Injury*, 46(1):61-5. doi: 10.1016/j.injury.2014.06.014. Epub 2014 Jun 21. PMID: 25069400.

May, L., Hillermann, C., Patil, S. (2016) Rib fracture management. *British Journal of Anaesthesia Education*, 16(1):26-32, https://doi.org/10.1093/bjaceaccp/mkv011

Merriam-Webster. (2024) Trauma. In *Merriam-Webster.com dictionary*. Retrieved September, 2024, from https://www.merriam-webster.com/dictionary/trauma

Kahloul M, Kacem I, Sboui MM, El Maalel O, Daami H, Hafsia M, Limam M, Aissa S, Ben Kbaier I, Mrizak N, Chaouch A, Naija W. (2020) Chronic pain following chest trauma: prevalence, associated factors, and psychosocial impact. *Pain Research and Management*, 28;2020:1030463

Mühling, B. (2017) Blunt and penetrating thoracic trauma. *Chirurg*, 88:807-816.

Mukherjee, H. & Bhonge, P., 2025. Assessing skew normality in marks distribution: a comparative analysis of Shapiro–Wilk tests. arXiv preprint arXiv:2501.14845.

Oosthuizen, G. V., De Wet, J., Bruce, J. L., and Clarke, D. L. (2017) Rib fracture fixation in a South African public trauma service. *South African Journal of Surgery*, *55*(4):4-8.

Orwelius, L., Nordlund, A., Nordlund, P., Simonsson, E., Backman, C., Samuelsson, A., Sjoberg, F. (2010) Preexisting disease: the most important factor for health-related quality of life long-term after critical illness: a prospective, longitudinal, multicentre trial. *Critical Care*, 14:R67.

Pandharipande, T., Girard, J., Jackson, A., et al. (2013) Long-Term Cognitive Impairment after critical illness. *National Institute of Health*, 369(14): 1306-16

Pickering, R.M., 2017. Describing the participants in a study. Age and Ageing, 46(4), pp.576–581.

Prada, S. I., Salkever, D., and MacKenzie, E. J. (2012) Level-I trauma center effects on return-to-work outcomes. *Evaluation Review*, 36(2):133-164. https://doi.org/10.1177/0193841X12442674

Reyes, P., Puelle, F., Barría, R. (2020) Perception of the quality of physiotherapy care provided to outpatients from primary health care in Chile.' *Evaluation & the Health Professions,* 43(1):16-22

Reed, R. N., Schurr, M.J. (2020) Acute pain in the trauma patient. *Current Trauma Reports*, 6:147-153 https://doi.org/10.1007/s40719-020-00198-3

Schneiderman, J., Van Aswegen, H., Becker, P., (2013) Health related quality of life of survivors of trauma six months after discharge. *South African Journal of Physiotherapy*, 69(1): 245

Shelat, V. G., Eileen, S., John, L., Teo, L. T., Vijayan, A., & Chiu, M. T. (2012). *Chronic pain and its impact on quality of life following a traumatic rib fracture*. *European Journal of Trauma and Emergency Surgery*, 38(4), 451–455.

Tadyanemhandu C, van Aswegen H, Ntsiea V. (2021) Organizational structures and early mobilization practices in South African public sector intensive care units: a cross-sectional study. J *Journal of Evaluation in Clinical Practice,* 27(1):42-52. doi: 10.1111/jep.13378. Epub 2020 Mar 6. PMID: 32141685; PMCID: PMC7483254.

Tøien, K., Skogstad, L., Ekeberg, Ø., Myhren, H. & Schou Bredal, I., 2012. *Prevalence and predictors of return to work in hospitalised trauma patients during the first year after discharge: A prospective cohort study*. *Injury*, 43(9), pp.1606–1613.

Treede, R., Rief, W., Barke, A.,et al. (2015) A Classification of chronic pain for ICD 11. *Pain*, 156: 1003-1007

Ulvik, A., Kvale, R., Wentzel-Larsen, T., Flaatten, H. (2008) Quality of life 27 years after major trauma. Acta Anaesthesiologica Scandinavica, 52:195201

Unsworth, A., Curtis, K. and Asha, S.E. (2015) Treatments for blunt chest trauma and their impact on patient outcomes and health service delivery. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 23(17):10. 1186/s13049-015-0091-5 [DOI] [PMC free article] [PubMed] [Google Scholar]

Utter, H., and Mc Fadden, R. (2020) Rib fractures, the evidence supporting their management, and adherence to that evidence base. *THE Journal of the American Medical Association*, 3(3):201591

