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TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICAN AND ZIMBABWEAN GOVERNMENT HOSPITALS' INTENSIVE CARE UNITS

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A Thesis submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree Doctor of Philosophy

Johannesburg, 2019

DECLARATION

I, Cathrine Tadyanemhandu, declare that this thesis is my own, unaided work. It is being submitted for the Degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

_____

(Signature of candidate)

24th day of July, 2019

DEDICATION

To my mentors and colleagues
who inspired me and nurtured my interest in cardiorespiratory physiotherapy

To all the patients admitted into intensive care units,
to their restoration of function and improvement in quality of life after discharge

PRESENTATIONS ARISING FROM THIS RESEARCH PROJECT

AMARI Annual Scientific Conference- Victoria Falls, Zimbabwe

Date: April 2017

Title: Early mobilisation practices of patients in intensive care units in Zimbabwean government hospitals - a cross sectional study

Type: Poster presentation

Presented by: Cathrine Tadyanemhandu

Authors: Cathrine Tadyanemhandu, Helena van Aswegen, Veronica Ntsiea

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Date: 2-4 July 2017

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Type: Oral platform presentation

Presented by: Cathrine Tadyanemhandu

Authors: Cathrine Tadyanemhandu, Helena van Aswegen, Veronica Ntsiea

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Date: 19-22 October 2017

Title: Early mobilisation practices of patients in intensive care units in Zimbabwean government hospitals - a cross sectional study.

Type: Oral platform presentation

Presented by: Cathrine Tadyanemhandu

Authors: Cathrine Tadyanemhandu, Helena van Aswegen., Veronica Ntsiea

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Type: Poster presentation

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Authors: Cathrine Tadyanemhandu, Helena van Aswegen, Veronica Ntsiea

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Type: Oral platform presentation

Presented by: Cathrine Tadyanemhandu

Authors: Cathrine Tadyanemhandu, Helena van Aswegen, Veronica Ntsiea

PUBLICATIONS ARISING FROM THIS RESEARCH PROJECT

1. Catherine Tadyanemhandu, Helena van Aswegen, Veronica Ntsiea. Early mobilisation practices of patients in intensive care units in Zimbabwean government hospitals - a cross-sectional study. Southern African Journal of Critical Care 2018 August 15;34(1):46-51.

ABSTRACT

Background: The early mobilisation of patients in the intensive care unit (ICU) is advocated as an intervention that may attenuate the consequences of critical illness. Recent evidence shows that the early mobilisation of patients in ICU is feasible, safe and is associated with improvement in the patients' clinical outcomes. However, not all units have adopted an early mobilisation programme as the standard practice of care for every ICU patient. There remains a paucity of evidence to explain why studies supporting the early mobilisation of patients in ICU are not being translated into practice as only a small percentage of patients are being mobilised out-of-bed, and this has resulted in an evidence-practice gap.

Purpose: The overall purpose of this study was to determine whether research evidence related to early mobilisation is being implemented in clinical physiotherapy practice in the ICUs of government hospitals in Zimbabwe and South Africa (SA); to identify the factors (barriers and facilitators) related to the implementation of such interventions; and the design strategies that may address the identified gaps at either the provider, patient or healthcare system level.

Methods: A mixed methods approach was used to address the aims of the study. An explanatory sequential study design in which a cross-sectional survey of 18 hospitals (n=5 in Zimbabwe; n=13 in SA) was done; this was followed by in-depth interviews with 22 physiotherapists (n=4 from Zimbabwe; n=18 from SA) working in ICUs to determine the prevalence of early mobilisation practice in the units, the ICU organisational structures and the barriers and facilitators that influence the early mobilisation of patients in SA and Zimbabwean government hospital ICUs. Lastly, a Delphi study with a panel of 23 experts from SA and Zimbabwe was done to explore expert opinions and consensus on the strategies to be implemented in SA and Zimbabwean government hospital ICUs to overcome the identified barriers to early mobilisation practice.

Results: The findings of the study suggest that there are very low rates of out-of-bed mobility activities performed in the ICUs in SA and Zimbabwean hospitals (19.5% and 25% respectively). Reasons why patients were not mobilised out-of-bed differed between the two countries with the majority of the patients from Zimbabwe not being mobilised on account of sedation and unresponsiveness (n=13; 32.5%), whilst the patients from SA were not mobilised as they were unresponsive (n=50; 24.4%, $p<0.05$). There was a significant difference in the indications for ICU admission between the two countries, with the majority of the patients from Zimbabwe being in the unit on account of acute respiratory failure (n=13; 30%) and for

postoperative care (n=10; 25%), whilst traumatic injury (n=86; 41.9%) and postoperative care (n=54; 26.3%) were the main indications for ICU admission in the SA cohort (p=0.001). Predictors of out-of-bed activities were the type of ICU, the method of ventilation, and the number of days in ICU ($p<0.05$). Facilitators to early mobilisation identified by the physiotherapy clinicians included awareness campaigns of the benefits of early mobilisation in staff training and practice; the acceptance of the intervention as the standard of care; the availability of protocols on sedation, delirium assessment and early mobilisation in the unit; multidisciplinary team engagement; adequate staff numbers (especially physiotherapists); and, adequate mobilisation equipment (e.g. portable ventilators, walking frames and bedside chairs).

Barriers to early mobilisation identified included variability in the manner of defining early mobilisation and the activities that constitute it; undefined roles within the multidisciplinary team responsible for the implementation of early mobilisation; negative perspectives of the clinicians about the intervention; the poor clinical reasoning skills of the clinicians; delayed consultations by specialists in the general ICUs; the high turnover rate of the ICU staff; the lack of protocols in the unit; patients in an unstable condition; inadequate staff numbers; and a lack of mobility equipment.

The expert panel agreed that there is a need to standardise the practice of early mobilisation in units in SA and Zimbabwe by defining the specific activities considered as early mobilisation; through the development of detailed protocols and guidelines to assist with early mobilisation; by enlisting champion leaders in ICU who advocate for the early mobilisation of patients; by ensuring the timely management of orthopaedic fractures; by promoting the admission of patients into specialised units; by making mobility equipment available; through the creation of physiotherapy posts; and through skills training for all staff responsible for implementing early mobilisation activities for patients in ICUs.

Conclusion: The rate of out-of-bed mobilisation activities in SA and Zimbabwean government hospital ICUs was found to be low and to be influenced by patient unresponsiveness, sedation and haemodynamic instability. The predictors of out-of-bed mobilisation activity included the type of ICU, the method of ventilation and the number of days in ICU. Overcoming the highlighted barriers will require a cultural change with regard to ICUs that prioritises the following: the early mobilisation of patients; developing standard operating procedures (clinical practice guidelines and protocols); multidisciplinary team engagement; coordinating the execution of early patient mobilisation; and effective communication among team members. These expert consensus strategies serve as the first step in guiding the development

campaign to a focused approach and to use research evidence to promote better quality patient care in daily clinical practice in an ICU setting.

Key words: early activity, mobilisation, physiotherapy practice, evidence-based practice, clinical practice guidelines, barriers, facilitators, outcomes, critically ill, implementation.

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LIST OF ABBREVIATIONS

ABCDE	- Awakening and Breathing Coordination, Delirium monitoring/management and Early exercise/mobility
APACHE	- Acute Physiology, Age, Chronic Health Evaluation
CFIR	- Consolidated Framework for Implementation Research
CIM	- Critical illness myopathy
CIP	- Critical illness polyneuropathy
CPG	- Clinical practice guideline
EBP	- Evidence-based practice
HIV	- Human immunodeficiency virus
HRQOL	- Health related quality of life
ICP	- Intracranial pressure
ICU-AW	- Intensive care unit acquired weakness
ICU	- Intensive care unit
LOS	- Length of stay
SA	- South Africa
SOPs	- Standard operating procedures
SOFA	- Sequential organ failure assessment score
USA	- United States of America

GLOSSARY

Term		Definition
Intensive care unit/ Critical care unit (ICU/CCU)	:	An organised system for the provision of care to critically ill patients that provides intensive and specialised medical and nursing care, an enhanced capacity for monitoring, and multiple modalities of physiologic organ support to sustain life during a period of acute organ system insufficiency, with continuous nursing care which is provided at a nurse to patient ratio that is higher than elsewhere in the hospital, and appropriate to the current needs of the particular patient (Marshall et al. 2017).
High dependency unit (HDU)	:	An intermediate or step-down unit which provides a more efficient distribution of resources for patients whose critical illness requires less use of monitoring equipment and staffing than an ICU (Chaboyer, James & Kendall 2005).
Early mobilisation	:	“Physical activity sufficient to elicit acute physiological effects that enhance ventilation, central and peripheral perfusion, circulation, muscle metabolism and alertness and are countermeasures for venous stasis and deep vein thrombosis” (Cameron et al. 2015: page 664).
Quality improvement	:	Systematic, data-guided activities designed to bring about immediate improvements in health care delivery in particular settings through identifying the specific problem, designing and implementing strategies to improve the specific problem (Bauer et al. 2015).
Evidence-based medicine (EBM)	:	“Conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett et al. 1996: page 71).
Evidence-based practice (EBP)	:	“Integrating individual clinical expertise with the best available external clinical evidence from systematic research” and “thoughtful identification and compassionate use of individual patients'

Term		Definition
		predicaments, rights, and preferences in making clinical decisions about their care" (Sackett et al. 1996: page 71).
Delphi study	:	The Delphi technique is designed as a structured group communication process that aims at conducting detailed examinations and discussions of a specific issue for the purpose of goal setting, policy investigation, or predicting the occurrence of future events by attempting to address "what could/should be" questions (Dalkey 1972).
In bed exercises	:	Mobilisation, which includes passive and active movements done with the patient in bed and sitting in bed with the head of the bed raised or without support.
Out-of-bed exercises	:	Mobilisation, which includes activities starting from sitting on the edge of the bed and progressing to out-of-bed activities such as walking.
Open-type ICU	:	Units where patient care is provided by a variety of doctors.
Closed-type ICU	:	Units that require patient transfers to or mandatory patient co-management by an intensivist.
General ICU	:	Units which admit both medical and surgical patients.
Permanent physiotherapist	:	A physiotherapist who is always covering specific ICU/s and wards and not rotating through the rest of the hospital.
Standard of care	:	That which is customarily done, plus anything that seems reasonable even if not typically done, or that which a minimally competent physician in the same field would do under similar circumstances (Moffett & Moore 2011).
Protocols	:	A comprehensive set of rigid criteria outlining the management steps for a single clinical condition or aspects of organisation (Grüne, Ottens, Klimek 2007).

Term		Definition
Clinical practice guidelines	:	These are "statements that include recommendations intended to optimise patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options" (Field & Lohr, 1990: page 38).
Adaptation of clinical practice guidelines	:	The systematic approach for considering the use and/or modifying guideline(s) produced in one cultural and organisational setting for application in a different context (Brouwers et al. 2010).
Implementation research	:	The scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice and, hence, to improve the quality and effectiveness of health services and care (Eccles & Mittman 2006).
Standard operating procedures (SOPs)	:	A specific set of practices that are required to be initiated and followed when specific circumstances arise (Rao et al. 2011).
Intensive care unit acquired weakness	:	A clinically detected weakness in critically ill patients in whom there is no plausible aetiology other than critical illness that is classified into three component conditions: critical illness polyneuropathy (CIP), critical illness myopathy (CIM), and critical illness neuromyopathy (CINM) (Stevens et al. 2009).
Immobilisation	:	Quiet rest in bed for a prolonged period used in the treatment of disease.

CHAPTER ONE

1. INTRODUCTION

1.1 GENERAL INTRODUCTION

The focus of critical care medicine has traditionally been on the restoration of patients' physiological and hemodynamic stability, and the prevention of death. Typical interventions used include bed rest and sedation (Adler & Malone 2012; Goddard et al. 2018). Owing to the nature of the interventions and the severity of the underlying illness of the patient or the injuries sustained, patients often remain relatively motionless for days to weeks after having been admitted to the intensive care unit (ICU) (Brower 2009), known as the act of immobilisation.

Immobilisation, which is considered to be a typical critical care intervention, has been found to be associated with ICU delirium, impaired exercise capacity, poorer functional outcomes and quality of life in patients (Cameron et al. 2015). The immobility which is experienced by patients in ICU has been found to play a major role in the development of the syndrome referred to as Intensive Care Unit Acquired Weakness (ICU-AW) (Hermans & Van den Berghe 2015). This syndrome comprises of critical illness myopathy (CIM) and critical illness polyneuropathy (CIP) which directly impact on the short- and long-term outcomes of patients who are critically ill (De Jonghe et al. 2002; Hermans et al. 2014; Hermans & Van den Berghe 2015). Besides immobilisation, the critical illness of the patient has many devastating consequences, which include the development of profound neuromuscular weakness, psychological and cognitive disturbances that may result in long-term functional impairments and a reduction in the quality of life (Herridge et al. 2011; Fan et al. 2014a; Jackson et al. 2014).

This has resulted in the shift of focus from short-term to long-term outcomes during patient care as important questions have arisen, such as what it means to patients and their relatives to survive critical illness, and whether survivors experience an improvement in their long-term outcomes (Angus & Carlet 2003; Paton, Lane & Hodgson 2018). As part of the strategies to prevent muscle weakness and enhance recovery subsequent to discharge from the ICU, attempts are being made to promote movement and exercise during the first days of patient's stay in the ICU and to reduce the duration of the period of immobilisation (Wright et al. 2018). Owing to this paradigm shift, the early mobilisation of patients is being increasingly advocated as the standard practice in ICUs worldwide (Cameron et al. 2015).

The early mobilisation of critically ill patients, although not new, is an ICU intervention that is beginning to receive significant attention by ICU multidisciplinary team members as its positive impact on patients' outcomes after discharge is now being documented (Morris & Herridge 2007; O' Connor & Walsham 2009; Adler & Malone 2012; Chiarici et al. 2019). The reported benefits of early mobilisation include: improvements in the peripheral and respiratory muscle strength, reductions in the shortness of breath, improvements in the quality of life after hospital discharge (Adler & Malone 2012; Kayambu, Boots & Paratz 2013; Roberson et al. 2018), shorter durations of delirium spells and more ventilator-free days, a reduction in the incidence of ICU-AW, improved functional recovery within the hospital setting, improved walking distance at hospital discharge, and lastly, reduced length of stay (LOS) in hospital (Morris et al. 2008; Schweickert et al. 2009; Kayambu, Boots & Paratz 2013; Tipping et al. 2017; Chiarici et al. 2019).

Although the literature indicates that early mobilisation is safe and feasible in critically ill adult patients (Cameron et al. 2015), not all units have adopted an early mobilisation programme as the standard practice of care for every ICU patient (Barber et al. 2015; Goddard et al. 2018). The evidence from point prevalence studies, which have been done to date in Australia and New Zealand, Germany, United States of America (USA), Switzerland and Brazil, shows that the proportion of patients being mobilised out-of-bed, especially the mechanically-ventilated patients, is very low, ranging from 10 to 30% (Berney et al. 2013; Nydahl et al. 2014; Jolley et al. 2017; Sibilla et al. 2017; Fontela et al. 2018). Based on these findings, there remains a paucity of evidence to explain why studies supporting the early mobilisation of patients in ICU are not being translated into practice (Barber et al. 2015), as only a small percentage of patients are being mobilised out-of-bed.

One important challenge that has been highlighted in the literature is the slow translation of research evidence into clinical practice (Grimshaw et al. 2004; Ohtake, Strasser & Needham 2013). The implementation of scientifically proven outcomes in clinical practice improves the quality of patient care delivery. However, there seems to be an increase in the evidence-practice gap. The reason for this is due to the fact that researchers and clinicians operate in vastly different worlds, with clinicians perceiving that researchers are out of touch with reality in the field, whilst clinicians' activities are perceived to be outdated and to fall short of the current trends in practice by researchers (Seymour et al. 2003; Bello 2012).

It has also been argued that the passive dissemination of health information through the publication of research findings in professional journals or the mailing of educational material contributes little or nothing to change clinical practice (Grol & Grimshaw 1999; Bello 2012). The evidence-practice gap might be the reason why early mobilisation is not being frequently practiced in several units around the world, especially in the case of mechanically ventilated patients.

Clinicians are encouraged to provide patient care that is based on the principles of evidence-based practice (EBP). The last-mentioned is anchored on using experience, feeding on education and literature, and considering the patient's preference and clinical data, in the making of clinical decisions (Sackett et al. 2000). The conceptualisation of EBP, which involves a process whereby clinical questions are solved through finding and critically appraising the appropriate research evidence used in clinical practice for individual patients, has been found to place very high demands on the clinicians (Sackett et al. 2000). The realisation that not all clinicians have the skills, motivation and time to perform the whole process governing EBP has led to the development of clinical practice guidelines (CPGs) and protocols (Kredo et al. 2016; Bernhardsson et al. 2015).

Clinical practice guidelines are defined as "..Statements that include recommendations intended to optimise patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options*"* (Field & Lohr 1990: page 38). Protocols on the other hand are regarded as more specific than CPGs as they provide a comprehensive set of rigid criteria outlining the management steps for a single clinical condition or aspects of organisation (Grüne, Ottens and Klimek 2007). A link between the best available evidence and clinical practice is provided through the use of CPGs and protocols as they bridge the evidence-practice gap, thereby facilitating the implementation of research findings in clinical practice and increasing the extent to which practice is evidence-based (Brouwers et al. 2011; Gagliardi 2012; Dogherty et al. 2012; Kredo et al. 2016).

1.2 PROBLEM STATEMENT AND JUSTIFICATION FOR RESEARCH

Numerous studies regarding the feasibility and implementation of early mobility exercise protocols and CPGs in ICUs have been conducted around the world over the last 10 years and are still being carried out (Chaboyer, James & Kendall 2005; Burtin et al. 2009; Byrnes et al. 2009; Hanekom, Louw & Coetzee 2012; Engel et al. 2013a;

Chiarici et al. 2019). However, most of the studies on the feasibility of early mobilisation have been executed primarily in high-income countries such as in France, Australia, New Zealand and the USA (Stiller, Phillips & Lambert 2004; Bailey et al. 2007; Morris et al. 2008; Schweickert et al. 2009; Skinner et al. 2009; Bourdin et al. 2010). In South Africa (SA), which is a middle-income country according to the World Bank classification, the published research evidence on the implementation of early mobilisation practices in ICU is from the Western Cape Province only (Hanekom, Louw & Coetzee 2012). It is not known whether other ICUs from the other provinces in SA have adopted early mobilisation practice as a standard of patient care.

In Zimbabwe, which is a low-income country according to the World Bank classification, an early mobilisation programme was implemented at one central hospital in Harare province to determine its feasibility, and the results showed that it was feasible and safe, and moreover that it resulted in improvements in the functional status of the patients at discharge from the unit (Tadyanemhandu & Manie 2015). Similarly, it is not known whether other ICUs from different provinces in Zimbabwe have adopted early mobilisation practice as the standard of patient care. Although the intervention is now the standard practice in most high-income countries, it is not known whether the early mobilisation of ICU patients has been implemented in most of the middle- and low-income countries.

The physiotherapy coverage in ICUs in the two countries vary, with one unit being covered by at least one physiotherapist at a time. The physiotherapists from Zimbabwe and South Africa both have first contact status, which means that patients can have access to health care primarily by utilising a physiotherapist without going through a general practitioner first for referral. However, the practices in ICU differ across the hospitals in the two countries. In some units, physiotherapists only treat patients who have been referred to them by the attending doctor/physician but in some units, the physiotherapists treat any patient who requires treatment based from their own assessment without referral from the attending doctor/physician.

To the researcher's knowledge, very little is known about early mobilisation practices in ICU, their feasibility for different categories of patients, and the barriers to early mobilisation experienced by the staff in ICUs in lower-to-middle-income countries such as SA and Zimbabwe. Understanding whether and how the early mobilisation of patients in ICUs is currently performed by physiotherapists or any other member of the ICU team is critical to the design and implementation of strategies to improve on its

application in the diverse population of critically ill patients in ICUs (Harrold et al. 2015; Malone et al. 2015).

From a recent systematic review, it was highlighted that future research is needed to extend the knowledge of early mobilisation in trauma/burn, neurological and surgical ICUs (Cameron et al. 2015) which are the type of cases mostly seen in ICUs in countries such as SA and Zimbabwe. Literature shows that there is growing evidence in support of the early mobilisation of adult mechanically ventilated patients in ICUs (Nydahl et al. 2014); however, there is little knowledge regarding the translation of these research findings into clinical practice. Therefore, this study was conducted in order to analyse the government hospital ICU settings and identify obstacles to early mobilisation practices in these hospitals in the two countries. The other aim of the study was to facilitate the uptake of research evidence in clinical practice by attaining a consensus regarding the recommended implementation strategies to overcome barriers to the early mobilisation of ICU patients in SA and Zimbabwean government hospitals through a multidisciplinary approach.

1.3 RESEARCH QUESTIONS

a) Is early mobilisation of patients by clinical staff in ICUs performed as part of current practice in government hospitals in SA and Zimbabwe?
b) What do physiotherapists in SA and Zimbabwe perceive to be the barriers and facilitators of the early mobilisation of patients in ICUs?
c) Which strategies targeting the elimination of the barriers faced and promoting the early mobilisation of patients as standard practice in ICU should be implemented in the ICUs?

1.4 AIMS OF THE STUDY

The overall purpose of the study was to determine whether research evidence related to early mobilisation is being implemented in clinical physiotherapy practice in government hospitals in Zimbabwe and South Africa

a) To establish the current practice related to the early mobilisation of patients by clinical staff in government hospital ICUs in SA and Zimbabwe.
b) To explore the barriers and facilitators to the early mobilisation of patients in SA and Zimbabwean government hospital ICUs as perceived by physiotherapists.
c) To attain consensus on the implementation strategies that are responsive to identified barriers to the early mobilisation of patients within government sector

ICUs in SA and Zimbabwe using the Consolidated Framework for Implementation Research (CFIR).

1.5 OBJECTIVES OF THE STUDY

1.5.1 Phase one of the study

The overall aim for phase one of the study was to describe the current early mobilisation practices in ICUs in SA and Zimbabwean government hospitals. The specific objectives were as follows:

a) To describe the ICU and patient characteristics of government hospital ICUs in SA and Zimbabwe.
b) To describe the practice of the early mobilisation of patients by clinical staff in SA and Zimbabwean government hospital ICUs.
c) To compare the current practice related to the early mobilisation of patients by clinical staff in the ICUs between government hospitals in SA and Zimbabwe.

1.5.2 Phase two of the study

The overall aim of phase two was to explore the barriers and facilitators to early mobilisation as perceived by physiotherapists working in government ICUs in SA and Zimbabwe. The specific objectives were as follows:

a) To explore the physiotherapists' perceptions on the implementation of early mobilisation practices in SA and Zimbabwean government hospital ICUs.
b) To identify the perceived barriers to early mobilisation practice in ICU experienced by physiotherapists in SA and Zimbabwe.
c) To identify the perceived facilitators to early mobilisation practice in ICUs experienced by physiotherapists in SA and Zimbabwe.

1.5.3 Phase three of the study

The overall aim of phase three was to attain consensus on the implementation strategies that are responsive to identified barriers to the early mobilisation of patients in government sector ICUs in SA and Zimbabwe by using the CFIR:

a) To formulate implementation strategies addressing barriers according to the following categories: i) characteristics of the intervention; ii) ICU contextual factors (the environment within which the implementation process proceeds); iii) hospital context including the patients' needs and resources; iv) characteristics of the individuals responsible for the implementation and v) the process, which refers to the active changes that occur to encourage the implementation of the intervention.
b) To attain a consensus of recommended implementation strategies to overcome

barriers to early mobilisation of ICU patients in SA and Zimbabwean government hospitals.

1.6 SIGNIFICANCE OF RESEARCH

The organisation of ICUs varies widely across hospitals, with some ICUs admitting patients with a wide range of diagnoses and procedures, hence the name, multidisciplinary or general ICU (Lott et al. 2009). The organisational characteristics of ICUs have been found to be related to the differences in patient outcomes noticed in practice among hospitals (Bakhru et al. 2015). These include the severity of the illness, differences in case mix, processes of care, discharge practices, financial limitations, insufficiencies of supporting essential disciplinary institutions such as laboratories, and the poor general health status of the patients (Dünser, Baelani & Ganbold 2006; Murthy & Adhikari 2013).

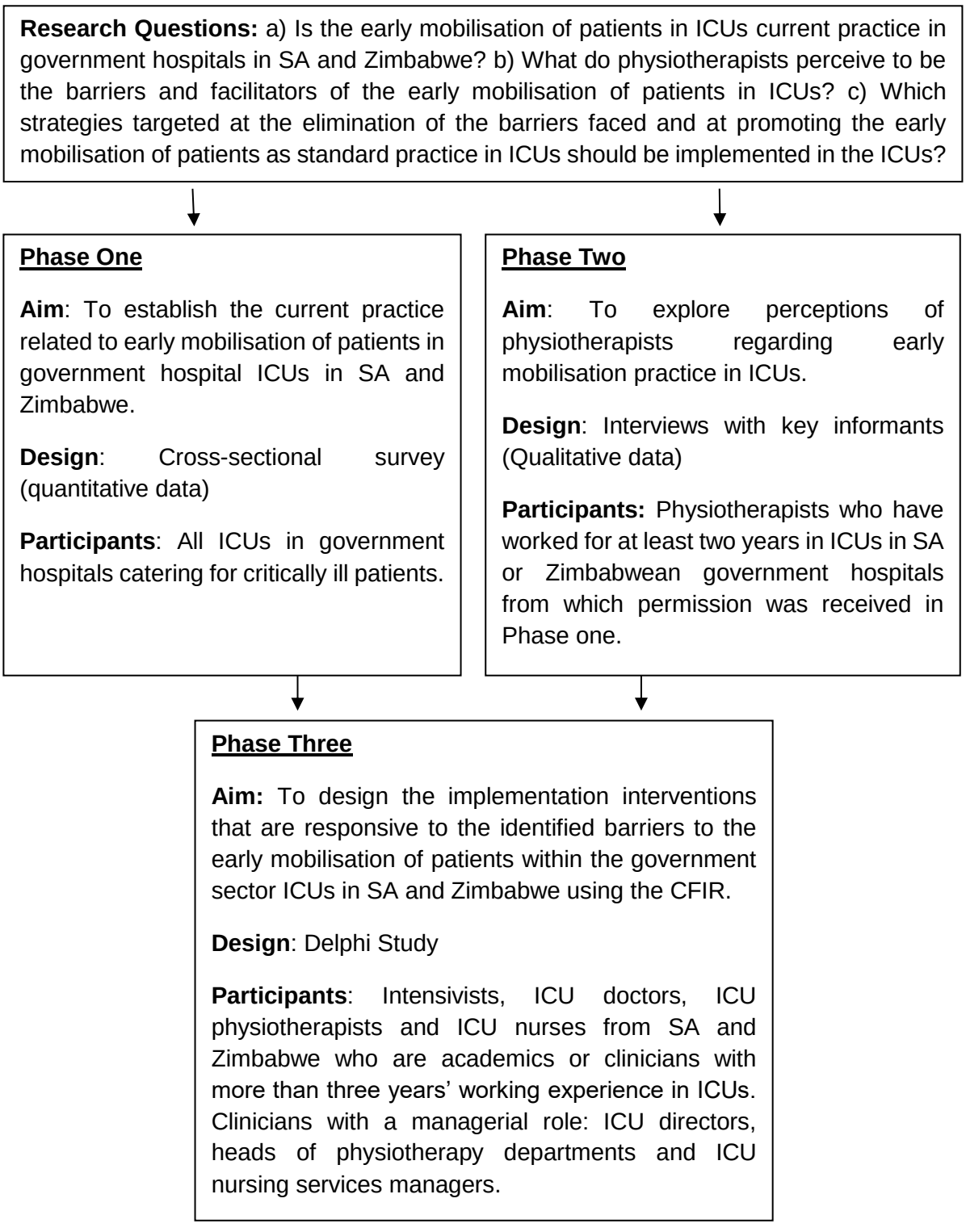
Also, of importance is an appreciation of the difference in conditions leading to ICU admission such as infection, trauma, post-operative treatment and perinatal complications, which are much more common causes of admission to an ICU in low-income countries than the complications arising from chronic cardiac, vascular and pulmonary diseases, which are prevalent in high- to middle-income countries (Dünser, Baelani & Ganbold 2006; Adhikari et al. 2010; Riviello et al. 2011). This has prompted the need for more studies to be conducted on the current state of ICUs in low- and middle-income countries in order to improve the care of the most severely ill in these countries (Dünser, Baelani & Ganbold 2006). In a commentary on the overview of critical care medicine in SA, Mathivha (2002) argued that the country's health care facility services range from a first world environment to an informal settlement environment. Mathivha (2002) stated that although there are sophisticated health care structures in some areas, the disease patterns still reflect those of a low-income country.

Some authors clearly highlight that the only way to enhance the sustainability of early mobility programmes is for research to focus on methods to overcome the perceived barriers to early mobilisation through knowledge translation strategies involving interdepartmental collaboration, communication, education and training (Cameron et al. 2015). This study focused on investigating disparities in the practice of the early mobilisation of patients in ICUs in terms of the activities performed, the barriers faced, and the patient safety criteria used in government hospitals in SA and Zimbabwe. After the disparities were identified, strategies and tools to eliminate these disparities were

designed through multidisciplinary ICU team engagement to bridge the gap between research evidence and clinical practice. Results from this project will contribute towards the development of policies that will ensure that early mobilisation is given to all patients who are likely to benefit from it.

1.7 CONCEPTUAL FRAMEWORK OF THE STUDY

A mixed methods approach was used to answer the research questions. This project was carried out in three phases. The conceptual framework showing the linkage between the various stages is presented below.



The mixed methods design, grounded in a pragmatic approach, was used to strengthen the results. This was done by overcoming the weakness of each method and aided in contextualising the findings which would then produce research evidence that is grounded in a best practice model (Shaw, Connelly & Zecevic 2010; Morgan 2013). A pragmatic approach highlights the importance of a research design as a link between the broader purposes of the study, as represented by the initial research question, and the specific procedures, as represented in the research methods (Morgan 2013). The pragmatic approach to research is informed by the belief that the practicalities of research are such that it cannot be driven by theory or data exclusively and that a process of abduction is recommended since it enables one to move back and forth between induction and deduction through a process of inquiry (Morgan 2007). The pragmatic approach involves a focus on 'what works' in order to seek answers to the research question (Creswell & Plano Clark 2011; Morgan 2013). It provides the research evidence that integrates the multiple concerns and practice paradigms of the clinicians better than either the qualitative or quantitative methodology in isolation (Shaw, Connelly & Zecevic 2010).

The advantage of the mixed methods approach is that it uses quantitative and qualitative study designs in combination and that it results in exploring the different dimensions of a problem (Fetters, Curry & Creswell 2013). Another advantage of using both qualitative and quantitative study designs together is that such an approach prevents inaccurate conclusions based on incomplete data or missing important aspects being drawn (Fetters, Curry & Creswell 2013).

An explanatory sequential design in which the quantitative data are collected first, followed by the qualitative element of the study (Ivankova, Creswell & Stick 2006; Fetters, Curry & Creswell 2013), was used for a better understanding of the underlying processes, and the results thus obtained informed the focus of the Modified Delphi study (Figure 1.1). The sequential mixed methods design involves multiple phases of data collection in which the research purpose and set of research questions determine the sequence (Ivankova, Creswell & Stick 2006; Fetters, Curry & Creswell 2013).

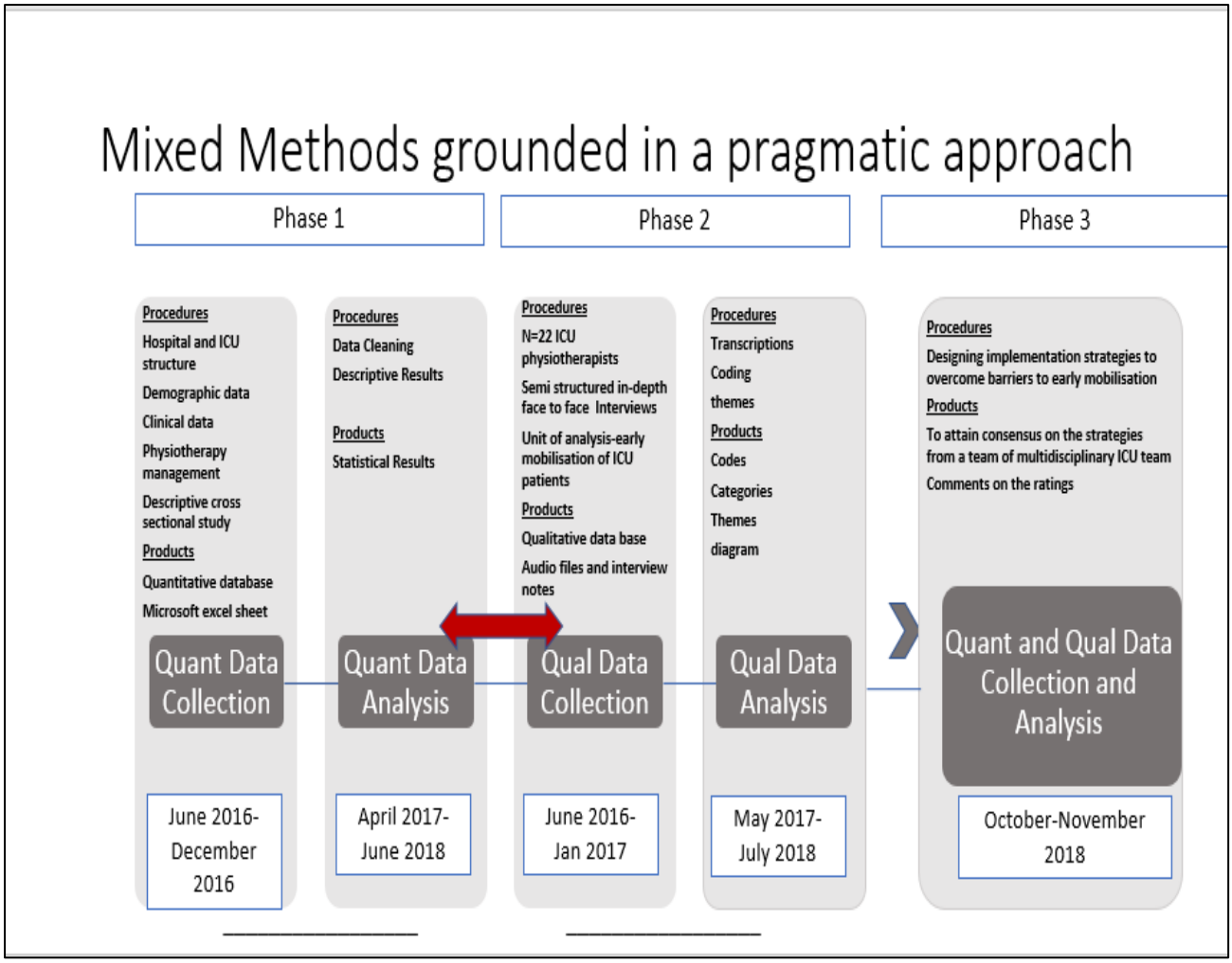


Figure 1.1: Overview of the Study Linking all of the Three Phases

1.8 OUTLINE OF CHAPTERS

Chapter One

This chapter describes the foundation of the study. It includes the general introduction, problem statement and justification for the research, the significance of the study, the research questions, and lastly, the aims, objectives and the conceptual framework of the study

Chapter Two

This chapter reports on the literature review related to the study topic and an analysis of the methodology reviews from other relevant studies.

Chapter Three

This chapter focuses on a quantitative study of the mixed method project. The methods, results and discussion of Phase one of the study are presented.

Chapter Four

This chapter describes the qualitative component of the mixed method project, which is incorporated in Phase two of the study. The methods, results and discussion related to Phase two are presented.

Chapter Five

This chapter reports on the Modified Delphi study which is equivalent to Phase three of the study. The research project and its methods, results and the subsequent discussion are presented.

Chapter Six

This chapter summarises in a concise manner the results from all three phases of the study and includes the conclusion to the thesis.

Chapter Seven

This chapter presents the strengths, limitations of the study and recommendations for future research.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 INTRODUCTION

A literature search was conducted in order to obtain all information that fulfils the objectives of the research with particular reference to the works of other authors. The following databases were accessed in order to review publications of relevant studies: Medline/PubMed, Access Physiotherapy, Ebsco, CINAHL, EMBASE and PeDro. There was no restriction to the years of the publications reviewed but only articles in English language were considered. Reference list of the retrieved articles was also checked for additional articles. The type of review which was done for this study was a narrative one. The keywords which were used to identify relevant literature included: early activity, mobilisation, physiotherapy practice, evidence-based practice, clinical practice guidelines, barriers, facilitators, outcomes, critically ill.

The review is presented under the following subheadings:

2.2 ICU organisational structure and practices
2.3 Consequences of immobility in the ICU
2.4 Early mobilisation of ICU patients
2.5 Barriers to the early mobilisation of patients in the ICU
2.6 Facilitators to the early mobilisation of patients in the ICU
2.7 Translation of the research into clinical practice
2.8 Conclusion

2.2 ICU ORGANISATIONAL STRUCTURE AND PRACTICES

The ICU is a dynamic, complex and at times, highly stressful work environment that involves ongoing exposure to the complexities of interprofessional team functioning (Donchin & Seagull 2002; Marshall et al. 2017). A discrete physical space is central to the definition of an ICU as this enables the concentration and efficient sharing of technologies and expertise so that all patients benefit maximally (Marshall et al. 2017). Critically ill patients are best managed in units where the most complex, high-risk and severely ill patients are concentrated for treatment (Abbenbroek et al. 2014) and the model of care is based on multidisciplinary teamwork (Ferri et al. 2015). The availability of a physical space where critically ill patients are concentrated makes it possible for the multidisciplinary team approach to be implemented with the main goal of offering the best health care services.

The introduction of ICUs in the 1950s was based on the idea that the lives of severely ill patients could be saved if they were treated in smaller, well-staffed units with access to the most technologically sophisticated equipment (Vincent 2013; West et al. 2014). Owing to the nature of the patients admitted in the units and the importance of timely intervention, the design of an ICU should reduce travel distances for staff, placing frequently needed spaces, equipment, or materials as close as possible to the site of use (Thompson et al. 2012). Although the patient population might present with a large variety of pathologies, the key features of patients admitted into ICU include a potential reversibility of one or more threatened vital functions; the need for close and continuous observations by highly skilled staff; and an organ support unit made possible by innovative new technologies (Valentin & Ferdinande 2011; West et al. 2014).

As a result, there should be strict assessments of eligible patients who can be admitted into the ICUs with reversible conditions, and this has in fact caused challenges to some patients with conditions which include human immunodeficiency virus (HIV) and cancer due to the prognosis of the disease in some patients. The minimum requirements for intensive care departments were described by Ferdinande (1997) and these informed the guidelines of international intensive care societies, as well as of legislative documents (Valentin & Ferdinande 2011).

However, the change in intensive care medicine and the conditions of practice has resulted in the need to regularly update the previously stipulated requirements and recommendations (Valentin & Ferdinande 2011; Thompson et al. 2012; Ferri et al. 2015). Although there are recommendations which have been published to serve as guidelines, not all hospitals have developed their ICU facilities in the same way, with the same competencies and identical structures and equipment, as ICUs must be adapted to the region and the hospital they serve in terms of size, staffing and technology (Valentin & Ferdinande 2011).

The definition of an ICU bed capacity varies around the world, and even within a single health care system, and is heavily shaped by public health priorities and regulatory requirements, as well as by economic factors, including resource availability and approaches to hospital and physician reimbursement (Valentin & Ferdinande 2011; Marshall et al. 2017). The number of patients receiving care in an ICU will vary between hospitals as this is dependent on the following factors: the variations in patients' needs

for life-sustaining therapies, the decision made by the medical team to admit individual patients, and the compositional differences between hospitals in the array of services they offer (e.g. specialised cardiac surgery services or advanced burns management) (Seymour et al. 2012).

The recommended size of an ICU is a unit accommodating a minimum of six beds with the optimum number of beds being eight to twelve, and if there is a need for more than 12 beds, an arrangement of the beds into multiple pods should be considered (Valentin & Ferdinande 2011; Thompson et al. 2012). There is a growing interest in concentrating critically ill patients into smaller numbers of ICUs (six to eight beds), known as specialised ICUs (Valentin & Ferdinande 2011; Ferri et al. 2015). The specialised ICUs have the following characteristics: patients are admitted in each subspecialty based on specific processes of care or pathology; the units share the same geographical location, administrative and other facilities (Iwashyna, Kramer & Kahn 2009; Valentin & Ferdinande 2011; Ferri et al. 2015). Since specialised ICUs provide diagnosis-specific care for selected patient populations, this then reduces the delay in consultation which is a problem that is more profound in a general ICU which provides care for a wide variety of patients and diagnoses (Diringer & Edwards 2001; Lott et al. 2009). Although the capacity of modern critical care has grown tremendously over recent decades with the introduction of the specialised units, much of the world, especially the low-income countries, lacks the resources to implement its high-cost and resource-intensive management strategies (Murthy & Adhikari 2013).

With critical care medicine growing very fast and becoming a full subspecialty of health care, different ICU models have arisen based on the extent of involvement and supervision by critical care physicians (Chowdhury & Duggal 2017). Although there can be several models of ICUs based on how they are being defined, there are three distinct models which have been highlighted which are ‘open’, ‘closed’ and ‘intensivist’ co-management’ ICU models (Treggiari et al. 2007; Chowdhury & Duggal 2017).

An ‘open’ ICU model is a unit in which the patient’s primary physician determines the need for ICU admission and discharge, hence a patient is admitted under the care of a family physician, surgeon or any other primary attending physician, with the intensivists being available to provide their expertise via elective consultation (Rothschild 2001; Wilcox et al. 2013a). The main disadvantage of this ‘open’ ICU model is the greater variability in practice patterns which then result in potentially unnecessary

and conflicting orders about patient care being made which might result in increased expenses for both the patient and the hospital (Chowdhury & Duggal 2017).

A ‘closed’ ICU model is a type of ICU model in which patients admitted to the ICU are transferred to the care of an intensivist (a board-certified physician who provides special care for critically-ill patients) assigned to the ICU on a full-time basis and the model is associated with improved outcomes (Treggiari et al. 2007; Watson & Alarcon 2010; van der Sluis et al. 2011; Wilcox et al. 2013a). The improved outcomes are possible in ‘closed’ ICUs as it is agreed that intensivists can better manage critically ill patients because of a better understanding and management of ICU pathology, better use of evidence-based medicine and increased usage of protocols, and better patient management related to mechanical ventilation (Chowdhury & Duggal 2017).

The last model, known as the ‘intensivists’ co-management’ model, involves an open ICU in which all patients receive mandatory consultation from an intensivist, but the family physician or surgeon remains the co-attending with the intensivists collaborating in the management of all ICU patients (Rothschild 2001). This model promotes communication among members of the care team and there is continuity of care by the primary care physician, and at the same time the intensivist provides expertise to patient care, resulting in best-practice compliance (Breslow 2007). However, additional consultation between the physician and the intensivist in this model may result in conflicting opinions and fragmented care that may negatively affect patient outcomes and expose patients to risky, costly, and unnecessary tests and procedures (Gasperino 2011). The ‘intensivists co-management’ model is also viewed by some physicians as a major disruption in autonomy as most of the patient’s care in the ICU may be provided by the intensivist (Gasperino 2011).

Comparing the three reported ICU models, the ‘closed’ ICU model has been reported to be associated with reduced hospital and ICU mortality, ICU and hospital LOS (Pronovost et al. 2002; Treggiari et al. 2007; van der Sluis et al. 2011). Even though the ‘closed’ ICU model is the ideal model when looking at outcomes, it cannot be achieved in practice, especially in most low- and middle-income countries as there is a paucity of appropriately trained personnel to provide advanced-level care in this setting (Murthy & Adhikari 2013; Ramesh et al. 2014; Jerome et al. 2017). Training opportunities remain sparse on account of the geographical inequalities in the distribution of critical care units and the few trained personnel who are overburdened by the workload or more likely to emigrate, further depleting personnel in these units

(Murthy & Adhikari 2013). A semi-closed ICU with appropriate and well-written protocols for various procedures might be an answer to reduce mortality and an ICU stay in a cost-effective manner in low-and middle -income countries (Chowdhury & Duggal 2017).

The relationship between hospital characteristics such as intensive and critical care nurse staffing levels and the quality of care provided to patients has become central to issues of healthcare delivery, research and policy formulations (Chamberlain et al. 2018). The key mechanisms linking ICU staff numbers and ratios-to-patient outcomes for the prevention of adverse medical events is surveillance. Surveillance is the process that ICU medical staff members use to acquire, process, and synthesise vast amounts of information in the course of an encounter with a patient (Henneman et al. 2010). Although there are many factors that influence the safety and outcomes of critically ill patients, it is indisputable that patient-centred care provided by an appropriately qualified medical workforce in the ICU makes a significant difference in patient safety and outcomes (West et al. 2014; Chamberlain et al. 2018).

In high-income and some high- to middle–income countries, the survival benefits from critical care depend primarily on the availability of skilled professionals, the existing infrastructure, and technological solutions that are inaccessible to most of the low- and middle-income countries (Murthy & Adhikari 2013; Rosman et al. 2013). One of the ten evidence-based intensive care nursing workforce standards states that the ICU patient case mix and the unit design must determine the appropriate nursing role in achieving positive healthcare outcomes, and the knowledge and skills required for the nursing workforce and support staffing of each unit (Chamberlain et al. 2018). Chamberlain et al. (2018) highlighted that each ICU must be evaluated objectively in terms of its unique patient case mix, design and environment to determine whether additional staffing is required to safely meet the needs of its patients.

Intensive care is not just a clinical specialty, but a system of care delivered by a skilled interprofessional team that includes physicians, nurses, respiratory therapists (in the USA), physiotherapists, pharmacists, microbiologists, social workers, ethicists, spiritual care workers, and many others (Marshall et al. 2017). The emergence of critical care as a distinct speciality and an increase in the number of intensivists has resulted in a change in the staffing and organisational model of ICUs in mostly high-income countries (Chowdhury & Duggal 2017). The workload of a unit has an impact on patient mortality in addition to the number of clinical staff in the unit (West et al.

2014). Currently, the staffing requirements are dictated by the patient numbers and acuity levels, institutional goals, accreditation requirements, regulations, and the efficiency by which critical care is delivered (Holdorf & Lilly 2015).

A greater involvement of critical care specialists or intensivists has been argued as a key initiative which might result in positive healthcare outcomes, limited practice variation and contained patient care costs in the unit (Angus et al. 2006). The model of ICU coverage in which physicians or intensivists are continuously rather than intermittently available, although it should be the ideal situation, has been associated with great challenges owing to shortages in the intensivist workforce (Murthy & Adhikari 2013; Holdorf & Lilly 2015). Holdorf & Lilly (2015) reported that this disparity among the number of intensivists and the hours of required coverage has led to a variety of leveraged staffing solutions which include either building one large ICU, which is manned by on-site intensivists, or one on-site intensivist providing services to critically ill patients in more than one ICU at each hospital.

The intensivist:patient ratio is likely to be influenced by several factors, which include the following: the severity of the illness and comorbidity, the case mix, the available forms of human support (e.g. other physician specialists and non-physician health care providers), and non-human resources (e.g. medical equipment, information technology) (Garland & Gershengorn 2013; Ward et al. 2013). The available data do not support recommending any specific intensivist:patient ratio, but consensus has been reached to the effect that intensivist:patient ratios should not exceed 1:14 for referral centre ICUs as higher ratios result in a negative impact on patient care (Ward et al. 2013; Holdorf & Lilly 2015).

Intensive Care Units are very expensive to run as they require much higher staff- to-patient ratios than general medical and surgical wards (West et al. 2014), as well as the interdisciplinary team-based care, with high-technology monitoring and interventions, which is a standard of care that will invariably generate high costs associated with equipment, consumables and salaries for the ICU team (Murthy & Adhikari 2013). To determine optimal or maximum provider: patient ratios is a complex task that must allow for multiple variables (Garland & Gershengorn 2013; Ward et al. 2013). An association between ICU nurse staffing and patient outcomes has been reported, thus confirming that a higher number of registered nursing staff to patient ratio (1:1 or 1:2) relates to improved safety and better outcomes for patients (Penoyer 2010). Critically ill patients require a large number of acute care resources and nurses

need to have a specialised knowledge and the required skills, thus necessitating education and preparation beyond their basic nursing degree to function competently (Penoyer 2010). The nurses in some units have specialised training in critical care which might not be the case for most of the units in the low- and middle-income countries (Dodek et al. 2012; Chamberlain et al. 2018).

As for the other allied health care personnel, the ratios vary per unit and hospital. For example, one physiotherapist with dedicated training and expertise in respect of critically ill patients should be available per five beds for level III care on a seven day per week basis (Valentin & Ferdinande 2011). The minimum standards of clinical practice for physiotherapists to ensure safe and independent practice in ICUs include the following: integrated medical knowledge, the knowledge and skills to conduct an holistic assessment of an ICU patient, the knowledge and skills of clinical reasoning and a knowledge of physiotherapy techniques (Skinner et al. 2016; Plani et al. 2017; van Aswegen et al. 2017; Twose, Jones & Cornell 2018). All the variations in organisational structures and practices will then lead to variations in practice across the ICUs and influence the implementation of specific interventions that might impact on patients' clinical outcomes (Dodek et al. 2012).

With regards to the implementation of an early mobilisation intervention, enough staffing numbers and institutional commitment to facilitate mobility would result in an increased intensity of mobility (Bakhru et al. 2016; Jolley et al. 2017). A higher staff:patient ratio has been reported in ICUs in high-income countries, with a mean nurse:patient ratio of above two and a physiotherapist:patient ratio of above seven (Nydahl et al. 2014; Sibilla et al. 2017; Fontela et al. 2018). There is a need for hospitals to regularly assess and reassess indicators of staffing supply and demand as understaffing will result in a lack of motivation among the entire ICU team which will result in the overall quality of care in ICUs being compromised (Ward et al. 2013; Klooster, dos Reis Miranda & Spronk 2017; Hodgson, Capell & Tipping 2018).

There is a huge gap in the effectiveness of ICUs between the high-income countries and the low-and middle-income countries. In high-income countries, caring for the critically ill patients involves a coordinated system of triage, emergency management and ICUs, which is complicated and unaffordable to many of the low-and middle-income countries on account of a lack of skilled personnel, an inadequate infrastructure and a lack of equipment (Baker 2009; Murthy & Adhikari 2013). Most low- and middle-income countries such as Zimbabwe and SA are experiencing a quadrupled burden

of disease comprising of the HIV/AIDS pandemic, infectious diseases, emerging chronic conditions (non-communicable diseases) and injuries resulting from violence, road traffic accidents or other trauma (Bradshaw et al. 2003; Baker 2009; Murthy & Adhikari 2013; Pillay-van Wyk et al. 2016; Reubi, Herrick & Brown 2016).

Although 90% of the trauma injuries have been indicated to occur in low- and middle-income countries, a huge trauma burden has in fact been reported in SA (Hardcastle et al. 2016). High levels of interpersonal and intentional injury have been reported to be a distinctive feature of the pattern of trauma and injury in SA for several decades now (Laing et al. 2014), with most of the violence caused by and affecting males who are younger than 40 years of age (Murthy & Adhikari 2013; Nicol et al. 2014; Hardcastle et al. 2016). The trauma injuries in the low-and middle-income countries are largely violence- or transport-related and occur mostly among young healthy men of low socio-economic status, who are affected by alcohol and drug misuse, which increases the burden on the developing communities (Hardcastle et al. 2016).

There is an anticipated increase in trauma injuries in low-and middle-income countries on account of urbanisation, but the management of these patients is further complicated by a shortage of trauma specialists, a shortage of ICU beds, inadequate monitoring devices and the presence of comorbidities such as smoking, diabetes and hypertension which compromise the recovery trajectory of the patients and result in increased LOS in ICU (Hawn et al. 2011; Khullar & Maa 2012; Ramesh et al. 2014; Resnick et al. 2014; Reddy et al. 2015; Tran et al. 2015; Jerome et al. 2017).

2.3 CONSEQUENCES OF IMMOBILITY IN THE ICU

Critical illness is a life-threatening experience, which predisposes many patients to the development of physical and neuropsychological symptoms such as ICU-AW and posttraumatic stress disorder which are increasingly being reported among survivors of critical illness (Roberts et al. 2018). Until recently, the management of critically ill patients required high levels of inactivity and bed rest for extended periods of time (Kress & Hall 2014). As such, the management of ICU patients was found to be associated with the development of various complications in the physical, cognitive and mental domains (Khan et al., 2006; Hayashi et al. 2013; Svenningsen et al. 2013; Kress & Hall 2014; Sosnowski et al. 2015; Zorowitz 2016; Franco & Nanchal 2018).

The physical and psychological complications associated with the immobility of ICU patients are ICU delirium, impaired exercise capacity, ICU-AW, poorer functional

outcomes and health-related quality of life (HRQOL) (Topp et al. 2002; Adler & Malone 2012; Leditschke et al. 2012; Harrold et al. 2015, Koo et al. 2016; Parry et al. 2017a; Brock et al. 2018; Capell, Tipping & Hodgson 2018). The immobilisation of patients is potentially promoted by the typical critical-care interventions used for patient management that include the administration of analgesics and sedatives to facilitate mechanical ventilation, reduce pain, agitation, and/or anxiety (Svenningsen et al. 2013). Prolonged periods in a stationary position result in greater hemodynamic instability when the patient has finally changed position, and it becomes important to start early mobilisation activities as soon as possible (Stiller et al. 2004; Vollman 2012; Engel et al. 2013b). The exact duration of immobility that may result in complications such as muscle weakness varies among studies, but the reported period to develop muscle weakness caused by critical illness ranges from as little as three days to fourteen days (De Jonghe et al. 2002; Bolton 2005; Khan et al. 2006; De Jonghe et al. 2007; Truong et al. 2009). Intensive-care-unit-acquired weakness and delirium in the ICU are discussed in more detail below.

2.3.1 Intensive Care Unit Acquired Weakness

The development of modern ICUs and other medical advances has led to an increase in the survival of critically ill patients (Appleton & Kinsella 2012; Kress & Hall 2014), and the prevalence of impairment and disability among the survivors of critical illness has increased significantly (Connolly et al. 2016). There is growing recognition that both critical illness and its associated treatments lead to muscle and nerve injury (Fan 2012). Recent attention in intensive care medicine has shifted to include considerations of the long-term impact of life-saving strategies on the clinical outcomes of critically ill patients (Sosnowski et al. 2015). A prolonged ICU stay owing to critical illness is associated with patients developing severe limb and respiratory muscle weakness, thus leading to an increased risk of permanent morbidity, prolonged and costly hospitalisation, and mortality (Batt, Dos Santos & Herridge 2013; Argov & Latronico 2014).

The syndrome referred to as ICU-AW has been identified in patients with critical illness (De Jonghe et al. 2002; Appleton & Kinsella 2012; Fan 2012; Argov & Latronico 2014). The term ICU-AW describes several pathological entities with similar clinical features, which can be aggravated by immobilisation and over sedation prescribed to patients in ICU as a by-product of the well-established safety culture of the unit (Puthucheary et al. 2013; Kress & Hall 2014; TEAM study 2015). The syndrome develops early and rapidly in many ICU patients, who receive mechanical ventilation for 24 hours or more,

and is more severe among patients with multi-organ failure (De Jonghe et al. 2002; Kress & Hall 2014). Denehy et al. (2013) reported that patients who were still ventilated at day five after having been admitted to the ICU had a more than twofold increase in the odds of being diagnosed with ICU-AW. This condition is independently associated with the prolongation of the subsequent duration of mechanical ventilation, the period spent in the ICU, the stay in hospital, and subsequent mortality in the first year following ICU discharge (Appleton & Kinsella 2012; Kress & Hall 2014; Fan et al. 2014b; Hermans & Van den Berghe 2015; Puthucheary & Denehy 2015; Hodgson et al. 2016). The syndrome is categorised by both axonal nerve degeneration and muscle myosin loss leading to profound muscle weakness. The aetiology is uncertain but believed to be the multifactorial result of systemic inflammation, sepsis mediators, corticosteroids, electrolyte disturbances, hyperglycaemia, nutritional deficiency, hormonal imbalance and immobility (De Jonghe et al. 2002; Appleton & Kinsella 2012; Batt, Dos Santos & Herridge 2013; Hermans & Van den Berghe 2015). The typical presentation of ICU-AW is that of severe flaccid weakness that symmetrically affects the four limbs but spares the ocular, bulbar, and usually the facial muscles (Bolton 2005).

During critical illness, marked muscle atrophy, which is a result of increased proteolysis, reduced protein synthesis, and increased apoptosis, occurs with approximately a three to four percent (3-4%) reduction in the cross-sectional area of the muscle per day (Paratz & Kayambu 2011; Appleton & Kinsella 2012). These changes manifest as a reduced cross-sectional muscle area and a decline in contractile strength (Fan 2012). Just one week of bed rest has been reported to result in a profound loss of muscle strength of up to 20% (Fan 2012). In fact, significant muscle mass was found to be lost during the first 10 days of ICU admission (Puthucheary et al. 2013). Early intervention in the first few days of ICU admission to prevent these complications is therefore of paramount importance - rather than to initiate treatment to manage complications that already exist.

The early initial decline in muscle strength results predominantly from functional changes which include muscle membrane in-excitability, reduced contractile protein function, altered sarcoplasmic reticulum function, and mitochondrial dysfunction, with the longer-term weakness predominantly resulting from structural changes and the marked muscle atrophy that occurs (Appleton & Kinsella 2012; Batt, Dos Santos & Herridge 2013; Roberson et al. 2018). Owing to the changes in the mass, strength, and metabolic function of the muscle, this then affects its role as a major reservoir of amino acids, the driver of metabolic homeostasis, and the consumer of energy

substrates (Batt, Dos Santos & Herridge 2013). The skeletal muscles, particularly the type I fibres of the antigravity muscles, lose microfilaments in response to reduced physical activity (Topp et al. 2002). Skeletal muscle weakness is also frequently associated with the weakness of the respiratory muscles, resulting in difficulty in weaning the patient from mechanical ventilation or resulting in a need for reintubation (Argov & Latronico 2014).

Recent data revealed that ICU-AW may have longer-term consequences, beyond the hospitalisation phase, as it is an important contributor to post-intensive care syndrome (Hermans & Van den Berghe 2015). The syndrome includes the physical, mental, and cognitive dysfunctions that are part of the persisting disabilities which extend beyond acute hospitalisation and have a major impact on the HRQOL of the growing population of ICU survivors (Hermans & Van den Berghe 2015).

Since the outcomes of ICU patients depend to a large extent on events that take place after the original injury and the type of intervention administered to the patients on their admission to ICU, there is a need to improve on the performance and treatment of these patients during their hospitalisation (Sawyer & Leon 2010). As ICU-AW is associated with multifactorial pathophysiological processes that minimise patient exposure to corticosteroids and/or neuromuscular blocking agents, the aggressive management of sepsis and the use of insulin therapy, with careful monitoring to avoid hypoglycaemia, are all key factors for addressing ICU-AW sequelae (Fan 2012; Kress & Hall 2014). The early mobilisation of patients in the ICU has become established as an evidence-based strategy to reduce the de-conditioning and dysfunctions so commonly seen in survivors of critical illness (Kress & Hall 2014; Sosnowski et al. 2015). For these patients, rehabilitation may continue in long-term care hospitals, inpatient rehabilitation facilities, or skilled nursing facilities (Zorowitz 2016).

2.3.2 **Delirium in ICU patients**

One of the complications which results on account of critical illness and the management of ICU patients is a condition known as delirium. Delirium, which is also referred to as acute brain failure, is a temporary disturbance of attention and awareness that is characterised by an acute onset of fluctuating disturbances in consciousness, inattention, and cognitive dysfunction (Cavallazzi, Saad & Marik 2012). Delirium may manifest in several ways, including disorientation, an inability to sustain attention, impaired short-term memory, impaired visuospatial ability, a reduced level of consciousness, and perseveration (uncontrollable repetition of a particular response,

such as a word or phrase, despite the absence or cessation of a stimulus) (Weinhouse et al. 2009; Cavallazzi, Saad & Marik 2012; Lamond, Murray & Gibson 2018; LeBlanc et al. 2018).

There are three subtypes: hyperactive, characterised by hallucinations and agitation; hypoactive, in which the patient is withdrawn and inattentive; and mixed delirium, which fluctuates between the two (Svenningsen et al. 2013; Elliot 2014; Rowley-Conwy 2018). Delirium medical sequelae are still often misconstrued as a psychiatric condition and this poses a particular risk in the acute care setting where less regard may be paid to such conditions and thus crucial diagnoses could be missed (Lamond, Murray & Gibson 2018). The incidence of delirium in patients in critical care is reported to be about 32% and increases to 80% in mechanically ventilated patients (Salluh et al. 2010; Rivosecchi et al. 2016).

An awareness of factors which increase the risk for delirium in the ICU is crucial in better understanding this complex syndrome and for the design of prevention programmes (Zaal et al. 2015). Baseline risk factors, which are positively and significantly associated with delirium in the ICU, are: pre-existing cognitive impairment, the need for invasive ventilation, the use of benzodiazepines, immobility, electrolyte disturbances, sleep deprivation, older age, female sex, co-morbidities, diabetes with complications, malignancy, moderate/severe liver disease, hemiplegia/paraplegia, renal failure and a high severity of illness at admission (Weinhouse et al. 2009; Salluh et al. 2010; Barr et al. 2013, Zaal et al. 2015; Rivosecchi et al. 2016; Singh et al. 2018).

Delirium is associated with adverse events that worsen patient outcomes, which include self extubation, the removal of catheters and failed extubation (Salluh et al. 2010; Singh et al. 2018). It is associated with a longer duration of hospitalisation, resulting in an increase in patient-care costs, and it is an independent predictor of ICU and hospital mortality and of long-term cognitive impairment up to one year subsequent to a critical illness (Salluh et al 2010; Girard et al. 2010; Barr et al. 2013; Zhang, Pan & Ni 2013; Salluh et al. 2015). Profound and persistent deficits in memory, attention/concentration, and executive function negatively impact on the functional status and HRQOL of survivors of critical illness (Wilcox et al. 2013b).

Effective prevention strategies can be achieved as long as the medical team can effectively assess the condition and make appropriate diagnoses. Delirium only reflects alterations in the content of consciousness, and it should only be assessed in

patients who are sufficiently alert to respond to some questions (Singh et al. 2018). Identifying delirium in an ICU setting can be challenging because patients are frequently unable to communicate owing to the severity of their illness and/or endotracheal intubation (LeBlanc et al. 2018). The use of a validated assessment tool results in a higher level of accuracy in the diagnosis which will result in more appropriate and safer patient interventions (Svenningsen et al. 2013; Lamond, Murray & Gibson 2018). The most appropriate tool to use in assessing delirium in the ICU, even in intubated patients, must consider both the content and level of consciousness of the patient (Singh et al. 2018; Lamond, Murray & Gibson 2018). The Confusion Assessment Method for the ICU and the Intensive Care Delirium Screening Checklist have been reported as the most valid and reliable delirium-monitoring tools in adult ICU patients (Gusmao-Flores et al. 2012; Tomasi et al. 2012; Barr et al. 2013). The evaluation of delirium using a validated tool such as the Confusion Assessment Method for the ICU requires the unit to be using sedation scores such as the Richmond Agitation and Sedation Scales as standard practice, since assessing the level of sedation is a prerequisite before checking for delirium. As long as the Richmond Agitation and Sedation Scales score is between -3 to -5, an evaluation of delirium is not possible because its assessment depends on the ability of the patient to interact at least to some degree with the examiner (Singh et al. 2018). Patients with delirium are also prone to be on sedatives, especially if it is the hyperactive form of delirium which the patient is presenting with. This further affects the evaluation of these patients (Salluh et al. 2010). Therefore, in units which do not use standardised sedation scales and have a culture of over sedating or continuously sedating patients, delirium evaluation will not be feasible or, if carried out, is likely to result in falsely categorising patients as delirious. However, it is also important to note that even when the tools for identifying delirium are available, they might be inconsistently used as having a tool will not necessarily warrant its use (LeBlanc et al. 2018). It has been established that effective screening tools are available, but it remains unclear who should take responsibility for using them (Lamond, Murray & Gibson 2018). Therefore, this means that barriers related to the implementation process of delirium assessment tools peculiar to each unit have to be identified by the entire ICU multidisciplinary team and be addressed in order to improve health outcomes in patients.

While there is no strong evidence to support pharmacological interventions to treat delirium, a greater emphasis is placed on effective prevention strategies. In fact, there are two approaches to the prevention of ICU delirium, namely pharmacological and non-pharmacological interventions (Rivosecchi et al. 2016). The use of multimodal

pharmacotherapy as a component of an analgesia-first approach to spare or to minimise opioid and sedative use and optimise analgesia and rehabilitation has been recommended for ICU patients (Devlin et al. 2018). Therefore, key recommendations for delirium prevention and management include regular assessments for the presence of delirium (e.g. Confusion Assessment Method for the ICU), the use of strategies to reduce or shorten the delirium phase, improve sleep, improve wakefulness, reduce immobility and the application of an interprofessional team approach to patient care (Cavallazzi, Saad & Marik 2012; Gusmao-Flores et al. 2012; Tomasi et al. 2012; Barr et al. 2013; Lamond, Murray & Gibson 2018; Devlin et al. 2018).

2.4 EARLY MOBILISATION OF ICU PATIENTS

2.4.1 Defining the Terms "Early Mobilisation", "Physical Activity" and "Exercise"

Researchers seem to use different terminologies to describe physical activity in the ICU (e.g. early physical activity, early activity, early rehabilitation, early physical therapy, early mobility therapy, early intervention, early active exercises and early mobilisation) (Parry et al. 2017a; Doiron, Hoffmann & Beller 2018; Clarissa et al. 2019). On account of the differences in the terminology used, there are some variations in how early mobilisation is interpreted which may be related to the specific type of activities done or to the time frame used to define 'early'. The different terminologies may refer to the different concepts as studies which use the term "early rehabilitation", thus focusing more on functional activities such as rolling and bridging, whilst the studies which use "early mobilisation focus more on stepwise mobility activities starting with sitting, standing and ambulation (Clarissa et al. 2019).

A clinical review on studies that were conducted on the early mobilisation of patients in the ICU showed that the term "early mobilisation" remains undefined and encompasses a range of heterogeneous interventions that have been used alone or in combination with others (Hodgson et al 2013). To date, studies on the early mobilisation of ICU patients have reported variations in dosage timing and the progression of the rehabilitative interventions used (Tipping et al. 2017; Hodgson, Capell & Tipping 2018; Clarissa et al. 2019).

Starting with the definition of the term "early", there is a lack of consensus on the exact interval or period that is defined as 'early'. In some studies, 'early' has been defined as the interval starting with the initial physiological stabilisation and continuing through the ICU stay (Hopkins & Spuhler 2009; Mendez-Tellez et al. 2012; Paton, Lane & Hodgson 2018). This gives room for variability in practice when it comes to the exact

period to initiate early mobilisation as it depends on clinical judgement, which is too subjective and varies with the experience of the clinician. Moreover, the notion that mobilisation in the ICU is generally considered as 'early' (Taito et al. 2016) contributes to the variability in the window period defined as 'early' in most studies as some patients have a longer stay in ICU. The lack of a unified definition impacts on the generalisability of studies, their transferability when implementing early mobilisation into practice and the way in which future research is conducted (Clarissa et al. 2019).

In some studies, 'early' is referred to as the commencement of exercise rehabilitation activities within one or two days of the initiation of mechanical ventilation (Mendez-Tellez et al. 2012), whilst in others, 'early' is defined as the first two to five days of critical illness or injury (Hodgson et al. 2013; Cameron et al. 2015). In some studies, patients were only recruited if they had a LOS of at least five days to participate in ICU exercise rehabilitation sessions (Berney et al. 2009; Denehy et al. 2013; McWilliams et al. 2018). The variations in the definition of 'early' are the reason why there is no consensus on the exact period referred to as 'early' in most of the studies done in the area of early mobilisation (Cameron et al. 2015). However, a systematic review has reported that early mobilisation which is started within the first 48 hours of ICU admission is more beneficial and it is in fact the only effective intervention to improve long-term physical functioning in critically ill patients (Calvo-Ayala et al. 2013).

Because muscle loss begins within the first 24 hours of critical illness, an important window of opportunity to improve outcomes was lost in studies which implemented early mobilisation after five days or longer after the onset of the illness (Amidei & Sole 2013). This illustrates the importance of timing in the execution of the intervention in order for the benefits to be noteworthy. The timing of early mobilisation has been found to be affected by the patient's condition at admission and the ICU culture (e.g. sedation practices and the availability of protocols), which results in delays in the rehabilitation of many patients for different reasons (Hopkins, Spuhler & Thomsen 2007; Schweickert et al. 2009). McWilliams et al. (2018) argued that the patients who are mostly at risk of prolonged sequelae are often still too acutely unwell to participate in active mobilisation during the first few days of critical illness. Factors which have been reported to be associated with the delay in the initiation of early mobilisation are: traumatic injuries such as fractured lower limbs, and spinal cord or head injury; severe illness; infusions of sedatives; and coma and delirium (Mendez-Tellez et al. 2012). Cameron et al. (2015) reported that in order to ensure clinical success, the optimal timing of exercise initiation, intensity, frequency, and duration must be established.

No standardised definition for early mobilisation exists. This reflects a case of 'practice variation' that is defined as "diversity of delivery that exists among early mobilisation definitions and includes the timing of commencement, the activities and the care team" (Clarissa et al. 2019: page 4). Early mobilisation has been defined as "the intensification and early application (within the first two to five days of critical illness) of physical therapy that is administered to critically ill patients, with the patients performing volitional active exercises" (Hodgson et al. 2013: page 2). In this definition, the period referred to as 'early' is clearly defined, but what is not clear is the aspect of physical therapy in terms of the specific activities or responsibilities according to the definition.

The variability in clinical practice across units and hospitals might prevail in terms of what people regard as physical therapy in ICU. According to Hopkins and Spuhler (2009), physical therapy includes the following activities: positioning, therapeutic exercise (strength, flexibility and endurance), and functional mobility training. In other settings, the primary responsibilities of the physiotherapists in ICU mainly include respiratory therapy tasks (postural drainage, percussion, airway suctioning and weaning from mechanical ventilation), which were initially the traditional foci of physical therapy in ICU rather than tasks related to mobility (Berney, Haines & Denehy 2012; Tadyanemhandu & Manie 2016). When referring to early mobilisation, the strength of the above definition lies in the emphasis being on active exercise for ICU patients, which has led to some studies focusing on the active and functional exercises rather than on the passive exercises. (Li et al. 2013; Hodgson et al. 2013; Hodgson et al. 2014; TEAM study 2015; Koo et al. 2016; Nydahl et al. 2017). Active mobilisation is body movement that is produced by skeletal muscles and which results in energy expenditure and physiological benefits (Castro-Avila et al. 2015; Herridge et al. 2016; Parry et al. 2017a; Phelan et al 2018).

As 'early' relates to the time frame being considered, the other grey area relates to the specific definition of mobilisation. In a systematic review, mobilisation was defined as "physical activity sufficient to elicit acute physiological effects that enhance ventilation, central and peripheral perfusion, circulation, muscle metabolism and alertness and that are countermeasures for venous stasis and deep vein thrombosis" (Cameron et al. 2015: page 664). The above definition puts emphasis on physical activity that has to be performed to counteract the complications of immobility, deep sedation and mechanical ventilation. This definition provides no specifics on the type of activities

regarded as physical activity. Hence, the early mobilisation activities that can be done in line with the above definition include the following: passive and active turning, moving in bed, active assisted and active exercises, the use of cycling pedals in bed, neuromuscular electrical stimulation, inspiratory muscle training, sitting on the edge of the bed, standing, stepping in place, transferring from bed to chair (passive/active), chair exercises and walking (Morris et al. 2008; Gosselink et al. 2008; Schweickert et al. 2009; Burtin et al. 2009; Mendez-Tellez et al. 2012; Sommers et al. 2015; Taito et al. 2016).

Caspersen et al. (1985) noted that the three terms, which are physical activity, exercise and physical fitness, are often confused with one another, and that the terms are sometimes used interchangeably. However, the terms clearly describe different concepts. Physical activity is defined as any bodily movement produced by the skeletal muscles and that results in energy expenditure, with the energy expenditure measured in either kilojoules or kilocalories (Caspersen et al. 1985). In turn, physical activity can be categorised on the basis of context or setting to include leisure-time or recreational physical activity and subcomponents of sport, transportation, and occupational activity (Hills, Mokhtar & Byrne 2014). In the ICU setting, physical activity was reported to encompass mobilisation, exercise training, rehabilitation and general activities of daily living (Parry et al. 2017a). On the other hand, exercise is a subcategory of physical activity as it is a physical activity that is planned, structured, repetitive and purposive in the sense that improvement or maintenance of one or more components of physical fitness is the objective (Caspersen et al. 1985). Physical fitness is a set of attributes that people have to achieve, with the health-related components of physical fitness being cardiorespiratory endurance, muscular endurance, muscular strength, body composition, and flexibility (Caspersen et al. 1985).

Variations in the type of interventions delivered to ICU patients as ‘early mobilisation’ have been noted and this makes it difficult to assess the impact of these interventions on patient outcomes (Doiron, Hoffmann & Beller 2018). Since physical activity in an ICU setting encompasses a wide range of activities, physical activity when used to refer to ‘early mobilisation’ will result in a misunderstanding of the specific activities carried out, especially when there is no adequate reporting, thus resulting in variations in the specific interventions (Clarissa et al. 2019).

Therefore, based on the evidence, and the knowledge that most of the complications which are due to ICU admission and management start in the first week of admission

to the ICU, the definition of early mobilisation that should be used to standardise practice and research is the one by Hodgson et al. (2013). These authors emphasise the intensification of active out-of-bed early mobilisation during the first two to five days of critical illness, depending on the stability of a patient's condition (Hodgson et al. 2013). Thus, based on the information presented, the term 'early mobilisation' was used in this thesis as it incorporates a time frame and defined activities which help in standardising the intervention.

2.4.2 Execution of Early Mobilisation Activities

In the past, mechanically ventilated patients were deemed medically too unstable or were secured to life-sustaining equipment and were not considered appropriate for early physical activity (Engel et al. 2013b). However, current evidence suggests that the early mobilisation of mechanically ventilated patients is safe and feasible and may improve functional recovery at hospital discharge (Adler & Malone 2012; Mendez-Tellez et al. 2012; Titsworth et al. 2012; Li et al. 2013; Stiller 2013; Hodgson, Capell & Tipping 2018; Zhang et al. 2018). Although the majority of the studies mentioned were conducted in medical and surgical units, some evidence demonstrates that early mobilisation in neurosurgical patients can be carried out safely and results in improvements in patients' outcomes (Titsworth et al. 2012; Parker, Sricharoenchai & Needham 2013; Klein et al. 2015; Young et al. 2019). These include a decrease in the rate of neurosurgical complications; reductions in the LOS and hospital-acquired infections; reduced ventilator use, ventilator days and overall hospital costs; and an improvement in patients' cognitive, neuromuscular and psychiatric functioning (Titsworth et al. 2012; Parker, Sricharoenchai & Needham 2013; Klein et al 2015; Olkowski & Shah 2017; Karic et al. 2017). The early progressive mobilisation of patients with external ventricular drains in neurosurgical units was found to be safe and feasible as transient adverse events (e.g. headache, nausea, and transient diastolic blood pressure elevation) with mobilisation were infrequent at 6.9% and had no permanent neurological sequelae (Yataco et al. 2018). Early mobilisation should therefore not be avoided in patients after traumatic brain injury without any contraindication to early mobilisation, but strict measures (e.g. high-level monitoring devices) need to be put in place for the mobilisation to be delivered with minimal adverse events.

There is variability in the reported interventions adopted for early mobilisation such as in the exact activities performed, the progression of the activities and the frequency of treatment, which makes comparisons or the standardisation of early mobilisation

difficult (Hodgson et al. 2013; Taito et el. 2016; Tipping et al. 2017; Clarissa et al. 2019). The variations are seen in both passive mobilisation and active mobilisation (Amidei & Sole 2013).

2.4.2.1 **Passive mobilisation**

Traditional physiotherapy in the ICU included the application of a passive range of motions and methods of encouraging the patient to engage in an active range of motion movements. However, these were mainly reserved for the period subsequent to the resolution of the acute phase of the illness (Gosselink et al. 2008). The haemodynamic instability experienced by critically ill patients may persist for days or weeks, resulting in a delay in the initiation of active mobilisation (Amidei & Sole 2013). Early passive mobilisation activities might be the most appropriate activity for the critically ill patients during the period of haemodynamic instability as these exercises do not result in major changes in the vital signs (Amidei & Sole 2013). However, the level of evidence to support the use of these interventions as part of an early mobilisation programme is weak and clinical observation suggests that more than simple passive movements should be encouraged to help preserve muscle strength while the patients in the ICU are sedated and uncooperative (Hodgson et al. 2013).

The cardiovascular and respiratory responses that are elicited through sitting a patient over the edge of the bed are higher compared to the situation when a passive chair transfer is carried out. Hence, the term early mobilisation should not be the reference term when passive mobilisation is carried out in isolation (Berney, Haines & Denehy 2012; Hodgson et al. 2013; Collings & Cusack 2015). It may be safer, where possible, to have patients who are not dependent on vasoactive medications participate in exercises that involve greater levels of activation of the larger muscle groups rather than in passively driven exercises to facilitate venous return (Boyd et al. 2018).

Historically, in Australia, passive limb movements were used by physiotherapists to maintain joint range of motion and prevent soft tissue contracture (Berney, Haines & Denehy 2012). However, recent evidence suggests that physiotherapists do not routinely prescribe passive limb movements in critically ill patients owing to a lack of evidence to support the technique (Berney, Haines & Denehy 2012). Although the primary aim of passive limb movements is to improve joint mobility, a recent review indicates that it is not yet clear whether passive movements are effective for the treatment and prevention of contractures (Prabhu, Swaminathan & Harvey 2013).

Passive mobilisation can be delivered manually by the physiotherapists or via machines such as cycle ergometers or continuous passive motion machines (Amidei & Sole 2013). It is still recommended that passive mobilisation (including manual passive exercises, tilt table therapy, neuromusculoskeletal electrical stimulation, cycle ergometers and/or continuous passive motion machines) be executed for patients unable to cooperate with instructions (Asher 2013; Cameron et al. 2015). The advantages of using some of the equipment listed above which promote functional activities by the patient include the following therapeutic goals: improved balance, increased levels of consciousness, increased haemodynamic responses to upright activities, improved aerobic capacity, increased upper and lower extremity strength, and preparing for ambulation by performing pre-gait activities (Chang et al. 2004; Asher 2013; Toccolini et al. 2015; McWilliams et al. 2017a).

However, major barriers to the widespread use of technology stated above include the cost of the equipment and the risk of infection (Nelson et al. 2004; Russotto et al. 2015). Contamination may result from the clinician's hands after direct patient contact, or after touching surfaces and equipment within the patient zone, thus resulting in the cross-transmission of pathogens between patients, as long as appropriate infection control measures are not adopted (Russotto et al. 2015).

2.4.2.2 **Active mobilisation**

Active mobilisation is characterised by the following activities: rolling sideways in bed, bridging, upper and lower limb flexion and extension exercises, cycle ergometry, inspiratory muscle training, sitting on the edge of the bed, standing by the bedside, stand transfer to a chair, marching on the spot, and walking away from the bedside (Hodgson et al. 2013; TEAM study 2015; Castro-Avila et al. 2015; Sommers et al. 2015; Koo et al. 2016; van Willigen et al. 2016; Nydahl et al. 2017; Doiron, Hoffmann & Beller 2018; Phelan et al. 2018). The activities included under active mobilisation include exercises which involve axial loading, movement against gravity, and activities requiring energy expenditure by patients (Clarissa et al. 2019). Owing to the nature of these activities, which have to be executed by the patient to encourage more volitional exercise and early mobilisation, a cultural change in the practices of ICU staff is necessary in terms of the management of sedation, analgesia and delirium (Bassett et al. 2012; Bassett et al. 2015; Taito et al. 2016; Costa et al. 2017). This shows that for effective early mobilisation to be achieved, the patient should be awake and cooperative. The knowledge of the rationale for and expected benefits of rehabilitation

activities in the ICU is reported to affect the implementation of early mobilisation activities (Engel et al. 2013a; Parry et al. 2017b).

According to Clarissa et al (2019), the activities associated with actively mobilising patients depend on the goal to be achieved, and the intended goals include progressive mobility, improving impairment and allowing the patient to regain his/her independence. The progressive mobility goal is achieved through performing activities starting with positioning which is then followed by elevating the head of the bed and sitting. Thus, the activities are divided into three stages, namely sitting in bed, sitting without a back support or on the edge of the bed, and sitting out-of-bed (Li et al. 2013; Hodgson et al. 2013; Hodgson et al. 2014; TEAM study 2015; Koo et al. 2016; Nydahl et al. 2017; Clarissa et al. 2019). After the sitting position, the patient can then progress to a standing position and finally ambulation, the afore-mentioned being considered to be examples of the highest level of mobility (Berney et al. 2009; Mendez-Tellez et al. 2012; Denehy et al. 2013; Hodgson et al. 2013; Cameron et al. 2015; Lai e al. 2017; Mc Williams et al. 2018; Clarissa et al. 2019).

The goal of improving impairment is mainly concerned with the patient's level of homeostasis, particularly in the functioning of the respiratory system and in regaining muscle and joint strength. Hence, the inclusion of the following activities, namely breathing exercises, range-of-motion exercises, weight bearing and cycling is important (Gosselink et al. 2008; Asher 2013; Clarissa et al. 2019). Lastly, the goal of regaining independence is related to early mobilisation activities aimed at preparing the patient for life after hospital discharge through the incorporation of the following functional activities: transfer training, marching, balance training, rolling, bridging, staircase exercises and the three stages of sitting outlined under the progressive mobility goal (TEAM study 2015; Nydahl et al. 2017; Clarissa et al. 2019).

2.4.2.3 **Implementation of early mobilisation**

Low levels of activity appear to be common among ICU patients, even though there are studies which have shown that the interventions are safe and feasible. This results in an evidence-practice gap (Connolly et al. 2017). A very low incidence of out-of-bed mobilisation activities, with a range of 10% to 33% for patients either on mechanical ventilation or non-invasive ventilation, has been reported in the point prevalence studies and prospective observational studies done on the early mobilisation of patients in ICUs. This is in spite of the evidence that confirmed the safety and feasibility of the interventions that came to the fore in a number of research studies on

this topic (Berney et al. 2013; Nydahl et al. 2014; Jolley et al. 2017; Sibilla et al. 2017; Capell, Tipping & Hodgson 2018; Fontela et al. 2018).

It is a common trend to prevent patients on mechanical ventilation from being sat out-of-bed or from reaching the level of walking before their discharge from the ICU. Only patients with artificial airways but not on mechanical ventilation, patients on face masks, and those receiving non-invasive ventilation tend to be mobilised out-of-bed (Berney et al. 2013; Nydahl et al. 2014; Sibilla et al. 2017; Berney et al. 2018; Capell, Tipping & Hodgson 2018; Fontela et al. 2018). An explanation offered for the low observed rates of the out-of-bed mobilisation of ICU patients is that ICU staff members have not yet developed a culture of early mobility (Berney et al. 2013).

Some commonly reported predictors of out-of-bed early mobilisation activities in mechanically ventilated patients include the type of airway, the level and type of sedation used , the haemodynamic instability of the patient (Fontela et al. 2018), and the duration of the stay in ICU, with out-of-bed mobilisation being encouraged only in patients with more than a 48-hour LOS in the ICU (Berney et al. 2013; Nydahl et al. 2014; Brock et 2018; Capell, Tipping & Hodgson 2018; Fontela et al. 2018).

A detailed initial planning phase by an interdisciplinary team is essential for the implementation of a successful early mobility programme (Engel et al. 2013b; Eakin et al. 2015 Corcoran et al. 2017). Considering the complexity of the implementation of early mobilisation, individual, group, and organisational readiness is particularly relevant in the ICU setting as multidisciplinary teams work together to provide patient care, with some individuals working across the organisation (Phelan et al. 2018).

Early mobilisation is more than just an exercise as it is a complex intervention that demands interdisciplinary coordination and communication (Engel et al. 2013a; Hodgson et al. 2013; Jolley et al. 2015; Iwashyna & Hodgson 2016; Walton et al. 2016; Marshall et al. 2017; Corcoran et al. 2017). When planning and implementing early mobilisation interventions, two crucial considerations are sustainability and penetration or reach (Phelan et al. 2018) as these factors affect the implementation of the intervention (Bowen et al. 2009). Communication and positive reinforcement, associated with setting and achieving dynamic individualised goals, is beneficial to patient and staff morale, and improved patient outcomes (Parry, Nydahl & Needham 2018).

The communication of new practices or innovations follows a continuum pathway from diffusion to dissemination to implementation to sustainability (Bernhardsson et al. 2015). Diffusion is defined as the passive, unplanned, untargeted, informal spread of new practices; dissemination is the active spread of new practices to the targeted group using planned, formal strategies; implementation is the process of mainstreaming or integrating new practices within a setting, and lastly, sustainability is making an innovation routine until it reaches obsolescence (Greenhalgh et al. 2004). All these factors need to be taken into consideration during the planning phase of early mobilisation in order to ensure and record high success rates in the implementation process.

The implementation process is affected by poor descriptions of the interventions used, as reported in the clinical trials, which makes it difficult for clinicians to implement the same exercise programmes in daily practice as those initially suggested, and which, therefore, results in a challenge to translate research evidence into clinical practice (Hariohm et al. 2017). The description and prescription of early mobility activities in the ICU in the literature do not consistently provide sufficient details on the variables of exercise prescription used, including frequency, intensity, time, type, volume and the progression of the exercise (Amidei & Sole 2013; de Queinoz et al, 2018). This makes it difficult for clinicians to replicate and implement exercise interventions that are associated with improved patient outcomes (Hariohm et al. 2017).

In a systematic review done on the evaluation of descriptions of active mobilisation protocols, only 66.7% of the randomised controlled trials included in the review described how the exercise programme was fostered, in spite of the fact that every exercise “dose” should have contained the following components: frequency, intensity, time, type, volume and progression (de Queiroz et al. 2018). Standardised early mobilisation programmes that are based on the therapeutic parameters of duration, intensity and frequency are critical in the field of intensive care therapy in order to demonstrate improved patient outcomes from early mobilisation (Amidei & Sole 2013). In order to allow for the replication of the interventions conducted in clinical trials, there is a need for the exercise programme implemented to give a detailed description covering all the aspects of a well-tested exercise programme. Besides replication, such interventions would also allow for comparisons to be made on the impact of the exercise programmes. .

In order to determine safety considerations in conducting either in-bed activities or out-of-bed activities with patients in ICU, Hodgson et al. (2014) developed a standard traffic light system to assist clinicians in evaluating safety criteria for the following categories: respiratory, neurological, cardiovascular systems and other relevant factors. The red light would indicate the need for caution as the risk of an adverse event for out-of-bed activity was high, with the yellow light indicating that out-of-bed mobilisation was possible, but only after further consideration and/or further discussions among the ICU multidisciplinary team, while the green light would indicate that the patient would be safe to be mobilised (Hodgson et al. 2014).

The unavailability of an objective criterion that indicates the level of safety of an intervention is believed to be the other obstructive factor working against the delivery of early mobilisation to ICU patients. Furthermore, with the introduction of safety criteria based on the traffic light system (Hodgson et al. 2014), however, the translation of the safety criteria into practice remains poor as the physiotherapeutic practices for early mobilisation remain conservative and are rarely carried out on mechanically ventilated patients (Capell, Tipping & Hodgson 2018). The provision of a detailed exercise programme covering all the components of exercise prescription and safety criteria used for early and out-of-bed mobilisation should be provided more often in all clinical trials to assist with the translation of the research evidence into clinical practice for physiotherapists and other ICU clinicians.

2.5 BARRIERS TO THE EARLY MOBILISATION OF PATIENTS IN THE ICU

Implementing early mobilisation in intensive care is challenging, and a detailed knowledge of factors that may hinder or facilitate implementation is essential for success (Phelan et al. 2018). A broader understanding of the specific barriers to early mobilisation in the ICU setting is needed as such data are relevant to inform changes in clinical practice, service delivery, policy and research, all areas that aim to enhance early mobilisation levels and survivorship outcomes (Parry et al. 2017a; Goddard et al. 2018). Although the feasibility and safety of implementing early mobilisation are well documented, translating the available knowledge into clinical practice remains a serious problem, resulting in an evidence-practice gap (Vollman 2010; Barber et al. 2015; Anekwe et al. 2017; Berney et al. 2018; Goddard et al. 2018).

In an attempt to reduce the evidence-practice gap by reducing the time lag to effectively deliver evidence-based patient care, it is important to consider the contextual factors in that specific clinical area which may impact on an effective change in practice to

promote early mobilisation (Parry et al. 2017b). Barriers to early mobilisation are largely influenced by the differences in the roles of each discipline during mobilisation, and the training and expertise of the professionals. There is a high level of variability among the clinicians operating in the maximum activity area that they deem appropriate for a given critically ill patient (Anekwe et al. 2017; Clarissa et al. 2019). Based on the clinician's background, the level of experience and the type of ICU setting that they work in, the reported barriers differ (Barber et al. 2015; Hoyer et al. 2015; Goodson et al. 2018; Clarissa et al. 2019). Potential barriers to the delivery of early mobility are diverse, multifactorial and may exist in different categories, the latter including patient-level, institutional-level, and clinician-level barriers (Dubb et al. 2016; Parry et al. 2017a; Parry et al. 2017b; Anekwe et al. 2017; Goddard et al. 2018).

2.5.1 **Patient-Related Barriers**

Patient-related barriers encompass a number of physical and psychological factors, as well as the safety factors in relation to the early mobilisation of patients in ICU. Reported barriers in the context of physical factors include the diagnosis of the patient on admission, the severity of the illness (significant), the age of the patient (aged), poor nutritional status, an increased body mass index, weakness, fatigue, leaking wounds, an open abdomen, diarrhoea and the presence of comorbidities (Nydahl et al. 2014; Castro et al. 2015; Bakhru et al. 2016; Boehm, Vasilevskis & Mion 2016; Dubb et al. 2016; van Willigen et al. 2016; Costa et al. 2017; Parry et al. 2017b; Fontela et al. 2018). Other factors which were found to negatively influence the ability of a patient to engage in early mobilisation activities include sedation, endotracheal intubation, delirium, inadequate analgesia, agitation, drowsiness, patient refusal, lack of motivation, anxiety, and a low level of consciousness (e.g. Glasgow coma scale score) (Jolley et al. 2014; Dubb et al. 2016; Anekwe et al. 2017; Berney et al. 2018; Boehm, Vasilevskis & Mion 2016; Capell, Tipping & Hodgson 2018; Fontela et al. 2018).

In a study done in Australia with a group of ICU medical, nursing and physiotherapy staff (Berney et al. 2018), a decision-tree analysis showed that the presence of an endotracheal tube and the level of sedation were the only discriminative variables that predicted the unsuitability of a patient for out-of-bed rehabilitation. Patients with tracheostomies or non-invasive ventilation seem to be easier to mobilise because of the small amount of equipment needed, the higher levels of alertness and cooperation, and the lower risk of airway complications during mobilisation (Fontela et al. 2018).