Van Aswegen, H. (2020) Physiotherapy Management of patients with trunk trauma: a state-of-the-art review. *The South Africa Journal of physiotherapy*, 76(1):1406

Van Aswegen, H., Myezwa, H., Mudzi, W., et al. (2011). Health-related quality of life of survivors of penetrating trunk trauma in Johannesburg, South Africa. *European Journal of Trauma and Emergency Surgery*, 37:419-426

Van Aswegen, H., Richards, G. A., Goosen, J., et al. (2010) The effect of penetrating trunk trauma and mechanical ventilation on the recovery of adult survivors after hospital discharge. *Southern African Journal of Critical Care*, 26(1): 25-35

Van Aswegen, H., Battle, C., Hardcastle, T. C., and Morrow B.M. (2024) Cardiopulmonary Physiotherapy in Trauma. In: Cardiopulmonary Physiotherapy in Trauma 241-315

Van Aswegen, H., Reeve, J., Beach, L., Parker, R., Olsèn, M.F. (2020) Physiotherapy management of patients with major chest trauma: Results from a global survey. *Trauma*, 22(2):133-141. doi:10.1177/1460408619850918

Wake, E., Ranse, J., & Marshall, A.P., 2022. *Scoping review of the literature to ascertain how follow-up care is provided to major trauma patients post discharge from acute care*. BMJ Open, 12(9), e060902.

Weinberg, B., Roos, R., Van Aswegen, H. (2018) Effectiveness of non-pharmacological interventions for pain and physical function in adults with rib fractures: a systematic review protocol. *Joanna Briggs Institute Database of Systematic Reviews & Implementation Reports,* 16(8):1599-1605. doi: 10.11124/JBISRIR-2017-003600. PMID: 30113543.

World Health Organization (WHO). (2018) Constitution of the World Health Organization. Geneva: World Health Organization. https://www.who.int/tools/whoqol

APPENDIX 1

- **ENGLISH QUESTIONNAIRE**

1. How do you feel about your physical activity levels as you are recovering from your chest trauma injury?

1.1. Are you scared to perform some physical activities?

1.2. Any chest pain with physical activity at this stage?

1.3. Any shortness of breath with physical activity at this stage (just check if they have any chronic respiratory disease/cardiac disease that could also cause SOB)?

1.4. Do you have any Discomfort when doing trunk movements during ADLs or on the job?

2. How do you feel about your emotional wellbeing as you are recovering from your chest trauma?
   a) Any feelings of anxiety at this stage for unexplained reasons?
   b) Any differences noted in your sleeping patterns compared to before the injury?
   c) Any recurring dreams/nightmares about your time in the hospital or the weeks following discharge home? Do you still get these nightmares/dreams?

3. Do you experience any problems with your memory and decision making since you suffered from chest trauma?

4. Do you feel you are able to participate in your family and society like you used to do before you were injured?

5. Have you been able to return to work after your injury?

5.1. Are you able to perform all your work responsibilities?

6. Did you receive any physiotherapy treatment after being discharged from the hospital?

6.1. Did the physiotherapy treatment that you received after hospital discharge influence your recovery?

7. Is there anything else you would like to tell me about your recovery journey?

8. reflect for a moment on your whole journey (since discharge from hospital up to this point of interview) and tell me what is your most prominent emotion that you feel?

APPENDIX 2

- **ZULU QUESTIONNAIRE**

1. Uzizwa kanjani ngamaleveli akho okusebenza ngokomzimba njengoba ululama ekulimaleni kokulimala kwesifuba?

1.1. Ingabe uyesaba ukwenza imisebenzi ethile yomzimba?

1.2. Bukhona ubuhlungu besifuba obuhambisana nokusebenza ngokomzimba kulesi sigaba?

1.3. Noma yikuphi ukuphelelwa umoya ngokusebenza ngokomzimba kulesi sigaba (vele uhlole ukuthi banaso yini isifo sokuphefumula esingapheli/isifo senhliziyo esingase sibangele iSOB)?

1.4. Ingabe Unakho Ukungakhululeki lapho wenza ukunyakaza kwe-trunk ngesikhathi sama-ADL noma emsebenzini?

2. Uzizwa kanjani ngempilo yakho engokomzwelo njengoba ululama ekulimaleni kwesifuba sakho?
   a) Noma yimiphi imizwa yokukhathazeka kulesi sigaba ngezizathu ezingachazwanga?
   b) Noma yimuphi umehluko ophawulwe emaphethini akho okulala uma kuqhathaniswa nangaphambi kokulimala?
   c) Yimaphi amaphupho/amaphupho amabi aqhubekayo mayelana nesikhathi sakho esibhedlela noma emasontweni alandela ukukhishwa ekhaya? Usawathola lawa maphupho/amaphupho amabi?