Another significant challenge in respect of early mobilisation is safety with respect to the type of activity performed and the patient's ability to tolerate movement on a haemodynamic level (Vollman 2010; Hodgson et al. 2013; Jolley et al. 2014; Nydahl et al. 2014; Harrold et al. 2015; Capell, Tipping & Hodgson 2018; Fontela et al. 2018; Hodgson, Capell & Tipping 2018). Haemodynamic instability has been reported to be the major barrier to the early mobilisation of ICU patients, especially when they are still on mechanical ventilation (Engel et al. 2013a; Berney et al. 2013; Nydahl et al. 2014; Castro et al. 2015; Dafoe et al. 2015; Harrold et al. 2015; Hodgson et al. 2014; Holdsworth et al. 2015; TEAM study 2015; Parry et al. 2017a; Brock et al. 2018; Capell, Tipping & Hodgson 2018; Fontela et al. 2018). The four most assessed individual vital signs under haemodynamic stability include blood pressure, heart rate, respiratory rate and the oxygen saturation levels (Pinsky, Clermont & Hravnak 2016). Fluctuations of the vital signs in relation to body movement are normal and occur during any procedure such as the turning of the patient for skin protection. Thus, the severity of a change in vital signs should be judged objectively by the team on an individual patient basis (Stiller et al. 2004; Vollman 2012; Engel et al. 2013b; Brissie et al. 2017). The available evidence shows that clinicians start early mobilisation activities once a patient's cardiorespiratory status has stabilised, and they are conscious and cooperating well (Berney et al. 2013; Hodgson et al. 2014; Nydahl et al. 2014; Harrold et al. 2015; Holdsworth et al. 2015; Anekwe et al. 2017; Parry et al. 2017a; Brock et al. 2018). A recent study showed that early, goal-directed mobilisation initiated within 72 hours of ICU admission is both feasible and effective in patients presenting with impairment of consciousness (Glasgow coma scale score of less than 8) (Schaller et al. 2019).

Understanding the perceived barriers to early mobilisation specific to the type of patients and ICU is important because there may be barriers unique to the specific group of patients and the setting (Hoyer et al. 2015). Myocardial infarction in the last 24 hours, cardiac patients who are dependent on vasoactive medication, coagulopathy, thrombocytopenia and delirium were some of the conditions reported to favour more bed-bound activities rather than out-of- bed activities (Anekwe et al. 2017). There is evidence that shows that it is safe to commence exercise rehabilitation in ICU patients who are dependent on vasoactive medication and that dependency on such medications should not delay exercise rehabilitation (Boyd et al. 2018).

Neurological and/or orthopaedic conditions have been reported to contribute to immobility in most patients in ICU (Brock et al. 2018; Capell, Tipping & Hodgson 2018). Bed-bound activities were reported to be conducted mostly in patients with traumatic

injuries, which include head injury, with normal or increased intracranial pressure (ICP), and stabilised spine injury, versus out-of-bed early mobilisation activities (Anekwe et al. 2017). It is important to note that most of the evidence about early mobilisation is mainly from general medical and surgical ICU environments rather than from neurological/neurosurgical or trauma ICU settings (Klein et al. 2015; Olkowski & Shah 2017). Few studies have been conducted on determining early mobilisation practices in patients with neurological conditions or injuries and this has made it difficult for clinicians to implement early mobilisation in neurological ICUs as patient presentation and management differ from those for the other types of patients (Olkowski & Shah 2017).

Safety during mobilisation in patients with neurological injuries can be compromised by hemiparesis, hemiplegia, cognitive impairment, increased ICP, low levels of cerebral perfusion, a high fall risk and impulsivity, and the dislodgement of cerebral monitoring or other indwelling devices (Anekwe et al. 2017; Young et al. 2019). However, some evidence demonstrates that an earlier and a higher degree of mobilisation in neurological patients can be carried out safely through the use of monitoring devices, thus enabling reviews of the patient's activities at an individual level and being associated with improved patient outcomes (Titsworth et al. 2012; Karic et al. 2015; Klein et al. 2015; Karic et al. 2017; Olkowski & Shah 2017). Since early mobilisation in neurological ICU presents unique challenges for the multidisciplinary team, there are recommendations and considerations which have been outlined to assist clinicians in decision-making as to when to mobilise these patients (Brissie et al. 2017; Olkowski & Shah 2017).

Severely injured patients with multiple trauma areas, including traumatic brain injury and associated limb fractures, represent a highly challenging and vulnerable patient population in the ICU (Flierl et al. 2010), and the timing for surgery for the fixation of fractures related to the pelvis and lower extremity is of paramount importance for success in the implementation of early mobilisation (Lewis & Waddell 2016). Orthopaedic trauma of the lower extremity and pelvis is common, and aggressive early mobilisation programmes, including range-of-motion and weight-bearing exercises, are key to the return of the patient to their previous level of function. However, these types of intervention may place the fracture fixation or soft tissue repair at risk for failure (Hoyt et al. 2015).

The immobility which is experienced on account of the fractures results in serious medical complications such as deconditioning, venous thromboembolic events, catheter-associated infections, and pneumonia. These have resulted in paradigm shifts with some allowance being made for controlled but appropriately aggressive early mobilisation activities and range-of-motion with progressive weight-bearing exercises, combined with multimodal pain control and psychosocial support (Hoyt et al. 2015).

2.5.2 **Organisation-/Institution-Related Barriers**

Apart from the safety of the patient, there are institutionally related barriers which exist. These barriers are related to the culture of the institution or the staff working in a specific ICU and include the prescription of bed rest, the need to have a physician referral for early mobilisation, the lack of equipment, the unavailability of clinical practice guidelines (CPGs) on early mobilisation, sedation and delirium assessment, the lack of space in the unit for mobilisation, early patient discharge from the unit, and the lack of an ICU champion who advocates for early mobilisation in all eligible patients (Barber et al. 2015; Dubb et al. 2016; Anekwe et al. 2017). The cultural factors are sometimes the major reasons why very low early mobilisation practices have been reported in most units even though studies have shown that early mobilisation is safe and feasible in critically ill patients who are also mechanically ventilated (Barber et al. 2015; Bakhru et al. 2016: Nydahl et al. 2017).

Delayed physiotherapy consultation or traditional staff practice patterns were mentioned to be barriers to early mobilisation in a quality-improvement project which was conducted in the USA (Engel et al. 2013a). As one example, the authors mentioned the need for a doctor's instruction before the early mobilisation of patients could be initiated. The intervention implemented to overcome this barrier was to have prompts for physiotherapy referrals for early mobilisation as part of the physician's order form (Engel et al. 2013a). Ordering early mobilisation should not be restricted to physicians, however, as there is the risk of delays in referrals (Bakhru et al. 2016). The problem of referral is strongly linked to the lack of awareness in physicians or intensivists of the benefits related to the early mobilisation of patients in ICU settings. In some units, where early mobilisation of patients is prioritised, the problem of a rapid staff turnover may result in the unsustainability of the culture of early mobilisation unless educational strategies are put in place to train new staff (Engel et al. 2013a; van Willigen et al. 2016). This then justifies the need to have an ICU champion and discipline-specific leader who is not only a key person in providing patient care, but

also a strong advocator of early mobilisation through the re-training of other colleagues, the standardisation of practices in ICU and the promotion of the early mobilisation of eligible patients (Engel et al. 2013a; Barber et al. 2015; Bassett et al. 2015; Eakin et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Parry et al. 2017b; Goddard et al. 2018; Parry, Nydahl & Needham 2018).

As the early mobilisation of patients in ICU requires a team of people to be involved, there may be reluctance on the part of the hospital administrators to invest in recruiting more people involved in early mobilisation and the purchase of additional equipment to promote the safe mobilisation of ICU patients. This potential lack of commitment from hospital management may result in a lack of time to implement early mobilisation practices, an increased workload, low staffing levels, and poor rehabilitation resources being the major barriers to early mobilisation and also affecting the sustainability of the intervention when implemented (Ross and Morris 2010; Bassett et al. 2015; Engel et al. 2013a; Hodgson et al. 2013; Jolley et al. 2014; Bakhru et al. 2015; Boehm, Vasilevskis & Mion 2016; van Willigen et al. 2016; Parry et al. 2017a, Parry et al. 2017b).

The barriers, which include increased workload and inadequate time, are strongly associated with staff levels and the available staff will need to have good time-management skills to meet the increased demands (Eakin et al. 2015). Also, another way to address the issue of lack of time and the competing priorities when it comes to the implementation of early mobilisation, is for rehabilitation in the ICU to be seen as the responsibility of the entire multidisciplinary team and not just that of a single discipline (Engel et al. 2013a; Marshall et al. 2017; Walton et al. 2016; Corcoran et al. 2017; Parry et al. 2017b).

The presence of unnecessary lines and the locational choices of such lines can limit the level of mobilisation achieved with any patient (Leditschke et al. 2012; Barber et al. 2015; Nydahl et al. 2014; Castro et al. 2015; Koo et al. 2016; Hodgson, Capell & Tipping 2018). Vascular access devices sited at the femoral region have been reported to be a barrier for mainly out-of-bed early mobilisation activities (Leditschke et al. 2012; Barber et al. 2015). The presence of the pulmonary artery catheter, the intra-aortic balloon pump, the femoral central venous catheter, the femoral dialysis line, the continuous renal replacement therapeutic device, the external ventricular drains, the extra-corporeal membrane, and the oxygenation tubing on a patient have been reported to favour bed-bound activities rather than out-of-bed activities in patients

(Anekwe et al. 2017; Young et al. 2019). Hodgson et al. (2014) pointed out that the venous and femoral catheters pose a low risk in respect of an adverse event for both in-bed and out-of-bed activities, and according to each ICU's protocol and procedures, early mobilisation activities can proceed as usual in patients with these lines.

The lack of rehabilitation equipment in the ICU has been cited as a major barrier to the early mobilisation of patients owing to the associated increased effort and burden of work it creates (Barber et al. 2015; Bassett et al. 2015; Castro et al. 2015; Dafoe et al. 2015; Bakhru et al. 2016; Koo et al. 2016; Parry et al. 2017b). The equipment reported to support early mobilisation activities in ICUs includes the bedside chairs with armrests, adjustable beds, cycle ergometry, neuromuscular electrical stimulation devices, a ceiling track lift, an air-assisted transfer system, transport ventilators, a dynamic tilt table and portable patient monitoring devices (Needham, Truong & Fan 2009; Mendez-Tellez et al. 2012; Asher 2013; Engel et al. 2013a; Hodgson et al. 2013; Nydahl et al. 2014; Toccolini et al. 2015; van Willigen et al. 2016; Brissie et al. 2017; McWilliams et al. 2017a). The equipment used should ensure the safety of both the patient and the clinician during the implementation of the early mobilisation activities (Needham, Truong & Fan 2009).

Neuromuscular electrical stimulation therapy causes the passive contraction of muscles through low-voltage electrical impulses, and this may play an important role in preventing and treating ICU-acquired neuromuscular complications (Needham, Truong & Fan 2009; Mendez-Tellez et al. 2012; Connolly et al. 2016). The Sara Combilizer® (Arjo Huntleigh) is a combined chair and tilt table which can be made completely flat to allow for the transfer of the patient on and off via a sliding board, apart from allowing for the standing position to be achieved (Asher 2013; McWilliams et al. 2017). A tilt table can allow partial weight bearing in a gravity-reduced environment for patients who require a graded transition from bed rest to a supporting mechanism for their full body weight (Mendez-Tellez et al. 2012). The use of a tilt table for ICU patients has been found to be safe and to be associated with a significant reduction in the time required to mobilise. It results in successfully in mobilising patients with higher levels of organ failure, and it improves their levels of consciousness and their respiratory muscle strength (maximum inspiratory pressure) (Asher 2013; Toccolini et al. 2015; McWilliams et al. 2017a).

Hospital beds that can be converted into a chair position allow patients to experience upright sitting with a minimum amount of movement and disruption to their lines, which

is often desirable when the patient is lethargic or when the physiotherapist is concerned about the patient's haemodynamic stability (Asher 2013). The available equipment to assist with transfer and mobilisation should be strictly examined for weight restrictions as some of the equipment should not be used on patients with a body mass index of more than 35 kg/m^2 (van Willigen et al. 2016).

2.5.3 **Clinician-Related Barriers**

Several clinician-related barriers have been cited to affect the rate of early mobilisation of patients in units. Reported barriers related to the ICU clinicians include limited staffing, the fact that the clinicians do not consider early mobilisation to be a top priority and that some individuals do not support early mobilisation, the lack of communication and coordination among the ICU team, limited awareness as to when early mobilisation should be initiated, the absence of a decision-making authority regarding the initiation of early mobilisation, conflicting perceptions on early mobilisation, safety concerns about early mobilisation related to both the patient and the clinician, and inadequate training to facilitate safe early mobilisation practice (Garzon-Serrano et al. 2011; Engel et al. 2013a; Barber et al. 2015; Cameron et al. 2015; Eakin et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Anekwe et al. 2017; Fontela, Forgiarini Jr & Friedman, G., 2018; Goddard et al. 2018; Hodgson et al. 2018).

Some of the barriers highlighted above have been further classified as process-related barriers and these include the lack of planning and coordination, undefined roles and responsibilities, delayed daily screening or none at all of patients for eligibility criteria, and lastly, safety issues for clinicians (stress and low back injuries) (Boehm, Vasilevskis & Mion 2016; Dafoe et al. 2015; Dubb et al. 2016; Parry et al. 2017a).

The priority placed on early mobilisation may be a reflection of the ICU clinicians' knowledge of the importance of early mobilisation or the interpretation of the existing evidence on the benefits of early mobilisation (Barber et al. 2015; Anekwe et al. 2017; Parry et al. 2017b; Hodgson et al. 2018). The effect of experience on the physiotherapists' clinical decision making in acute-care settings has been highlighted (Stiller et al. 2004; Smith, Joy & Ellis 2010; van Willigen et al. 2016; Parry et al. 2017b; Goodson et al. 2018), with key factors underpinning the transition from the novice to the expert physiotherapist being the motivation to provide optimal care, the critical assessment of new knowledge, the use of reflection to evaluate their experiences with the patients, and the progressive increase in self-confidence (Smith, Joy & Ellis 2010). This might explain why the perceived barriers to mobilisation are usually higher for

junior staff with less experience as opposed to those pertaining to the experienced staff (Hoyer et al. 2015; van Willigen et al. 2016; Goodson et al. 2018). The variations seen between a novice and a cardiorespiratory expert are due to the differences which exist in the organisation of the knowledge base and the use of cognitive strategies, since clinicians working in ICU are often dependent on their own experience when making decisions regarding individual patient management (Plani et al. 2017).

The timing of the initiation of early mobilisation plays an important role (Jolley et al. 2014; Cameron et al. 2015; Castro-Avila et al. 2015; TEAM study 2015) as most studies which do not show the benefits arising from early mobilisation often commence with the intervention at a later stage during the patient's ICU stay (five to seven days from ICU admission) (Denehy et al. 2013; Morris et al. 2016, McWilliams et al. 2018), whereas those studies which showed benefits started sooner (Bailey et al. 2007; Morris et al. 2008; Schweickert et al. 2009; Schaller et al. 2016).

A lack of communication and coordination among the members of the multidisciplinary team in the delivery of patient care may hinder the ability to maintain early mobilisation as a priority of care (Ross and Morris 2010; Balas et al. 2013; Barber et al. 2015; Eakin et al. 2015; Dafoe et al. 2015; Bakhru et al. 2016; Costa et al. 2017; Parry et al. 2017a; Hodgson et al. 2018). Discord between the ICU team in terms of what management should be carried out in terms of the patient at any specific given time affects the delivery of early mobilisation (Goddard et al. 2018). The fragmented care of patients in ICU which results from poor communication skills among the team members may make it difficult to implement early mobilisation activities as some team members might be concerned that active exercise therapy might cause an immediate adverse event (Goddard et al. 2018). A lack of coordination, communication and accountability then result in mobilisation orders not being carried out (Barber et al. 2015).

In a study done by Hoyer et al. (2015) in USA, nurses as opposed to physiotherapists, reported significantly higher perceived barriers (e.g. not enough time to mobilise patients, lack of training and comfort) to mobilising hospitalised patients In another study done in Canada, physiotherapists were 2.5 times more likely to feel well trained and well informed as opposed to physicians in the implementation of the early mobilisation of patients in ICU (Koo et al. 2016). This is not surprising because physiotherapists are specifically trained to mobilise patients and do so as an essential component of their daily clinical work (Asher 2013; Hodgson et al. 2013; Hoyer et al.

2015). On account of this, the professional background of an ICU clinician can influence his/her perception of the early mobilisation of patients in ICU.

In most units, there is a shortage of competent staff to safely perform out-of-bed patient mobilisation as this is a highly demanding task which requires extensive time to plan for its execution, enough members of staff with the relevant clinical skills and the availability of suitable equipment (Barber et al. 2015; Jolley et al. 2014; Iwashyna & Hodgson et al. 2016). Increased numbers of staff in ICU or the introduction of a new staff member dedicated to ICU mobilisation, may improve the rates and the levels of active exercise therapy and out-of-bed mobilisation (Engel et al. 2013a; Bassett et al. 2015; van Willigen et al. 2016).

Besides the shortage of staff in the ICU, the high turnover rate of ICU staff also has a significant impact on the sustainability of the early mobilisation interventions. The training of the new members of staff should be carried out meticulously and without exception and early mobilisation should be advocated so that it remains the preferred standard of care, irrespective of the changes in staff (Engel et al. 2013a; van Willigen et al. 2016).

2.6 FACILITATORS TO THE EARLY MOBILISATION OF PATIENTS IN THE ICU

For clinicians who have implemented early mobilisation activities for patients as a standard of care in their units, various enabling factors have been reported. The necessary components required for the successful implementation of an early mobilisation programme and the sustainability of the programme include buy-in from the ICU staff, multidisciplinary teamwork and effective communication (Engel et al. 2013a; Engel et al. 2013b; Bassett et al. 2015; Eakin et al. 2015; Jolley et al. 2015; Dubb et al. 2016; Iwashyna & Hodgson 2016; Corcoran et al. 2017). Facilitators to early mobilisation include strong leadership, increased staff availability, the creation of an early mobilisation culture among the staff in the ICU, the structuring and moulding of a mobility team, multidisciplinary team planning, positive staff attitudes, dedicated time for rehabilitation in ICU, good liaising within the ICU multidisciplinary team involving the patients' families in the early phases of rehabilitation, the development of institution-based formal protocols to guide physical rehabilitation in ICU, the availability of adequate resources, and staff training (Mendez-Tellez et al. 2012; Hanekom, Louw & Cortzee 2012; Barber et al. 2015; Eakin et al. 2015; Holdsworth et al. 2015; Goddard et al. 2018).

2.6.1 **Patient-Related Facilitators**

The patient-related facilitators of early mobilisation in ICU include communication with the patient about the importance of early mobilisation, the clinician's expectations, reassurance and encouragement of the patient during the implementation phase of the intervention, building a routine for the patient, and the documentation of goals on white boards to enhance overall communication (Boehm, Vasilevskis & Mion 2016). A high score on the Glasgow coma scale, that the patient be a male and that the illness be less severe, as measured through standardised severity scores, are major predictors of the successful implementation of active mobilisation, including out-of-bed activities (Brock et al. 2018). Considering the physiological and psychological consequences highlighted as barriers in the previous sections, the facilitators to promote early mobilisation should include the limited use of patient sedation, assessments of and treatments for delirium, the promotion of sleep in ICU patients and the administration of analgesia before mobilisation for optimal pain management (Taito et al. 2016; Vincent et al. 2016; Berney et al. 2018; Boyd et al 2018; Fontela et al. 2018; Goddard et al. 2018). Haemodynamic stability and having a patient who is awake, alert and following commands, are some of the reported facilitators to the early mobilisation of patients in ICU (Holdsworth et al. 2015).

2.6.2 **Organisation/Institution-Related Facilitators**

Enhancing patient mobilisation is widely considered to be the most challenging part of rethinking critical care patient management, as it involves the greatest shift in culture and daily processes (Bassett et al. 2015). A cultural change may be difficult to achieve, but for early mobilisation practices to be facilitated, there is a need to formulate strategies to improve ICU teamwork, link interventions with patient-centred outcomes, and to reorganise the management practices that interfere with early mobilisation (Needham & Korupolu 2010; Engel et al. 2013b). Making patient mobilisation routine through the use of early mobilisation protocols and guidelines has been shown to increase the rate of early mobilisation in an ICU, thereby reducing the morbidity related to critical illness as a factor in the daily assessments by the entire multidisciplinary team to determine protocol administration (Berney et al. 2013; Hanekom, Louw & Coetzee 2012; Barber et al. 2015; Bassett et al. 2015; Harrold et al. 2015; Jolley et al. 2015; Bakhru et al. 2016). The presence of a mobility protocol is associated with reports of delivery of activity to higher-severity patients and higher-level activities for mechanically ventilated patients (Berney et al. 2013; Hanekom, Louw & Coetzee 2012; Barber et al. 2015; Harrold et al. 2015; Jolley et al. 2015; Taito et al. 2016; van Willigen et al. 2016; Goddard et al. 2018).

It has been recommended that having a tool as a guideline or protocol in the form of a flow diagram in clinical practice, and detailing patient assessments prior to early mobilisation may be useful in assisting with staff training and the provision of a standardised pathway for clinical decision making, and may serve to mitigate some of the perceived work stress associated with the early mobilisation of patients (Hanekom et al. 2011; Jolley et al. 2014; Hodgson, Capell & Tipping 2018). The availability of an early mobilisation protocol or guideline also deals with the problem of variability in clinical practice as it addresses the concerns of low prioritisation, safety concerns and poor communication in terms of the daily patient reviews (Barber et al. 2015). For early mobilisation to be successfully implemented, it is a prerequisite that sedation be minimised, delirium assessment and management be thoroughly conducted, and pain be controlled (Taito et al. 2016; Boyd et al. 2018).

In the light of sedation, pain and delirium which have been considered to be some of the most commonly-reported barriers to early mobilisation, one of the strategies which was observed to facilitate the early mobilisation of patients in ICU was the implementation of protocols or guidelines into routine ICU care procedures across regions so that patients can be awake, free of pain and able to participate in physical activity (Balas et al. 2013; Bassett et al. 2015; Vincent et al. 2016; Hodgson, Capell & Tipping 2018). Prioritising early mobilisation may encourage ICUs to move away from deep sedation by providing an additional rationale for changing practice (Denehy, Lanphere & Needham 2017).

The Awakening and Breathing Coordination, Delirium monitoring/management and Early exercise/mobility (ABCDE) bundle is an evidence-based, inter-professional, multicomponent strategy for minimising exposure to sedation use, reducing the duration of mechanical ventilation, and managing ICU-acquired delirium and weakness (Morandi, Brummel & Ely 2011; Balas et al. 2013; Costa et al. 2017). After the introduction of the ABCDE bundle, Vincent et al. (2016) also introduced an integrated and adaptable approach to achieve light sedation that could be initiated early in the treatment process, the delivery of effective analgesia, and the practice of a patient-centred focus through Early Comfort using Analgesia, minimal Sedatives and maximal Humane care (eCASH). The recently updated guideline to recommend best practices for managing pain, agitation/sedation, delirium, immobility and sleep (PADIS) so as to improve clinical outcomes in adult ICU patients (Barr et al. 2013; Devlin et al. 2018) is also worthy of mention.

However, the successful implementation of these protocols depends on a variety of factors. In a study done by Boehm and colleagues (2016), five major interrelated domains (e.g. organisational facets, labour quantity, labour quality, tasks, physical environment) were noted to affect provider attitudes (e.g. internal disposition and way of thinking) and this subsequently affected adherence to protocol. In a study done to determine the barriers to delivering the recommended ABCDE bundle, it was found that its implementation was complex as clinicians and administrators face many challenges when trying to provide high quality care to patients in the ICU (Costa et al. 2017).

Early mobility, which is the last level of the bundle, can only be successfully implemented when the other four components of the bundle have been successfully implemented. Moreover, successful implementation of the bundle has been shown to be affected by other factors, which include the performance of daily multidisciplinary ward rounds, the organisational characteristics of the ICU, and an ICU culture that focuses on quality improvement (Balas et al. 2013; Carrothers et al. 2013). Ease of use of the guidelines in real-life clinical practice must always be a major consideration if successful implementation is to occur (Kennedy, Leathley & Hughes 2010). Boehm and colleagues (2016) reported that when it comes to the implementation of bundles such as the ABCDE, activities that can be carried out by only one health care professional are more likely to be successfully implemented, whereas those requiring coordination among multiple professionals and the patient, such as early mobilisation, are more challenging and are often reluctantly executed. However, implementation interventions aimed at improving protocol implementation must address individual clinician- and patient-related barriers and emphasise the intervention-specific and contextual issues surrounding the implementation of a multicomponent clinical intervention (Costa et al. 2017).

Other facilitators to early mobilisation in terms of organisational change include having access to a dedicated mobility team, good leadership, including a champion who would assist with multidisciplinary team planning and meetings, resources to provide for adequate staff training and equipment, effective feedback on the success and failure of early mobilisation activities, the successful mentorship of junior staff by senior physiotherapists, setting daily goals for patients, the integration of the family into a caregiving role in the ICU, and the services of a permanent, non-rotational physiotherapist in ICU (Der 2009; Gurses and Xiao 2006; Barber et al. 2015; Bakhru

et al. 2016; Eakin et al. 2015; Boehm, Vasilevskis & Mion 2016; Schaller et al. 2016; Goddard et al. 2018; Parry, Nydahl & Needham 2018). It seems plausible that with the integration of families in the performance of supervised exercises and their encouragement of their loved one, the patient will have more opportunities to participate in early mobility practices (Barber et al. 2015).

2.6.3 **Clinician-Related Facilitators**

It is important to note that the implementation of interventions such as early mobilisation and the effecting of changes in clinician behaviour towards the adoption of new interventions may be facilitated through clinical reasoning (Michie 2008; Foy et al. 2011). Strategies to overcome resistance to change include staff buy-ins through the belief that early mobilisation is beneficial, the designation of physician leaders or champions who advocate for early mobilisation, ensuring that the rehabilitation personnel are sufficient in number to facilitate early mobilisation, the provision of continuous feedback to the team in question regarding the impact of early mobilisation on patient outcomes, and finally the addressing of concerns around mobility and safety (Bassett et al. 2015; Eakin et al. 2015; Boehm, Vasilevskis & Mion 2016).

There is a need to provide insight into the factors that should be used to inform research, new clinical services and policies in an attempt to improve ICU practices (Parry et al. 2017b). Key strategies to facilitate rehabilitation in ICUs include the addressing of the educational needs of the multidisciplinary team concerning rehabilitation in the ICU, both at the level of entry into practice and also at the level of upgrading clinicians in the workforce in terms of skills training, mentorship and support for junior clinicians to improve their confidence and expertise (Bevan 2010; Engel et al. 2013a; Kislov et al. 2014; Cameron et al. 2015; Eakin et al. 2015; van Willigen et al. 2016; Parry et al. 2017b). Strategies to improve the training and education of the multidisciplinary team may include the development of mobility guidelines, the utilisation of evidence-based tools to standardise assessment processes, gaining access to dedicated inter-professional leaders and mentors, the availability of e-learning packages, the development of newsletters; and invitations being extended to speakers to provide their views on successful models of rehabilitation in other ICU settings (Needham & Korupolu 2010; Bassett et al. 2015; Eakin et al. 2015; Parry et al. 2017a; Parry et al. 2017b). Early mobilisation programmes can then be sustained through implementing multidisciplinary rounds and continually reinforcing the implementation of early mobilisation activities on all eligible patients (Der 2009; Bassett et al. 2015; Bakhru et al. 2016).

Physiotherapists are members of the ICU team, who are responsible for and instrumental in implementing mobilisation plans, prescribing exercise and making recommendations for progression in conjunction with other team members (Gosselink et al. 2008; Asher 2013; Engel et al. 2013a; Hodgson et al. 2013; van Willigen et al. 2016; Parry et al. 2017a). The physician and nurse should be responsible for facilitating the timely delivery of early mobilisation practices through early referrals, supporting the work of breathing of the patient, minimising pain, and temporarily disconnecting feeding tubes and other patient attachments where applicable (Engel et al. 2013a; Hodgson et al. 2013; Jolley et al. 2015).

For early mobilisation to be successful in the ICU setting, the need for leadership both at a broader unit level and at the individual discipline level is evident (Engel et al. 2013a; Hodgson et al. 2013; Barber et al. 2015; Bassett et al. 2015; Eakin et al. 2015; Jolley et al. 2015; Marshall et al. 2017; van Willigen et al. 2016). The advantages of having a leader dealing with the discipline issues (e.g. a permanent physiotherapist) are significant. Such a person who serves as the leader in the unit and does not rotate, who standardises the clinical practices, extends the information regarding ICU-related matters, formulates and implements practice guidelines, and ensures that the early mobilisation programmes are sustainable, would be invaluable. Therefore, for the successful implementation of an early mobilisation programme, the need for a driving force on the unit, a patient-coordinator at the patient's bedside, modern, readily-available equipment, and a conducive work environment (i.e. availability of education, materials and finances) (Klooster, dos Reis Miranda & Spronk 2017), cannot be overlooked.

2.7 TRANSLATION OF THE RESEARCH INTO CLINICAL PRACTICE

Translating research into clinical practice can be challenging, especially in the complex ICU environment, thus narrowing the gap between evidence and practice (Needham & Korupolu 2010; Elliot 2014). It is being recognised increasingly that the translation of research evidence into practice has to be supported by the development of internal capacity in healthcare organisations to engage with and apply research findings, with capacity building being seen by many as one of the key aims in the acquisition of knowledge (Ward, House & Hamer 2009; Kislov et al. 2014; Cameron et al. 2015; Eakin et al. 2015).

Different implementation strategies have been highlighted to engage clinicians to participate in the early mobilisation of ICU patients. A thorough assessment and engagement of a multidisciplinary team before the implementation of an early mobilisation programme are key to its success, and positive outcomes can be noted by improving job satisfaction and changing the culture of a hospital unit (Engel et al. 2013b; Eakin et al. 2015 Corcoran et al. 2017). The first implementation strategy should focus on a team-centred approach by collaborating with role players and engaging multiple disciplines to define their roles and evaluate the implementation process (Leditschke et al. 2012; Engel et al. 2013b; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; Iwashyna & Hodgson 2016). Such measures should then be followed by staff education focusing on the importance of early mobilisation, the required procedures to carry out the programme, and lastly, the use of current literature and evidence to initiate and sustain early mobilisation (Cameron et al. 2015; Eakin et al. 2015).

It has been reported that clinicians rarely participate in conducting research, and that the uptake of research findings is slow, the reasons for this being a lack of interest in reading published research evidence, an inability to access the internet at work to search for research evidence or outcome-based tools, and not attending workshops or conferences (Farley 2009; Majid et al. 2011). Even with the strong emphasis being on continuing education and lifelong learning, many organisations do not provide training or training benefits for their clinicians, who again, must use their scarce personal time and money to continue their professional development by attending specialised seminars or conferences that are often time- and cost-prohibitive for many of them (Farley 2009).

The active identification of specific barriers and the strategies to overcome these factors should be included as part of an early mobilisation implementation plan (Leditschke et al. 2012; Klooster, dos Reis Miranda & Spronk 2017; Hodgson, Capell & Tipping 2018). There is a need to understand which barriers to early mobilisation exist in each institution and to then formulate strategies to overcome these issues in order to provide a baseline understanding of the clinical practice around ICU mobility prior to the implementation of a dedicated ICU mobility protocol (Jolley et al. 2014). This can only be achieved through staff buy-in that stems from the four processes, namely engaging, educating, executing and evaluating (Eakin et al. 2015). Some ICUs have implemented an early goal-directed mobilisation programme as a standard practice, which has resulted in a greater dose of early mobilisation in patients on

mechanical ventilation (Hodgson et al. 2016; Schaller et al. 2016). As a result of this programme, more than 50% of the patients achieved an ambulatory level on ICU discharge. This was achieved through enhanced communication among the team members and the implementation of physical exercises intended to maximise physical activity at the highest functional level that the patient could tolerate (Hodgson et al. 2016; Schaller et al. 2016).

The existence of the evidence-practice gap has resulted in nations beyond Zimbabwe and SA formulating CPGs and protocols on the early mobilisation of patients in their respective units and hospitals as a way to standardise the practice and also to make sure the interventions administered are underpinned by research evidence (Duffy 2017; Hodgson, Capell & Tipping 2018). The availability of CPGs and protocols in ICUs results in the standardisation of practice since these aspects comprise of three components, namely a simple algorithm that gives a practical sequence of steps to follow for each patient; an explanation of the content of the algorithm to the clinician; and a detailed summary of the evidence that supports such advice (Grüne, Ottens, Klimek 2007).

These CPGs and protocols serve as useful mechanisms for breaking down complex data sets into more manageable and digestible formats, thereby promoting the effective use of evidence by busy clinicians in order to individualise patient care (Dijkers, Murphy & Krellman 2012). Another advantage of CPGs and protocols is the ability to reduce variations in practice among clinicians in different units and organisations as the interventions implemented will be underpinned by similar research evidence (Kredo et al. 2016). However, it is important to emphasise that CPGs and protocols are not intended to replace but rather to complement professional knowledge and expertise by providing the clinicians with a framework on which to base their clinical judgement (Bernhardsson et al. 2015).

Implementation science, which is concerned with the challenge of bridging the gap between research and practice, and the dissemination of research findings constitutes a research field that has grown rapidly in the wake of the evidence-based practice (EBP) movement (Bernhardsson et al. 2015). Implementation science typically begins with an EBP that is underutilised, and then identifies and addresses the resultant quality gaps at the provider, clinic, or healthcare system level and takes as part of its mission an explicit goal of developing knowledge that can be generalised and widely applied beyond the individual system under study (Bauer et al. 2015). In order for early

mobilisation to impact on clinical practice, it must become a standard of care and include the prescription of validated exercises that are adapted to improving the levels of patient function, which their turn can be achieved through the formulation of CPGs or protocols (Cameron et al. 2015). Hodgson, Capell & Tipping (2018) indicated that some of the drivers of clinical decision making may be modifiable with better adherence to sedation and mobilisation protocols/guidelines, clinical leadership and increased staff resources and training. With that, it can be clearly stated that multifaceted interventions that address specific barriers to change are more likely to lead to changes in practice rather than to a mere focusing on systematic, data-guided activities designed to bring about immediate improvements in health-care delivery (Grol & Grimshaw 1999).

One model for the formative evaluation of implementation is the CFIR that outlines five areas that impact on the implementation of early mobilisation activities: (1) outer environment (e.g. hospital administrative support), (2) inner environment (e.g. proximal unit culture), (3) intervention characteristics (e.g. length of time and resources needed), (4) implementation strategies, and (5) staff (e.g. the attitudes and skills of the staff implementing the intervention) (Eakin et al. 2015). The five CFIR domains are further subdivided into constructs that provide additional clarification to each of the domains that include patient needs and resource, culture, structural characteristics, implementation climate, and readiness for implementation (Eakin et al. 2015; Costa et al. 2017). The CFIR is a widely used implementation framework and provides a structured approach to examining the barriers to implementation (Costa et al. 2017).

On account of the multifactorial barriers cited above (section 2.5), it is not surprising to find variability in terms of clinical practice and the implementation of early mobilisation programmes in ICUs. Clinical practice variability is a situation in which patients with similar diagnoses, prognoses, and demographic status receive different levels of care depending on when, where, and by whom they are treated, despite the agreed and documented evidence of best practice (Kennedy, Leathley & Hughes 2010). A lack of CPGs and protocols in ICUs is linked to the variability in clinical practice, which then compromises the quality and the safety of the patient's focused care (Kennedy, Leathley & Hughes 2010; Koo et al. 2016).

There is a great need for knowledge translation interventions that will augment the clinicians' knowledge of the potential benefits of early mobilisation while enhancing their skills to safely and effectively mobilise mechanically ventilated critically ill patients

(Anekwe et al. 2017). The attitudinal beliefs of staff around the disadvantages of mobilising ventilated patients are largely unsupported in the literature (Holdsworth et al. 2015). Most of the cited barriers in the literature are potentially avoidable. Therefore, the active identification of barriers to early mobilisation and strategies to avoid these issues should be included as part of an early mobilisation plan (Parry et al. 2017a; Hodgson, Capell & Tipping 2018). Although knowledge may not be sufficient to generate a change in practice, it is a necessary foundation for evidence-based clinical practice (McCluskey & Lovarini 2005; Anekwe et al. 2017). Changing critical-care practices also requires an interdisciplinary approach addressing cultural, psychological, and practical issues (Bassett et al. 2015).

2.8 CONCLUSION

The immobility experienced by patients in ICUs on account of mechanical ventilation, sedation and analgesia is associated with physical, mental and cognitive dysfunctions that result in the prolongation of the period spent in ICU and in the hospital stay, an increase in costs and the fact that the disability persists even after discharge, thus impacting on the HRQOL of ICU survivors.

Early mobilisation is advocated in the management of the physical, mental and cognitive dysfunctions that arise as a result of critical illness. The translation of evidence into clinical practice seems slow as irrespective of the available research evidence, few units have adopted a culture of early mobilisation as a standard of patient care. Barriers to the implementation of early mobilisation are multifactorial and differ per unit and/or hospital setting. They encompass factors related to the practicalities of implementing early mobilisation, accountability and the leadership which should all be in place for its successful implementation.

On the other hand, there are differences in the manner in which early mobilisation is defined, the final goal envisaged in treatment, the exact activities performed, and the progression of the treatment in most of the studies done. Together, these factors result in the variability of practice and in difficulties in some settings in the implementation of the interventions. The concept of implementing an early mobilisation programme is not a ‘one-size-fits-all’ approach. Instead, there is a need for internal reflection and evaluation since a variety of factors need to be considered, evaluated and re-evaluated for successful change to be introduced and maintained (McWilliams 2017b). Hence there is a need to evaluate what it is currently happening in the ICUs in SA and Zimbabwean government hospitals in terms of early mobilisation, including the existing

structures and/or organisational practices to promote such interventions, the active identification of barriers to the early mobilisation of patients in ICUs, and the strategies to follow in order to implement early mobilisation into routine patient care.

CHAPTER THREE

3. PHASE ONE: DESCRIPTION OF THE ICU ORGANISATIONAL STRUCTURE AND CURRENT EARLY MOBILISATION PRACTICES FOR GOVERNMENT HOSPITALS IN SA AND ZIMBABWE

3.1 INTRODUCTION

In order to establish the current practice related to the early mobilisation of patients in government hospital ICUs in SA and Zimbabwe, a cross-sectional survey was conducted. The overall objectives of the study could best be achieved by determining what was currently happening in the hospitals in relation to early mobilisation and through a description of the ICU organisational structure. In this chapter, the methodology, results and discussion for Phase one of the study are presented.

3.2 STUDY OBJECTIVES

The overall aim for Phase one of the study was to describe the current early mobilisation practices of patients in ICUs in SA and Zimbabwean government hospitals. The specific objectives were as follows:

a. To describe the ICU and patient characteristics of government hospital ICUs in SA and Zimbabwe;
b. To describe the practice of the early mobilisation of patients by clinical staff in SA and Zimbabwean government hospital ICUs;
c. To compare current practices related to the early mobilisation of patients by clinical staff in ICUs between government hospitals in SA and Zimbabwe;
d. To determine factors associated with the early mobilisation of patients in government hospital ICUs in SA and Zimbabwe.

3.3 METHODOLOGY

3.3.1 Ethical Considerations

The general ethical principles underpinning the study as a whole and the application of these principles to the study are discussed below. The specific ethical principles underpinning Phase one of the study are discussed in detail in this chapter, while those applying to the other phases are discussed in detail in the relevant chapters (Chapter 4 and Chapter 5).

Prior to the commencement of the study, written institutional approval was obtained from the review boards of all government hospitals in Zimbabwe (Appendix 1-5). For

the hospitals in SA, permission to include them in the study was sought from the Provincial Departments of Health through the online submission system. The researcher registered the study on the National Health Research Database website (https://nhrd.hst.org.za/). The documents, which included the research proposal, the research ethics committee approval document, and the proof of the scientific quality of the review (faculty approval letter) were submitted online for each provincial Department of Health committee in SA to review.

A total of eight out of nine provinces in SA, namely Gauteng, Western Cape, Kwazulu Natal, Free State, Eastern Cape, Mpumalanga, Northern Cape and Limpopo, provided written approval for the study to be conducted in the respective provinces (Appendix 6-12). After obtaining the approval from each province online, the researcher contacted the Chief Executive Officers or the Director of Clinical Services of the eligible hospitals (see section 3.3.2) within each of the eight provinces.

All government hospitals with an ICU across the eight provinces were identified. A total of 25 hospitals were contacted to participate in the study. The distribution of the contacted hospitals was as follows: Eastern Cape (n=4), Free State (n=3), Gauteng (n=7), Kwazulu Natal (n=4), Limpopo province (n=2), Mpumalanga (n=2), Northern Cape (n=1) and Western Cape (n=2). Out of the 25 hospitals contacted, only 13 responded and gave their institutional approval, with 12 of the hospitals giving written approval (Appendix 13-24), while verbal permission was obtained from one hospital. The number of hospitals per province that provided approval included: Eastern Cape (n=1), Free State (n=2), Gauteng (n=6), Kwazulu Natal (n=3) and Western Cape (n=1). Thereafter, ethical clearance to conduct the study was obtained from the Joint Research Ethics Committee for the University of Zimbabwe's College of Health Sciences and the Parirenyatwa Group of Hospitals (JREC REF: 377/15) (Appendix 25), the Medical Research Council of Zimbabwe (MRCZ/A/2040) (Appendix 26), and the University of the Witwatersrand's Human Research Ethics Committee (Medical) (REF: M150927) (Appendix 27).

3.3.1.1 **Autonomy and informed consent for participants in phase one**

All ethical principles according to the Declaration of Helsinki were adhered to during this phase of the study. The participants in this study fell into a category designated as a "vulnerable" research population which suggests that they were at greater risk of harm or exploitation if sound ethical principles were not adhered to (Levine et al. 2004; World Medical Association 2013). Participants were considered vulnerable when they

were not respected as autonomous and/or their voluntary participation was compromised. The main type of vulnerability encountered in ICUs related to decisional/cognitive impairment, whereby participants lack the capacity to make autonomous decisions in their own interest on account of the severity of their critical illness or the effect of the medications they are receiving (Bigatello, George & Hurford 2003; Chenaud, Merlani & Ricou 2007). The decision to include this vulnerable group in the study was based on the capacity that the project would have in contributing to the current or future management of the critically ill, and the fact that the research questions could not be answered by conducting the study in a non-vulnerable group.

The unit of analysis for this study was mainly the ICU and part of the data collected included patients' clinical data and the details regarding the management that they were exposed to in the ICU. In order to access the patients' documents for the purpose of gathering the clinical data to answer the research questions, informed consent was obtained. Owing to the type of setting and the patient criteria, those patients who were capable of decision making in the presence of a witness were treated with respect for their capacity for self-determination and they were asked for their informed consent. For those patients who lacked the capacity to make decisions, informed consent was obtained from the next of kin or a legal guardian. Due to the design of the study, participants were never contacted for their retrospective consent if and when their decision-making capacity returned. It was clearly highlighted to both the patients and their guardians that none of the treatment intervention that was being undertaken was for the purpose of the study. The informed consent form was not lengthy. In fact, it was a simple summary of the goals of the study, which were elaborated upon to the patient or next of kin to enable them to understand all the concepts (Appendix 28).

3.3.1.2 **Beneficence and non-maleficence**

There was no risk to the patients or the clinicians as a result of their being involved in the study. No further treatment interventions were administered to the patients for the purpose of the study. As such, the well-being of the patients was not compromised. The main goal of the research study was to gain knowledge that might help future patients, and this was explained to all of the participants. The findings from the interviews contributed towards informing the Modified Delphi study, which was phase three of the study.

3.3.1.3 Justice and Fidelity

After identifying the government hospitals with ICUs, each hospital was given an opportunity to participate. The reasons behind the selection of the hospitals and/or units to participate in this study was that they fell into the categories regional, tertiary and central/quaternary, and that the Director of Clinical Services or the Chief Executive Officer had given his/her approval for participation. The Director of Clinical Services and/or the Chief Executive Officers were given study information forms which clearly stipulated the purpose of the study and associated procedures, including the data collected (Appendix 29). The ICU staff was assured that there would be no interference in the routine care of the patients or a burdening of either the hospital or the ICU staff. The same questions, in the form of a questionnaire, were posed to all hospitals which participated in the study. The questionnaire was uploaded using the REDCap electronic data capture tools hosted at University of the Witwatersrand (https://redcap.core.wits.ac.za/redcap/index.php?action=myprojects). The hospitals and patients were not identified by name, but the data obtained were coded for anonymity in reporting the results.

3.3.2 Research Setting

For administrative purposes, Zimbabwe is divided into eight provinces and two cities with provincial status. The country is further divided into 63 districts and more than 1000 municipalities (Zimbabwe Service Availability and Readiness Assessment Survey 2015). The healthcare system caters for a population of just over 13 million people with over a third being under 15 years and 70% of the population living in the rural areas (Zimbabwe Service Availability and Readiness Assessment Survey 2015). In Zimbabwe, the government health system is the largest provider of health-care services, complemented by non-profit groups, church organisations, company-operated clinics and for-profit clinics (Osika et al. 2010). The health services, divided into four levels of care, are meant to function as a referral chain, namely at the primary, secondary, tertiary and quaternary levels (Osika et al. 2010; Ministry of Health and Child Welfare 2005). The four tiers for health service delivery are as follows (Zimbabwe Service Availability and Readiness Assessment Survey 2015):

1. Primary Level: These include the rural health centres with primary care services in the 220 wards of Zimbabwe. Primary care consists of village health workers, community-based distributors, and the small clinics/facilities that the patients usually encounter first, especially in the rural or urban areas. This level comprises of 78% of all health facilities in Zimbabwe. The primary-care facilities

provide for basic preventative measures, maternity and curative services, and most of the facilities are run by a nurse, or possibly several nurses in a larger urban area. More complicated cases, which are beyond the scope of the health services offered at primary level, are referred to the district hospitals (Osika et al. 2010).

2. Secondary Level: District hospitals with emergency, ambulatory and inpatient services in the sixty-three districts of Zimbabwe. Secondary-level care consists of facilities that provide adequate services to handle the emergencies referred from the primary-care facilities and the patients are treated by a medical doctor. The facilities mainly include the district and mission hospitals, representing about 3.6% of all health facilities in the health system (Osika et al. 2010).

3. Tertiary Level: These include the provincial hospitals with ambulatory and in-patient specialist services in the eight provinces of Zimbabwe. Provincial hospitals receive referrals of patients from district hospitals who require specialists able to deal with more difficult health issues.

4. Quaternary Level: Central teaching hospitals with specialist medical services in the capital city, Harare, the second-largest city, Bulawayo, and in Chitungwiza. Quaternary/central care is provided by six central hospitals and they have the most advanced equipment, staff, and pharmaceuticals for dealing with the most severe cases. The central hospitals have the largest contingent of staff, consisting of specialists and clinicians and act at the highest level in respect of health referrals.

The overall national in-patient bed density was reported to be 18 in-patient beds per 10 000 population. This is double the regional average of nine hospital beds per 10 000 population recorded in the World Health Organisation's (WHO) African Regional Report (Zimbabwe Service Availability and Readiness Assessment Survey 2015). There are currently five central hospitals with ICUs in Zimbabwe, three of which are in Harare and Chitungwiza, in the northern part of the country, and the remaining two are in Bulawayo, in the southern region. The hospital bed capacity ranges from the smallest with 500 beds to 1 800 beds for the largest referral hospital. The ICU occupancy rate for the hospitals varies according to the location and the number of beds available in each unit, ranging from six to eight beds. In Zimbabwe, all five of

the hospitals with ICUs from the two regions were recruited to participate in the study.

The South African Department of Health under the National Health Act (2003) categorised government hospitals as district hospitals, regional, tertiary, central and lastly, specialised hospitals (Department of Health, 2012).

1. A district hospital may only provide the following specialist services: (a) paediatric health services, (b) obstetrics and gynaecology, (c) internal medicine, (d) general surgery and family medicine. Based on the available number of beds, which should range between 50 and 600 beds, the district hospitals are categorised into small, medium and large district hospitals.

2. A regional hospital must provide for at least one of the following specialties in addition to the services which are provided at a district hospital: (a) orthopaedic surgery, (b) psychiatry, (c) anaesthetics, and (d) diagnostic radiology. It also provides short-term ventilation in a critical care unit and trauma and emergency services.

3. A tertiary hospital provides specialist-level services provided by regional hospitals including subspecialties of the specialties referred to above. These include intensive care services under the supervision of a specialist or specialist intensivist, who may provide training for health-care service providers.

4. A central hospital must provide tertiary hospital services, central referral services and may provide national referral services. The following aspects also define a central hospital: the training of health-care providers, research projects, the reception of patients referred from more than one province; and a formal association with a medical school as the main teaching platform. Central referral services are provided in highly specialised units and require unique, highly skilled personnel, who are in short supply. They also occupy only a small number of sites nationwide. National referral services refer to the super-specialised units and perform extremely specialised and expensive services (e.g. heart and lung transplants, bone marrow transplants, liver transplants, cochlear implants).

5. A specialised hospital provides specialised health services such as psychiatric

services, tuberculosis services, infectious diseases and rehabilitation services (Department of Health 2012).

Of the 388 government hospitals in SA, 64% are district hospitals, whilst the regional and specialised hospitals make up 16% each of the total number, and tertiary/provincial and central hospitals constitute less than four percent (4%) of all hospitals in the government sector (Cullinan 2006). According to a national audit done in SA by Naidoo and colleagues (2013), during the period 2008 to 2009, there were about 1 186 ICU beds in government hospitals as opposed to the 3 533 ICU beds in the private sector hospitals. The majority of the ICUs in both the private and government sectors are located in three provinces, namely Gauteng (49%), Kwazulu Natal (14%) and Western Cape (15%). These ICUs cater for 54% of the country's population (Naidoo, Singh & Lalloo 2013). In SA, a total of 13 hospitals from five provinces were recruited to participate in the study. The hospitals ranged from regional/provincial to central level hospitals.

3.3.3 Study Design

A descriptive cross-sectional survey study was carried out. Cross-sectional studies involve measuring the outcomes and the exposure at one point or over a short period of time to determine the level of association in the relationships between the variables or to understand the nature of the associations which are useful in generating hypotheses for future studies (Levin 2006; Setia 2016).

The strengths of a cross-sectional study are that it is relatively inexpensive and takes little time to conduct. It is used to estimate the prevalence of an outcome of interest and there is no loss to follow up on (Levin 2006). A limitation of this study design is that since it is carried out at one point in time, it gives no indication of the sequence of events. As such, it becomes difficult to infer causality, and the situation may provide different results if another timeframe were to be chosen (Levin 2006; Setia 2016).

3.3.4 Study Period

Data collection was carried out during the period June 2016 to December 2016.

3.3.5 Participants

Five Zimbabwean government hospitals, quaternary level facilities with ICUs, were informed of the survey and agreed to participate. All of the ICUs were mixed ICUs

and three of the hospitals had separate adult and paediatric ICUs, whilst the other two hospitals had one ICU admitting both adults and children. In SA, a total of 25 hospitals were informed of the survey and 13 of the hospitals gave permission for the survey to be conducted. Out of the 13 hospitals, a total of 29 ICUs, which consisted of mixed ICUs and specialised ICUs, took part in the survey. The specialised ICUs included those catering for medical, surgical, trauma, neurosurgical complaints, acute spinal cord injuries, cardiothoracic problems and burns. Only information about adult patients who were in the ICU on the day of the survey at each of the hospitals was recorded in Zimbabwe and SA respectively.

3.3.6 Sampling Method

Convenience sampling was used for the participating hospitals as only those that provided consent could be included in this phase of the study (Portney & Watkins 2009). Patients who participated in the survey were consecutively sampled according to the inclusion and exclusion criteria set out for this phase of the study (Portney & Watkins 2009). The advantages of the chosen sampling methods were that they were representative of an inexpensive method to conduct research, that they were conducted for logistical purposes, and that they offered the best method for finding answers to the research questions posed. An effort was made to include hospitals from the different provinces in SA and from different ICUs in the hospitals in SA which had more than one ICU at a particular hospital.

3.3.7 Selection Criteria

3.3.7.1 Inclusion criteria

All those government hospitals in SA and in Zimbabwe that were categorised as being on the central/quaternary, tertiary and provincial/regional levels and with ICUs were included in the samples

3.3.7.2 Exclusion criteria

All paediatric ICUs.

3.3.8 Instruments

A survey questionnaire was developed using information obtained from two of the point prevalence studies conducted in Australia and New Zealand, and Germany (Berney et al. 2013; Nydahl et al. 2014). The survey questionnaire consisted of three sections. Information sought under Section A was related to the hospital-specific information which included: type of hospital, number of adult ICUs in the hospital, type

of ICU, description of the ICU, bed capacity, average monthly patient admissions over the past three months, ratio of ICU staff to patients (determined by profession), and the availability of clinical guidelines for patient management. Section B of the questionnaire focused on the ICU demographics. The following data were collected: type of conditions seen in patients admitted to the unit, staff members who were routinely involved in the mobilisation of patients, and the procedures, if any, that were implemented in the ICU to promote early mobilisation.

Section C of the questionnaire sought information relating to the patients. The section was divided into two parts. Part 1 of Section C sought information on patients who had an ICU stay of less than 24 hours, whilst Part 2 focused on documenting similar facts about patients who had an ICU stay of more than 24 hours. The data which were collected from the patients' ICU charts and files included demographic (age, gender) and clinical information (admission diagnosis, cause of condition, reason for ICU admission, number of days in ICU, number of days on mechanical ventilation, an Acute Physiology and Chronic Health Evaluation II score (APACHE II), a Sequential Organ Failure Assessment score, and comorbidities-SOFA). The mobilisation practices performed on patients in ICU by clinical staff in the previous 24 hours of their ICU stay were also recorded. Activities screened for and recorded included the following details: a) patient remained in bed with treatment mostly in a supine position, b) patient turned in bed during treatment, c) a passive range-of-motion exercises, d) active-assisted exercises, e) active exercises, f) sitting up in bed, g) sitting up on the edge of the bed, h) sitting out-of-bed in a chair, i) standing upright next to the bed, j) stepping (marching) in one place by the bedside, and j) walking away from the bedside. The reasons for treatment received in bed mostly in a supine position were also documented. The last questions on the questionnaire were related to the adverse events which were recorded as a direct result of out-of-bed mobilisation. The questionnaire consisted mainly of closed-ended questions, with only a few open-ended questions.

The questionnaire was sent to three experts in the field of critical care to ensure content and face validity. Two of the experts were physiotherapists from SA who were full-time lecturers at two universities in SA. They both had more than 10 years of clinical and teaching experience and they taught cardiopulmonary physiotherapy at both the undergraduate and the postgraduate levels at their respective institutions. The third expert was a consultant anaesthetist with more than 15 years of clinical and teaching experience at a university in Zimbabwe. The experts provided suggestions regarding the face and content validity of the questionnaire (Appendix 30). There was

consensus on the suggested changes by the three experts which was assessed subjectively. The suggested changes, in cases where there was no consensus among the experts, were reviewed to determine whether to consider the changes or to disregard the highlighted changes. The final version of the questionnaire was based on all the highlighted changes which the experts had agreed upon (Appendix 31). Thereafter the questionnaire was uploaded to REDCap for data collection during the survey.

3.3.9 Procedure

After obtaining institutional approval at each hospital, the researcher obtained the contact details (emails and/or phone numbers) of the ICU director, the head of physiotherapy and the ICU nursing services manager. The researcher contacted the above and sent the proposal documents, study information sheets and institutional approval letter to them for their perusal. At each hospital, the date for data collection was agreed upon in conjunction with the ICU director and the head of physiotherapy. Data collection was carried out by the researcher and/or a research assistant (Caryn Mhangara, a physiotherapist with more than 10 years working experience) in each of the hospitals at a pre-arranged date during the period June 2016 to December 2016.

On the day of the survey, the researcher and/or the research assistant reported to the head of physiotherapy in the physiotherapy department first. The head of physiotherapy introduced the researchers to the physiotherapists working in the ICUs during the study period. The physiotherapists working in the ICUs took the researchers to the respective ICUs. The researchers were introduced by the ICU physiotherapists to the nursing head of shift and the consultants/doctors in the unit. The head of the nursing shift then introduced the researchers to the other nurses who were on shift and encouraged the nurses to assist them with the information required from each eligible patient.

The information about the hospital and the organisation and structure of the ICU was obtained from either the nursing head of shift or the ICU physiotherapist through an informal interview. The information sought included the ICU bed capacity, the average figure for monthly admissions, and the available clinical protocols in the unit. Other information relating to each individual patient was gathered from the patients' notes. Most of the units had patients' notes by the

bedside, whilst a few were ‘paperless units’, with all of the information pertaining to the patient captured electronically.

For the units that were capturing information electronically, the physiotherapists working there assisted the researchers by logging into the system and sharing the required information with them. The information captured under patient-specific information included demographics, clinical data and the mobilisation activities performed. Information was obtained for the early mobilisation activities performed in the units during the previous 24 hours. The information regarding the workload of the ICU physiotherapists and for clarifying the reasons why some patients may not have been mobilised in the 24-hour period prior to the survey was obtained from the respective physiotherapists through an informal interview. Potential barriers which were listed in the questionnaire were mentioned when the physiotherapists were interviewed, and also included additional reasons mentioned by the physiotherapists which were not included in the questionnaire but were recorded under ‘other’. The last section of the survey questionnaire recorded any adverse events which had occurred as a direct result of mobilisation.

3.3.10 Data Management

The data which was captured in REDCap was checked for completeness and accuracy and data cleaning was done. Some of the information obtained through open-ended questions was encoded for ease of data analysis. The names of the hospitals were not used for confidentiality reasons and each hospital was given an individual code.

3.3.11 Statistical Analysis

The data obtained were nominal, ordinal and ratio in nature. Data were captured from REDCap onto a Microsoft Excel (2016 Version) spreadsheet. The IBM® Statistical Package for Social Sciences (SPSS version 25.0; IBM Corp, Armonk, New York, USA) for Windows was used to analyse the data. Descriptive statistics were used to present the quantitative data. Continuous variables were summarised as means and standard deviations for normally distributed data or medians and interquartile ranges for data that were not normally distributed. The Shapiro-Wilk test for normality was used. The Mann Whitney U test was used to test differences in rank order for the continuous variables between the groups. Categorical variables were summarised as frequencies and percentages. Chi-square and Fisher’s Exact tests were used to test the

relationships between the categorical data. Binary logistic regression analysis was conducted to determine the factors associated with the early mobilisation of the patients from the two countries. The enter method of model fitting, which involves the entering of all variables at the same step was used. A p-value of ≤ 0.05 was deemed statistically significant. All qualitative interview data obtained from open-ended questions during the informal interviews were summarised into themes as were the items within each theme using frequencies and percentages. These data were then analysed in a descriptive rather than an interpretative manner since the data were supplementary to the quantitative data. The data obtained from the open-ended questions were shallow. Therefore, an in-depth quantitative data analysis was not possible at this time.

3.4 RESULTS

This section describes the results obtained for Phase one of the study.

3.4.1 Hospital and ICU Structure

Table 3.1 summarises information regarding SA and Zimbabwean government hospitals and their ICU characteristics.

Table 3.1: Description of the SA and Zimbabwean Government Hospitals and ICU Characteristics (n=18)

Item	Description	Zimbabwe	SA
Number of Hospitals, n		5	13
Level of Hospital, n (%)	Quaternary/Central	5 (100)	7(53.8)
	Tertiary	0	5(38.5)
	Regional	0	1(7.7)
Number of ICUs, n		5	29
Category of ICU, n (%)	General	5(100)	11(37.9)
	Trauma	0	4(13.8)
	Neurosurgery	0	4(13.8)
	Cardiothoracic	0	3(10.3)
	Medical	0	2(6.9)
	Surgical	0	2(6.9)
	Acute Spinal Cord Injury	0	1(3.4)
	Burns	0	1(3.4)
	Cardiac	0	1(3.4)
Type of ICUs, n (%)	Open	4 (80)	16(55.2)
	Closed	1 (20)	13(44.8)
Monthly admission in ICU, median (IQR)		39 (23.5-45.5)	35.5 (30-75)
Units with permanent physiotherapy cover, n (%)	Yes	3 (60)	15(51.7)
	No	2 (40)	14(48.3)
Workload of ICU physiotherapists at each hospital, n (%)[a]	Other ICUs in the hospital	2 (40)	9(31.0)
	High Care Units	5 (100)	11(27.9)
	Inpatient wards	2 (40)	26(89.7)
	Outpatients	3 (60)	6(20.7)
	Hospital Clinics	0	2(6.9)

a-multiple option responses possible therefore cell percentages add up to more than 100

Of the 18 hospitals, there were five ICUs from Zimbabwe and 29 ICUs from SA. All of the Zimbabwean ICUs were general ICUs and the majority of the hospitals from SA were general ICUs (n=11; 37.9%).

The median bed capacity of the Zimbabwean units on the day of the survey was 7 (IQR=6-8.5) patients, with median monthly admission rates of 39 (IQR=23.5-45.5) patients. The median bed capacity of the units from SA was also 7(IQR=5-9) patients, with median monthly admission rates of 35.5 (IQR=30-75). The nurse-to-patient ratio across all units in the Zimbabwean hospitals was 1:1. The ratio for SA hospitals varied,

with some units reporting a nurse-to-patient ratio of 1:1 (n=19; 65.5%), some a ratio of 1:2 (n=7; 24.1%), and a minority of units reporting ratios of 1:3 and 1:4 (n=2; 6.9%; n=1; 3.4%) respectively. The number of physiotherapists covering the units ranged from one to two per hospital in Zimbabwe and one to five in SA. The physiotherapist-to-patient ratio ranged across units from 1:4 to 1:9, depending on the ICU bed capacity in Zimbabwe and from 1:1 to 1:12 in SA.

3.4.2 Characteristics which influence ICU Culture to Promote Early Mobilisation

Table 3.2 summarises the characteristics which influence ICU culture to facilitate early mobilisation in participating ICUs.

Table 3.2: Characteristics which influence ICU Culture of Participating ICUs to Facilitate early Mobilisation

Description	Zimbabwe (n=5)	SA (n=29)
Multidisciplinary ward rounds	2 (40.0)	21 (72.4)
Discipline-specific ward rounds	5 (100)	29 (100)
Physiotherapist participation in ward rounds		
Always	1 (20.0)	5 (17.2)
Sometimes	4 (80.0)	24 (82.8)
Staff members involved in mobilisation		
Nurses	5 (100)	24 (82.8)
Physiotherapists	5 (100)	29 (100)
Doctors	0	6 (20.7)
Activities/procedures which promote early mobilisation		
Documentation of patient goals	5 (100)	29 (100)
Setting of daily sedation goals	5 (100)	29 (100)
Utilisation of sedation scoring system	0	11 (42.3)
Presence of a mobility guideline	1 (20.0)	2 (6.9)
Presence of a resident ICU physiotherapist	0	0
Assessment of mobility status of a patient	5 (100)	29 (100)
Use of a standardised outcome measure to assess mobility status	0	2 (6.9)

All the ICUs surveyed indicated that they had discipline-specific unit rounds every day but only two units (40%) from Zimbabwe and 21 units (72.4%) from SA reported that multidisciplinary ward rounds were held in their units. All ICUs from Zimbabwe reported that nurses and physiotherapists were responsible for patient mobilisation,

whilst six units (20.7%) from SA reported that doctors also assisted in the early mobilisation activities.

Figure 3.1: represents the clinical protocols available in ICUs from SA.

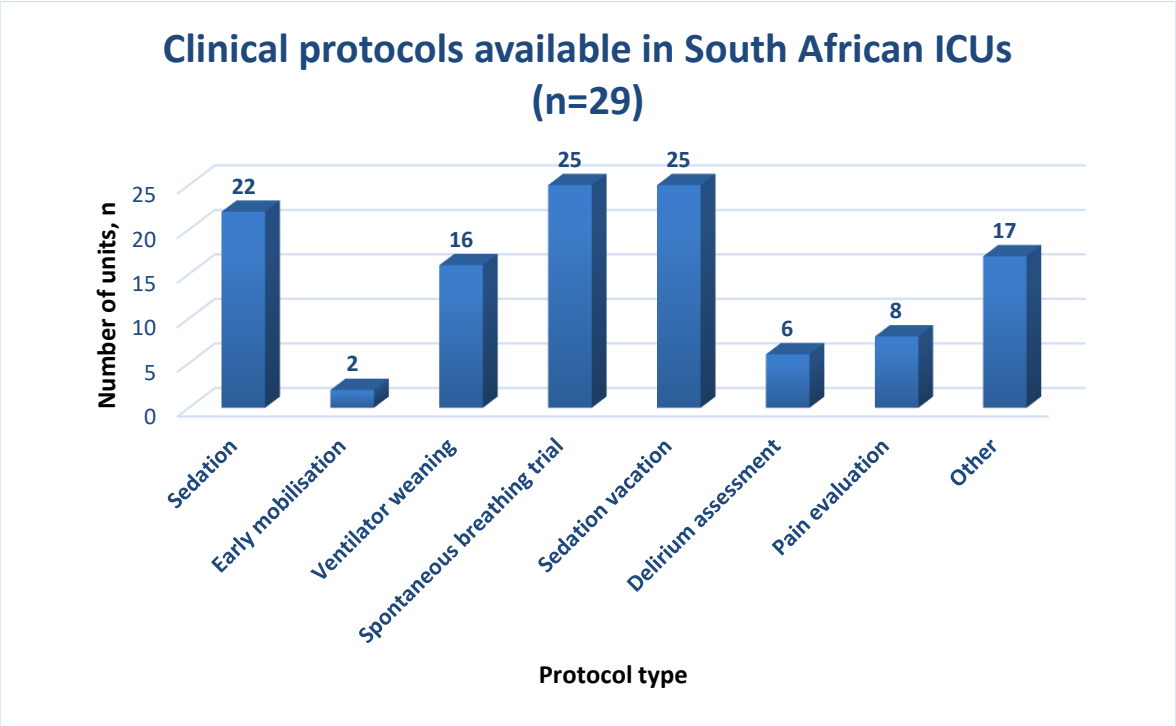


Figure 3.1: Clinical protocols available in ICUs from SA

All of the units from SA indicated that they had clinical protocols in their units. The most commonly reported protocols were the spontaneous breathing trial protocols and the sedation vacation protocols reported in 25 (86.2%) of the units. Only two (6.9%) of the units reported that they had an early mobilisation protocol in the unit. The most commonly reported protocols under “others” were enteral feeding and infection control protocols. The ICUs from Zimbabwe had no structured clinical protocols in their units, but one unit had an early mobilisation eligibility guideline.

3.4.3 Equipment for the Early Mobilisation of Patients

The equipment available in the units to facilitate early mobilisation is presented in Table 3.3.

Table 3.3: Equipment to Promote Early Mobilisation in the Participating ICUs

Description	Zimbabwe (n=5)	SA (n=29)
Type of beds		
Manually adjustable beds	1 (20.0)	6 (20.7)
Electronic beds	5 (100.0)	29 (100.0)
Type of bedside chairs		
Standard chair with back and arm rests	5 (100.0)	12 (41.4)
Adjustable reclining chairs with back and arm rests	0	17 (58.6)
Adequacy of bedside chairs to ICU bed capacity		
Yes	1 (20.0)	10 (34.5)
No	4 (80.0)	19 (65.5)
Availability of transfer and mobilisation equipment		
Portable oxygen cylinders	5 (100)	29 (100)
Ambubags	5 (100)	29 (100)
Portable ventilators	2 (40.0)	16 (55.2)
Walking frame	0	2 (6.9)
Sliding board	0	3 (10.3)
Transfer board	0	2 (6.9)
Hoist	0	12 (41.4)
Tilt table	0	4 (13.8)
Standing frame	0	4 (13.8)

The availability of portable ventilators was limited to only two (40.0%) units from Zimbabwe and 16 (55.2%) units from SA. None of the ICUs from Zimbabwe reported having rehabilitation equipment available in their units.

3.4.4 Demographic Details of Patients in the Units on the Day of the Survey

Across the 34 units, 245 patients were surveyed. Table 3.4 summarises the demographic information of patients in ICU on the day of the survey.

Table 3.4: Demographic data of Patients Surveyed in Government Hospital ICUs in Zimbabwe and SA (n=245).

Description	Zimbabwe (n=40)	SA(n=205)	Test
Gender; n (%)			**0.007***
- Male	17 (42.5)	135 (65.9)	
- Female	23 (57.5)	70 (34.1)	
Age, median (IQR) range	33 (23.3-38)	39 (30-58)	**0.0007***
Airway type; n (%)			**0.282**
- Endotracheal tube	20 (50)	109 (53.2)	
- Tracheostomy	4 (10)	38 (18.5)	
- Spontaneous ventilation	16 (40)	58 (28.8)	
Number of hours on mechanical ventilation; median (IQR) range	120 (72-180)	120 (72-240)	**0.72**
Number of days in the unit; median (IQR) range	5 (3-8)	5 (3-9)	**0.46**
Indications for ICU admission n (%)			**0.001***
- Acute respiratory failure	12 (30)	53 (25.9)	
- Hypertensive disorders of pregnancy	7 (17.5)	3 (1.5)	
- Postoperative Care	10 (25)	54 (26.3)	
- Trauma	9 (22.5)	86 (41.9)	
- Sepsis	2 (5)	9 (4.4)	
Referring unit/specialty; n (%)			**0.0001***
- Cardiothoracic Surgery	1 (2.5)	41 (20.0)	
- General Surgery	11 (27.5)	59 (28.9)	
- Neurosurgery	5 (12.5)	51 (24.8)	
- Medical	11 (27.5)	43 (20.9)	
- Obstetrics and gynaecology	10 (25)	4 (2.0)	
- Orthopaedics	1 (2.5)	3 (1.4)	
- Neurology	1 (2.5)	4 (2.0)	

Abbreviations: IQR-interquartile range *denotes statistically significance using Chi-square test or Fisher's exact test for categorical data and the t-test for continuous data

The majority of the patients from SA were males (n=135; 65.9%), while females constituted the majority of the patients (n=23; 57.5%) from Zimbabwe, with the difference in gender between the two countries being significant (p=0.007). Indications for admission to the ICU included acute respiratory failure (n=12; 30%) and perinatal complications (n=10; 25%) for the Zimbabwean cohort. For the cohort from SA, the indications for admission included trauma (n=86; 41.9%) and postoperative care

(n=54; 26.3%). The difference in indications for ICU admission between the two countries is significant (p=0.001).

Figure 3.2 shows the admission categories of conditions/procedures for patients admitted in the ICUs.

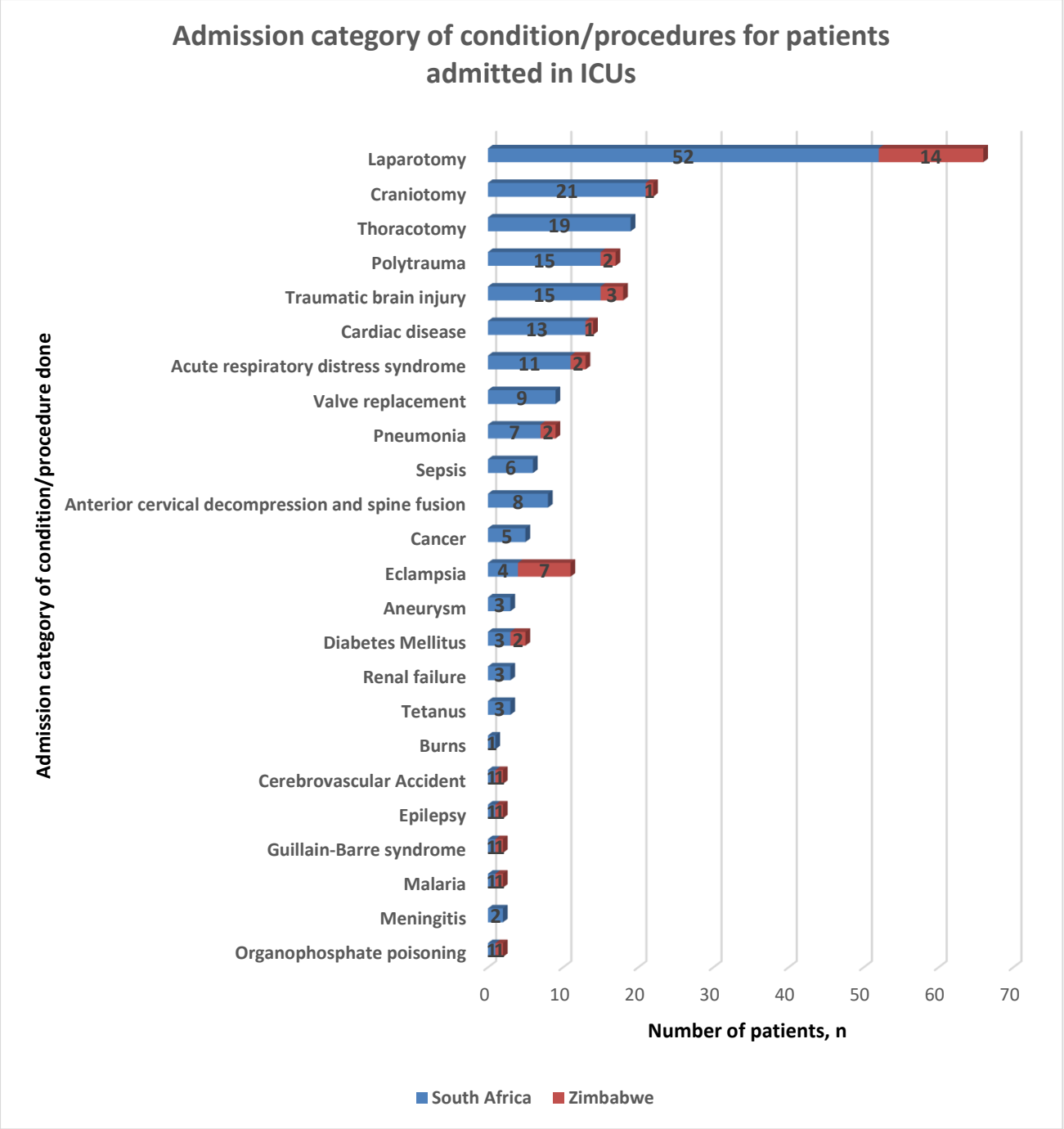


Figure 3.2: Admission Categories of Conditions/Procedures for Patients Admitted in ICUs in Zimbabwe and SA (n=245)

The most common surgical procedure carried out for patients admitted to the SA units was laparotomy (n=52; 25.4%), followed by craniotomy (n=21; 10.2%). Similarly, for the cohort from Zimbabwe, laparotomy was the most common surgical procedure done (n=14; 35%).

The causes of trauma are presented in Figure 3.3.

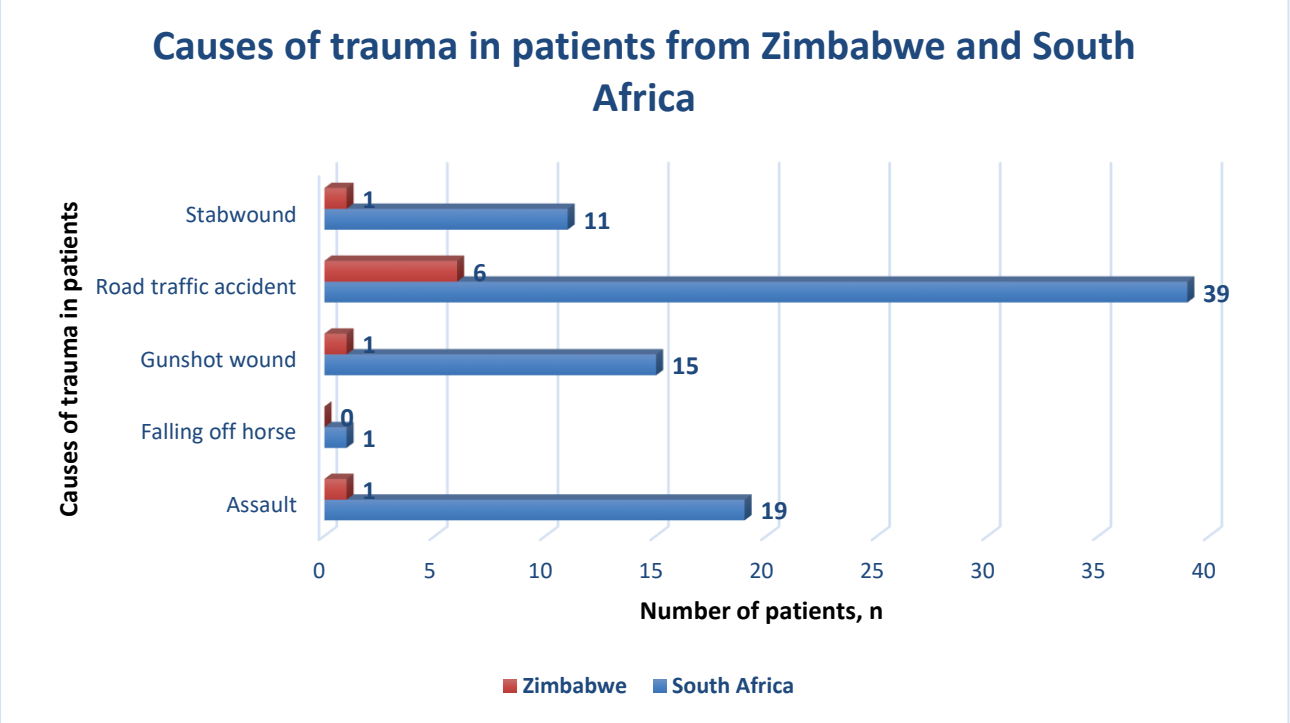


Figure 3.3: Causes of Trauma in Patients from Zimbabwe and SA (n=245)

The most common causes of trauma for patients from SA were road traffic accidents (n=39; 19%) followed by assault (n=19; 9.3%), whilst in Zimbabwe it was road traffic

The comorbidities which patients presented with are summarised in Figure 3.4.

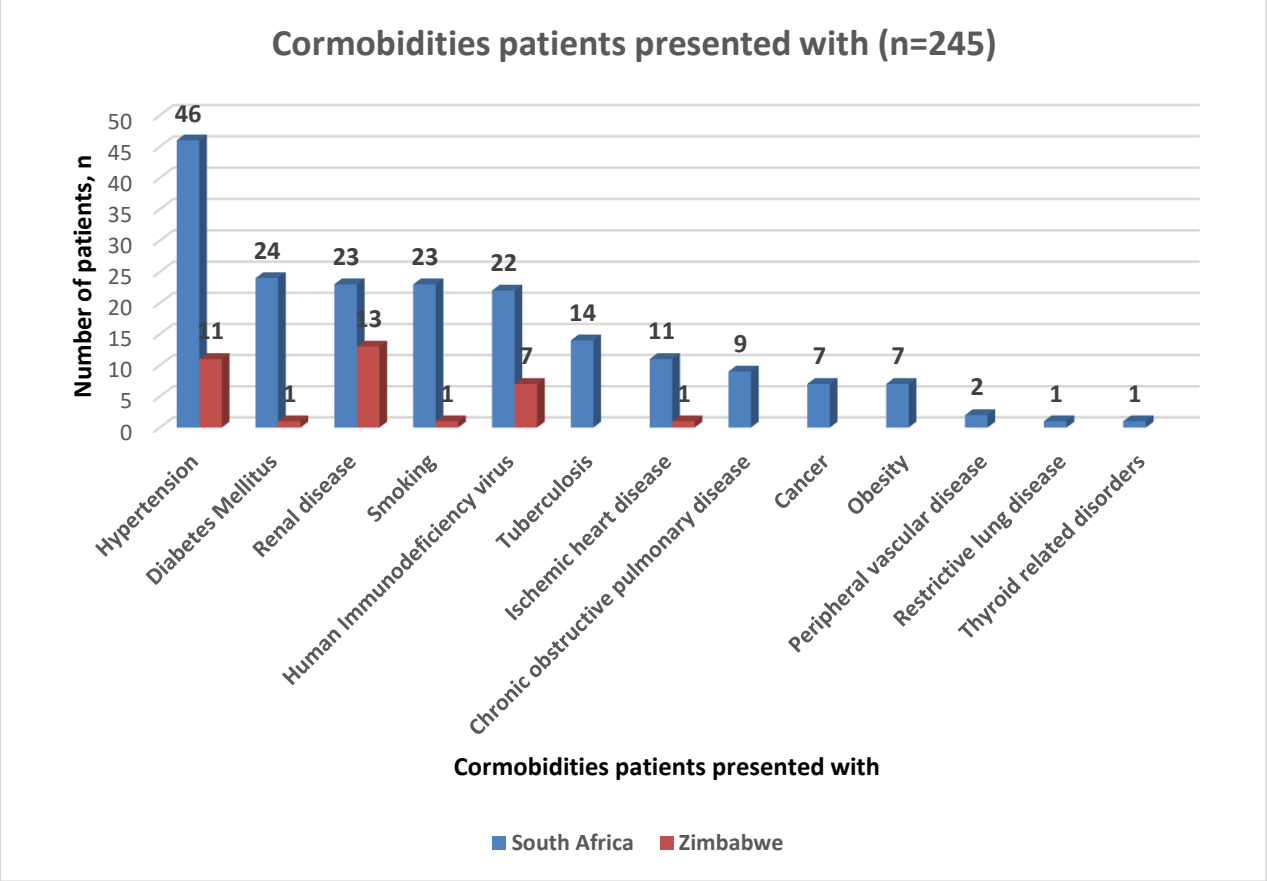


Figure 3.4: Comorbidities of Patients admitted in Zimbabwe and SA

The most common comorbidities were hypertension (n=46; 22.4%) and diabetes mellitus (n=24; 11.7%) for the cohort from SA, whilst for the Zimbabwean cohort it was renal disease (n=13; 32.5%) and hypertension (n=11; 27.5%).

3.4.5 Current mobilisation practices

Figure 3.5 summarises the types of activities that were performed with patients who had an ICU stay of less than 48 hours.

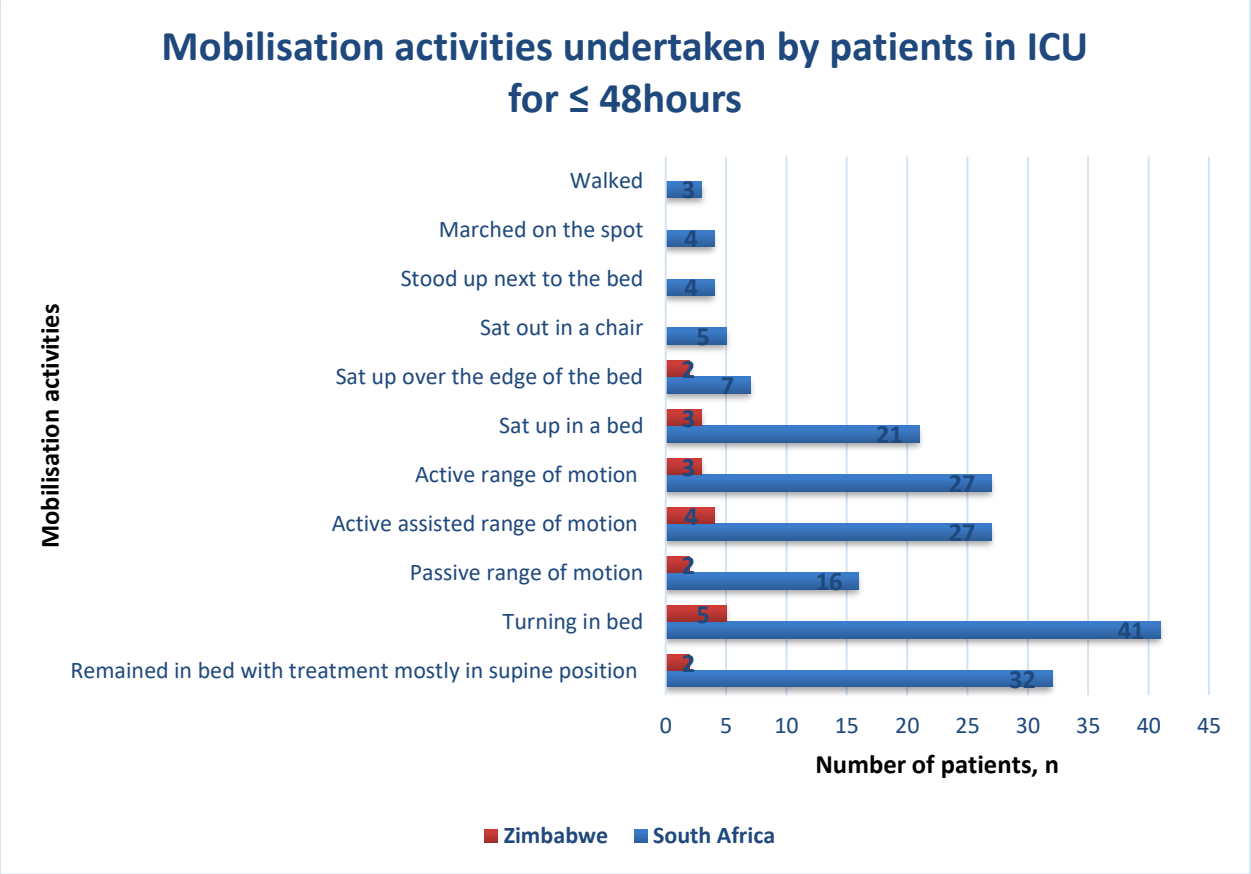


Figure 3.5: Mobilisation Activities Undertaken by Patients in ICU for ≤ 48 Hours

From Zimbabwe, a total of five patients had stayed in the ICU for less than 48 hours whilst from SA, there were 51 patients. All the patients from Zimbabwe who were in the ICU for less than 48 hours were turned in bed (n=5; 100%) and none of the patients walked. From the SA cohort, 41 (80.4%) of the patients were turned in bed whilst only three (5.9%) of them walked.

Figure 3.6 summarises the types of activities that were performed with patients who had an ICU stay of more than 48 hours.

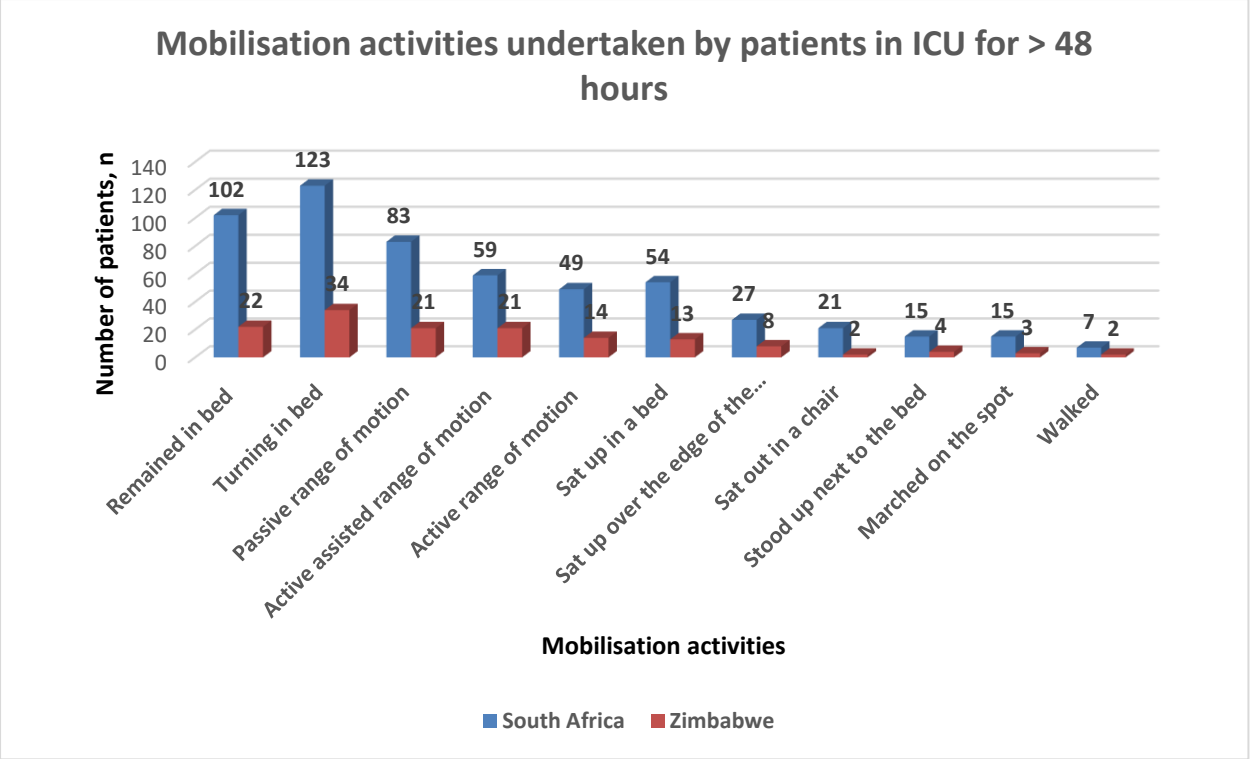


Figure 3.6: Mobilisation Activities Undertaken by Patients in the ICU for >48 Hours

A total of 35 patients from Zimbabwe and 154 from SA had stayed in the ICU for more than 48 hours. The majority of the patients from Zimbabwe (n=34; 97.1%) and SA (n=123; 79.9%) were turned in bed whilst only two patients from Zimbabwe (5.7%) and seven patients from SA (4.5%) were walked.

The highest levels of mobilisation achieved by patients who were in ICU for ≤ 48 hours are presented in Figure 3.7.

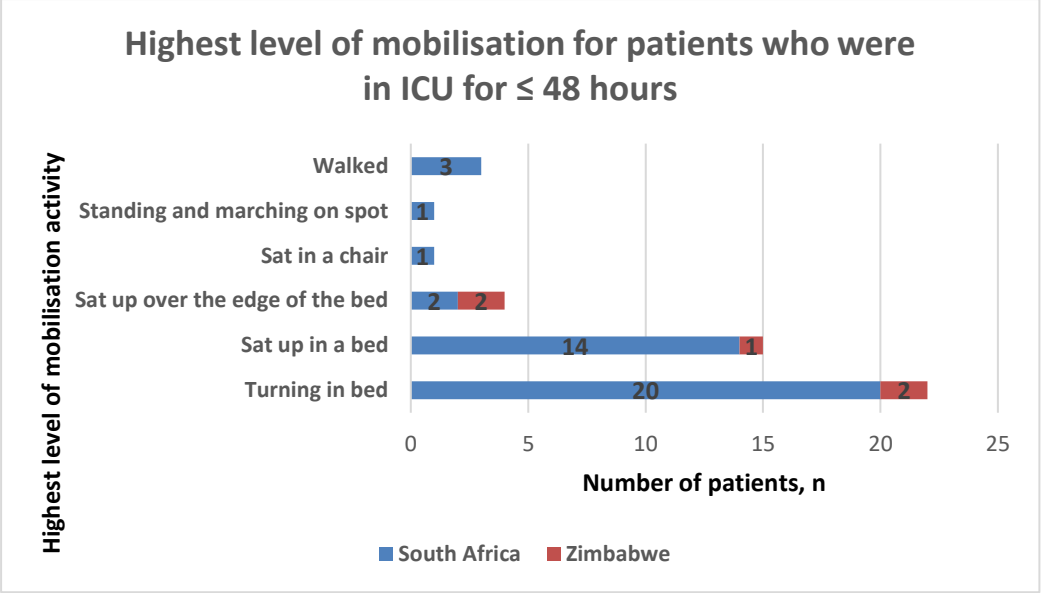


Figure 3.7: Highest Level of Mobilisation Achieved by Patients with ICU stay ≤ 48 hours

The highest level of mobilisation which was achieved by patients from Zimbabwe who had been in the ICU for less than 48 hours was sitting on the edge of the bed (n=2; 40%). Out of the 51 patients from SA who had been in the ICU for less than 48 hours, three (5.9%) of the patients achieved walking as the highest level of mobilisation. Out-of-bed mobilisation, which included activities starting from sitting on the edge of the bed and progressing to walking, was achieved by two (40%) of the patients in Zimbabwe and by seven (13.7%) of the patients from SA.

The highest levels of mobilisation achieved by patients who were in ICU for >48 hours are presented in Figure 3.8.