3. Ingabe uhlangabezana nezinkinga ngenkumbulo yakho nokwenza izinqumo njengoba uhlaselwe yisifuba?

4. Ingabe unomuzwa wokuthi ungakwazi ukubamba iqhaza emndenini wakho nasemphakathini njengoba wawujwayele ukwenza ngaphambi kokulimala?

5. Ingabe ukwazile ukubuyela emsebenzini ngemva kokulimala?

5.1 Ingabe uyakwazi ukwenza yonke imithwalo yemfanelo yakho?

6. Ingabe uthola noma yikuphi ukwelashwa kwe-physiotherapy ngemva kokuphuma esibhedlela?

6.1 Ingabe ukwelashwa kwe-physiotherapy okuthole ngemva kokukhishwa esibhedlela kwaba nomthelela ekululameni kwakho?

7. Ingabe kukhona okunye ongathanda ukungitshela kona mayelana nohambo lwakho lokululama?

8. zindla isikhashana kulo lonke uhambo lwakho (kusukela uphuma esibhedlela kuze kube kuleli qophelo lenhlolokhono) bese ungitshela ukuthi yimuphi umzwelo wakho ogqame kakhulu owuzwayo?

APPENDIX 3

- **SOUTHERN SOTHO QUESTIONNAIRE**

1. U ikutloa joang ka maemo a hau a ho ikoetlisa ha u ntse u hlaphoheloa ho tsoa kotsi ea sefuba sa hau?

1.1. A na u tšaba ho etsa lintho tse itseng tsa 'mele?

1.2. Na ho na le bohloko ba sefubeng ka ho ikoetlisa ka nako ee?

1.3. Ho phefumoloha hofe ka ho ikoetlisa ka nako ena (sheba feela hore na ba na le lefu le sa foleng la ho hema / lefu la pelo le ka bakang SOB)?

1.4. Na u na le Mathata leha e le afe ha u etsa metsamao ea kutu nakong ea ADL kapa mosebetsing?

2 U ikutloa joang ka boiketlo ba hau ba maikutlo ha u ntse u hlaphoheloa bohlokong ba sefuba?

a) Ho na le maikutlo a ho tšoenyeha ka nako ee ka mabaka a sa hlalosoang?
b) Ho na le liphapang life tse boletsoeng mekhoeng ea hau ea ho robala ha e bapisoa le pele ho kotsi?
c) Ho na le litoro tse etsahalang khafetsa / litoro tse tšosang mabapi le nako ea hau sepetlele kapa libekeng tse latelang ho tsoa lapeng? A na u ntse u fumana litoro tsee tse tšosang?

3. Na u na le mathata leha e le afe ka mohopolo oa hau le ho etsa liqeto ho tloha ha u tšoeroe ke lefu la sefuba?

4. Na u ikutloa u ka khona ho kenya letsoho lelapeng la hau le sechabeng joalo ka ha u ne u etsa pele u lemala?

5. Na u khonne ho khutlela mosebetsing ka mor'a ho tsoa kotsi?

5.1. A na u khona ho phetha mesebetsi eohle ea hau?

6. Na u fumane phekolo ea physiotherapy ka mor'a ho tsoa sepetlele?

6.1. Na phekolo ea physiotherapy eo u e fumaneng ka mor'a ho tsoa sepetlele e ile ea susumetsa hore u fole?

7. Na ho na le ntho e 'ngoe eo u ka ratang ho mpolella eona ka leeto la hau la ho hlaphoheloa?

8. nahanisisa ka motsotsoana leetong lohle la hau (ho tloha ha u tsoa sepetlele ho fihlela nakong ena ea lipuisano) 'me u mpolelle hore na maikutlo a hau a hlahelletseng ao u a utloang ke afe?

APPENDIX 4

- **TRREE COURSE ON INTRODUCTION TO RESEARCH ETHICS CERTIFICATE**



TRREE

Zertifikat
Certificat
Certificado
Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that

Clinical Trials Centre
The University of Hong Kong

Precious Mnisi

a complété avec succès - has successfully completed

Introduction to Research Ethics

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Release Date: 2022/03/26
CID : mORnSLHc61

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator

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[REV : 20220217]

APPENDIX 5

- **RESEARCH ETHICS COMMITTEE CERTIFICATE**

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Ms PS Mnisi

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M220934

NAME: (Principal Investigator)	Ms PS Mnisi
DEPARTMENT:	School of Therapeutic Sciences Department of Physiotherapy Medical School University
PROJECT TITLE:	*Perceptions of patients with major thoracic trauma on their recovery after injury: a qualitative study*
DATE CONSIDERED:	2022/09/30
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:	2022/11/21