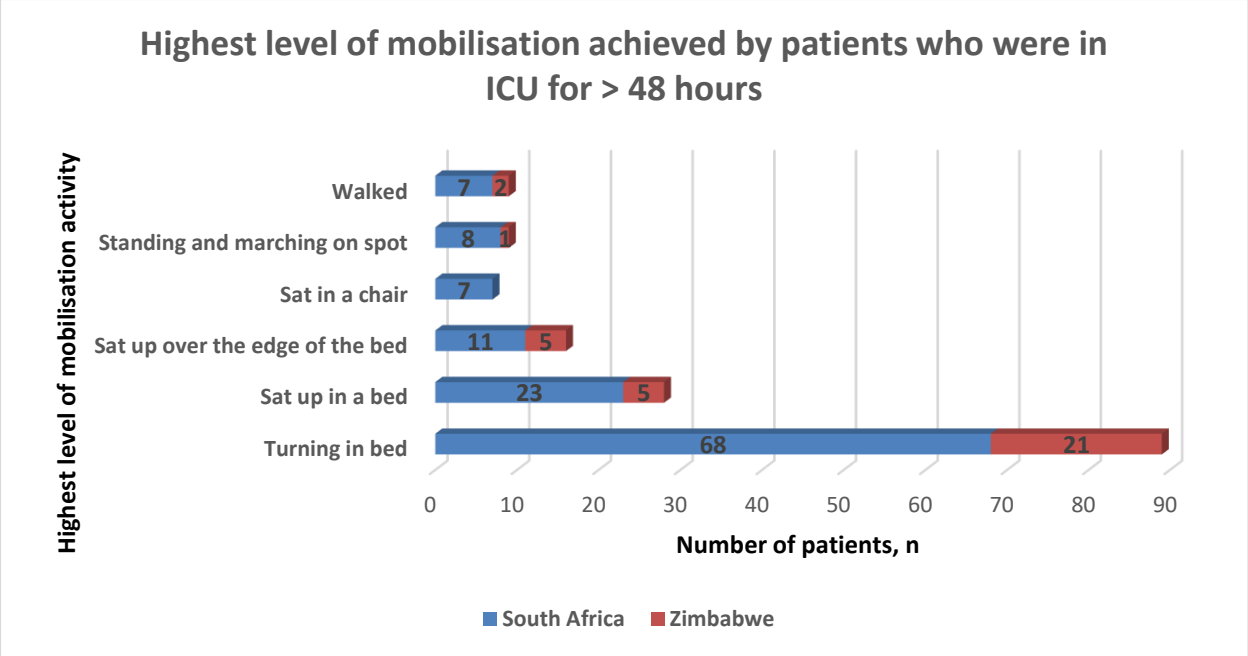


Figure 3.8: Highest Level of Mobilisation Achieved by Patients with ICU Stay > 48 hours

The highest level of mobilisation achieved by the majority of the patients who had been in ICU for more than 48 hours was walking in two (5.7%) of the patients from Zimbabwean ICUs and in seven (4.5%) of the patients from SA ICUs. Out-of-bed mobilisation, which included activities starting from sitting on the edge of the bed and progressing to walking was achieved in eight (22.9%) of the patients in Zimbabwe and in 33 (21.4%) of the patients from SA.

3.4.6 Barriers to early mobilisation

The most common barriers to mobilisation are summarised in Table 3.5.

Table 3.5: Barriers to Early Out-of-Bed Patient Mobilisation (n=245)

Reasons for not sitting out-of-bed and walking	Zimbabwe (n=40)	SA (n=205)	Test
Sedated, n(%)	2 (5)	20 (9.8)	0.545
Unresponsive, n(%)	3 (7.5)	50 (24.4)	0.02*
Sedated and Unresponsive, n(%)	13 (32.5)	6 (2.9)	0.0001*
Multiple orthopaedic injuries, n(%)	2 (5)	9 (4.4)	0.696
Haemodynamic instability, n(%)	10 (25)	42 (20.5)	0.0001*
Physiotherapist's decision, n(%)	4 (10)	19 (9.3)	0.775
Unstable spine, n(%)	0	9 (4.4)	0.362
Patient on dialysis, n(%)	0	4 (2.0)	1
Patient not in ICU, n(%)	0	4 (2.0)	1
Other reasons, n(%)	5 (12.5)	32 (15.6)	0.641
Suture line gaped	2	0	
Patient depressed	2	0	
Paralysis of peripheral muscles	1	1	
Medical contra-indications	0	13	
Open wound	0	4	
Agitation	0	6	
Confusion	0	6	
Pus oozing	0	1	
Patient refusal	0	1	

**denotes statistically significant*

The barriers to early mobilisation raised by physiotherapists from Zimbabwe included sedation, unresponsiveness (n=13; 32.5%) and haemodynamic instability (n=10; 25%). The most common barriers to early mobilisation reported by physiotherapists from SA were patient unresponsiveness (n= 50; 24.4%) and haemodynamic instability (n= 42; 20.5%). The differences between the barriers to early mobilisation in the ICUs in Zimbabwe and South Africa that were considered in terms of unresponsiveness, sedation and unresponsiveness and haemodynamic instability, proved to be significant ($p<0.05$).

3.4.7 Adverse Events Reported after the Out-Of-Bed Mobilisation of Patients

Figure 3.9 summarises the adverse events recorded when patients were mobilised out-of-bed.

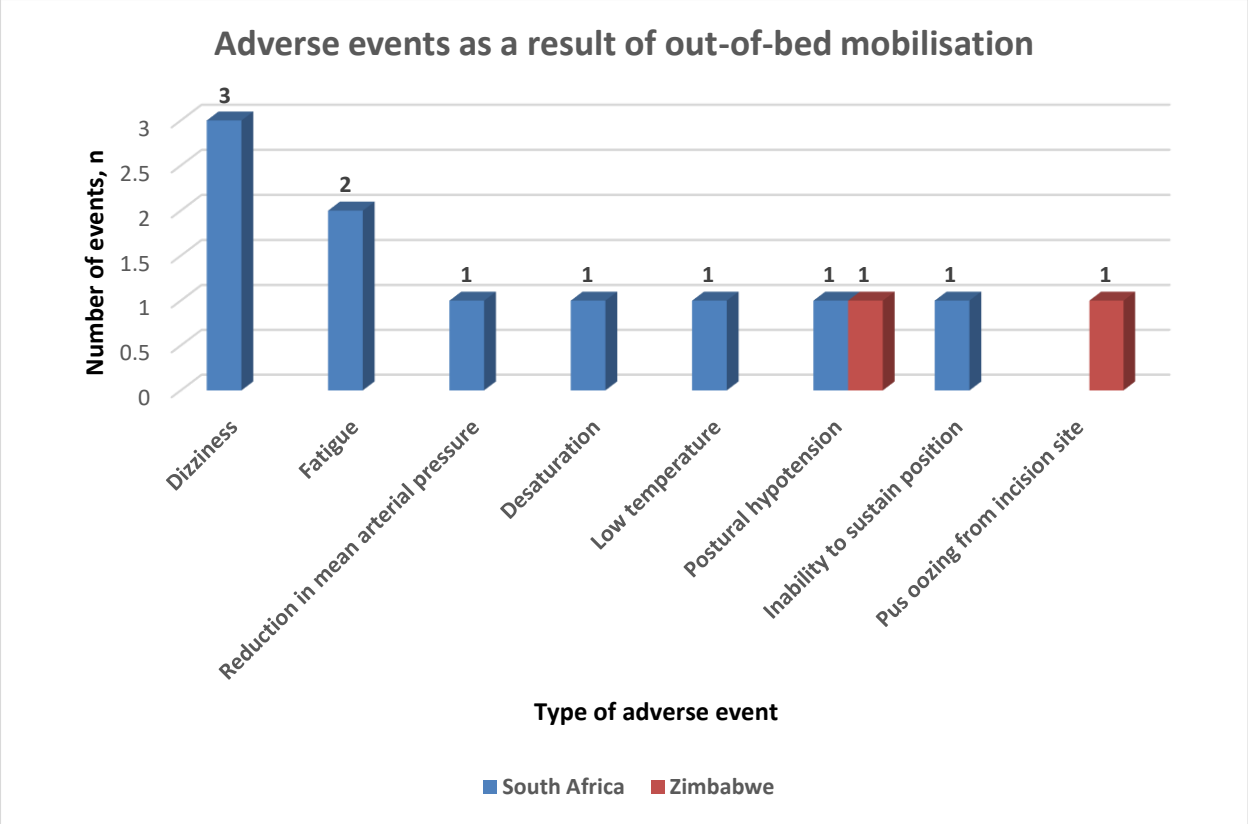


Figure 3.9: Adverse events recorded after the out-of-bed mobilisation of patients

Mobilisation was safe, with incidence of adverse events reported overall being low. Adverse events related to the mobilisation of patients in the Zimbabwean cohort were orthostatic hypotension when sitting on the edge of the bed (n=1; 2.5%) and large volumes of puss oozing from an incision site when a patient was standing next to the bed (n=1; 2.5%). In the SA cohort, the reported adverse events included dizziness (n=3; 1.5%) and fatigue (n=2; 1.0 %)

3.4.8 Factors Associated with Mobilisation Activities in Zimbabwe and SA

Table 3.6 presents the predictors for out-of-bed mobilisation in patients from Zimbabwe and SA.

Table 3.6: Predictors of Out-of-Bed Mobilisation in Patients from Zimbabwe and SA (n=245)

Predictor of Out-of-Bed Mobilisation	B	Wald	P value	Odds ratio	95% CI
Constant	-3.747	22.112	0.000	0.024	
Country [a]	-0.769	1.737	0.188	0.463	0.148-1.455
Type of ICU [b]	1.257	7.561	0.006*	3.516	1.435-8.615
Permanent ICU physiotherapy [c]	0.825	2.786	0.95	2.282	0.866-6.012
Physiotherapy participation in ward rounds [c]	0.600	1.255	0.263	1.823	0.638-5.211
Age	0.010	0.726	0.394	.1.1010	0.987-1.034
Number of days in ICU	0.099	21.331	0.000*	1.104	1.059-1.151
Method of ventilation [d]	1.293	9.345	0.002*	3.642	1.590-8.343
Sedated [c]	-0.823	1.400	0.237	0.439	0.112-21.717
Availability of transfer equipment [c]	-0.131	0.074	0.786	0.878	0.343-2.248

a SA is the reference category b Closed unit is the reference category c Yes is the reference category d Spontaneous breathing is the reference category
*denotes statistically significant

The binary logistic regression analyses indicated that the type of ICU, the number of days in the ICU and the method of ventilation were significant predictors of out-of-bed mobilisation for patients in SA and Zimbabwean ICUs [Chi-Square=66.567, df=9 and p<0.001]. Country was not a significant predictor for out-of-bed mobilisation (p=0.19). The odds that a patient would be mobilised out-of-bed were 3.5 times higher for patients in a closed type of ICU compared to patients in an open type of ICU (OR=3.516; 95% CI 1.435-8.615) and this was proved to be statistically significant (p=0.006). The odds that a patient would be mobilised out-of-bed were 3.6 times higher for patients on spontaneous breathing compared to patients on an artificial airway (OR=3.642; 95% CI 1.590-8.343). This finding was found to be significant (p=0.002).

3.5 DISCUSSION

Results from this cross-sectional study show that patients in ICUs in government sector hospitals in Zimbabwe and SA perform a range of mobilisation activities during their stay. However, the majority of these activities are performed in bed and therefore the incidence of out-of-bed activities was low (25% and 19.5% in Zimbabwe and SA respectively), with only five percent (5%) of the patients walking away from the bedside.

No other surveys have reported on mobilisation practices in SA and Zimbabwean government hospital ICUs to date. Similarities were found between the results of the current study and those reported by other point prevalence studies and prospective observational studies on the early mobilisation of patients in ICUs (Berney et al. 2013; Nydahl et al. 2014; Jolley et al. 2017; Sibilla et al. 2017; Capell, Tipping & Hodgson 2018; Fontela et al. 2018). Low incidences of out-of-bed mobilisation, with a range of 10% to 33%, have also been reported in all the point prevalence studies which have been conducted to date (Berney et al. 2013; Nydahl et al. 2014; Jolley et al. 2017; Sibilla et al. 2017; Fontela et al. 2018). This shows that early mobilisation is not being implemented as standard care, thus illustrating the gap that exists between research evidence and the implementation of this evidence in clinical practice.

The results of the current study show that predictors of out-of-bed mobilisation in SA and Zimbabwe include the method of ventilation (spontaneous breathing versus artificial airway), the number of days in ICU ($p=0.02$ and $p<0.0001$ respectively), and the type of ICU ($p=0.006$). (The type of ICU will be discussed in more detail later.) The low incidence of out-of-bed mobilisation for patients ventilated through artificial airways was noted in the current study. The cohort from SA included more patients on endotracheal tubes and tracheostomies as compared to those from Zimbabwe, although the difference was not significant ($p=0.282$). This might be the reason why the percentage of patients who were mobilised out-of-bed in SA hospitals was lower than that for Zimbabwe. In agreement with these findings, the incidence of out-of-bed mobility for those on mechanical ventilation was reported by others to be significantly lower compared to those on spontaneous breathing (Berney et al. 2013; Nydahl et al. 2014; Sibilla et al. 2017; Berney et al. 2018; Capell, Tipping & Hodgson 2018; Fontela et al. 2018). Besides the type of airway, out-of-bed mobilisation was found to be most prevalent in the current study in patients who had been in the ICU for more than 48 hours as compared to those patients who had been in the ICU for less than 48 hours.

Brock et al. (2018) reported that predictors of out-of-bed mobilisation include a longer length of stay in ICU, the male sex, and those patients with a high Glasgow coma scale of above 10. Berney et al. (2013) similarly reported that the LOS in the ICU for most of the patients who had an artificial airway in situ and who participated in out-of-bed mobilisation activities was more than 48 hours. The low incidence of out-of-bed mobilisation for patients who stayed for a shorter length of time in the ICU may be explained by their use of sedation and the fact that they might have been more unstable from a cardiovascular point of view (Nydahl et al. 2014; Fontela et al. 2018).

In support of this statement, Capell and colleagues (2018) reported that more than half of their Australian patient cohort was too sedated for active mobilisation on days one and two after ICU admission, whilst more than 30% remained sedated even on days three and four after ICU admission. Their cohort comprised of patients who had suffered major traumatic injury, who had undergone organ transplantation, who had suffered exacerbating chronic diseases, and who were recovering after surgery. These patients had a median APACHE II score of 17 (IQR=12.5-21.0) and it was noted that they required a period of sedation after ICU admission on account of their medical instability (Capell, Tipping & Hodgson 2018). However, it is not known whether the patients who were admitted to the ICUs in the SA and Zimbabwean government hospitals, were sicker and were therefore managed predominantly as in-bed cases, as opposed to the patient cohorts in the previously mentioned studies, since none of the participating hospitals routinely recorded APACHE II or the SOFA. As such, the researcher could not determine the severity of the illness or the risk of morbidity at the time of assessment.

Considering the cohort of patients in this survey, the indications for ICU admission were mainly due to acute respiratory failure, postoperative care and trauma. Cohorts that were investigated in Australia and New Zealand, Germany and USA also consisted of patients with medical and surgical conditions (Berney et al. 2013; Nydahl et al. 2014; Jolley et al. 2017). Apart from the medical and surgical conditions, the majority of the patients in the SA ICUs were in there for conditions secondary to trauma and the difference in indications for ICU admission between the two countries was significant (p=0.001). Trauma constitutes approximately 25% of the emergency workload at most government hospitals in SA where there is limited capacity for rehabilitation and ICU facilities are lacking (Hardcastle et al. 2016). The results of the current study show that traumatic injuries are generally sustained as a result of road traffic accidents or interpersonal discord, and/or intentional injury, and occur mostly among young men, which is similar to the reports in the literature (Laing et al. 2014; Nicol et al. 2014; Hardcastle et al. 2016).

Moreover, as reported in the literature (Bradshaw et al. 2003; Pillay-van Wyk et al. 2016; Reubi, Herrick & Brown 2016), the current study also found that the critical care service is burdened by the presence of comorbidities which include hypertension, diabetes, renal diseases and HIV. The above-mentioned survey shows that smoking is among the common comorbidities in patients from SA. It has been reported that a large proportion of adults in SA continue to use tobacco, thus resulting in a smoking prevalence of 17.6%, with males having a prevalence four times that of females (Reddy et al. 2015).

Patients who smoke have an increased risk of postoperative pulmonary complications and of being admitted to the ICU as smoking is recognised as a risk factor for poor wound healing, cardiovascular and thromboembolic events, respiratory compromise and the need for prolonged mechanical ventilation after surgery (Hawn et al. 2011; Khullar & Maa 2012; Resnick et al. 2014). All of the stated factors have an influence on early mobilisation practices and must all be considered when formulating CPGs and protocols of mobilisation which can be successfully implemented in low- and middle-income countries.

The reasons for patients not sitting out-of-bed or walking away from the bedside in ICU were found to differ significantly between the two countries and can be attributed to patient unresponsiveness, haemodynamic instability, and patients being sedated and unresponsive ($p<0.05$). More than one third of the patients from Zimbabwe were managed in bed owing to sedation and unresponsiveness. The problem of sedation is more common in the Zimbabwean patients than in those from SA. This could be due to the fact that none of the units from Zimbabwe which participated in this study reported having protocols in place to manage patient sedation or pain levels, and only one unit had eligibility criteria in place to monitor patient readiness for mobilisation.

The results from an international survey conducted in France, Germany, the UK and the USA showed that ICUs with an early mobilisation protocol were reported to automatically initiate early mobilisation programmes upon the admission of the patient into the unit, whilst ICUs without early mobilisation protocols in place often required a physician's order to start the treatment (Bakhru et al. 2016). The absence of early mobilisation protocols, delirium assessment protocols, and physical function assessment tools in the ICUs, as well as the type of patient seen in the unit might explain the low level of out-of-bed mobilisation that was reported in the current study. The physiotherapists and/or nurses either verbally reported or wrote in the patients' notes that the reasons why some of the patients were not mobilised on the day of the survey included muscle weakness, agitation, depression and confusion. However, these complaints were not assessed through standardised outcome measures as there were no reported tools to measure the level of functional status or delirium in most of the units. As such, protocols for the following should be standard practice in the ICU: ventilator weaning protocols, delirium assessment protocols, sedation protocols, early mobilisation protocols and pain evaluation protocols (Bassett et al. 2015). These recommendations have resulted in the introduction of a new bundle of interventions which incorporates performance and the coordination of spontaneous awakening trials and spontaneous breathing trials; the

careful selection of sedatives; the assessment, prevention, and management of delirium; and early exercise with progressive mobility (ABCDE bundle) to improve the care of critically ill patients (Balas et al. 2013).

Deep sedation has been reported to be a barrier to early mobilisation in other studies, resulting in patients being subjected to in-bed mobility activities as compared to out-of-bed mobilisation activities (Sibilla et al. 2017; Capell, Tipping & Hodgson 2018). This then shows that the problem of sedation has not been successfully solved and if not resolved, the prevalence of the out-of-bed mobilisation of ICU patients will continue to be very limited worldwide. The use of bedside sedation scales may move the ICU team away from the use of deep and prolonged sedation towards the continuous targeted light sedation, with drugs that are relatively short acting and easier to titrate (Vincent et al. 2016).

Although the units from SA indicated that they had sedation vacation and daily interruption-of-sedation protocols in place, this did not translate into a higher incidence of early mobilisation activities in their units, as compared to the patients from Zimbabwe. However, even though the units from SA have sedation protocols, out-of-bed mobilisation activities might have been affected by the type of patients present in the units on the days of the survey rather than by the presence or absence of sedation protocols. It has become important to determine the barriers to the implementation of early mobilisation specific to each unit before implementation so that these can be addressed to ensure optimal patient response and clinical outcomes. The high prevalence of trauma in the cohort from the SA units might be the reason why the majority of the patients from SA were not mobilised out-of-bed, the main reason being their unresponsiveness and the raised ICP that they were experiencing on the day of the survey. The majority of these patients had sustained head injuries and they were in the unit for either neuroprotection or postoperative care after a craniotomy had been done. Since the most frequently cited reason was unresponsiveness, this shows that the majority of these patients had sustained severe traumatic brain injury.

Severe traumatic brain injury is defined by a Glasgow coma scale as equal to or less than eight (8), and these patients usually require management according to well-defined clinical protocols. These include mechanical ventilation, ICP monitoring, the maintenance of intracerebral homeostasis, and aggressive imaging, and are generally set in place in order to identify patients who require a neurosurgical operation (Jerome et al. 2017). With urbanisation, a growing middle class, and the availability of cheaper

cars and motorcycles, an even higher burden of traumatic brain injury is anticipated in the future (Tran et al. 2015). In low- and middle-income countries, critical care resources available to manage patients with traumatic brain injury are inadequate and most units are characterised by a shortage of neurosurgeons, a shortage of ICU beds, a paucity of ICP monitoring devices, and a limited number of theatre days (Ramesh et al. 2014; Jerome et al. 2017). All of these factors directly affect the implementation of early mobilisation in this specific group of patients.

All of the units in SA had clinical protocols in place. They ranged from mechanical ventilator weaning, sedation, and spontaneous breathing trial protocols. Only two ICUs had an early mobilisation protocol. Despite the presence of these clinical protocols, very few patients were mobilised out-of-bed, with the majority of the patients being managed in bed. Nydahl et al (2014) reported that 75% of participating units in Germany had protocols in place for monitoring the levels of patient sedation and pain and that 71% had protocols in place for the early mobilisation of patients in ICU; yet more than half of their participants were managed in bed (Nydahl et al. 2014). More than three quarters of the ICUs from Switzerland had sedation vacations, spontaneous breathing trials, and early mobilisation protocols in place; yet only about a third of the patients were mobilised out-of-bed (Sibilla et al. 2017).

It is thus fair to conclude that the culture of the early mobilisation of patients in ICUs has not been universally adopted by clinicians in the SA and Zimbabwean government hospital settings or elsewhere in the world. Since there is an underutilisation of CPGs and/or protocols by the ICU teams in Zimbabwe and SA, there is a need to further explore the attitudes and beliefs of clinicians about the use of CPGs in patient care and the factors associated with their acceptance and use. Hodgson et al. (2014) highlighted the fact that the practice of early mobilisation of patients is not delivered to all patients who might benefit from it owing to a lack of objective criteria which indicates that it is safe to initiate mobilisation. Results from a recent prospective study have shown that the translation of expert consensus recommendations for early mobilisation to be integrated into clinical practice have been poor as physiotherapists are overly conservative in their management of patients during mechanical ventilation; and they do not commonly mobilise patients in or out-of-bed as a result of the risk, either low, potential or significant, of an adverse event (Capell, Tipping & Hodgson 2018).

Another factor which was found to be significantly associated with out-of-bed mobilisation in the current study was the type of ICU (p=0.006) with more out-of-bed

mobilisation happening in the closed type of ICU. Closed-type ICU settings may more readily result in the standardisation of practice since all decisions related to patient management are mainly made by one intensivist. The knowledge and attitude of the intensivist towards early mobilisation becomes a key component in the closed type of ICU as the intensivist serves as the champion leader in the implementation of such interventions in the unit (Chowdhury & Duggal 2017). In contrast, all participating units in the Australian and New Zealand survey were closed units and yet no patients on mechanical ventilation for longer than 48 hours stood, sat out-of-bed or walked in the unit on the day of the survey (Berney et al. 2013). This shows the complexity associated with the implementation of early mobilisation, which is dependent on multiple factors that require interprofessional communication for successful implementation. One of the best strategies implemented in the ICU is to improve communication through multidisciplinary ward rounds, where best-patient management is discussed by the whole team. Multidisciplinary rounds allow for the real-time and in-person exchange of information, making the goals and plans for the care for each patient clear to everyone (Der 2009), and this is an important mechanism for communication and coordination in the care of patients (Gurses and Xiao 2006).

However, the results of the current study show that not all of the units conducted multidisciplinary ward rounds and physiotherapists participated minimally in the multidisciplinary ward rounds. The successful implementation of early mobilisation programmes is associated with staff attendance at the multidisciplinary ward rounds and the setting of daily mobility goals for each patient (Bakhru et al. 2016). A cultural change, which involves the mandatory attendance of staff members at multidisciplinary ward rounds, must be implemented in all units as poor communication in the team providing the care will result in poor patient-related outcomes. Physiotherapists must be encouraged to always engage in the ward rounds, so that their perspective in the management of the patients can also be reviewed and if they need any support in the management of the patient, this should then be communicated to the team. The limited participation of the allied health clinicians in ward rounds has been reported and this must be rectified because a collaborative approach to care planning can only occur by ensuring that the roles and responsibilities of each discipline in the ICU is clearly defined (Walton et al. 2016).

Other factors that were reported to influence mobilisation activities performed with patients with critical illness, but that were not significantly associated with out-of-bed mobilisation in the current study, were the staff-to-patient ratio and the level of availability

of rehabilitation and transfer equipment in the units (Bakhru et al. 2016). In the current study, one nurse provided care for one patient, while one physiotherapist provided care for up to nine patients in some ICUs in Zimbabwe. On the other hand, in SA, the nurse-to-patient ratio ranged from one nurse for each patient to one nurse for four patients. The physiotherapist-to-patient ratio ranged from 1:1 to 1:12 across units depending on the bed capacity of the ICU. The majority of the units from both countries reported that nurses and physiotherapists are both responsible for the mobilisation of the patients and a few of the units from SA also indicated that the physicians/doctors also generally assist with mobilisation. This is in contrast to the high ICU staffing levels reported in Germany, where the mean nurse- to-patient ratio is 2.4 and the physiotherapist-to-patient ratio is 9.7 (Nydahl et al. 2014). In this German study, nurses and physiotherapists were mostly involved in the mobilisation of patients, with physicians assisting at times, which was the same as the situation reported for SA in the current study.

The majority of the participating units reported the availability of transfer and lifting devices, as well as rehabilitation equipment such as tilt tables and walkers (Nydahl et al. 2014). In the current study, it was noted that there was a lack of transfer and rehabilitation equipment, with none of the units from Zimbabwe having that type of equipment, whilst very few units from SA reported the availability of such equipment. Therefore, the low staffing levels and the lack of readily available equipment in SA and Zimbabwean government ICUs may impact on the frequency with which mobilisation activities are performed in these units.

Another barrier to the out-of-bed mobilisation of patients commonly reported for patients admitted in Zimbabwean ICUs is haemodynamic instability. Similarly, this barrier to out-of-bed mobilisation has been commonly reported in several studies (Berney et al. 2013; Nydahl et al. 2014; Harrold et al. 2015; Hodgson et al. 2014; Holdsworth et al. 2015; Parry et al. 2017b; Brock et al. 2018). Since the risks associated with immobility have been well documented, there are safety guidelines which have been developed and are now in place to help clinicians to screen patients for eligibility for out-of-bed mobilisation and to categorise them in terms of the risk of an adverse event occurring (Hodgson et al. 2014; Nydahl et al. 2017). The low rate of adverse events (4.9% and 5% for SA and Zimbabwe respectively) reported in the current study was consistent with what has been reported in other studies (Berney et al. 2013; Jolley et al. 2017). All adverse events reported were minor in nature and therefore it can be concluded that the early mobilisation of patients in government sector ICUs in participating hospitals in SA and Zimbabwe is a safe practice.

Looking at the design of this phase, it has its own strengths and weaknesses. A cross sectional study design was used and due to its weaknesses, this limit the extrapolations that one can make from these results. Cross-sectional designs are limited however by the fact that they are carried out at one time point and give no indication of the sequence of events, whether exposure occurred before, after or during the onset of the disease outcome (Hofer, Sliwinski & Flaherty 2002; Levin 2006). This being so, it is impossible to infer causality. Another disadvantage of this study design is that it will be only a snapshot and the situation may provide differing results if another timeframe had been chosen due to seasonal variations of the diseases (Levin 2006; Setia 2016). The results from the study showed that majority of the patients were in the unit due to trauma and that might have been the reason for the low early mobilisation activities. It is not known for sure if that is the trend throughout the year to have a high proportion of trauma patients. Nevertheless, cross-sectional studies indicate associations that may exist and are therefore useful in generating hypotheses for future research (Levin 2006; Setia 2016). The results of this study will inform other research to be done in this area in order to fill the gap or to answer the questions which have arisen. However, this design was chosen for this study mainly because of these advantages; they are relatively inexpensive and takes up little time to conduct, one can estimate prevalence of outcome of interest because sample is usually taken from the whole population, many outcomes and risk factors can be assessed, they are useful for public health planning, understanding disease aetiology and there is no loss to follow-up (Levin 2006; Setia 2016). The research questions were appropriately answered through use of the study design.

3.5.1 **Conclusion to the Discussion**

The rate of out-of-bed mobilisation activities in SA and Zimbabwean government hospital ICUs was found to be low and to be influenced by patient unresponsiveness, sedation and haemodynamic instability. The predictors of out-of-bed mobilisation activity include the type of ICU, the method of ventilation and the number of days in ICU. Most of the cited barriers to early mobilisation are modifiable and require a cultural change in the staff manning the units. The standardisation of practice through the adoption of already existing CPGs for patient management may be the key factor to improving service delivery to all patients in ICUs. There is a need for the implementation of quality-improvement projects in these units, with the overarching goal of making changes that result in better patient outcomes through the provision of well-established clinical interventions and further professional development.

CHAPTER FOUR

PHASE TWO: EMPIRICAL EXPLORATION OF THE BARRIERS AND ENABLERS TO EARLY MOBILISATION

4.1 INTRODUCTION

The strategies to bridge the evidence-research gap include the active identification of barriers to early mobilisation which exist in each unit. This phase of the study (Phase two) was done to explore the perceptions of physiotherapists regarding early mobilisation practice in ICUs in relation to the barriers and enablers in their units. The identified barriers and enabling factors to early mobilisation should be used to specifically direct the implementation and quality improvement efforts which will ultimately result in improvements in clinical practice (Goddard et al. 2018).

4.2 STUDY OBJECTIVES

The overall aim of this phase of the study was to explore the barriers and enablers to early mobilisation as perceived by the physiotherapists working in ICUs. The specific objectives were as follows:

a) To explore the physiotherapists' perceptions of the implementation of early mobilisation practices in SA and Zimbabwean government hospital ICUs.
b) To identify the perceived barriers to early mobilisation practices in ICUs as experienced by physiotherapists in SA and Zimbabwean ICUs.
c) To identify the perceived enablers to early mobilisation practices in ICUs as experienced by physiotherapists in SA and Zimbabwean ICUs.

4.3 METHODOLOGY

4.3.1 Ethical Considerations

The general ethical principles followed and how they were applied in the study are as discussed previously (refer to Section 3.3.1). According to the Declaration of Helsinki, all ethical principles were adhered to during this phase of the study.

4.3.1.1 Autonomy and informed consent for participants in phase two

All participants who were eligible to participate in Phase two of the study were issued with an information letter and an informed consent form (Appendix 32). Informed written consent was obtained from each physiotherapist who participated in the interviews and he/she signed a consent form for the audio-recording and transcription of the interviews (Appendix 33). The use of a semi-structured interview guide ensured

consistency as the same questions were posed to all the participants. The researcher notified all participants that a copy of the findings would be sent to their departments or emailed to them directly.

The audio files were erased from the recording pen and were kept as voice files on the researcher's computer hard drive. Only the researcher and academic supervisors had access to the voice files. The anonymity of the participants was ensured as neither the name nor any other identifying information (such as a voice or a picture) was used in the presentations or in the written products resulting from the study. The participants and their hospitals were identified by means of code numbers.

4.3.2 **Study Design**

A qualitative case study research design was used. A qualitative case study is an approach to research that facilitates the exploration of a phenomenon within its context by using a variety of data sources (Baxter & Jack 2008). This ensures that the issue is not explored through one lens, but rather through a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood (Baxter & Jack 2008). Case studies may be used to draft success stories that are then used to demonstrate the effectiveness of health promotion programmes (Creswell & Poth 2017).

This design has been recommended as a valuable approach in health science research as it allows one to develop theory, evaluate programmes, and develop interventions because of its flexibility and rigour (Baxter & Jack 2008). A case study design is an appropriate design under the following circumstances: (a) when the research is set to answer "how" and "why" questions; (b) when one cannot manipulate the behaviour of the participants; (c) when there is a need to cover contextual conditions as they are relevant to the phenomenon under study; or (d) there are no clear boundaries between the phenomenon and the context (Yin 2003).

The case which is referred to as the unit of analysis is defined as "a phenomenon of some sort occurring in a bounded context" (Miles & Huberman 1994). In this study, the case study incorporated early mobilisation practices and the context was the ICU setting of government sector hospitals in SA and Zimbabwe. The case study type used in this research project incorporated multiple case studies. A collective case study, or multiple case studies, allows the researcher to analyse within each setting and across

settings in order to understand the similarities and differences between the cases (Yin 2003; Baxter & Jack 2008).

4.3.3 Study Period

The interviews were conducted from June 2016 to January 2017.

4.3.4 Sampling and Study Participants

Physiotherapists working in the government hospital ICUs which participated in Phase one of the study were invited to participate in semi-structured, in-depth, face-to-face interviews to reveal their perceptions as to the implementation of early mobilisation practices in their respective units. Non-probability purposive sampling was used to select the hospitals and the ICUs in the two countries. The sampling was carried out to include hospitals from the different provinces and different ICUs in SA, which on occasion has more than one ICU in one hospital.

The physiotherapists attached to the selected hospital ICUs were then invited for an interview. The study was conducted in four of the five government hospitals which participated in Phase one of the study in Zimbabwe as the saturation level of the information gleaned was reached after interviewing physiotherapists from the selected hospitals. Saturation was defined as data adequacy and operationalised as collecting data until no new information is obtained (Morse 1995). The distribution of these hospitals included three hospitals in Harare and Chitungwiza and one hospital in Bulawayo.

In SA, there were eight hospitals which participated in Phase two of the study of the 13 hospitals which had participated in Phase one of the study as the saturation level of the information gleaned had also been reached. The distribution of these hospitals included four of the hospitals in Gauteng province, three in Kwazulu Natal and one in Western Cape.

4.3.5 Selection Criteria

4.3.5.1 Inclusion criteria

The physiotherapists from the two countries were selected for the study on the basis of the following stated criteria: 1) they had worked in ICUs in government hospitals for at least two years; 2) they were currently working in at least one of the adult ICUs during the study period; 3) they had experience of the phenomenon under investigation

(early mobilisation of ICU patients); and 4) they were willing to answer the research questions through participating in the interview.

A period of two years was chosen since during the first year after graduation, the physiotherapists from the two countries work under guidance and they would rotate through the different areas in the hospital. After two years, the physiotherapists would have gained experience and confidence and would have been making their own decisions regarding patient care. After two years, they would have had an opportunity to work long enough in an ICU to provide pertinent details in respect of patient management. At least one physiotherapist from each unit was interviewed.

4.3.6 **Semi-structured interview guide**

A semi-structured interview guide was developed through a review of the literature on early mobilisation (Appendix 34). The interview guide consisted of questions on the following: perception and attitude towards early mobilisation; knowledge about early mobilisation practice in the ICU; benefits of early mobilisation to the patients and the hospital; perceived barriers and enablers to early mobilisation; recommendations to improve the implementation and execution of the early mobilisation programmes in the units.

The interview guide was sent to two experts in the field of ICU and the qualitative research to a lecturer in cardiopulmonary physiotherapy and an ICU nurse lecturer; both with more than 15 years of research experience for content and face validation. The experts suggested that the interviewer should start the interview with a general question about the interviewee's perceptions of the use of the early mobilisation of patients in the ICU that they work in. Other comments received related to a re-phrasing of some of the questions so that they would be clearer and would facilitate greater understanding in the interviewees. The experts commented that all of the questions included in the semi-structured interview schedule were adequate for finding answers to the objectives and research questions associated with this phase of the study, and thus no further alterations or additions were necessary.

4.3.7 **Procedure**

At each hospital, Phase one, which was a quantitative survey study, was completed prior to Phase two, which was a qualitative study. This allowed the researcher a prolonged time of exposure to the phenomenon under study and in its context and also to establish rapport with the participants before conducting the face-to-face interviews.

The physiotherapists who were working in the ICU were then approached to conduct the semi-structured in-depth interviews. The time and the specific venue were set with each participant as Phase one and Phase two of the interviewing process did not always occur on the same days. The interviews were conducted in English in both countries as all participants were able to speak and understand English. They were conducted by a team of two people which included the researcher (PhD candidate) and a research assistant (Physiotherapy Master's student), who was responsible for notetaking during the interviews.

At the beginning of the interview, each physiotherapist was given a piece of paper to write down their gender, country of residence, years in practice, the type of ICU that they work in and the size of the unit. The interviews were conducted within the hospital setting in a place that was convenient for the interviewees. The interviews lasted between 20 and 55 minutes. The additional issues (not in the interview guide) that were raised by the physiotherapists in the interviews allowed the researcher to explore a wide range of topics, thus enabling her to further develop these in subsequent interviews with other participants. The participants were encouraged to talk frankly and were assured that no hospital identification details were going to be reported. The interview sessions were audio recorded using Livescribe 4GB Echo Smartpen. They were conducted until the saturation level of the information obtained was reached.

Credibility was assured in the following ways: 1) the researcher's familiarity with the role of physiotherapy in the ICU, 2) the researcher's knowledge and experience in the area of study, which was early mobilisation in the ICU, 3) the researcher's request for the physiotherapists who participated in the interviews to be honest, 4) a review of the transcript analysis by a more experienced researcher, and 5) the return of the transcript analysis following an initial analysis, to a few physiotherapists, who participated in the interviews to validate the findings.

Transferability was assured by providing a detailed description of the study setting and the working conditions of the physiotherapists in the two countries, while the methodology was described in detail by the researcher for the sake of dependability. Confirmability was assured through record keeping and by using physiotherapists working in different types of ICUs and from different regions to provide for a coherent and deeper perspective.

4.3.8 **Data Management and Analysis**

The audio-recorded interviews were transcribed verbatim by the researcher, who read through all the transcripts for consistency and accuracy. The content analysis method was used. Content analysis is defined as a research method for the subjective interpretation of the content of textual data through the systematic classification process of encoding and identifying themes or patterns (Hsieh & Shannon 2005). The analysis was carried out through open coding after immersive reading of the transcriptions. Preliminary data analysis occurred concurrently with data collection during the quarterly de-briefing meetings between the researcher and her supervisors (Professor Helena van Aswegen and Professor Veronica Ntsiea). Discussions during these meetings helped to identify emerging issues and also informed further data collection.

Two people were independently involved in the encoding (the researcher and Professor Helena van Aswegen), and one of the supervisors (Professor Veronica Ntsiea was responsible for the verification and validation of the codes from the two encoders. The codes were formulated through blocking at the response level. Codes that were descriptive labels were created through the process of recoding until the encoders were satisfied. Codes relating to a common concept were assigned into subcategories first and then into categories, which were conceptualised into themes. The codes formed the basis for the thematic analysis, where patterns and meanings were established.

Open coding was followed by axial coding, which resulted in formulations of the conceptual links from the list of categories which were generated. Analysis was conducted through inductive content analysis, which refers to approaches that primarily use the detailed readings of raw data to derive concepts, themes, and/or a model through interpretations made from the raw data by an evaluator or researcher (Thomas 2006). ATLAS.ti® v.8.4.15 Scientific Software Development GmbH, Berlin was used by the researcher to assist with the analysis and organisation of the data.

4.4 RESULTS

4.4.1 Description of the Participants

Table 4.1 summarises the description of the physiotherapists and their work experience. A total of 22 physiotherapists were interviewed; four of the physiotherapists were from four ICUs in four Zimbabwean hospitals whilst 18 of the physiotherapists were from 18 ICUs in eight of the hospitals in SA.

Table 4.1: Description of the Physiotherapists and the Intensive Care Units They Work in

Characteristics		Zimbabwe (n=4)	SA (n=18)
Gender, n	Females	2	14
	Males	2	4
Years of experience in physiotherapy, median (IQR)		5.5 (2-9)	9 (7-10)
Years of ICU experience, median (IQR)		3.5 (2.5-6.5)	7.5 (6-8)
ICU bed capacity, median (IQR)		7.5 (6-9)	9 (8-13)
Number of physiotherapists in a unit, median (IQR)		1.5 (1-2)	2 (1-3)

The majority of the participants were female (n=16, 73%). The median ICU years of experience for Zimbabwean physiotherapists was 3.5 (IQR-2.5-6.5) years, whilst that for physiotherapists from SA was 7.5 (IQR=6-8) years.

The types of ICUs that the physiotherapy participants worked in are presented in Figure 4.1.

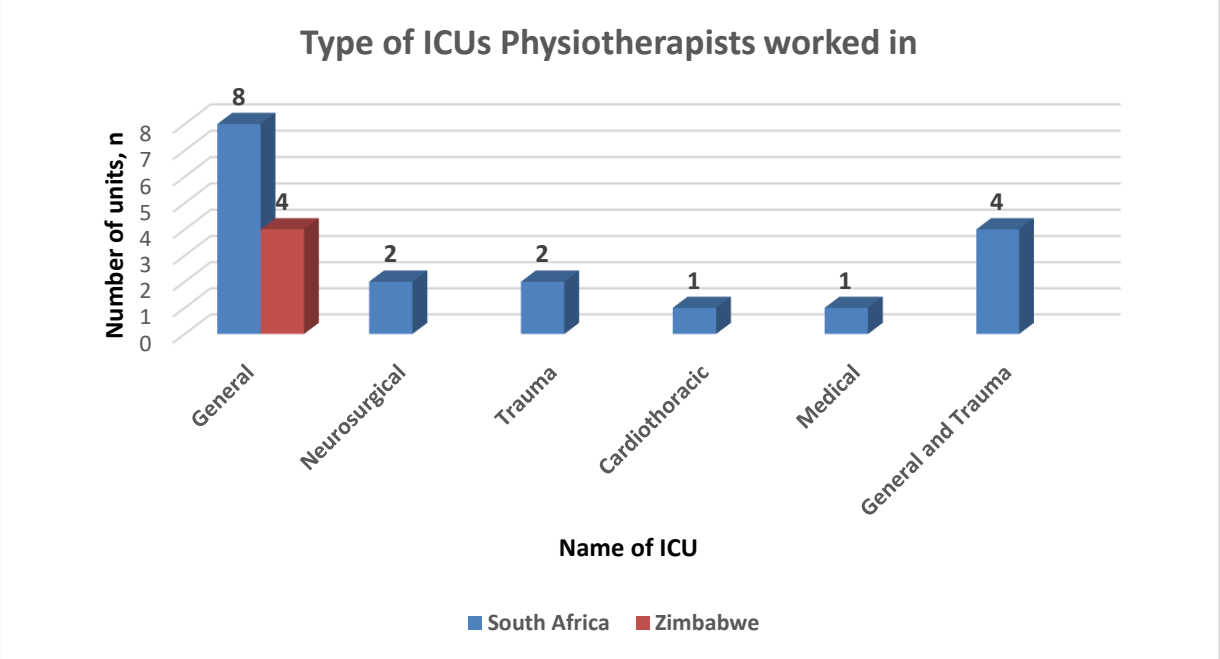


Figure 4.1: The Types of ICUs that the Physiotherapy Participants Worked in

All of the physiotherapists in Zimbabwe were working in a general ICU setting whilst those in SA were either working in a general ICU or a specialised ICU.

4.4.2 Physiotherapists' Perceptions on the Implementation of early Mobilisation Practices in ICUs

4.4.2.1 Interpretation of early mobilisation

The participants were asked to explain what they understood by the term "early mobilisation". The themes which emerged in relation to how physiotherapists interpreted early mobilisation included activities and the clinicians' expectations. Figure 4.2 represents the themes and categories which were established.

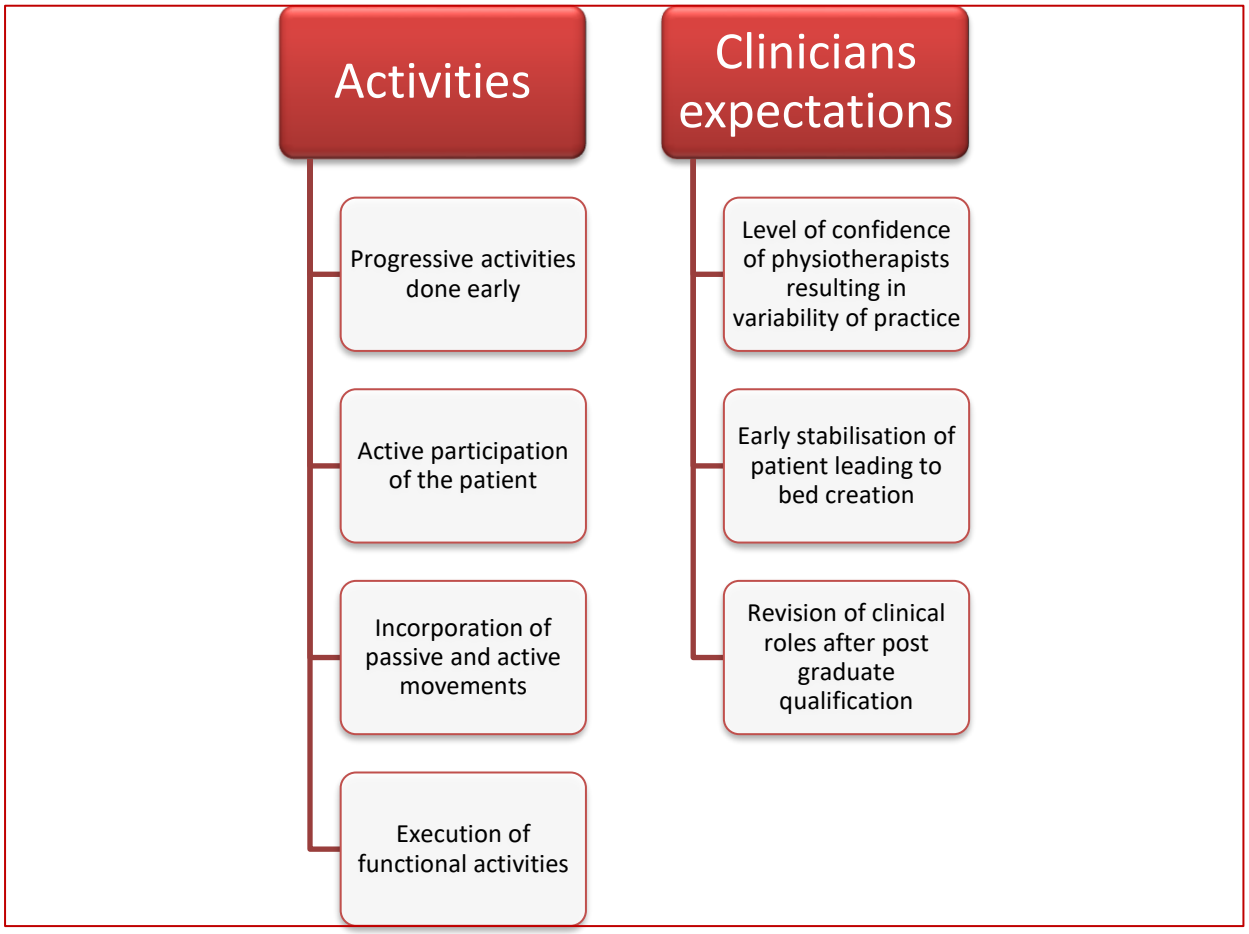


Figure 4.2: Major Themes and Categories under Interpretation of early Mobilisation

4.4.2.1.1 Activities

The participants from both countries felt that the early mobilisation activities should be done progressively and as early as possible, depending on the condition of the patient.

'Early mobilisation, uh, I think on admission, like when patients are admitted, you are not always there to attend to them at that moment, but the next time, you see that patient, then you should incorporate progressive mobilisation of that patient from bed to ambulation. So, from the first treatment, if you could consider that as the treatment intervention for that patient…..'ZM007 General Unit

'So, depending on the condition, we start rolling, sit over the edge of the bed, standing and marching on [the] spot and sometimes we even walk in the unit. Sometimes we have taken out patients and put them in a wheelchair and taken patients outside…..'SA014 General and Trauma Units

'Early mobilisation refers to the early execution of the following activities in an ICU patient: turning, sitting up in bed, positioning, sitting over the edge of the bed, standing and walking…..'ZM012 General Unit

'I think early mobilisation is getting the patient out-of-bed or trying to change the patient's position at least in bed as soon as possible, for after surgery, that is day 1 or day 2 after sedation…..'SA006 Cardiothoracic Unit

The participants felt that the patient should be able to actively participate for the exercise to be beneficial. Passive movements were not regarded as part of early mobilisation.

'I think the patient should be able to participate in the mobilisation, uh... it shouldn't be a complete passive endeavour or a passive procedure, uh...., the patient should actively participate in it, otherwise I feel like that there won't be as much benefit, that is in terms of mobilisation out-of-bed…..'SA001 General Unit

'I think early mobilisation, it encompasses the active movements on a patient even with minimum assistance, starting from turning in bed to walking. So, it includes bed mobility to out-of-bed activities…..'ZM005 General Unit

'Remember: when I say mobilisation, I am not actually including passives because anyway passive, you still can do [that] in paralysed and sedated patients…..'SA018 General and Trauma Units

Some participants felt that the early mobilisation of a patient incorporates both active and passive activities.

'Mobilising in bed, uh, so in terms of in-bed mobilisation, then we are just doing an active range of motion exercises. That is great, but we will try to do that; and we do passive range of motion - obviously with most of our patients - dependent on time…..'SA001 General Unit

The participants reported that the early mobilisation of patients includes sitting the patient up in bed unsupported first, then later to incorporate the sitting with other activities.

'To me, early mobilisation of ICU patients means getting the patient to sit on the bed, without being supported, I think we can get to 80 or 90 degrees for the head rest and from there if they tolerate it, we can proceed to the other activities….'SA002 Neurosurgical Unit

The participants felt that early mobilisation performed by physiotherapists incorporates functional activities to get the patient active.

'…in terms of physiotherapy mobilisation, we (physiotherapists) try to do lots of functional activities and try to incorporate lots of exercise therapy in the mobilisation, so you try to do some sit-to-stand, marching on the spot, stretches and strengthening exercises, then mobilise the patient to a chair…' SA006 Cardiothoracic Unit
'…I think when we (physiotherapists) mobilise the patient, we (physiotherapists) try to get them (patients) to do more functional mobility, so to actually stand up, get up straight, turn around, sit down…'SA006 Neurosurgical Unit

4.4.2.1.2 Clinician expectations

The participants noted that early mobilisation has been successfully implemented in some units but that there is variability of practice as some physiotherapists are not comfortable with mobilising some patients.

'The treatment has been successfully implemented in the unit but it varies with therapists as some therapists are pro-mobilisation and other people are not as comfortable with mobilising a ventilated patient, and other people are so comfortable, so it just varies from therapists to therapists because you might have two therapists in the same area and one would mobilise a patient and the other one will not…'SA006 Medical Unit.

The participants noted that the need to have patients quickly stabilised and have them discharged to make beds available to new patients is associated with the execution of early mobilisation in ICUs with limited bed capacity but catering for a large population group.

'….our ICU is a provincial ICU and we cater for the whole province and it is a four-bed ICU, so usually we want the patients to stabilise early so that they can be discharged early for us to receive other new patients.'ZM005 General Unit

The participants felt that a postgraduate qualification in physiotherapy is not valued as there is no difference in clinical roles and this affects the implementation of early mobilisation in the units.

'…if you do postgrad and you go to HPCSA, they just register it as an additional qualification; there is no specialty attached to it.' SA019 General and Trauma Units
'Right now, even furthering your education by getting a master's or a PhD is not of any benefit because it does not change your duties in the hospital setting, so in the end, people are not keen to pursue their studies…'ZM007 General Unit

4.4.3 Perceived Barriers to the Implementation of early Mobilisation in ICU Patients by Physiotherapists

According to the data which were obtained during the interviews, the four themes which were identified as barriers to the implementation of early mobilisation in ICU patients included the following: the implementation process, the organisation of ICU services, patient characteristics, and environmental context. The themes, categories and subcategories of barriers to the early mobilisation of ICU patients in government sector hospitals are shown in Table 4.2.

Table 4.2: Major Themes and Categories associated with Barriers to the Early Mobilisation of ICU Patients

Theme	Category	Subcategory
1. Implementation Process	Professional autonomy	Undefined roles
		Accountability for responsibilities
	Mindset	Lack of motivation
		Inadequate remuneration
		Negative perceptions
	Synthesis of Evidence	Low priority
		Type of patient
		Unawareness of benefits
	Clinical skills	Poor handling skills
		Poor clinical reasoning skills
2. Organisation of ICU services	Administration	Referral system gap
		High turnover rate
	Staffing	Delayed consultation
		Unsustainable rotational coverage
		Lack of leadership
	Policies and guidelines	Lack of standard operating procedures (SOPs)
		Unsatisfactory sedation practices
	Communication Channels	Discord between team members
		Ineffective interprofessional communication
3. Patient Characteristics	Vital Signs	Haemodynamic instability
		Raised ICP
		Thrombocytopenia
	Responsiveness of the patient	Mental instability
		Alertness of the patient
		Reluctance of the patient
		Pain levels
	Condition of the patient	Complexity of the condition
		Obesity
4. Environmental context	Human resources	Inadequate staff numbers
	Equipment	Lack of appropriate equipment
	Lines and attachments	Number of attachments
		Position of attachments
	Timing	Time pressure

4.4.3.1 **Implementation process**

4.4.3.1.1 Professional autonomy

The issue of undefined roles within the ICU team during the implementation of early patient mobilisation was highlighted by some participants.

'Early mobilisation is not defined as part of a physiotherapy role; it is a collaborative role, because that's where people are getting it wrong.'SA013 General Unit
'…. The doctors do not understand the role and benefits of rehabilitation sometimes. Sometimes we see a difference in how they value rehabilitation based on where they trained .'ZM005 General Unit

Participants noted that it is not clear who has the authority or is empowered to prescribe early mobilisation activities for patients in the ICU as some resistance from the nursing staff is experienced once a physiotherapist recommends such measures. On the other hand, some attending doctors resist out-of-bed mobilisation of the patients when initiated by the physiotherapist.

'…if I just come and say the patient needs to be mobilised, and pay attention to the fact that I am going to be alone in it without the sisters' support and sometimes they [nurses] really want to see if the doctors have said the patient must be mobilised…'SA002 Trauma Unit
'…even if you want to mobilise the patient, they will ask you if that is what the doctor has recommended for that patient. If the answer is "yes", they are most likely to be cooperative but if that is not the doctor's order then they are not keen to assist you on mobilisation…'ZM012 General Unit
'…but as far as mobilisation I mean out-of-bed [goes], we usually wait for the instruction from the consultant and also the condition of the patient to be stable, but they have never asked, in my experience, for mobilisation of the patient first.'SA009 General Unit
'Then the other barrier is that the consultant or anaesthetist, even when you see that the patient is ready for mobilisation all the way to out-of-bed mobilisation, he is difficult to convince.'ZM005 General Unit

There seems to be a lack of clarity regarding which profession will be held accountable when it comes to returning the patient back to bed after he/she has been sitting in a chair as illustrated below:
'So, the question will remain to say, whose responsibility is it to take the patient back to the bed after mobilisation because I have other wards to go to. Therefore, I cannot

spend most of my time in ICU waiting to take the patient back to bed….'SA003 General Unit

'…it's the thing of bringing the patient back in bed, so if the patient is easy to mobilise out, then the nurses are quite happy with helping to mobilise him back later, which is good, but if the patient is difficult….'SA006 Neurosurgical Unit

4.4.3.1.2 Mindset

A lack of motivation on the part of the physiotherapist was highlighted by interviewees from Zimbabwean and SA ICUs as a reason to discourage the early mobilisation of patients, thus resulting in delays in implementing early mobilisation activities in eligible patients or the selection of in-bed activities in patients who cannot participate in out-of-bed activities.

'Motivation to do the job is the main problem. Even if you are attending to a patient who is now stable and recovering well, the type of patients you can do quite a number of sessions with, but you are just de-motivated and do not have time to do that, so you just tell yourself that you will attend to the patient when she/he is discharged to the ward…'ZM007 General Unit

'…the morale of the physiotherapists is very low …..' 'SA013 General Unit

Participants felt that inadequate remuneration in the form of the low salaries paid to health professional working in government hospitals results in lower levels of mobilisation activities for their patients.

'...because of the salaries. So, I find that they will do the least amount of work possible. So, people clearly say that I am not doing that because the government does not pay me enough.'SA013 General Unit

The negative attitude of the nursing staff as in their view on early mobilisation as a disruptive intervention by physiotherapists was also noted to affect the levels of early mobilisation in some units.

'….the nursing staff, who are not very keen on it, they feel that we just come and disrupt their work; they find us quite disruptive…'SA013 General Unit

4.4.3.2 **Synthesis of evidence**

The participants expressed the opinion that there is a general interpretation by clinicians that early mobilisation is not considered to be a treatment option when a patient has been referred for chest physiotherapy. As a result, such interventions in ICUs are low on the prioritisation list.

'In my unit [neurosurgical ICU], I think the priority now is their chest, I think the respiratory system is more important than anything else…not that I am going to completely ignore mobilisation, I do mobilise but that is not my priority, my priority is the chest…'SA002 Neurosurgical Unit
'Usually I can say, I [physiotherapist] might want to mobilise. It's a priority to me but not to the other staff [nurses, doctors] it is not really a priority... to them the priority is just clearance of the chest airway…'ZM017 General Unit

The participants from SA indicated that certain types of patients in ICU should not participate in high levels of mobilisation which they consider to be too intense owing to the nature of their illness.

'As for having a walking frame in the unit, it [just]doesn't get there in the ICU [neurosurgical]. Usually, when I can just get them to sit, it's when they are stable and they [doctors] can extubate them.'SA002 Neurological Unit
'Patients in ICU are in the acute stage such that they would not need aggressive mobilisation; such that we do not use such equipment like a treadmill, tilt table; we do not need them…'SA018 General and Trauma Units

A lack of knowledge about the associated benefits of early mobilisation in ICU patients by the ICU team was raised as one of the factors that negatively affect the levels of early mobilisation.

'Here in government hospitals, sometimes it is more to do with the lack of information on the benefits of the early mobilisation by all the health professionals working in the unit…'SA004 General Unit
'…education of the head of the unit, because he is the boss; so sometimes if you see that the patient is ready for mobilisation, like the mobilisation in bed is not a big problem, but when it comes to out-of-bed mobilisation, that's when most resistance comes in.'ZM005 General Unit

4.4.3.2.1 Clinical skills

The participants expressed the view that the prevailing clinical reasoning skills in the ICU vary across the board for different physiotherapists as these are directly affected by their level of experience. Owing to a lack of a screening guideline, which would positively affect the level of early mobilisation, physiotherapists have to rely on the skills that they have developed through their own experience.

'…because you will see that it comes with the therapist's years of experience, someone who recently graduated will not feel comfortable to mobilise a patient, especially during the acute phase, but for someone with more years of experience, they are not reluctant to mobilise the patient even when on a mechanical ventilator.'SA004 General Unit
'Besides the factors that I have mentioned, it would also depend on the experience of the physiotherapist; you know, if you have been working in ICU, you know how to, from experience, you will be able to do fairly better than someone who is completely new in the unit, so it depends on those factors..' SA018 General Unit

The question of poor handling skills by the other ICU team members was noted, resulting in the intervention being labelled as a risky treatment.

'Sometimes the way the other professionals handle patients, like the lifting techniques, are very poor.'ZM005 General Unit
'..so people do not like to be called for mobilising because they will be saying, "Ah Ah, you gonna hurt my back, that is the main thing!"…'SA002 Trauma Unit

4.4.3.3 **Organisation of ICU services**

4.4.3.3.1 Administration

Participants highlighted the fact that there is inconsistency in the referrals of patients for early mobilisation in some units as physiotherapists treat only those patients referred to them by the attending doctor/physician. However, some doctors never specifically request early mobilisation activities for patients.

'…because we do work on referrals based on ward rounds, our ICU.... it's not blanket cover; so we do not see every patient every day. Also, chest is the priority in our ICU setting and our doctors usually request specifically for chest physiotherapy first and mobilisation comes later.'SA009 General Unit
'..because we cannot provide a blanket cover in ICU due to staff shortages, ideally we should be seeing each single patient whether it is for prophylactic chest physiotherapy

or passive mobilisation or early mobilisation; because of staff shortages, we ask the consultants; the doctors do their rounds and then we get the patients for chest physiotherapy...'SA008 General Unit

The high turnover rate of patients in some ICUs was reported to be the major reason why physiotherapists start mobilising patients only once they have been discharged from the ICU into the high care unit. This is due to easier interventions within the high-care environment and the availability of support.

'…patients tend to go to high care quite quickly and it is much easier to get them going there in high care... and also you have nurses to assist you in high care. It's much easier to do mobilisation in our high care unit,' SA008 General Unit

4.4.3.3.2 Staffing

The participants noted that the delay in early mobilisation in general ICUs is as a result of delayed consultations by the specialist doctors.

'You can find that the patient can be admitted and only a few days later, you are still seeing on the patient's notes: "Awaiting neurosurgeon's consultation"; and some..... they delay coming and these people give different orders at different times and it causes a lot of confusion on the nursing staff for they do not know which order to follow.'SA004 General Unit
'…we do not have a neurosurgeon at the hospital so usually they ask the neurosurgeon at [hospital 1] to come and consult, but that can take ages; you can wait for two weeks.'ZM007 General Unit

Delayed investigations in the ICU were mentioned as one of the factors that affect the rate of early mobilisation as these have an influence on the clinical judgements made.

'You see that in the patients' notes it's written that a certain test or investigation should be done on the patient, but on follow up, you see there is nothing written about that test or the investigation.'SA004 General Unit

The participants felt that a lack of leadership in the form of either a champion leader, who is usually the head of the unit, or a senior physiotherapist mentor, would promote the case for early mobilisation as these are influential roles to push for the increase in the rate of early mobilisation in the unit.

'…that force, that pushes from the head, is something that is also needed in the unit that I am working [in]…'SA002 Trauma Unit

'.there are quite a number of factors that are affecting the way we [physiotherapists] are doing our job - either in the private or government setting. One factor is there are no mentors, like senior people, whom we can say... us junior therapists.... we look up to them and they supervise us…'ZM007 General Unit

The participants also felt that owing to the lack of sustainability in the provision of services that has been caused by the reshuffling of the physiotherapists, there is no guarantee of continuity in the type of services which are offered. In fact, the rotational coverage of physiotherapists in the ICU negatively impacts on the rate of early mobilisation.

'…the thing is we can try and do stuff when we are in the rotation, but we cannot guarantee that the person replacing us is actually going to carry over the activities, so the question is on sustainability.'SA019 General and Trauma Units

'…we do not have a policy in the unit.... whichever therapist is covering the unit at that time, his or her philosophy is the one which works at that given time; we do not even have a policy which states that in this unit, this is how things are done.'ZM007 General Unit

4.4.3.3.3 Policies and Guidelines

The participants highlighted the fact that a lack of standard operating procedures (SOPs) in the ICUs, which include mobility CPGs or protocols, results in variabilities of practice in terms of when to initiate the treatment and the type of activities suitable for each patient at any given time.

'…so, there is no protocol per se to start mobilising because of the nature of the patients we see, but as soon as they are haemodynamically stable, we start mobilising…'SA006 Medical Unit

'…we do not have a guideline for eligibility criteria for early mobilisation, so it is difficult sometimes to know which patient is ready for mobilisation and for which type of activities, or which ones should you avoid in that same patient …'ZM012 General Unit

The participants felt that the sedation practices in some units prevented the early mobilisation of patients as continuous sedation was being used without being based on any standardised sedation scales.

'…they continuously sedate the patients; there isn't anything on sedation vacations done…they end up having over-sedated patients and for some patients the sedation is prolonged because no [sedation] scale is being used to guide them [staff]…'ZM007 General Unit

'So, the challenge is not only because of the ventilator, but it is the ventilator plus sedation because you can mobilise a patient on a ventilator to sit at least, but if sedated and ventilated it becomes a challenge…'SA011 General Unit

4.4.3.3.4 Communication Channels

Participants felt that the discord between team members delays the early mobilisation of patients, especially in the general units and in patients who would have sustained either multiple injuries or with multiple comorbidities.

'…every specialist will be saying" "Fix this first before we come in", and the others will be saying: "Address that first before we address the problem relevant to us", and the nurses do not understand what to do. Then the physiotherapist comes and you do not know what to do with the patient as you are awaiting the further [medical and/or surgical] management of the patient, and this delays the time for early mobilisation.'SA004 General Unit.

"If a patient has been told by his or her doctor not to do something, you cannot convince them otherwise…"ZM005 General Unit

Failure to communicate effectively with the members of the inter-professional team through participation in ward rounds seriously affects the adoption of early mobilisation activities. The participants felt that there is no interaction between the members in discussing the best management of the patient.

'.it all goes back to a shortage of staff, such that we[physiotherapists] can't even attend ward rounds, because of our workload. I cannot afford to attend a ward round….So that results in a serious challenge that we do not often get to communicate or share and work as a team…'SA002 Trauma Unit

'Attending ward rounds is also a challenge and it depends on the consultant covering the unit or the availability of the students (physiotherapy)…'ZM007 General Unit

4.4.3.4 **Patient characteristics**

4.4.3.4.1 Vital Signs

The participants expressed the viewpoint that the haemodynamic instability of the patient affects the early mobilisation of patients, especially in the case of medical patients. The haemodynamic parameters include the heart rate, blood pressure and the oxygen saturation levels.

'…it is a medical ICU, most of the patients come in quite haemodynamically unstable, so as soon as they are haemodynamically stable, and it is appropriate, then we start mobilising.'SA006 Medical Unit
"…patients with BPs which scare you off sometimes e.g. 280/200…"ZM005 General Unit

The participants felt that raised ICP levels in patients with head injuries influence the rate of early mobilisation for such patients.

'…remember I work in [a neurosurgical ICU]. If the ICP is too high, I cannot do mobilisation.'SA002 Neurosurgical Unit
'..most of the patients we have, they are not allowed to sit up because of the ICPs, because of the drains. However, as soon as the patient is allowed to, they are generally quite ok with sitting up in bed…'SA006 Neurosurgical Unit

The participants felt that a low platelet count (thrombocytopenia) influences the early mobilisation activities that can be carried out with a patient.

'…and check the platelets are too low. You do not want to over handle them, even chest physiotherapy.... I cannot do anything vigorous on the patient. I need a stable patient for me to mobilise them…'SA002 Neurological Unit
'..and if the platelets are less than 50, we just do bed exercises and not much with the patient. Platelets below 100, you will be very cautious…SA014 General and Trauma Units

4.4.3.4.2 Responsiveness of the patient

The participants were of the opinion that patients with a head injury would be inclined to present with mental instability related to confusion, and that this would affect the

level at which early mobilisation could be executed, as well as the associated safety issues.

'…and then in our unit, mostly the type of patients we see are head injury patients who cannot cooperate because of confusion. It becomes difficult for me to do any mobilisation with them…'SA003 General Unit
'…these are not normally sedated but because of the confusion that they will be presenting with, it is difficult to mobilise them early.'ZM012 General Unit

The level of alertness of a patient, especially after periods of sedation, influences early mobilisation owing to their tendency to pull out their attachments when conscious.

'..for mechanically-ventilated patients who are awake, who are now at the stage of being weaned off, there is a challenge of them pulling out the tube if they are awake; also if they are weaned off the sedation, and all the attachments, it is quite intimidating…'SA010 General Unit
'…very drowsy.... If the patient is confused and pulling all the lines, attachments out, it makes it a bit difficult.'SA006 Cardiothoracic Unit

Reluctance on the part of the patient on account of the nature of the surgery, their lack of motivation, after having received their HIV-status results, or their tiredness from previous activity sessions, were expressed as factors which could result in the low levels of early mobilisation in ICU patients

'…so ideally, I would like a patient to be up and out every day, but some patients if they are out today, they are extremely tired tomorrow.'SA006 Neurosurgical Unit
'…some patients whom you see,... they can participate in early mobilisation, but they refuse to do so, especially those patients who would have undergone major operations…'ZM005 General Unit
'…for HIV patients, those who are diagnosed whilst in ICU, when they are told, then they do not want to do anything because they will be grieving.'ZM005 General Unit

The participants mentioned that severity of pain determines the type of activities that they could possibly undertake. It was reported that high pain levels limit out-of-bed activities.

'..talking about the overall condition of the patient, number one, Is the patient in pain? If the patient is in severe pain, you may opt to do exercises in bed…'SA018 General and Trauma Units

4.4.3.4.3 Condition of the patient

The participants felt that the complexity of the condition hinders early mobility activities, especially in cases where patients have sustained multiple injuries, patients with head injury or those with multiple comorbidities.

'When it comes to polytrauma, it becomes a problem, like when a patient comes in with a fractured femur, pneumothorax, lung contusion, the femur is not going to be prioritised…'SA010 General Unit

'…we do have some patients who have comorbidities and multiple injuries, and instabilities. The most difficult patients are the critically ill..... We say that movement will not be a priority in this type of patient …'ZM007 General Unit

The participants highlighted the fact that early mobilisation is delayed in trauma patients with open wounds and also with unfixed fractures.

'The other thing.... if they are exposed in trauma, and the wounds are not dressed, especially the abdomen, that is left open, or anything like that, we will not mobilise.' SA014 General and Trauma Units
'..then in some patients who would have undergone abdominal surgery and have had the abdomen left open for further investigations, those patients are very reluctant to move.' ZM005 General Unit
'…if a patient has sustained obviously lower limb fractures you may not get that patient out-of-bed. It will be better to treat [the] patient in bed, and it also depends on the post-op [condition], the nature of the operation,'SA018 General and Trauma Units
'…delay in the fixing of the injuries the patient sometimes sustains.... so there is nothing you can do with the patient during the waiting period.' ZM007 General Unit

Participants highlighted the need for more manpower and equipment for the out-of-bed mobilisation of an obese patient to be achievable.

'…if a patient is very big, very heavy, so it requires a lot of staff to help you put the patient out and back in bed again, and that makes it a little bit difficult when mobilising those types of patients.'SA006 Cardiothoracic Unit

'…and we do not have a hoist or something, then it becomes a challenge. You can't really put the patient in a chair, even if you have enough hands, to get them back to bed, it is difficult and the nurses don't always want to help if it is a big patient because of their backs.'SA011 General Unit

4.4.3.5 **Environmental context**

4.4.3.5.1 Human resources

The participants highlighted the fact that the manpower available to assist with early mobilisation determines the activities which can be carried out with a patient at any given time. This includes the number of people present to assist with mobilising the patient and the fact that the duties of the nursing staff must first be fulfilled before they can assist during the planned time for the early mobilisation of the patient.

'…and also, our staffing numbers….. that makes it difficult to actually mobilise patients; …most of the times itis just one person, so it's one on one…'SA009 General Unit

'It is not possible for me to mobilise all the patients in the unit if they are eligible for mobilisation when you are only one (physiotherapist).'ZM012 General Unit.

4.4.3.5.2 Equipment

The participants felt that the units lack appropriate equipment to facilitate the transfer and mobilisation of ICU patients (e.g. portable ventilators, hoists and chairs), thereby negatively influencing the rate of early mobilisation of patients.

'We do not actually have mobile ventilators, or trolleys, or anything that helps to carry all the lines, so we are physically carrying all the lines and attachments if you want to walk the patient…'SA006 Cardiothoracic Unit.

'We do not have the equipment in the department currently, so …even if the patient requires a walking frame, then they [patients] are told to buy one…'ZM005 General Unit.

'…the chairs we have in the unit are the standard chair with arm and back rests and these might be difficult to use with ICU patients because they are too low, and the arm rests are not adjustable…'ZM012 General Unit

'Then in terms of chairs, in ICU, there are only two appropriate ones with wheels and brakes, that are suitable for ICU patients because you cannot put an ICU patient in a normal chair….'SA006 Trauma unit.

4.4.3.5.3 Lines and attachments

The presence of multiple patient attachments, the length of the attachments, and the location of the attachments was reported to limit the early mobilisation of patients in ICU.

'..that is actually another barrier.... that the patient is on lots of lines and attachments, and it is very difficult to mobilise those patients and sometimes you end up avoiding mobilising them…'SA006 Cardiothoracic Unit

'Early mobilisation has not been successfully implemented in our unit [general ICU] because of a number of factors (e.g. it is difficult when a patient has lots of IV lines, it is difficult to mobilise, sometimes you want to move a lot of stuff but because different specialties come at different times to review the patient, and that interrupts your treatment…'ZM012 General Unit

'Sometimes the lines ....you can't move around with them, they are so short that you have to disconnect completely, or things end up falling…'SA014 General and Trauma units

'Attachments are one factor which influences my decision to mobilise because if there are many, then mobilising is usually limited to just sitting the patient up in bed. When you want to move to one side of the bed, then it depends on the length of the lines…'ZM012 General Unit

The participants noted that the attachments are usually all over the body of the patient and as such affect the handling and transfer of such patients.

'It's never a plan that everything is on one side of the bed so that you can easily manoeuvre…'SA014 General and Trauma units

'…that will be better than to have lots of cannulas all over the body of the patient…"ZM012 General Unit.

4.4.3.5.4 Timing

The participants highlighted the fact that the pressure of time affects the rate of early mobilisation in their units (e.g. when the physiotherapist is ready to do the treatment *versus* the availability of the patient). The ICU is a busy area with inter-professional interactions on one patient and early mobilisation was noted to be an intervention which is demanding and requires a considerable period of time for its execution.

'…you will not get the assistance you need as nurses will also be busy with their duties; or it is during their tea break and they are not by the bedside to assist you.'ZM012 General Unit

'…then look at the time constraints..... whether it is appropriate at the time, in terms of whether the nursing staff are busy with the patient and the doctors are busy with the patient. Yeah.... so, we take a whole lot of factors into consideration.'SA001 General Unit

'…I think time is a problem, so you have to move quite fast because it will take longer if you have to put a patient out-of-bed….'SA006 Neurosurgical Unit

Figure 4.3 shows the major themes and categories under barriers to early mobilisation.

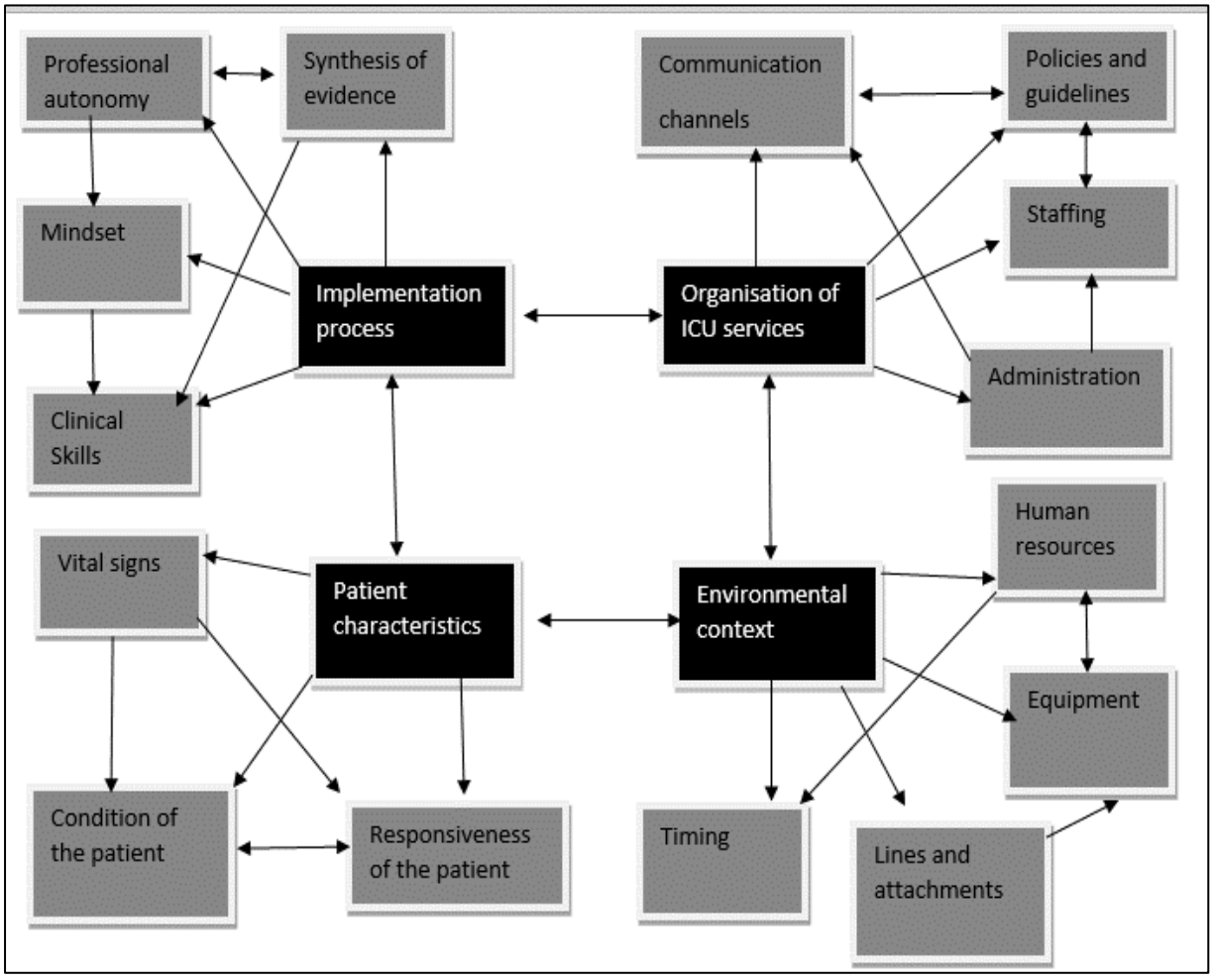


Figure 4.3: Major Themes and Categories under Barriers to Early Mobilisation

4.4.4 Physiotherapists' Perceptions on the Enablers to the Implementation of Early Mobilisation in ICU

The same themes which were identified as barriers (the implementation process, the organisation of ICU services, patient characteristics and environmental context), emerged as enablers to early mobilisation practices in the ICUs in SA and Zimbabwean government hospitals. The physiotherapists from SA identified more enablers to the early mobilisation of ICU patients compared to the physiotherapists from Zimbabwe. Table 4.3 presents the themes, categories and subcategories related to the enablers of early mobilisation of ICU patients.

Table 4.3: Major Themes, Categories and Subcategories Associated with Enablers of the Early Mobilisation of ICU Patients

Theme	Category	Subcategory
1. Implementation process	Synthesis of evidence	Advocated in Training
		Knowledge dissemination
		Awareness of the benefits
	Mindset	Acceptance as a standard of care
		Motivated staff
		Conducting research
2. Organisation of ICU services	Policies and guidelines	Availability of CPGs and protocols
		Non-rotational physiotherapy coverage
		Less use of sedation
	Communication Channels	ICU team pro mobilisation
		Respect of teamwork
3. Patient Characteristics	Condition of the patient	Type of conditions
4. Environmental context	Human resources	Adequate staff numbers
		Supportive nursing staff
	Equipment	Adjustable beds
	Space	Availability of space

4.4.4.1 **Implementation process**

4.4.4.1.1 Synthesis of evidence

The participants mentioned that the rate of the early mobilisation of patients is increased through awareness programmes which include advocating for this benefit during training, and the running of workshops with the ultimate focus of disseminating the relevant information to all team members.

'…we have been made aware since from school that for one to have an effective physiotherapy, early mobilisation is key'.SA018 General and Trauma Units
'One of our therapists has done a master's degree on early mobilisation that she presented at one of the congresses where all our doctors were at, so they are very pro mobilisation.'SA014 General and Trauma Units

The participants reported that acquiring knowledge of the benefits associated with early mobilisation which is then followed up by willingness to implement the treatment is an enabler of early mobilisation.

'I find it is the awareness of the benefits of early mobilisation.... If people know the benefits, they will implement it... willingness... once they have the knowledge, the knowledge of the indications and contra-indications, the willingness not only of the therapist but of the whole team...'SA013 General Unit
'We know and understand the importance of early mobilisation protocols and the relationship that they have with the incidence and prevalence of complications; the influence they have on the length of stay and the influence it has on costs…'SA019 General and Trauma Units

4.4.4.1.2 Mindset

The participants highlighted the fact that the acceptance of early mobilisation treatment as the standard of care by the entire ICU team allows for the execution of such treatment in the ICU.

'…there has definitely been an improvement and when people walk in and see that we have put a ventilated patient in a chair, no one is having a heart attack.'SA016 General and Trauma Units

The participants felt that having motivated physiotherapists allows for the implementation of the early mobilisation of patients.

'Maybe it is because we are motivated, and we try our best, and we do get help from each other and from the staff...'SA011 General Unit

Conducting research in the unit in the area of mobilisation was also noted to facilitate the implementation of the intervention in the unit.

'When we started doing my research, that also brought about a bit of a change, because we were really pushing our patients to see how far they could go…'SA016 General and Trauma Units.

4.4.4.2 Organisation of ICU services

4.4.4.2.1 Policies and guidelines

The participants expressed the opinion that the availability of standardised operational procedures, including the availability of mobilisation protocols and CPGs, help to increase the levels of mobilisation of the ICU patients.

'…, it's part of the rehabilitation process in the unit, so the whole team is pro-rehabilitation in the unit.'SA006 Cardiothoracic Unit

'…I use a mobilisation guideline called MOVE. I check the myocardial stability of the patient, looking at the ECG tracing that there are no signs of arrhythmias, infarctions or cardiac arrest in the past 24 hours, check blood pressure and heart rate, then check on the orientation of the patient, patient not confused or agitated or sedated, is cooperative and able to follow commands, like you ask them to do something, and they cooperate. Vasopressor use: …Are they on the lowest possible doses, and [they should] not have been increased in the past 24 hours; and lastly, the effort of the patient: Are they able to actively participate in the mobilisation or will it be more of a passive transfer by checking on the upper limb and lower limb muscle strength? They should be at least a grade 3...'ZM007 General Unit

Non-rotational physiotherapy coverage in ICU was reported to result in high levels of mobility in patients as physiotherapists develop the specific skills and expertise in the specific area of critical care and a good working relationship is established with the entire ICU team, resulting in the receiving of support and assistance when needed.

'You really grow a relationship with the other staff in the unit, so you can negotiate with them if you want to mobilise a difficult patient and they are not too keen… so you really create a nice relationship, and that is always an advantage…'SA006 Cardiothoracic Unit

'…I have worked so long in the unit with the nurses …. so I have a very good relationship….. they know how we operate, and they know that if I want to mobilise the patient, I will help them with other nursing duties if they help me...'SA006 Trauma Unit.

The participants indicated that the use of sedation scales or the reduced use of sedation in patients creates an environment which promotes the implementation of early mobilisation in the units.

'There is not much sedation and I think it depends on the availability of sedatives because we do not usually see that and it's not continuous when it is available…'ZM017 General Unit

'We have protocols; we have an awake cycle within the sedation days, just to assess the GCS in the morning, unless the patient is completely restless, so they keep them sedated…."SA006 Trauma Unit.

4.4.4.2.2 Communication channels

The participants mentioned the fact that communication is key in raising the mobility levels in the units. This includes having an ICU team which is pro- early mobilisation and which respects teamwork through working together and appreciating the role that each one plays.

'…I think we are very lucky. The doctors are on board and the nurses are fine with it too.'SA001 General Unit

'.and many times, the doctors order it, so they say: "Mobilise the patient out-of-bed…' SA011 General Unit

'Ah! I think in our unit it is the teamwork with the nursing staff and the doctors. They are on board and they promote mobilisation…'SA006 Cardiothoracic Unit

'…that is nice, it makes you feel involved, part of the team.... so, they are approachable, it is not like they do their own thing…'SA008 General Unit

4.4.4.3 **Patient characteristics**

4.4.4.3.1 Type of condition

The participants felt that early mobilisation is more easily achieved in patients with medical and surgical conditions.

'…most of our patients in ICU are post-op patients so when they are admitted in ICU, usually by the second day post, we get them out-of-bed, sitting out-of-bed in a chair, or standing.' ZM017 General Unit

'… I think it works much better in the medical ICU; [In the] trauma ICU it's often too many fractures or too many unstable fractures so that delays [it] a bit.'SA014 General and Trauma Units

4.4.4.4 **Environmental context**

4.4.4.4.1 Human resources

The availability of two or more physiotherapists covering each unit was reported to be an enabler to early mobilisation as the physiotherapists are less reliant on the availability of nursing staff for assistance.

'Having two therapists covering the unit.... they help each other.'SA014 General and Trauma Unit

The participants felt that the presence of a supportive nursing staff and an adequate number of nurses in the unit promote the early mobilisation of ICU patients.

'…the sisters will also assist with the lines.... if the lines are too short, then we can fix them.'SA011 General Unit
'And if you need assistance, the ratio of patient: nursing staff is quite good... so you can get assistance…'ZM017 General Unit

4.4.4.4.2 Equipment

The participants highlighted the fact that the availability of adjustable electrical beds results in increased levels of mobilisation as the bed allows for a change in position without straining the physiotherapist's lower back.

'Another good thing in our unit is the availability of the hydraulic beds [electric beds] so you can prop up patients in bed. Those who can't actively come up to sitting independently.... you can at least prop them up in bed, and by doing that, you are having a positive effect on most systems of the body in that patient…'ZM012 General Unit
'…we have lovely beds there and you do not have to hurt your back to get the patient sitting in bed…'SA008 General Unit

4.4.4.4.3 Space

The participants noted that the availability of space for unobstructed movement in the ICU promotes early mobilisation as one is able to carry out the relevant activities without any spatial limitations.

'The staff is very supportive.... the environment.... The setup is such that there is space available for us to do what we want to do, unless the patient is ventilated, we [are] really able to do what we want to do…'ZM017 General Unit

'..the two chairs which are available have been put in high care because of [the]space [available]…'SA010 General Unit.

Figure 4.4 shows the major themes and categories under the enablers to early mobilisation.

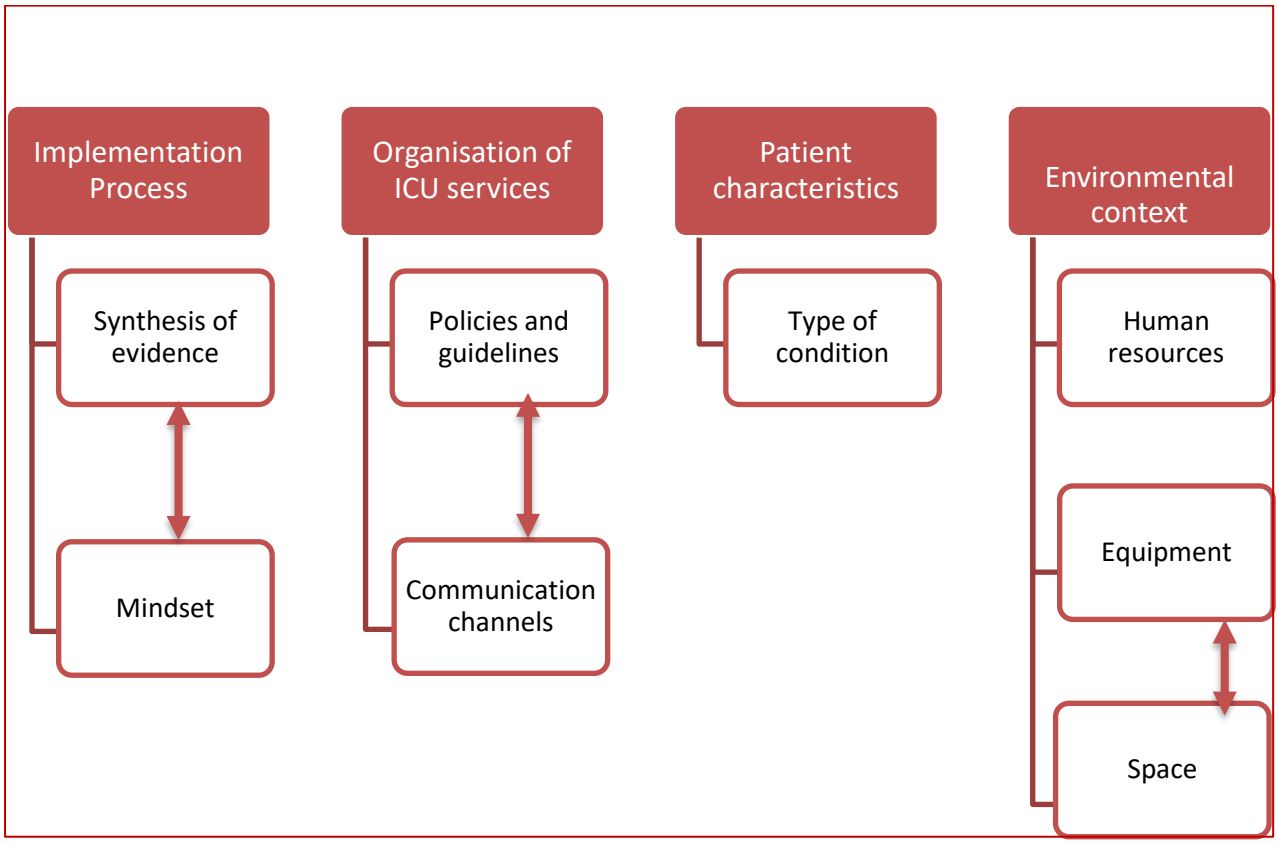


Figure 4.4: Major Themes and Categories under the Enablers to early Mobilisation

4.4.5 Physiotherapists' Perceptions regarding the Receiving of Education and Training in the Early Mobilisation of Patients in ICU

4.4.5.1 Knowledge translation strategies

Three broad themes emerged when the physiotherapists were asked about how they felt about receiving education and training in the early mobilisation of patients in ICU. The themes, categories and subcategories are presented in Table 4.4.

Table 4.4: Major Themes Associated with Knowledge Translation Strategies

Theme	Category	Subcategory
1. Bridge evidence-practice gap	Dissemination of research findings	Unawareness of current research
	Development of context-based standard outcome measures	Appropriateness of tool
2. Communication	Cultural change	Planning by a multidisciplinary team
	Knowledge dissemination	Benefits
	Implementation	Definition of execution
3. Standardisation of practice	Standardised operational procedures	Development of protocols

4.4.5.1.1 Bridging the evidence-practice gap

The participants felt that there is a need to bridge the evidence-practice gap through the dissemination of the research findings as they acknowledged that there are many findings emanating from the published research on early mobilisation that they are not aware of.

'I think it could be very beneficial to actually have a lot of or some research [pause] like I'm not aware of that particular study, but some research, maybe that will be quite informative…'SA001General Unit

'That is the challenge: - that we are not getting current research evidence, like on early mobilisation.... there are studies which have been done on the benefits of the treatment but getting that information is sometimes difficult…'SA004 General Unit

Unfamiliarity with context-based standardised outcome measures for the ICU population was reported by the participants. They indicated that it would be beneficial if the right tools for measuring outcomes, which are less time consuming, were to be shared with the physiotherapists for application in the ICU setting.

'…use of standardised outcome measures in early mobilisation.... I know they are many, but I think I haven't been exposed to the right one…'SA006 Trauma Unit

'...currently I am not using any standardised outcome measure. I tried using a functional independence measure at one point but aaah [laughing] it was not for long. I would appreciate it if I could get some assessment tools specifically for ICU patients which are not difficult to use and also not time-consuming.' ZM012 General Unit.

4.4.5.1.2 Communication

Another strategy to facilitate training and education highlighted by the participants from both countries was communication. The purpose of communication was identified to be for multidisciplinary team planning for the initiation of mobilisation decisions in patients.

'We are not going to get this right until we have a buy in from all stakeholders because in an ICU setting you cannot act independently, you cannot act without the nurse, doctor backing up your decision…'SA013 General Unit.
'I think educating the whole team will really help a lot because the other barrier I forgot to mention is that doctors seem not to be confident about our [physiotherapists'] capabilities…'ZM012 General Unit.

The participants felt that there is a need to disseminate information on the benefits of early mobilisation.

'…it does make a difference if staff is educated about the benefits of early mobilisation. It makes a difference in the unit because you will see that mobilisation will be done more [frequently] …'SA006 Cardiothoracic unit.

The participants highlighted the need to clearly define the implementation process for early mobilisation.

'...and it will make a big difference in how it will be implemented, like the implementation of the treatment. You will see that the staff that are not well educated on the benefits of early mobilisation [and] will see it more as a burden.'SA006 Cardiothoracic Unit.

4.4.5.1.3 Standardisation of practice

The development of early mobilisation protocols in the units was reported by participants from SA to be one way of standardising practice and helping physiotherapists in their clinical assessments during the implementation phase of the treatment.