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 **September** and therefore reports and re-certification will be due in the month of **September** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator

Date 23 | 11 | 22

APPENDIX 6

- **PERMISSION LETTER FROM PRACTICE OWNER OF PLANI, LAIDLER, FLEISHMAN, SKLAAR AND ASSOCIATES PHYSIOTHERAPY**

Plani, Laidler, Fleishman, Sklaar and Associates
Physiotherapists
Practice number 7205147

Oakdene,
17 Orpen Road
Tel: 011 435 6177/0969
Fax: 011 436 2010
Cell: 079 602 2874

Alberton,
56 Clinton Rd, New Redruth
Tel: 011 907 3647
Fax: 011 869 1512
Cell: 082 448 6673

Mulbarton Med. Centre
25 True North Road
Tel: 011 432 3470
Fax: 011 682 2702
Cell: 082 903 2239

Lambton
122 Webber Road
Tel: 011 824 1666
Fax: 086 606 1518

Edenglen
Medical Centre
Karaglen Mall
Baker Rd
Tel: 011 609 7593
Cell: 064 504 2636

Bedfordview
Unit 2, Boeing Rd East
Therapy Centre
95 Boeing Rd East
Tel: 011 454 0232

Postal Address
P O Box 6295
Meyersdal
1447

Email sklaar@medi.co.za
Website www.physiotherapySA.co.za

Permission to access patient data base

Perceptions of patients with major thoracic trauma on their recovery after injury: a qualitative study.

I Natasch Plani, owner of Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice, give Precious Mnisi permission to access and contact our patients for the sole purpose of the above mentioned study.

Signature: 

Date: 31 / 08 / 2022

Barry Laidler
B.Sc. Physio (Wits)
M.Sc Physio (Wits)
Sport Science (UCT)
M. Sc. Mindfulness (Aberdeen)

Natascha Plani
B. Phys T (Pta)
M.Sc Physio (Wits)

Caren Fleishman
B.Sc Physio (Wits)
M.Sc. Physio (Wits)

Heather Talbot
B.Sc. Physio (Wits)
M.Sc. Physio (Wits)

Renee de Smedt
B.Sc. Physio (Wits)

Cikizwa Mafanya
B.Sc. Physio (UWC)
M.Sc.Physio (UWC)

Wendy Labuschagne
B. Sc. Physio (Wits)

Hannes Van Aartsen
B.Sc. Physio (Wits)
M.Sc.Physio (Cardiopulmonary) (Wits)

Francesca Bharath
B. Physio (UKZN)

Samson Hlongwane
B.Sc Physio (MEDUNSA)

APPENDIX 7

- **CONSENT FOR PARTICIPATION AND FOR AUDIO RECORDING OF THE INTERVIEW**

Consent form

Perceptions of patients with major thoracic trauma on their recovery after injury: a qualitative study

Consent for participation

I give consent to participate to the above mentioned study. The purpose of the study has been explained to me to my satisfaction .I am fully aware that participation in the study is completely voluntary and I can choose to exist this study at any point without facing any repercussions. My identity will be kept anonymous and any information given to the study will only be used for academic purposes.

Name and Surname_____ Date__/__/__ Signature_____

Consent for audio or video recording

I give consent for audio or video recording of me to be taken during my interview for the above mentioned study .The audio or video will only be used for academic purposes and will be kept safe by the researcher .

Name and Surname_____ Date__/__/__ Signature_____

There is a risk that the interview questions might evoke emotional distress due to the trauma that you might have experienced during your recovery. There is a psychologist who will be available to counsel you should participating in this study cause any emotional distress. Her contact details are as follows, Anne Rademeyer counselling psychologist, tel: 0118673534, email address: anner862@gmail.com .

APPENDIX 8

- **INFORMATION SHEET**

INFORMATION SHEET

1. Gender : male ☐ female ☐

2. Age : _____

3. Did you receive any physiotherapy treatment after being discharged from the hospital?
   Yes ☐ No ☐

4. While you were admitted in hospital, were you treated in ICU?
   Yes ☐ No ☐

5.When were you discharged from the hospital?

APPENDIX 9

- **FULL INTERVIEW SCHEDULE**

FULL INTERVIEW SCHEDULE

- `Introduction: the researcher will introduce herself and give the participant the opportunity to also introduce themselves.