'…Protocols, yes that is exactly what I have been saying, protocol per unit that everyone is aware of so that in the case of changes, then one just follows a protocol. Of course, there [are] going to be anomalies that will not fit the protocol, but at least there will be something to base your judgement on…' SA013 General Unit

'…the other challenge is unavailability of a protocol, like an early mobility protocol, which clearly states on Day 1: This is what we do with the patient; then Day 2: a plan, so that everybody is aware of it. I'm not saying like you should tell us what to do but look at each patient: how is he presenting and this is our long-term goal, so that communication is important….'SA010 General Unit

4.4.5.1.4 Interrelations between categories under knowledge translation strategies

Figure 4.5 shows the major categories under knowledge translation strategies.

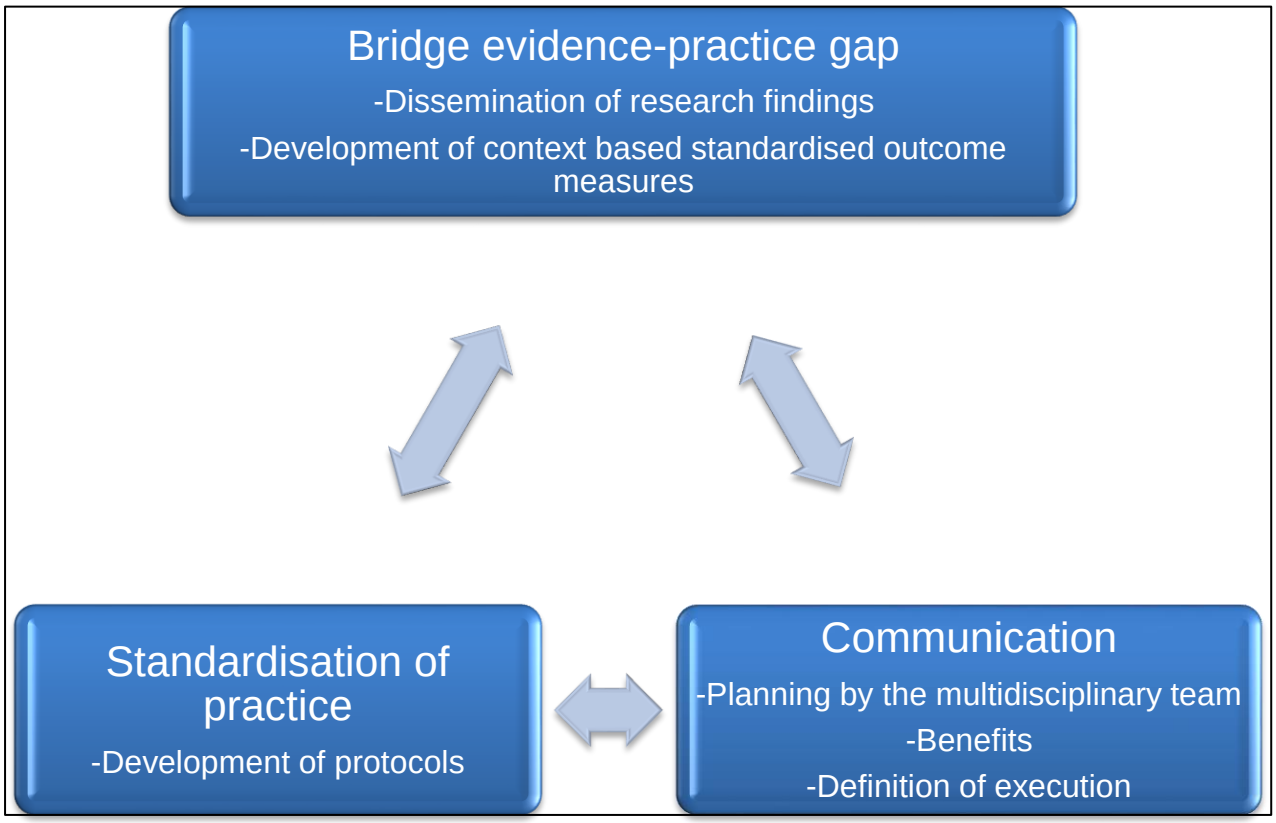


Figure 4.5: Network of the Interrelations of the Formulated Categories under Knowledge Translation Strategies

4.5 DISCUSSION

The study aimed to explore the perceptions of physiotherapists regarding the implementation of early mobilisation practices in ICUs and to understand the perceived barriers and enablers specific to ICUs in SA and Zimbabwean hospitals. The two themes which emerged under the interpretation of early mobilisation were 'activities' and 'clinicians' expectations. Under activities, the physiotherapists defined the specific mobilisation activities carried out on or with the patients which were collectively labelled as early mobilisation. On exploring the perceived barriers and enablers to early

mobilisation, the four themes which include ‘implementation process’, ‘organisation of ICU services’, ‘patient characteristics’ and ‘environmental context’, emerged.

With regard to defining the activities regarded as early mobilisation, active participation of the patient arose as the most important feature for the intervention to be perceived as beneficial to the patient. Both the active and passive activities encouraged in a patient were noted to form part of the concept of early mobilisation. There was a discrepancy in terms of the time period defined as “early”, as some reported that early mobilisation can only be initiated once a patient has been discharged from the ICU.

The difference in perceptions issued from the definition used for early mobilisation and the goals of treatment. One definition puts emphasis on the goals of early mobilisation as a countermeasure for *venous stasis* and deep vein thrombosis, thereby incorporating passive movements as one of the activities (Cameron et al. 2015). The second definition of early mobilisation, which is widely used, includes all the aspects which were highlighted by the participants and which included the active participation of the patient, early execution, progressive activities and functional activities. The recognised definition states that early mobilisation is the intensification and early application (within the first two to five days of critical illness) of any active exercises where the patient could assist with the activity using his/her own muscle strength and control that occurs while the patient is receiving mechanical ventilation (Li et al. 2013; Hodgson et al. 2013; Hodgson et al. 2014; TEAM study 2015; Koo et al. 2016; Nydahl et al. 2017).

On the specific period defined as “early”, there was variability as participants indicated that they considered a number of factors before the mobilisation of the patients which varied across the units. In agreement with the findings of this study, Hodgson et al (2013) indicated that standard mobilisation practice in ICU remains poorly defined since different techniques are employed and the period referred to as “early” varies in different studies. The period after ICU admission is important to note as physical functioning impairments are increasingly common during the first few days of invasive ventilation (Jolley et al. 2014; TEAM study 2015). Cameron et al. (2015) reported that delaying mobilisation until the acute phase of the illness has subsided may not only significantly reduce the benefits but also result in less-optimal patient outcomes. Therefore, the identification of barriers to early mobilisation during the first few days of critical illness should be emphasised so that there is no delay in initiating the early mobilisation of ICU patients.

With regard to the implementation process, the key aspects which arose were related to professional autonomy, the motivation of the staff, negative perceptions, and knowledge of the rationale and the benefits of early mobilisation. The issue of role clarity and accountability during early mobilisation has been reported to be a barrier to implementation within the multidisciplinary team as there is a belief that early mobilisation should be carried out by only one discipline (Boehm, Vasilevskis & Mion 2016; Dubb et al. 2016; Parry et al. 2017a). This supports what was raised by the participants in this study as there were no clearly defined professional roles in the context of the early mobilisation of patients in the unit, and early mobilisation was perceived as mainly a physiotherapist's role.

Physiotherapists should be an integral part of the interdisciplinary team in the ICU and should be involved in the implementation of early mobilisation as they are the experts in movement and exercise (Asher 2013; Hodgson et al. 2013). However, the physiotherapists cannot work entirely alone and without the support of the other ICU team members, which include the physicians/doctors, nurses, and occupational therapists. These become the professions which constitute an early mobilisation team in the ICU environment, with each professional member providing information and education to the rest of the team regarding their potential individualised roles in early mobilisation and in the ICU in general (Engel et al. 2013a; Hodgson et al. 2013; Jolley et al. 2015; Marshall et al. 2017). This shows that early mobilisation should be a collaborative initiative and that each member of the team has a specific role to play in order for the intervention to be successful, with some being responsible for the delivery and others supporting the delivery of the programme.

Other barriers related to the implementation process that were raised by participants have been cited in the literature too, and these include the lack of motivation in the staff (Carrothers et al. 2013; Klooster et al. 2017; Hodgson et al. 2018), the lack of awareness of the benefits to patient outcomes, which culminate in the low prioritisation of early mobilisation or merely the negative perceptions associated with it (Barber et al. 2015; Engel et al. 2013a, Parry et al. 2017b; Hodgson et al. 2018). The lack of awareness as to the benefits of early mobilisation has resulted in mobilisation not being considered as a treatment option when the patient has a respiratory dysfunction. Since mobilisation results in the optimisation of oxygenation through improved ventilation, alveolar recruitment and lung perfusion, and assists in the clearance of the airways (Gosselink et al. 2008; Asher 2013), it should be regarded as a treatment option when

a patient has been referred for chest physiotherapy. This should be unequivocally emphasised to the benefit of all physiotherapists so that the levels of early mobilisation in ICU patients can increase and thus result in better patient outcomes.

The issue of clinical skills was raised as a barrier to the implementation process. Variability in the implementation of early mobilisation based on the level of staff experience was reported, with most of the junior staff being reluctant to implement early mobilisation activities for patients or delaying the initiation of out-of-bed mobilisation on account of a lack of confidence and of knowledge, and a feeling of being overwhelmed by the ICU environment (van Willigen et al. 2016; Parry et al. 2017b). It is known that the ICU setting is a complex environment. A description of the minimum standards of clinical practice for physiotherapy to facilitate the optimal care of patients during their ICU stay has been reported in Australia and New Zealand, SA and the United Kingdom (Skinner et al. 2016; Plani et al. 2017; van Aswegen et al. 2017; Twose, Jones & Cornell 2018). Mobilisation of both non-ventilated and ventilated patients was reported to be one of the techniques that the physiotherapists working in ICU should be able to execute. They should also understand the indications and contra-indications, provide evidence to the effect that they are applying the technique, and keep a record of the progression of the exercise activity (Skinner et al. 2016). Measures should then be put in place for skills training to equip clinicians to effectively work in ICU and be confident in their implementation of early mobilisation activities.

The issue of variability in clinical skills based on experience was raised mainly by participants from SA, who had more years of ICU working experience (compared to Zimbabwean participants) and had worked with the junior staff in the unit. This finding is supported by Stiller et al. (2004), which reported that experienced clinicians are often able to discern which patients will tolerate mobilisation in spite of marginal cardiac and/or respiratory conditions by taking into account the more objective parameters and observing or interpreting the more subjective factors. The barriers raised by participants in this study were also raised by others and can be viewed as evidence that is current and also based on previous experiences. There is a need for restructuring in ICUs so that at any given time there are discipline-specific senior leaders who are responsible for the training and guidance of junior staff.

The factors associated with facilitating the implementation process that were reported by participants have been cited in the literature too in studies evaluating the implementation of interventions. The enablers to the implementation of early

mobilisation that were noted include the early mobilisation activities that were advocated during student training as part of the undergraduate curriculum (Parry et al. 2017a), the dissemination of knowledge through presentations to educate the ICU team to increase their awareness of the benefits of early mobilisation to patient outcomes (Basset et al. 2015; Eakin et al. 2015, Parry et al. 2017a), and having a motivated team with overall job satisfaction (Eakin et al. 2015). The importance of conducting research and making use of the research evidence was found to be associated with better implementation outcomes and to be linked to the sustainability of an early mobilisation programme (Cameron et al. 2015; Eakin et al. 2015). This supports what was raised by the participants in the current study.

The other theme that emerged in the current study was the organisation of ICU services. This relates to aspects, including administration, staffing, policies and guidelines, and communication channels in ICUs. Depending on the participant or the specific ICU, these were regarded as either barriers or facilitators. Staff shortages were reported to be the main reason why physiotherapists do not provide blanket cover to their ICUs, thereby relying on the doctors or the physicians to refer to them to the specific patients requiring physiotherapy interventions. Valentin and Ferdinande (2011) reported that one physiotherapist with dedicated training and expertise in the management of critically ill patients should be available per five beds on a seven-day-per-week basis. For out-of-bed mobilisation of mechanically ventilated patients, it requires a minimum of two people to guard the vital lines and attachments (Needham, Truong & Fan 2009; Engel et al. 2013a). The findings of the study in Phase one (see section 3.4.1) showed that the physiotherapist-to-patient ratio ranged across units from 1:4 to 1:9, depending on the ICU bed capacity in Zimbabwe, and from 1:1 to 1:12 in SA. The numbers of physiotherapists working in some of the ICUs in Zimbabwean and SA government sector hospitals should be revised so that this measure fits the recommended international standard of staffing based on the bed capacity of each unit. Having enough physiotherapy staff covering each unit is one way of making sure that there is blanket cover of ICU patients and the timely delivery of treatment interventions. The creation of new posts for physiotherapists and having one dedicated physiotherapist at the disposal of the ICU to promote and sustain an early mobility programme has been reported in the literature to ensure the sustainability of such an intervention (Engel et al. 2013a; Bassett et al. 2015; Valentin & Ferdinande 2011; van Willigen et al. 2016). Therefore, having a more senior physiotherapist, who is dedicated to the ICU, should be the standard practice in government sector hospitals so as to facilitate the implementation of early mobilisation activities in critically ill patients.

The standardisation of practice through the implementation of CPGs and protocols was noted by participants to be a barrier when they are lacking. The CPGs and protocols could also be considered to be enablers in the units where they are available. Higher levels of mobilisation of patients can be achieved in ICUs that have implemented protocols related to sedation reduction, pain control, delirium assessments and the early mobility of patients (Barber et al. 2015; Taito et al. 2016; van Willigen et al. 2016; Goddard et al. 2018).

Besides developing CPGs and protocols, other necessary components for the successful implementation of early mobilisation programmes that have been highlighted by participants and supported in the literature include the acceptance of early mobilisation as a standard practice in patient care in the unit, respect for the different levels and forms of expertise within the ICU team, good communication among the team members, and a positive attitude towards the early mobilisation of patients in the ICU team (Eakin et al. 2015; Dubb et al. 2016; Parry et al. 2017b; Hodgson et al. 2018). A lack of communication and coordination in the multidisciplinary team has been reported to negatively impact upon the successful implementation of early mobilisation (Barber et al. 2015; Balas et al. 2013; Eakin et al. 2015; Dafoe et al. 2015; Bakhru et al. 2016; Costa et al. 2017; Hodgson et al. 2018). The effects of poor team communication are more marked in an open-type ICU where different doctors and/or physicians are responsible for the admission and management of patients. One disadvantage of the open-type ICU which has been highlighted is the variability in practice patterns and conflicting instructions regarding patient care (Chowdhury & Duggal 2017). It becomes very important to formulate CPGs and protocols in an open ICU as a way of standardising practice in such units.

Delayed consultation by specialists in mainly the general ICUs has arisen as a barrier in both countries. The delay is mostly marked in patients with traumatic injury that has resulted in either a neurological injury or a musculoskeletal injury. The general lack of resources to manage trauma patients in the low- and middle-income countries has been reported. In Africa, consisting mainly of low- and middle-income countries, there is an average of one neurosurgeon per 6.36 million of the population (Ramesh et al. 2014; Jerome et al. 2017), compared to the one neurosurgeon per every 65 580 of the population reported for high-income countries (Rosman et al. 2013). The few specialists are overwhelmed with workload as there is a high incidence of trauma-related injuries in sub-Saharan Africa (Laing et al. 2014; Tran et al. 2015), resulting in

delayed consultations in the ICUs which further delays the management of such patients. There is a need to increase the resources for the management of trauma patients in the low- and middle-income countries as the burden of the disease is high.

Patient characteristics were another key theme that came to light from an examination of the data obtained. The most reported barriers to early mobilisation under this theme included haemodynamic instability, raised ICP, thrombocytopenia, mental instability, reluctance from the side of the patient, pain levels, the complexity of the condition, and obesity. Haemodynamic instability has been reported by others as a legitimate barrier to out- of-bed mobilisation (Engel et al. 2013a; Berney et al. 2013; Nydahl et al. 2014; Castro et al. 2015; Dafoe et al. 2015; Harrold et al. 2015; Hodgson et al. 2014; Holdsworth et al. 2015; TEAM study 2015; Parry et al. 2017a; Brock et al. 2018; Capell, Tipping & Hodgson 2018; Fontela et al. 2018). However, it has been noted that there is a difference in the limits of the reported parameters which exist in most studies which has resulted in heterogeneity in the haemodynamic events reported (Nydahl et al. 2017). There is a need for a consensus to be reached on the optimal limits for these haemodynamic parameters as a way of standardising practice and reducing adverse events arising from out-of-bed mobilisation. Clinicians should not always view haemodynamic instability as a barrier to early mobilisation as most of the patients in ICU present with deranged vitals, which might have been caused by a procedure done as part of managing the condition (Stiller et al. 2004; Vollman 2012; Engel et al. 2013b).

Apart from haemodynamic instability, participants reported the challenges associated with out-of-bed mobilisation of an obese patient in an environment lacking in the equipment and manpower to assist with transfers and mobilisation. Obesity has also been reported as a barrier to early mobilisation in other studies (Nydahl et al. 2014; Boehm, Vasilevskis & Mion 2016; Bakhru et al. 2016; Castro et al. 2015; van Willigen et al. 2016). Although the mobilisation of an obese patient is not an easy task, obesity should not be labelled as a contra-indication to early mobilisation as these patients are more at risk of developing further complications associated with bed rest (Asher 2013). On account of the associated complications in obese patients, they should be classified as the priority group for early mobilisation and the resources to facilitate their early mobilisation should be made available.

Mental instability, which was reported as any one or more of the following, includes confusion, drowsiness, raised ICP or a low Glasgow coma scale score, has emerged as a common barrier in the current study. This barrier was reported mainly in

neurological patients, resulting in the low prioritisation of early mobilisation in patients with neurological injuries. Neurological instability, characterised by a low Glasgow coma scale score, drowsiness and difficulty to control ICP, was reported by others as a major contributor to immobility in the ICU (Leditschke et al. 2012; Harrold et al. 2015; Koo et al. 2016; Parry et al. 2017a; Brock et al. 2018; Capell, Tipping & Hodgson 2018). However, a recent study showed that early mobilisation initiated within 72 hours of ICU admission in patients with a low Glasgow coma scale score can be considered to be safe and effective (Schaller et al. 2019).

A main barrier to mobilisation has been the fear of adverse effects such as the development of a cerebral vasospasm and the increased risk of secondary brain damage (Karic et al. 2017). Impulsive behaviour, agitation or the inability to re-direct, which were some of the barriers highlighted by participants, should not be considered as barriers in these patients as early mobilisation has been shown to reduce delirium and anxiety (Klein et al. 2015; Goddard et al. 2018). Klein et al. (2015) reported that adverse events related to the dislodgement of cerebral monitoring devices and of compromising the oxygen levels, haemodynamic instability, and slower recovery in the post-intervention group, were not validated in their study or in any other ICU mobility investigations into neurological patients. The barriers raised by the current participants about the early mobilisation of patients with neurological injuries are not evidence-based. Therefore, there is a need to advocate for the early mobilisation of patients in neurological/neurosurgical ICUs, keeping the published recommendations and considerations in mind.

The other barriers to early mobilisation reported by participants, which were similar to those reported by others, include the severity of the illness, open wounds, unfixed fractures, high pain levels, reluctance from the patients and the presence of multiple comorbidities (Boehm, Vasilevskis & Mion 2016; Brock et al. 2018; Parry et al.2017a; Parry et al. 2017b; Costa et al. 2017).

Participants indicated that early mobilisation is more feasible in medical and surgical patients as opposed to the trauma population. The reason why early mobilisation is a challenge in trauma patients may be linked to the issue of delayed consultation, as discussed earlier. Participants reported that platelet levels at times affected the type of activities that they were able to do with a patient (e.g. a platelet count of less than 50 x 10^9/L would prohibit out-of-bed activities). In a guideline for early mobility, developed by Stiller et al (2004), a platelet count of above 20 x 10^9/L was considered safe for out-

of-bed mobilisation. Furthermore, a study done in Canada reported that activity restrictions were not necessary for patients who had thrombocytopenia (Koo et al. 2016). This shows a lack of consensus on the optimal limit of the platelet count that should be considered for safe early mobilisation. However, parameters indicated in the early mobilisation guidelines or protocols are not intended to be absolute contra-indications or to be interpreted in isolation but should be used in conjunction with sound clinical judgement (Stiller et al. 2004).

The environmental context was the last theme to emerge. The highlighted barriers to early mobilisation include inadequate staff numbers, the lack of appropriate equipment, the number and position of the attachments, and time pressure. A lack of staffing to assist with the out-of-bed mobilisation of patients, especially in terms of the number of available physiotherapists, results in the low prioritisation of early mobilisation in the unit. Similar findings were reported by others (Barber et al. 2015; Castro et al. 2015; Bakhru et al. 2016; Boehm, Vasilevskis & Mion 2016; Koo et al. 2016; Parry et al. 2017a; Parry et al. 2017b).

The ICU is a busy environment and time constraints were noted to be yet another barrier related to early mobilisation in this setting. This barrier was similarly highlighted by others (Jolley et al. 2014; Bakhru et al. 2015; Boehm, Vasilevskis & Mion 2016; Parry et al. 2017a; Parry et al. 2017b). The problem of time pressure is even more marked when there is a shortage of staff, resulting in an increased workload.

The position and number of lines attached to a patient were noted to be barriers to early mobilisation in the current study. Similar findings have been reported in other studies, with a change in the access site of vascular catheters suggested to promote the early mobilisation of patients in ICUs (Leditschke et al. 2012; Nydahl et al. 2014; Castro et al. 2015; Koo et al. 2016).

Participants from Zimbabwe and SA reported that the lack of appropriate equipment influences the delivery of early mobilisation to patients in ICUs. The equipment includes both transfer and mobilisation equipment, and if it is inadequate and there is a lack of resources, it can be, and has also been cited as a barrier to early mobilisation in several studies (Barber et al. 2015; Bassett et al. 2015; Castro et al. 2015; Dafoe et al. 2015; Bakhru et al. 2016; Koo et al. 2016; Parry et al. 2017b). Although it has been reported that standard hospital equipment may generally be adequate to enable patients to walk during the implementation of early mobilisation activities (Asher 2013;

Hodgson et al. 2013), their safety, efficiency and effectiveness may be compromised when clinicians have to hold all the attachments and lines in their hands (Needham, Truong & Fan 2009). This has resulted in some hospitals developing custom-made walkers, which incorporate a walking frame on wheels, an intravenous pole, an oxygen basket and a platform to support a ventilator into a single device (Engel et al. 2013a; Asher 2013; Hodgson et al. 2013). Therefore, based on the available evidence, it should be argued that adequate equipment which maximises on safety, efficiency and effectiveness should be provided in all of the units so as to promote the early mobilisation of patients in a safe environment.

Engel et al (2013a) reported that to facilitate early mobilisation, waffle cushions were bought for skin protection during sitting. This supports what the current participants noted with regards to the need for comfortable chairs, which are suitable for ICU patients, and the availability of adjustable beds so as to promote the early mobilisation of these patients. Some researchers believe that only a minimum level of equipment is absolutely necessary to promote mobilisation and therefore the lack of specialised equipment in the units should not be reported as a barrier to mobilisation (Asher 2013; Eakin et al. 2015).

The minimum level of equipment which should be present in each unit to ensure the safety of both the patient and the clinician during the mobilising process should not compromise on the efficacy of the delivered intervention. Such facilities include an adjustable hospital bed with the use of a stool or a platform for foot support, a draw sheet to assist the patient in sitting forward, a blanket roll or pillow for a fully-erect sitting posture, an overhead lift system, bedside chairs with armrests, a foam mattress rather than an air mattress for mobility activities, ergometers, thera-bands for upper and lower extremity exercises, standard walkers, stand-assist devices and a tilt table for patients who do not possess the lower extremity strength to stand with a walker or the upper extremity strength to use a stand-assist device (Asher 2013). For ambulating a mechanically-ventilated patient, several pieces of equipment will need to accompany the patient and these include a portable ventilator, a resuscitation bag, an oxygen tank, a portable monitor, an intravenous pole, pressure bags, urinary and faecal collection devices, chest tubes with suction devices, a wheeled walker and a wheelchair with a blanket in case the patient needs to be lifted back to bed (Asher 2013).

Education and training in the area of the early mobilisation of patients were perceived by the participants to be important. The issues which were raised included bridging the

evidence-practice gap by disseminating the research findings, multidisciplinary team planning through team communication, and lastly, standardising practices by developing CPGs and protocols. As a lack of written CPGs or protocols was cited as a barrier to early mobilisation (Dubb et al. 2016; Koo et al. 2016), and they were non-existent in most of the units, the participants noted the need to develop their own CPGs and protocols. In most of the projects focusing on quality improvement which have been done, the CPGs and protocols were developed by the entire multidisciplinary ICU team responsible for the early mobilisation of patients. The team gained these skills through their attendance during multidisciplinary ward rounds or at meetings (Engel et al. 2013a; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Parry et al. 2017a). It is the responsibility of the discipline-specific leaders to make sure that the practices in the unit are standardised through the formulation of CPGs or protocols that emanate from consultations with the rest of the ICU team. This can be promoted by making sure that there are discipline-specific leaders who remain consistent in the unit and are responsible for the education and training of their junior colleagues. The dissemination of research findings was noted to be a key factor as participants highlighted the fact that they were not aware of the current evidence available on the effects of early mobilisation on patient outcomes and were not familiar with the appropriate outcome measures to use for assessing the functional ability of the patients in ICU during mobilisation.

There is a need to further explore the reasons why clinicians are not aware of the current research evidence in spite of all the available published literature on early mobilisation and the workshops and conferences which are frequently held in SA and Zimbabwe, with the emphasis being on improving care in patients admitted to ICUs. The participants' unawareness of current research may be explained by in terms of the lack of interest to read published research evidence, their inability to access the internet at work to search for research evidence or outcome-based tools, and the fact that clinicians do not attend workshops or conferences (Farley 2009; Majid et al. 2011). The impact of these factors on the clinicians' work performance would need to be further explored in future studies. Clinicians should be encouraged to move from passive involvement in formal education and training towards active continuous participation, incorporating new knowledge and skills into the existing practice (Bevan 2010; Kislov et al. 2014; Eakin et al. 2015).

Some of the strategies used for active participation are the exchange of knowledge between individuals, groups and organisations, and the university staff (academic)

providing continuous mentorship and support to clinicians (Kislov et al. 2014). For early mobilisation to be a standard practice in government hospital ICUs in SA and Zimbabwe, clinicians should actively participate in the acquisition of knowledge and conduct research into their clinical areas.

Qualitative case study design was used to better understand the perceptions experiences of the clinicians. This approach facilitated the exploration of a phenomenon within its context (Baxter & Jack 2008) as the interviews were done with the physiotherapists in their working area. As the qualitative study was done after the quantitative one, this ensured that the issue was not explored through one lens, but rather through a variety of lenses which allowed for multiple facets of the phenomenon to be revealed and understood (Baxter & Jack 2008; Creswell & Poth 2017).

4.5.1 **Conclusion to the Discussion**

To enhance the level of early mobilisation of patients in government sector ICUs in SA and Zimbabwe, it is important to understand why the identified barriers exist and to examine ways to overcome them before the implementation and evaluation of any early mobilisation programme can be successful. The barriers to the early mobilisation of patients in government sector ICUs in SA and Zimbabwe are not only patient-related factors but include environmental influences, the organisation of the ICU services, and factors related to the implementation process.

The results of this qualitative study highlighted the importance of multidisciplinary team collaboration and planning before implementing early mobilisation activities, with the focus being on assessing and identifying strategies to overcome the multifactorial barriers to early mobilisation that have been identified in SA and Zimbabwean ICUs.

CHAPTER FIVE

PHASE THREE: DESIGNING INTERVENTIONS THAT ARE RESPONSIVE TO IDENTIFIED BARRIERS TO EARLY MOBILISATION

5.1 INTRODUCTION

The highlighted barriers and facilitators to early mobilisation reported in Phase two (Chapter 4) are multifactorial and encompass factors related to the practicalities of implementing early mobilisation, accountability and the leadership which should be in existence for any success in this respect. All of these factors need to be identified in each ICU during the planning phase of early mobilisation for the success and sustainability of the programme. This phase (Phase three) focuses on designing strategies that may be responsive to the identified barriers to the early mobilisation of patients in ICUs in government hospitals in Zimbabwe and South Africa. It is based on the CFIR with the aim being to promote early mobilisation as a standard practice in all units. Results from the explanatory sequential study (Phases I and II) were used to design the strategies with a panel of experts who were working in ICUs at the time of the study.

5.2 STUDY OBJECTIVES

a) To formulate implementation strategies addressing barriers according to the following categories:
   i. Characteristics of the intervention
   ii. ICU contextual factors (the environment within which the implementation process proceeds)
   iii. Hospital context (including patient needs and resources)
   iv. Characteristics of the individuals responsible for the implementation
   v. Process (active changes that occur to promote the implementation of the Intervention).

b) To reach consensus concerning the recommended implementation strategies in order to overcome the barriers to the early mobilisation of ICU patients in SA and Zimbabwean government hospitals.

5.3 METHODOLOGY

5.3.1 Ethical Considerations

The general ethical principles followed and how they were applied in the study have been discussed previously (refer to Section 3.3.1). All ethical principles according to the Declaration of Helsinki were adhered to during this phase of the study.

5.3.1.1 Autonomy and Informed Consent for Participants in Phase Three

For the Modified Delphi study, all participants who agreed to participate were given the information letter (Appendix 35) and an informed consent form (Appendix 36) to sign. All eligible participants were approached to participate in the study and there was no discrimination. The anonymity of the participants was ensured as neither the name nor any other identifying information was used in the presentations or in the written products resulting from the study. The participants and their hospitals were identified by code numbers.

5.3.2 Research Design

An online, two-round, Modified Delphi survey was used. Modified Delphi designs do not typically start with an open-ended questionnaire which serves as the cornerstone for soliciting specific information about a content area from the panel of experts (Hsu & Sandford 2007), but rather the researcher generates questions through a review of the literature and presents the questions to the panel to initiate the consensus-seeking process (Avella 2016).

The Modified Delphi technique is designed as a structured group communication process that aims at conducting detailed examinations of and discussions around a specific issue for the purpose of goal setting, policy investigation, or for predicting the occurrence of future events by attempting to address “what could/should be” questions (Dalkey 1972). It employs multiple iterations designed to develop a consensus of opinions concerning a specific topic and the feedback process allows the participants to reassess their initial judgement about the information provided in previous iterations (Hsu and Sandford 2007). The Modified Delphi technique requires a minimum of two rounds, or three, if the first round was open-ended, and beyond that the number of the rounds is disputed (Thangaratinam & Redman 2005).

The advantages of the technique are participant anonymity which can reduce the effects of dominant individuals which is often a concern when using group-based processes to collect and synthesise information (Dalkey 1972). Another advantage is

confidentiality, which is facilitated by the geographical dispersion of the subjects, as well as the use of electronic communication such as e-mail to solicit and exchange information (Hsu and Sandford 2007). The ability to statistically analyse the data obtained is a practice which further reduces the potential of group pressure to advocate conformity since statistical analysis can ensure that the opinions generated by each participant in a Modified Delphi study are well represented in the final iteration (Dalkey, 1972).

5.3.3 Study Period

Data collection was carried out during October and November of 2018.

5.3.4 Sampling and Study Participants

The panel of experts was purposively selected, and a shortlist of all eligible panellists was obtained from the professional people who were contacted during Phases one and two of the study. The contacted people were also asked to put forward the names and contact details of other professional people to include in the study, apart from those who had participated in Phases one and two of the study. Intensivists, consultant anaesthetists, ICU doctors, ICU physiotherapists and ICU nurses in the selected SA and Zimbabwean hospitals who were practising at the time of the study as clinicians and/or academics, and with more than three years' working experience in ICUs, were considered for participation in this phase of the study. Clinicians with a managerial role such as ICU Directors, Heads of the Physiotherapy Departments and ICU Nursing Services managers were also considered. The eligibility of the panellists was determined in terms of their field of expertise and clinical experience. The anonymity of the panellists was assured throughout all of the Modified Delphi rounds. Informed consent was obtained for participation in the study and for the publication of the results. Furthermore, upon completion of this phase of the study, the panellists were given the option to participate in the writing of a manuscript on the results of this phase.

5.3.5 Sample Selection and Sample Size

There are no hard and fast rules on the size of the panel for a Modified Delphi study (Thangaratinam & Redman 2005). The number of participants anticipated was between 20 and 40 people. This assumption was based on the literature, which states that as long as the background of the participants is homogeneous, then ten to fifteen people should participate. However, if various reference groups are involved, more participants should be included (Hsu & Sandford 2007). As the definition of an expert depends on the setting and objectives of the proposed

Modified Delphi study (Thangaratinam & Redman 2005), the panel of experts for this study were chosen from the clinicians, academics and managers who had experience in working in government hospital ICUs in SA and Zimbabwe and in the practice of early mobilisation. The clinicians, managers and academic experts were invited with the object being to provide practical, research-based, and theoretical perspectives on clinical practice (van der Lee, Hill & Patman 2018). Those invited to be members of the panel of experts were contacted via the email.

5.3.5.1 Inclusion criteria

a) Those intensivists, ICU doctors, ICU physiotherapists and ICU nurses who were clinicians and/or academics with more than three years working experience in ICU. The contributions from the clinicians were considered to be important since they are the ones involved in the day-to-day care of the patients and they know what works best in clinical practice, with more experience in the field being an added advantage.

b) Experienced ICU nurses involved in the teaching and training of nursing students because of their direct involvement in the early mobilisation of patients. Early mobilisation requires the nurses and physiotherapists to work together as a team.

c) Top management decision-makers, including the ICU Director of Services, the ICU Nursing Services Directors and Heads of the Physiotherapy Department as these people contribute to such issues as budgeting, staff capacity, building and maintenance and related matters, and would be likely to use the outcomes of the Modified Delphi study.

5.3.5.2 Exclusion criteria

Clinicians, academics and/or managers who were not contactable through electronic means were excluded. Since the Modified Delphi study involved communication through an online survey, the participants were required to indicate whether they had access to electronic forms of communication.

5.3.6 Instruments

The barriers which were identified in Phases I and II of this study were categorised according to the CFIR. The researcher (CT) then reviewed the literature to formulate evidence-based strategies as a means to overcoming the barriers. The considered articles included mainly systematic reviews and projects focusing on quality

improvements. Statements were then drafted and subsequently approved by the supervisors (Professor Heleen Van Aswegen and Professor Veronica Ntsiea). Furthermore, the researcher designed two separate online REDCap questionnaires for the clinicians and/or academics (Appendix 37) and the managers (Appendix 38). The Heads of the Physiotherapy Departments were the only managers who were not directly working in the ICU whilst the ICU Director of Services and the ICU Nursing Services directors worked in the ICU. Hence, they were able to complete the clinicians' and/or academics' questionnaires. A manager's copy was developed from the clinician and/or academic copy by deleting some of the clinical questions which could be answered only by the clinicians responsible for the day-to-day management and early mobilisation of the ICU patients.

The questionnaires consisted of four parts. The first part collected the demographic details of the participants (profession, current position, type of ICU, years of ICU experience). For the managers, the years of experience as a clinician and the years of experience as a manager were collected under this section.

The second part included the development of the CFIR. This section included statements relating to the following categories: i) characteristics of the intervention; ii) ICU contextual factors (the environment within which the implementation process proceeds); iii) hospital context (including patient needs and resources); iv) characteristics of the individuals responsible for the implementation; and v) the process (the active changes that occur to promote the implementation of early mobilisation).

The third part of the questionnaire included statements relating to the equipment needed to facilitate or assist with the early mobilisation of patients in the ICU. Lastly, the fourth part included statements related to the implementation of early mobilisation, definitions of the activities and variables or the outcomes to be considered to determine the progression of exercise therapy during patient mobilisation.

5.3.7 **Data Collection Process**

The design of this Modified Delphi study consisted of three stages (Figure 5.1).

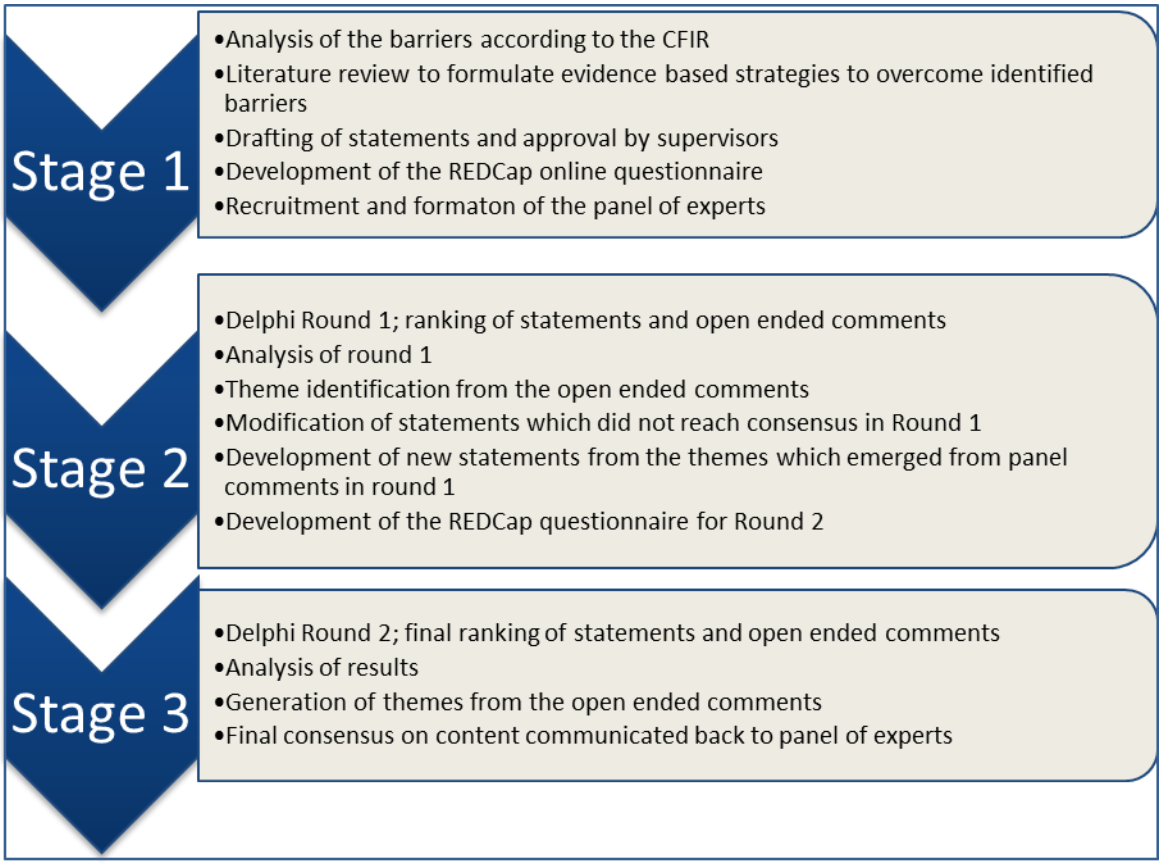


Figure 5.1: The Modified Delphi Consensus Process

Invitations along with a description of the aims and objectives of the study were sent to all identified individuals who met the inclusion criteria (Appendix 31). After accepting the invitation, the participants were asked to sign a consent form for participation and to indicate if they were electronically contactable for a period of six weeks (Appendix 32). For Round 1 of the study, a REDCap link was sent to all of the eligible participants (clinicians, managers and academics) in October 2018 and they were given three weeks to complete the questionnaire. Round I consisted of long statements which required participants to dedicate blocks of time to complete it. Participants were asked to rank the items to establish the preliminary priorities among items and to comment on their rating. A five-point Likert scale was used for each of the statements and the participants were asked to rate each statement accordingly. Statements asked for levels of agreement, namely strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5); and levels of importance namely not important at all (1), of little importance (2), of average importance (3), very important (4), absolutely essential (5); and levels of likelihood which were extremely unlikely (1), unlikely (2), neutral (3), likely (4) and extremely likely (5). Participants were made aware that the strategies they were rating had either been implemented in other ICUs in a different context or were

recommended as possible solutions to overcome the barriers to early mobilisation identified in other studies. Experts were also given the opportunity to provide comments and suggest additional items that may not have been included when developing the initial list of statements.

After three weeks, the project on REDCap was put into an inactive status for analysis to commence. The analysis of Round 1's data was done, and statements which did not meet consensus were modified and included in Round 2 of the Modified Delphi study. New statements were added to the second round. They were based on the themes generated by panel members through their open-ended responses. The rounds were approximately two weeks apart. In Round 2, links with the clinicians' and/or academics' questionnaire (Appendix 39) and managers' questionnaire (Appendix 40) were sent to the same participants from Round 1. Round 2 of the Modified Delphi process lasted for another three weeks even though the questionnaire was shorter and included fewer statements than that for Round 1.

During this time, panelists had unlimited access to the database and were allowed to add anonymous text comments. The identity of panel members and their individual results for each round were known only to the researcher and they remained anonymous to the other panel members. During each round of the Modified Delphi study, a reminder email was sent to those who had not yet completed the questionnaire by Week 2 to remind them to do so to ensure an optimal response rate. Consensus was reached after two rounds of the Modified Delphi study. The areas of agreement and disagreement were identified.

5.3.8 **Data Management and Analysis**

The data captured in REDCap were checked for completeness and accuracy and data cleaning was carried out. Some of the information obtained through the open-ended questions was encoded for ease of analysis. Data were captured from REDCap onto an Excel spreadsheet. The IBM® Statistical Package for Social Sciences (SPSS version 25.0; IBM Corp, Armonk, New York, USA) was used to analyse the data collected. Descriptive statistics were used to present the quantitative data. Continuous variables were summarised as means and standard deviations for normally distributed data, or as medians and interquartile ranges (IQR) for data that was not normally distributed. The Shapiro-Wilk test for normality was used. The median, IQR and semi interquartile range (SIQR) were calculated for each statement. Consensus for a statement was defined as *a priori* if the median score ≥ 4, IQR ≤ 1, SIQR ≤ 0.5, and ≥

70% of the participants either “agreed and/or strongly agreed” with the statement or rated the statement as “either likely and/or extremely likely” or “important and/or very important” (Vernon 2009; Bentley, Kerr & Powell 2016). For the calculation of consensus on the percentage of agreement, importance and likelihood, the five-point scale was re-categorised, with scores of 1 or 2 defined as disagreement; 3, as having reservations or neutral; and 4 or 5 as agreement (Kim et al. 2017).

After Round 1, statements not meeting the 70% agreement standard and/or a median score of ≥ 4 and SIQR ≤0.5 were modified in accordance with the feedback provided by the panel of experts and redistributed to the panellists for Round 2. All of the qualitative interview data obtained from the open-ended questions were summarised into themes, and a deductive approach was used with the responses being analysed within the framework of the CFIR domains. The responses were read and encoded. A summary of quotes was assigned to each domain and presented alongside the quantitative results.

5.4 RESULTS

5.4.1 General Characteristics of the Panel

Figure 5.2 summarises the general characteristics of the participants who were invited to participate in the study and the final panel sample size

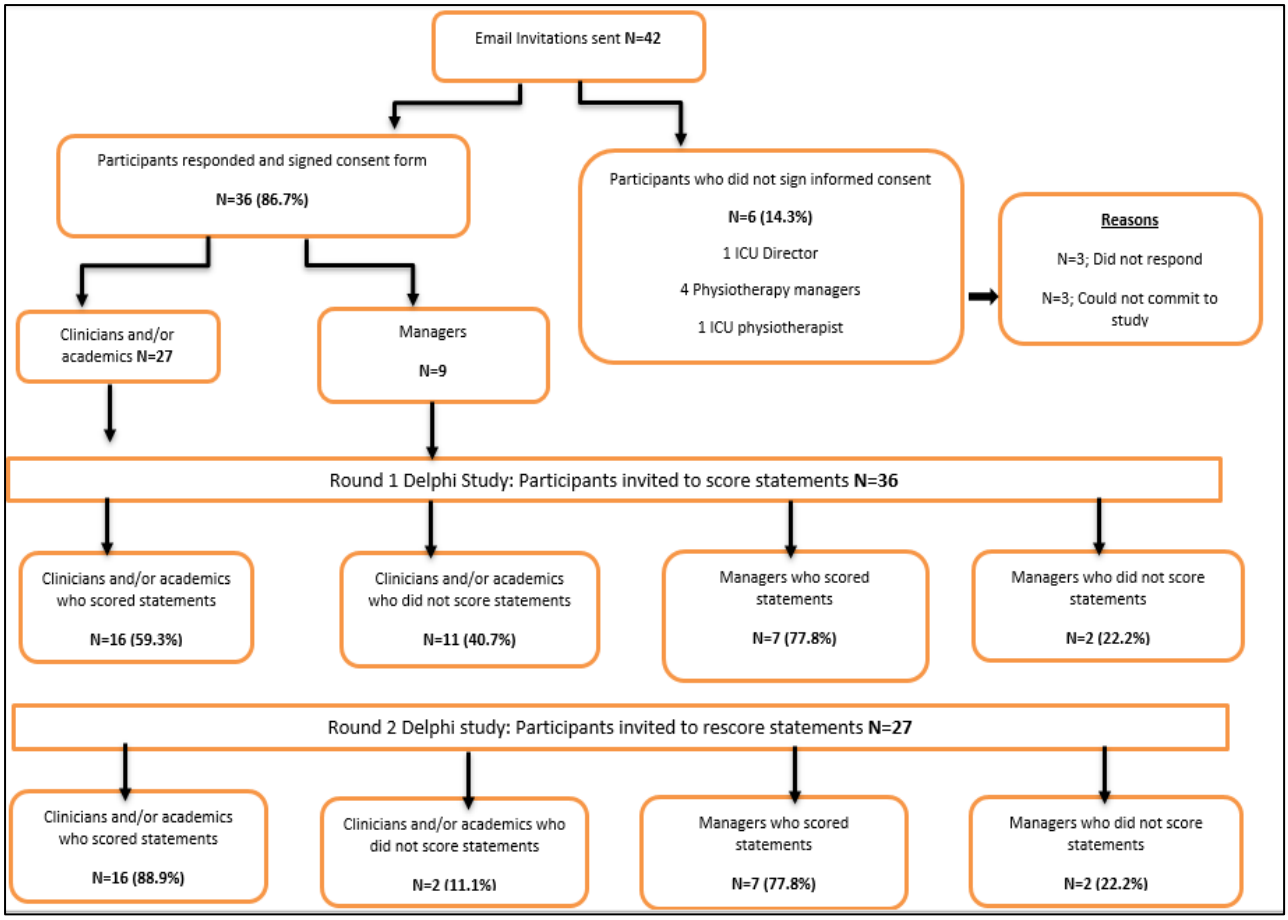


Figure 5.2: Consort Diagram for the Number of Participants for the Modified Delphi Study

In October 2018, 42 clinicians, academics and managers working in government hospitals and/or academic institutions in SA and Zimbabwe and who were directly involved with the early mobilisation of ICU patients were identified and invited by email to take part in the study and form the panel of experts. Of these, 36 (86.7%) responded and signed the consent forms. For Round 1, the online survey was sent to these 36 participants (nine managers, six academics and 21 clinicians) and responses were received from 23 participants (overall response rate = 63.8%).