- The purpose of the interview and the study will be explained to the participant

- The participants will be given an opportunity to ask questions if they do not understand or need more clarity on the purpose of the interview and the study

- Once the participant is satisfied with the given information and happy to continue with the interview, the interview questionnaire will then be administered.

- After all the questions on the questionnaire have been answered, the participant will be given an opportunity to add any other comments they have about their recovery journey

- The researcher will then thank the participant and end the interview

APPENDIX 10

- **STUDY INFORMATION SHEET**

STUDY INFORMATION SHEET

Perceptions of patients with major thoracic trauma on their recovery after injury: a qualitative study

I would like to invite you to take part in a research study. Before you decide you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or if you would like more information. Take time to decide whether or not to take part*.*

WHO I AM AND WHAT THIS STUDY IS ABOUT:

My name is Precious Mnisi. I am a physiotherapist working at the Netcare Alberton hospital. I am doing this study as part of my Master's degree at the University of the Witwatersrand. The study aims to gain insight on how patients who survived chest trauma perceived their recovery journey after the injury up to six months of being discharged from the hospital. The study will be looking at the following aspects of the recovery journey: physical function, mental health status, cognitive function, reintegration into family and society and the ability to return to work.

WHAT WILL TAKING PART INVOLVE?

The study will be conducted online using Whatsapp video call or a video call via Microsoft Teams. You will be asked to answer a few questions that address your perceptions of your recovery journey from chest trauma. The interview will be recorded, and I will keep notes for the purpose of this study during the interview. Thirty minutes will be allocated for your interview.

WHY HAVE YOU BEEN INVITED TO TAKE PART?

You have been selected to take part in this study because you meet the study inclusion criteria. The study inclusion criterion is as follow:

- Male and female patients who are 18 years and older who suffered major chest trauma for the first time.
- Chest trauma patients who were discharged from Netcare Alberton hospital six months ago without any physiotherapy intervention post discharge.

Patients who completed the current post-discharge physiotherapy research project at Plani, Laidler, Fleishman, Sklaar and Associates physiotherapy practice rooms in Alberton.

DO YOU HAVE TO TAKE PART?

Participation in the study is completely voluntary and you do have the right to refuse participation, refuse any question and withdraw at any time without any consequence whatsoever*.*

WHAT ARE THE POSSIBLE RISKS AND BENEFITS OF TAKING PART?

There are no risks or harm that you will be subjected to by taking part in this research project. The benefits in taking part in this research project are to shed some light and information into a subject that has not been explored a lot. Providing research information that might shape and better how chest trauma patients are managed by physiotherapists post hospital discharge is important. Your

participation will provide research information to us about the recovery journey of patients after chest trauma injury.

WILL TAKING PART BE CONFIDENTIAL?

Confidentiality will be kept in the study by giving each participant a coded name when analysing and reporting the data. Non-anonymised data in the form of signed consent forms and audio/video recordings will be collected and retained as part of the research process but will not be publicly shared***.***

HOW WILL THE INFORMATION YOU PROVIDE BE STORED AND PROTECTED?

This information will be kept safe in a password protected folder on the researchers' computer. Information will only be used for the purpose intended for this study. Raw data will be stored according to University of the Witwatersrand policy (six years for unpublished data and two years for published data). Under freedom of information legalisation you are entitled to access the information you have provided to me at any time.

WHAT WILL HAPPEN TO THE RESULTS OF THE STUDY?

The results of this study will be submitted in the form of an anonymised and summarised research dissertation to the University of the Witwatersrand for the purpose of my master's degree. The results will also be presented at future Physiotherapy conferences and written up into a manuscript format for publication in a Physiotherapy journal.

WHO SHOULD YOU CONTACT FOR FURTHER INFORMATION ABOUT THIS STUDY?

Precious Mnisi (researcher) 0605540336

WHO SHOULD YOU CONTACT IF YOU WANT TO REPORT ANYTHING ABOUT THIS STUDY?

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg. A principal function of this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research. If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za

Thank you for reading this Study Information Sheet.

APPENDIX 11

- **DISTRESS PROTOCOL COUNSELLING PSYCHOLOGIST LETTER**

Distress Protocol Counselling Psychologist letter

Project Title: *Perceptions of patients with major thoracic trauma on their recovery after injury: a qualitative study*

It has been identified that the above-mentioned study can provoke or induce distress. Provision has been made for patients who may need counselling as a result of the study.

This letter serves as confirmation that I **Ann Rademeyer**, a qualified counselling psychologist, am available to provide counselling for patients who might experience distress due to the above mentioned study.

Signature 

Date 9 / 11 / 2022

APPENDIX 12

- **TURN-IT-IN REPORT**

Dissertation P Mnisi

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