In Round 2, the online survey was sent to a total of 27 participants from Round 1 for the re-scoring of the statements. The overall response rate for Round 2 of the Modified Delphi Survey was 85.2%.

The characteristics of the Modified Delphi Expert Panel are presented in Table 5.1.

Table 5.1: Characteristics of the Modified Delphi Panel (n=23)

	Attribute	Expert Panel
Sample size, n		23
Country, n	Zimbabwe	9
	South Africa	14
Years of ICU experience [a]	Median years (IQR)	8.5 (5-17)
Years of experience as head of department [b]	Median years (IQR)	13 (5-20)
Profession, n(%)	Doctor	7(30.4)
	Physiotherapist	12 (52.2)
	Nurse	4 (17.4)
Current position, n(%)	ICU Doctors/Physicians	3(13.0)
	Physiotherapy managers	3(13.0)
	ICU Director of Services	2(8.7)
	ICU Nursing Services Directors	2(8.7)
	ICU Physiotherapist	7(30.5)
	Academic/Lecturer	4(17.4)
	Other	2(8.7)
Type of ICU, n(%)[c]	Surgical	1(5.0)
	Trauma	2(10.0)
	Cardiothoracic	1(5.0)
	General	16 (80.0)

a & c-only applies to participants working in the ICU
b-applies to managers working outside the ICU

The expert panel was composed of 23 participants (seven managers, four academics and 12 clinicians). The median for years of ICU experience for the ICU clinicians, academics and managers working in ICU was 8.5 (5-17) years. Most of the participants were from a general ICU clinical background (80%). Under current position, the 'other' category comprised of one senior medical officer and one anaesthetist registrar. For the managers who were working outside the ICU, the median for years of experience as clinicians was 27 (15-30) years.

5.4.2 Characteristics of Early Mobilisation Interventions

Table 5.2 summarises the results from the ranking of statements by the ICU clinicians and/or academics on the characteristics of early mobilisation interventions.

Table 5.2: Ranking of Statements by Participating Clinicians and/or Academics under the Theme of Characteristics of Early Mobilisation Interventions

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Early mobilisation should be done within Days 2-5 after ICU admission for it to be a key factor for successful clinical outcomes (Hodgson et al. 2013; Hodgson et al. 2014; Schaller et al. 2016).	4 (0.5)	*	✓
Early mobilisation should preferably be done earlier but sometimes some of the patients' conditions restrict early mobilisation between Day 1 to Day 5. Therefore, it should be initiated at the patient's earliest signs of stability and cooperation as it is better to be late than not to mobilise at all.	2(1.25)[a]	5(0.5)	✓
Early mobilisation should be defined as the intensification and early application of any active exercises where the patient could assist with the activity using his/her own muscle strength and muscle control (Hodgson et al. 2013; TEAM study 2015).	4 (0.75)	*	✓
A better definition of early mobilisation, which incorporates the physiological effect intended and is placed in the context of the physiological, psychological and the physical state of the patient should be provided.	**	4(0.875)	×
Passive joint movements should not be considered as early mobilisation but the passive transfer of a patient out-of-bed to a chair is early mobilisation as this stimulates the neural pathways for the patient to gain postural control and remain in a seated posture	3 (0.75)[a]	4(1)	×
Passive mobilisation should include the following activities done for patients who are unable to cooperate according to instructions (Cameron et al. 2015) a) Manual passive movements	5 (0.5)	*	✓
b) Tilt table therapy – the use of a tilt table (Passive orthostatism) to achieve the vertical position in critically-ill patients for motor stimulation, improvements in cardiovascular function and alertness	4 (0.5)[a]	4(0.5)	✓
c) Neuromusculoskeletal electrical stimulation- can provide some muscular activity even very early on, during critical illness. It is non-volitional and can be administered without causing cardiopulmonary instability and while the patient remains in bed	3 (0.75)[a]	4(0.5)	×
d) Cycle ergometers- allow patient activity to move back and forth between passive cycling (where the patient does not contribute to the pedalling motion), active assisted cycling (where the patient can augment the motorised cycle with his/her own energy), and active cycling (with the option for a PT to add resistance to cycling).	3 (1)[a]	4(0)	✓

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
e) Continuous passive motion machines - devices are used during the first phase of rehabilitation following a soft tissue surgical procedure or trauma and help in the prevention of stiffness	4 (0.5)[a]	4(0)	✓
Passive mobilisation should be included as part of early mobilisation activities but should not be done in isolation as it only preserves joint range, muscle length and does not actively involve the muscle to improve strength	3.5 (1)[a]	4(0.5)	✓
Active mobilisation should be characterised by the following activities: a) Rolling	4 (0)	*	✓
b) Bridging	4 (0.25)	*	✓
c) Upper and lower limb flexion and extension exercises	4 (0.5)	*	✓
d) Sitting on the edge of the bed	5 (0.5)	*	✓
e) Standing next to the bed	5 (0.5)	*	✓
f) Stand transfer to a chair	5 (0.5)	*	✓
g) Marching on the spot	5 (0.5)	*	✓
h) Walking away from the bed (Castro-Avila et al. 2015; Koo et al. 2016; van Willigen et al. 2016; Nydahl et al. 2017; Phelan et al. 2018).	5 (0.5)	*	✓
A flow diagram detailing content related to patient assessments in ICU prior to early mobilisation is a useful tool in clinical practice (Hodgson et al. 2018).	4 (0)	*	✓
Development of early mobilisation protocols for each unit will facilitate the implementation of the treatment (Dubb et al. 2016; Parry et al. 2017a).	4 (0.5)	*	✓
Parameters (e.g. heart rate, respiratory rate and blood pressure) indicated in early mobilisation guidelines or protocols are not intended to be contra-indications to mobilisation or to be interpreted in isolation, but they should be used in conjunction with sound clinical judgement (Stiller et al. 2004).	4 (0.5)	*	✓
The ICU multidisciplinary team should work together to formulate protocols and guidelines for the early mobilisation of patients in their units (Engel et al. 2013b; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Parry et al. 2017a). .	5 (0.25)	*	✓
The focal person to initiate the formulation of relevant discipline- specific protocols or guidelines should be the discipline-specific leader, in consultation with the entire ICU team.	4 (0.5)	*	✓
The physiotherapist must always be present in the ICU for him/her to identify patients who are ready for early mobilisation, to implement mobilisation plans and to make recommendations for	4 (0.75)[a]	4(0.5)	✓

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
the progression of patient management in relation to early mobilisation and in conjunction with the other ICU team members as the once daily visit will not make this possible			
There is a need to appoint a coordinator of early mobilisation in an ICU who should be responsible for the planning and communication within the entire ICU team since this group is responsible for patient care (Engel et al. 2013b; Eakin et al. 2015; Schaller et al. 2016).	4 (0.5)	*	✓

a-item modified based on comments of the panel of experts
*-consensus achieved after Round 1 ✓-consensus of statement achieved
**- new statement derived from comments of the panel of experts
x-no consensus of statement achieved

A total of 26 statements were ranked by the panel of experts under this category. Consensus was reached for 23 (88.5%) of the items pertaining to the characteristics of the early mobilisation intervention after Round 2. Consensus was reached on the activities that should be considered as active mobilisation, namely rolling (SIQR: 0), bridging (SIQR: 0.25), upper and lower limb active range of motion exercises (SIQR: 0.5), sitting on the edge of a bed (SIQR: 0.5), standing next to the bed (SIQR: 0.5), a stand- transfer to the chair (SIQR: 0.5), marching on the spot (SIQR: 0.5) and walking away from the bedside (SIQR: 0.5). The panel agreed on the need to develop early mobilisation protocols for each unit in order to facilitate the implementation of early mobilisation (SIQR: 0.5) and that the ICU multidisciplinary team should work together to formulate the protocols and guidelines (SIQR: 0.25). The panel agreed that the parameters such as vital signs, indicated in early mobilisation guidelines or protocols, are not intended to be contra-indications or to be interpreted in isolation, but that they should be used in conjunction with sound clinical judgement (SIQR: 0.5). Consensus was reached on the need to employ a coordinator for early mobilisation who should be responsible for planning purposes and communication within the team (SIQR: 0.5).

Consensus was not reached after Round 2 for a total of three statements (11.5%) in the category for characteristics of early mobilisation interventions. The panel did not reach consensus on whether early mobilisation should be re-defined to include the physiological effects intended (SIQR: 0.875). Neither was consensus reached on the exclusion of passive joint movements as part of early mobilisation activities (SIQR: 1) and the inclusion of neuromuscular electrical stimulation (SIQR: 0.5) as part of passive mobilisation.

Table 5.3 represents the categories and quotes which were derived from the comments made by clinicians and/or academics under the theme, characteristics of the early mobilisation interventions.

Table 5.3: Categories and Quotes from the Clinicians and/or Academics under the Theme of Characteristics of the early Mobilisation Interventions

Category	Quotes from Participants
Initiation of early mobilisation	'Might not always be feasible. Depends on the patient's condition. Disease processes differ so it cannot be definitive as to how soon you will start mobilising the patient.' **Participant 04, nurse**
	'Within two to five days…. we prevent a lot of complications of prolonged immobility. However, sometimes the patient will still be very unstable for mobilisation. Only passive movements will be possible. Therefore, it really depends on the patient's condition within the first two to five days.' **Participant 11, nurse**
	'Clinically I have experienced that the sooner you start mobilisation, the better the outcome.' **Participant 12, physiotherapist**
	'For some patients, earlier mobilisation is impossible. Mobilisation should be done as soon as it is possible. It is never too late to provide some benefit.' **Participant 05, doctor**
	'…by Day 8, muscle weakness would have set in; therefore, initiating mobilisation would require more time to achieve functional independence.' **Participant 16, physiotherapist**
	'I don't agree that if mobilisation is initiated after a week, it will not result in functional independence. There are many conditions that are contra-indications to mobilisation. I believe that it should be instituted at the patient's earliest signs of stability and co-operation.' **Participant 19, physiotherapist**
Redefining early mobilisation	'A definition is only an explanation which puts everything under one umbrella, but when it comes down to practical activities, individualistic approaches will be applied. So, changing the definition will not change much in my opinion.' **Participant 04, nurse**
	'I believe a patient may be physically and physiologically ready for early mobilisation but still be emotionally or psychologically not willing to mobilise. Therefore, the definition needs to demonstrate holism and incorporate all dimensions of readiness to mobilise.' **Participant 11, nurse**
	'It may not be possible to strictly define 'early' mobilisation because of the different patient mixes [e.g. similar problems faced with 'early' tracheostomies]. However, mobilisation can be active or passive [e.g. turning].' **Participant 15, doctor**
Incorporation of passive mobilisation	'Some patients are not able to use their own muscle strength or might require deep sedation in the acute phase of ICU admission, but they should still receive passive mobilisation to create the optimal setting for active mobilisation.' **Participant 05, nurse**
	'Passive movement does not activate muscles. Muscle activation is necessary for hypertrophy. Passive mobilisation merely retains tissue flexibility.' **Participant 06, doctor**

Category	Quotes from Participants
	'Passive movements are equally important in preventing the risk of complications such as joint stiffness, pain, as well as contractures.' **Participant 11, nurse**
	'…small steps towards recovery and regaining control is an important motivator for the patient. It will also help to prevent complications from poor body positioning that might go undetected for long periods of time.' **Participant 17, nurse**
Discouraging passive movements as part of early mobilisation	'This depends….. passive joint mobs in bed is not early mobilisation, but a passive transfer to a chair may be passive but will require the patient to remain in a seated posture requiring postural control, which is not passive.' **Participant 19, physiotherapist**
Equipment to promote passive mobilisation	'All of them are important passive mobilisation activities, provided that the resources are available.' **Participant 11, nurse**
	'Aside from the manual passive joint movements, which are practical in our setting, I am not experienced with other tools. The tilt table may be useful in cases of prolonged bedrest, but it is resource-intensive and can be used in selected cases.' **Participant 13, doctor**
	'Passive joint movement to prevent contractures. Tilt table [is] a must. NMES for muscle activity and severe atrophy before the patient is able to cooperate (can also be used in prevention for known lengthy sedation periods). Passive cycle ergometers need to be accompanied with dosage of exercise, depending on the physiological system treated (e.g. cardiorespiratory).' **Participant 20, physiotherapist**
Protocol development	'There will be a sense of ownership for the protocol and therefore health workers will implement and use the protocol better than those protocols handed down to them from top management.' **Participant 11, nurse**
	'...pivotal for the success of a protocol to consider local resources and environment.' **Participant 13, doctor**
	'It enables other healthcare providers to be on the same page in promoting patient rehabilitation and recovery.' **Participant 17, nurse**
	'While I agree that early mobilisation protocols will assist with the decision of when to mobilise the patient, some thought and consideration needs to be put into the dosage. Dosage of exercise may have to be tailored to the patient.' **Participant 20, physiotherapist**
Relevance of parameter limits	'In our ICU, we have a motto "nurse the patient; not the numbers". Sometimes the parameters don't reflect on your clinical assessment and vice versa.' **Participant 04, nurse**
	'Some patients will have deranged vital signs for prolonged periods of time and mobilisation should not be delayed for such patients at the expense of muscle and joint activity unless the situation should arise that mobilisation aggravate the vital sign derangements.' **Participant 11, nurse**
	'Parameters are dependent on varying conditions, ages, drugs [received] etc. and so cannot be read in isolation.' **Participant 19, physiotherapist**

The participants commented that although early mobilisation should be initiated within the first five days of critical illness, it may not always be feasible in all patients on account of the disease process and the trajectory of recovery. The participants agreed that although the early execution of early mobilisation is associated with better outcomes, mobilisation should still be initiated for some patients, even if late during their ICU stay, to achieve functional independence. The panel did not reach consensus as to the statement of the inclusion of passive mobilisation as part of early mobilisation as some indicated that it is beneficial as a precursor to active mobilisation and others commented that it is of little benefit as it only preserves muscle length and flexibility, with no effect on the muscle strength. Participants commented that vital sign parameters should not be read in isolation for early mobilisation to be contra-indicated since critically ill patients will have deranged vital signs for a prolonged time.

5.4.3 The Environment within which the Implementation Process of Early Mobilisation Proceeds

Table 5.4 summarises the results from the ranking of statements by participating ICU clinicians and/or academics on the environment within which the implementation process of early mobilisation proceeds.

Table 5.4: Ranking of Statements by Participating Clinicians and/or Academics under the Theme of the Environment within which the Implementation Process of Early Mobilisation Proceeds

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Promote the admission of patients into the relevant specialised ICUs so that delays in time to consultations can be reduced.	4 (0.5)	*	✓
Each unit should have discipline-specific leaders who remain in the unit and are responsible for educating new staff on unit guidelines for early patient mobilisation (Engel et al. 2013b; Eakin et al. 2015; van Willigen et al. 2016).	4 (0.5)	*	✓
The medical consultants/physicians should be consulted before a final decision of early mobilisation is made and they should ensure that the practice is evidence-based, and embrace the innovations and changes put forward by other disciplines where it will benefit the patients	4 (1)[a]	4(0.5)	✓
The physiotherapist must be the champion leader of early mobilisation (Engel et al. 2013b).	4 (0.5)	*	✓
The ICU nurse has the bigger role of providing nursing care, and hence of taking a leading role in early mobilisation, which will overburden the nurse. However, they can assist during implementation as they are with the patients 24 hours around the clock and they will be aware of the patient's readiness for procedures, their physical stability and psychological well-being.	3 (0.75)[a]	4(0.5)	✓
Use of sedation protocols to minimise over sedation or the continuous sedation of patients (Barber et al. 2015; Taito et al. 2016; van Willigen et al. 2016; Goddard et al. 2018).	4.5 (0.5)	*	✓
Implementation of daily sedation interruptions should be a pre-requisite for early mobilisation in each unit (Balas et al. 2013; Taito et al. 2016).	4 (0.5)	*	✓
ICU multidisciplinary team members should engage frequently for planning purposes through ward rounds or ward meetings (Engel et al. 2013b; Barber et al. 2015; Bakhru et al. 2016; van Willigen et al. 2016).	5 (0.25)	*	✓
The premise of multidisciplinary rounds is not the composition of the health disciplines physically in attendance, but rather the interdisciplinary communication, shared planning and decision making that should occur (Rose et al. 2011)	4 (0.5)	*	✓
There is a need for clarity on the role of leadership in an interprofessional team. This is critical for effective team functioning (Bentley et al. 2016).	4 (0.5)	*	✓
There is a need to facilitate team interdependence. Team members should cooperate and work interactively to complete tasks related to patient care and rehabilitation (Bentley et al. 2016).	5 (0.5)	*	✓
A sign with the target mobility goal should be posted at each patient's bedside and the clinical team should work towards achieving the mobility goal throughout that day (Schaller et al. 2016).	4 (0.5)	*	✓

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Technologically advanced equipment in ICU will be beneficial to mobilise patients earlier and eliminate physical strain on the clinicians, but owing to the cost implications in the government setting, the unavailability of the specialised equipment should not limit early mobilisation.	4 (0.75)[a]	5(0.5)	✓
Only a minimum level of equipment is necessary to facilitate early mobilisation in a unit (Asher 2013; Eakin et al. 2015).	4 (0.25)	*	✓
Reducing the number of attachments to a patient when possible, whilst mobilising them, will promote early mobilisation (Leditschke et al. 2012; Nydahl et al. 2014; Castro et al. 2015; Koo et al. 2016).	4 (0.5)	*	✓
ICU nurses should be responsible for reducing the number of lines and attachments on a patient to promote early mobilisation.	4 (0.25)	*	✓
Reducing the number of lines/attachments should be considered as part of the preparation for mobilisation and should be done by the person who is most knowledgeable and/or who works consistently with the lines. ICU physiotherapists should not be responsible for reducing the number of lines and attachments as they might not be aware of the ongoing need for the lines and attachments.	2 (0.5)[a]	4(0.5)	✓
Catheter sites should not preclude mobilisation if clinically assessed as secure and suitable.	4 (0.75)[a]	5(0.5)	✓

a-item modified based on comments of panel of experts
*-consensus achieved after Round 1 ✓-consensus of statement achieved

The panel reached consensus on the 13 statements (72.2%) out of a total of 18 statements under this category in Round 1. The panel agreed that having a discipline-specific leader who remains in the unit and has the responsibility of educating new staff will promote the early mobilisation of ICU patients (SIQR: 0.5). Consensus was reached on the inclusion of the following in the culture of the unit to promote early mobilisation: the use of sedation protocols to minimise over sedation (SIQR; 0.5), the engagement of the ICU multidisciplinary team for shared planning, decision making, the facilitation of team interdependence (SIQR: 0.25), and the need to clarify the role of leadership in an ICU multidisciplinary team (SIQR: 0.5).

After the first round, no consensus was reached on a total of five statements (27.8%) under the ICU contextual factors theme. The panel did not reach consensus on whether a medical consultant (SIQR: 1) or a nurse (SIQR: 0.75) should be the champion leader of early mobilisation. No consensus was reached on the use of specialised equipment to achieve higher levels of early mobilisation (SIQR: 0.75) or the benefit of changing the site for vascular catheters to promote early mobilisation

(SIQR: 0.75). After modifications were made to the statements in Round 2, consensus was reached on all of the statements.

Table 5.5 represents the category and quotes which were derived from the comments by clinicians under the ICU contextual factors theme.

Table 5.5: Categories and Quotes Extracted from Clinicians and/or Academics' Responses under the Category, the Environment within which the Implementation Process of early Mobilisation Proceeds

Category	Quotes from Participants
Champion leaders for the early mobilisation of patients	'In as much as I agree"…, again not practical in our setting owing to the exodus of specialised staff.' **Participant 04, nurse**
	'If you are driving change in practices, this cannot be done on a consultancy basis. Physiotherapists need to be functional members of the ICU team; not consultants who come and go as needed. **Participant 17, nurse**
	'This is very helpful for consistency, establishing rapport and the training of younger staff members.' **Participant 19, physiotherapist**
	'The physiotherapist working in the unit should have the clinical skills to decide whether to mobilise a patient. Junior physiotherapists should have a "senior" person in place to assist them in their decision-making process if they are unsure. The medical consultant should be consulted before a final decision is made and this can be communicated in a ward round/patient hand over/ patient discussion.' **Participant 20, physiotherapist**
	'In reality, everyone looks to the physician to take the blame if things go wrong. So the physician inevitably gets this role.' **Participant 06, doctor**
	'Physiotherapists can guide and teach others the know-how because they are the experts in mechanics and in the movement required for the procedures…. As independent practitioners, the nurses play an important role in determining the patient readiness for the procedures. This includes the physical stability and psychological well-being of the patient. Nurses are with patients 24 hours around the clock.' **Participant 17, nurse**
	'While the nurse spends the most time with a patient, he/she is not the "expert" on exercise and exercise-related activity and its effects. Also, differential diagnosis is not part of the nursing scope. In South Africa, physiotherapists have first-line practitioner status and differential diagnosis is taught (basics) at the undergraduate level…...The physician should be the most visible leader, but only to provide the medical plan and prognosis for the patient. The physiotherapist should lead the early mobilisation programme in relation to the medical plan.' **Participant 20, physiotherapist**
Multidisciplinary team engagement	'This is a key requirement for the success of inter-disciplinary strategies. Ward rounds work best because they also provide an opportunity for educating others who are not familiar with the strategies but may be involved in the care of the patient…most disciplines do not know what the contribution of the other discipline is. If you are establishing an interprofessional team, we need to know the individual discipline's contribution and how this will enhance the interprofessional team functions. There can't be an overlap in functions;… each discipline's contribution must be uniquely stated for this to work.' **Participant 17, nurse**
	'Establishing trusting relationships and mutual respect between disciplines goes a long way to achieving common patient goals. MDT meetings where evidence can be shared and discussed may be beneficial...' **Participant 19, physiotherapist**

Category	Quotes from Participants
	'This is a culture that has to change in South Africa. The hierarchy that exists with physicians "assuming" that the rest of the multidisciplinary team's opinions are not "as important" because they are not contributing to the medical "cure" of the patient. Basically, the team should be consulted with each member of the MDT expressing their informed opinion and contributing to the well-being and holistic management of the patient. I am not a doctor and will not tell you how to do medicine...but you are not a physiotherapist.' **Participant 20, physiotherapist**
Physicians' orders regarding early mobilisation intervention	'Other professionals such as physiotherapists and nurses are capable and well trained to make independent decisions. They should not be limited to following physicians' orders. In fact, most physicians' focus is not even on the mobilisation of the patient. The suggestion above of waiting for the physicians' orders is so de-motivating as it leads other members of the multidisciplinary team to feel inferior and yet they are more competent in their own specialty areas'. **Participant 11, nurse**
	'Not necessarily does one need a physician's order to mobilise, but the sound judgement and assessment of each individual patient should be considered'. **Participant 16, physiotherapist**
	'I think this need to be looked at from the reverse perspective. There needs to be a physician's order NOT to mobilise a patient early, with medical reasons to justify this. If the physiotherapist feels that the order is too cautious, the therapist needs to consult with the physician (and provide sound evidence) prior to mobilising the patient'. **Participant 20, physiotherapist**

The participants agreed that although the availability of a discipline-specific leader in the unit might facilitate early mobilisation, this might not be possible in Zimbabwean and South African settings, owing to the exodus of experienced staff and the rotational coverage by physiotherapists. Although the panel agreed on the importance of having a champion leader for early mobilisation, there was no agreement on the discipline suitable for supporting the champion leader, as different levels of expertise were highlighted for the various disciplines.

5.4.4 Patient Needs, Resources and Hospital Administrative Support

Statements related to the patient needs, resources and hospital administrative support are presented in Table 5.6.

Table 5.6: Ranking of Statements by Participating Clinicians and/or Academics under the Patient Needs, Resources and Hospital Administrative Support Theme

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Overview of safety issues prior to active mobilisation of ICU patients			
Prolonged tachycardia is common in many ICU patients owing to autonomic neuropathy. Hence, the need to consider the cause of tachycardia before one decides not to mobilise on account of an increased resting heart rate	3 (1)[a]	4(0.5)	✓
Interpretation of the resting heart rate should be done in conjunction with other safety parameters (e.g. blood pressure, ECG tracing and respiratory reserve) (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	4 (0.5)	*	✓
The administration of vasoactive drugs should not be an absolute contra-indication to mobilisation as patients can be on a low dose of vasopressors for vasodilation and can handle mobilisation (Hodgson et al. 2014).	4 (0.5)[a]	4(0)	✓
SpO_2 of above 90% is usually recommended to initiate early mobilisation (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008; Hodgson et al. 2014)	4 (0)	*	✓
A respiratory rate of less than 30 breaths/minute is safe for both in bed and out-of-bed mobilisation activities (Hodgson et al. 2014)	4 (0.5)	*	✓
Vital signs cannot be looked at in isolation as some patients may actually present with deranged vitals (e.g. low oxygen saturation levels in a patient with basal atelectasis). However, they would benefit significantly from early mobilisation	**	4(0.5)	✓
Patients are not allowed to progress with early mobilisation in the case of increased ICP (>15–20 mmHg) (Olkowski & Shah 2017; Brissie et al 2017).	4 (0.5)	*	✓
Patients may proceed with early mobilisation if their ICP is well controlled for 24 hrs with no administration of Mannitol or hypertonic saline, as mobilisation should be dependent on the overall condition of the patient.	4 (0.5)[a]	4(0.5)	×
Early mobilisation should not be initiated on patients with an ICP greater than 20 mmHg (Olkowski & Shah 2017).	4 (0.5)	*	✓
A single ICP spike related to an acceptable reason (i.e. during bowel movement, needle insertion) should not preclude mobilisation (Olkowski & Shah 2017).	4 (0)	*	✓
A platelet count of above 20 x 10^9 /L, with no other bleeding risks should be considered safe for out-of-bed mobilisation. However, at times that information is not known in a clinical setting (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	4 (0.5) [a]	4(0)	✓

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Exercise therapy has a large effect size on reducing the levels of depression experienced by patients and should therefore commence in the ICU (Wegner et al. 2014).	5 (0.5)	*	✓
Impulsive behaviour, agitation and/or an inability to re-direct should not be considered as a barrier in neurological patients as early mobilisation has been shown to reduce delirium and anxiety (Titsworth et al. 2012; Klein et al. 2015; Karic et al. 2017).	4 (0)	*	✓
Adjusting treatment plans with patient input and providing patient education will promote early mobilisation activities (Leditschke et al. 2012; Dubb et al. 2016).	4 (0.5)	*	✓
Screen for levels of pain experienced using standardised outcome measures in ICU and provide pain medication before mobilisation (Castro et al. 2015; Dubb et al. 2016).	5 (0.5)	*	✓
Screening of patients should be done through interprofessional meetings to make a decision on the initiation of early mobilisation activities in ICU (Eakin et al. 2015; Dubb et al. 2016).	4 (0)	*	✓
Timely management of fractures sustained by patients in ICU should be done to allow for early mobilisation and improved patient outcomes.	5 (0.5)	*	✓
The creation of posts to support the manpower required for the successful implementation of early mobilisation should be considered. (Engel et al. 2013b; Eakin et al. 2015; Dubb et al. 2016)	4 (0.5)	*	✓
The restructuring of roles, responsibilities and care pathways for the available staff in the absence of increased staffing levels will promote the execution of early mobilisation activities in ICU (Eakin et al 2015; Parry et al. 2017a).	4 (0)	*	✓
Criteria for terminating early mobilisation			
Early mobilisation activities should be terminated when a respiratory rate of either less than five breaths/minute or above 40breaths/minute has been recorded (Adler et al. 2012).	4 (0)	*	✓

a-item modified based on comments of panel of experts
*-consensus achieved after round 1
**- new statement derived from comments of panel of experts
✓-consensus of statement achieved ×-no consensus of statement achieved

A total of 20 statements were ranked by the panel of experts under this theme. Consensus was reached for 19 (95%) of the items pertaining to patient needs, resources and hospital administrative support to promote early mobilisation intervention. The panel reached consensus on the following safety measures prior to

early mobilisation: the interpretation of the resting heart rate should be executed in conjunction with other safety parameters (SIQR: 0.5); oxygen saturation levels of above 90% are recommended for the initiation of early mobilisation in patients (SIQR: 0); a respiratory rate of below 30 is safe for both in-bed and out-of-bed early mobilisation activities (SIQR: 0.5); and an ICP of more than 15mmHg is not safe for progression with early mobilisation (SIQR: 0.5).

After Round 2, no consensus was reached on the progression of early mobilisation in a patient with controlled ICP (SIQR: 0.5). Experts reported as follows: '*For me, this would be moving into dangerous ground. Intracranial pressure can increase dramatically by even a light flicker of change.'* (**Participant 17, nurse**) and '*The settling of raised ICP cannot be assumed simply because no Mannitol has been given; premature mobilisation may be a major risk in traumatic brain injury patients.'* (**Participant 06, doctor**).

5.4.5 Characteristics of the Individuals Responsible for the Implementation of Early Mobilisation Intervention

Statements related to the characteristics of the individuals responsible for the implementation of early mobilisation interventions are presented in Table 5.7.

Table 5.7: Ranking of Statements by Participating Clinicians and/or Academics Relating to the Theme, Characteristics of Individuals Responsible for the Implementation of Early Mobilisation Interventions

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Expertise development and skills training to equip the clinicians to undertake successful early mobilisation interventions with patients should be introduced so as to increase the levels of early mobilisation in units (Parry et al. 2017a).	5 (0.5)	*	✓
A knowledge and understanding of the different roles, boundaries, responsibilities and levels of expertise of health professionals is a key factor in the successful implementation of early mobilisation (Bentley et al. 2016).	4 (0.5)	*	✓
The representatives of each profession are responsible for providing the information regarding their individualised roles in early mobilisation (Engel et al. 2013).	4 (0.5)	*	✓

A physician should be the most visible leader regarding the implementation and continuity of the early mobilisation programme, and in leading the implementation process and fostering the growth of the programme by gaining staff and administrative buy in (Eakin et al. 2015).	4 (0.5)	*	✓
Physiotherapists should be responsible, in conjunction with other team members, for implementing mobilisation plans and exercise prescriptions and for making recommendations for the progression of patient management (Gosselink et al. 2008; Engel et al. 2013b; van Willigen et al. 2016; Parry et al. 2017a).	4 (0.5)	*	✓
ICU doctors should be responsible for facilitating the timely delivery of early mobilisation through early referrals and for minimising the levels of pain experienced by patients (Engel et al. 2013b; Hodgson et al. 2013; Jolley et al. 2015).	4 (0.5)	*	✓
ICU nurses should be responsible for facilitating the timely delivery of early mobilisation through early referral, minimising the levels of pain experienced by patients, and temporarily disconnecting feeding tubes and other attachments to patients where applicable (Engel et al. 2013b; Hodgson et al. 2013; Jolley et al. 2015).	4 (0.5)	*	✓
Early mobilisation should be a collaborative role, with some being responsible in the delivery and others supporting the delivery of the programme.	5 (0.5)	*	✓
An ability to express one's opinion to others involved in the care of ICU patients will bring results in respect of teamwork and promote early mobilisation (Bentley et al. 2016).	5 (0.5)	*	✓
An ability to acknowledge the views and ideas of other ICU team members promotes interprofessional communication and therefore promotes the implementation of early mobilisation in ICUs (Bentley et al. 2016).	4 (0.5)	*	✓
Knowledge transfer and the education of healthcare professionals about the burden of ICU-acquired weakness and its impact on long-term patient outcomes will lead to the achievement of higher levels in the early mobilisation of patients in ICUs (Jolley et al. 2014; Barber et al. 2015; Eakin et al. 2015; Bakhru et al. 2015; Dubb et al. 2016)	4 (0.5)	*	✓
The training of the ICU team members on the implementation of early mobilisation activities by experts will lead to higher levels in the early mobilisation of patients (Parry et al. 2017a).	5 (0.5)	*	✓
The importance of having senior, experienced clinicians in the unit who are able to discern which patients will tolerate mobilisation in the face of marginal cardiac and/or respiratory reserve, and be able to educate or guide the junior staff, should be emphasised in all units so as to increase the rate of early mobilisation in patients (Stiller, Phillips & Lambert 2004)	5 (0.5)	*	✓

*-consensus achieved after Round 1 ✓-consensus of statement achieved

Under this category, there were a total of 13 statements and consensus was reached in all of the statements (100%) in Round 1. The panel agreed that there is a need to

define roles for all clinicians responsible for early mobilisation for the smooth execution of the intervention (SIQR: 0.5). Consensus was reached on the need for skills training for all staff members (SIQR: 0.5) and the acknowledgement that all disciplines working in ICU are responsible for early mobilisation. Thus, there is a need for collaboration (SIQR: 0.5).

5.4.6 Active Changes that Occur to Enable the Implementation of Early Mobilisation Interventions

Table 5.8 summarises the results from the ranking of statements by the ICU clinicians and/or academics on the active changes that should occur for the more consistent implementation of early mobilisation interventions in ICUs.

Table 5.8: Ranking of Statements by Clinicians and/or Academics under the Theme, the Active Changes that Occur to enable the Implementation of Early Mobilisation Interventions

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Physiotherapists should assess all patients and screen those eligible for early mobilisation for the successful implementation of the early mobilisation of patients to be achieved (Engel et al. 2013b).	4 (0.5)	*	✓
To have prompts for physiotherapy referrals for early mobilisation as part of the physician's order form should be the standard practice so as to increase the rate of early mobilisation in the units. (Engel et al. 2013b).	4 (0.5)	*	✓

*-consensus achieved after Round ✓-consensus of statement achieved

Consensus was reached on the importance of having physiotherapists who assess all patients and screen the patients who are eligible for early mobilisation (SIQR: 0.5). The panel agreed that there is a need to have prompts for physiotherapy referrals for early mobilisation as part of the physician's order form (SIQR: 0.5).

5.4.7 Equipment Considered Important by Clinicians for the Early Mobilisation of ICU Patients

The equipment considered to be important by the clinicians and/or academics to assist with the early mobilisation of ICU patients is presented in Table 5.9.

Table 5.9: Ranking of the List of Equipment Considered Important by Clinicians and/or Academics for the Early Mobilisation of ICU Patients.

Type of Equipment	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Wheelchair	4 (1)	3(1.5)	×
Cycle ergometry	3 (0.5)	3(1)	×
Neuromuscular electrical stimulation	3 (1)	3(1.5)	×
Ceiling track lift	3 (1)	3(0.5)	×
Air-assisted transfer system	3 (0.5)	3(1)	×
Mobile/portable ventilators	5 (0.5)	*	✓
Dynamic tilt table	4 (1)	4(0.5)	×
Portable monitors	5 (0.5)	*	✓
Adjustable bed	5 (0.5)	*	✓
Walking aid	4 (0.5)	*	✓
Transfer board	4 (0.5)	4(0.5)	✓
Waffle cushions	4 (0.5)	4(1)	×
Adjustable chairs (“lazyboy”)	5 (0.5)	*	✓
Custom-made walkers	4 (0.5)	*	✓

*-consensus achieved after round 1 ✓-consensus of statement achieved
×-no consensus of statement achieved

The panel agreed on a set of equipment to assist with early mobilisation which includes portable ventilators (SIQR: 0.5), portable monitors (SIQR: 0.5), adjustable beds (SIQR: 0.5), walking aids (SIQR: 0.5), adjustable chairs (SIQR: 0.5) and custom-made walkers (SIQR: 0.5). No consensus was reached on the use of the other items listed in Table 5.9.

Regarding the list of equipment to facilitate early mobilisation, one expert commented as follows: *‘Most of this equipment is for stable patients who can cooperate and are free from attachments.’* (**Participant 04, nurse**). Another expert reported: *‘As discussed above, electrotherapy may not benefit all ICU patients and wheelchairs are*

necessary only if the patient can manage to sit at the edge of the bed….' (**Participant 10, physiotherapist).**

5.4.8 Definitions for Early Mobilisation Activities

Table 5.10 summarises the definitions and codes for early mobilisation activities as ranked by the clinicians and/or academics.

Table 5.10: Definitions and Codes for Early Mobilisation Activities as Ranked by the Clinicians and/or Academics

Activity Code	Definition	Round 1	Round 2	Consensus
		Median (SIQR)	Median (SIQR)	
Nothing (lying in bed)	Passively rolled or exercised by staff, but not actively moving	2 (1.5)	4(1)	×
Transferring from bed to chair without standing	Hoist, passive lift or slide transfer to the chair without standing	4 (0.5)	4(0.5)	✓
Sitting in bed/exercises in bed	Any activity in bed, including rolling, bridging, active exercises, cycle ergometer, or active assisted exercises; not moving out-of-bed or over the edge of the bed	4 (0.5)	*	✓
Tilt table/tilt bed	The use of a tilt table or a tilt table function with the hospital bed	4 (0.5)	4(0.5)	✓
Sitting on the edge of the bed	Actively sitting over the side of the bed with some trunk control (may be assisted by staff)	4 (0.5)	*	✓
Standing	Weight bearing through the feet in the standing position with or without assistance; may include the use of a standing lifter	4 (0.5)	*	✓
Transferring from bed to chair with standing	Able to step or shuffle through standing to the chair. This involves actively transferring weight from one leg to another to move to the chair. If the patient has been stood with a machine, he/she must step to the chair.	5 (0.5)	*	✓
Marching in place	Able to walk in one place by lifting the feet alternately (must be able to step at least four times = two steps on each foot), with or without assistance	5 (0.5)	*	✓
Walking with the assistance of two or more people	Walking away from the bed/chair in at least four steps (two for each foot) assisted by two or more people	5 (0.5)	*	✓
Walking with the assistance of one person	Walking away from the bed/chair in at least four steps (two for each foot) assisted by one person	4 (0.5)	*	✓
Walking with gait aid, but without the assistance of any person (or wheelchair ambulation)	Walking away from the bed/chair in at least four steps (two for each foot) with a gait aid, but no assistance from another person. In a wheelchair- bound person, this includes wheeling the chair without assistance	4 (0.5)	*	✓
Walking without a gait aid and without the assistance of any person	Walking away from the bed/chair in at least four steps (two for each foot) without assistance from a person or a gait aid	4 (0.5)	*	✓
Unknown	It is unknown regarding what activity, if any, occurred	2 (1)	3(1)	×

*-consensus achieved after Round 1 ✓-consensus of statement achieved
×-no consensus of statement achieved

The panel agreed on the definitions and codes for the following early mobilisation activities: sitting in bed/exercise in bed (SIQR: 0.5), sitting at the edge of the bed (SIQR: 0.5), standing (SIQR: 0.5), transferring from the bed to a chair with standing (SIQR: 0.5), marching in one place (SIQR: 0.5), walking with assistance and without assistance (SIQR: 0.5). Consensus was not reached on the following definitions and codes: lying in bed (SIQR: 1) and unknown activity (SIQR: 1). On the statements concerning which there was no consensus, one expert commented as follows: *'It must be clear which activities doctors are referring to when they write 'no mobilisation'.* (**Participant 10, physiotherapist**). Regarding the unknown code, one expert commented: *'There should not be any room for an "unknown" code.'* (**Participant 11, nurse).**

5.4.9 Progression of Exercise Therapy during the Early Mobilisation of the Patient

Table 5.11 summarises the parameters highlighted by participating clinicians and/or academics to determine progression during early mobilisation.

Table 5.11: Parameters to Determine Progression during the Early Mobilisation of ICU Patients Ranked by Clinicians and/or Academics

	Round 1	Round 2	Consensus
Description	**Median (SIQR)**	**Median (SIQR)**	
Sedation levels	4 (0.5)	*	✓
Vasoactive drugs	4 (0.5)	*	✓
Strength of the patient	4 (0.5)	*	✓
Fatigue	4 (0.5)	*	✓
Level of mobility	4 (0.5)	*	✓
Function	5 (0.5)	*	✓
Consequences which occur after mobilisation (pus oozing, depression, increased fluid drain)	4 (0.5)	*	✓
Changes in vital signs (HR, BP, RR and SpO_2)	5 (0.5)	*	✓
Subjective appearance of the patient	4 (0.5)	*	✓

HR-heart rate; BP-blood pressure;
RR-respiratory rate; SpO_2- oxygen saturation level
*-consensus achieved after Round 1 ✓-consensus of statement achieved

Consensus was reached on all nine parameters to determine the progression of early mobilisation for ICU patients in the first round. The panel agreed that sedation levels

(SIQR: 0.5), vasoactive drug dosage (SIQR: 0.5) and the strength of the patient (SIQR: 0.5) determine how early mobilisation activities should be enhanced.

5.4.10 Priority Focus areas for the Successful Implementation of Early Mobilisation

Figure 5.3 summarises the main priority focus areas for the successful implementation of early mobilisation in government hospitals' ICUs.

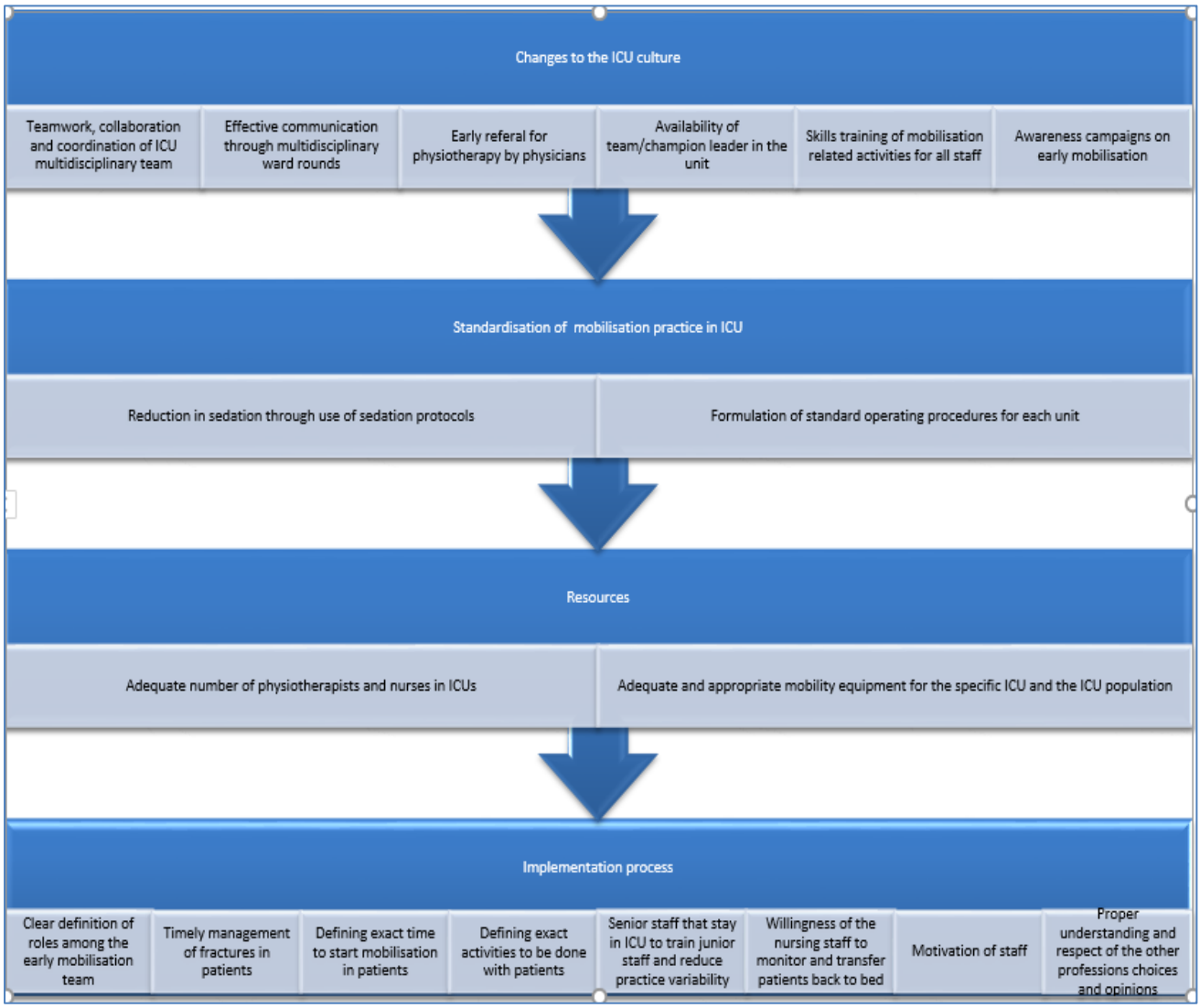


Figure 5.3: The Priority Focus Areas Reported by Clinicians and/or Academics for the Successful Implementation of Early Mobilisation in Government Hospitals

The panel listed priority focus areas based on the identified barriers for the successful implementation of early mobilisation in Round 1. The broad areas identified included the ICU culture, the standardisation of practice in the ICU, resources and the implementation process. The most frequently cited focus areas by the clinicians

include the following: skills training for staff, multidisciplinary teamwork and collaboration, the formulation of SOPs and the availability of the appropriate mobility equipment.

5.4.11 Characteristics of the Early Mobilisation Interventions Category Ranked by Managers Working outside ICU

Table 5.12 summarises the results from the ranking of statements by the managers working outside the ICUs on the characteristics of early mobilisation interventions.

Table 5.12: Ranking of Statements under the Characteristics of the early Mobilisation Interventions by Managers Working outside the ICUs.

Implementation Strategy	Round 1	Round 2	Consensus
	Median SIQR)	Median (SIQR)	
The development of early mobilisation protocols for each unit will facilitate the implementation of the treatment (Dubb et al. 2016; Parry et al. 2017a).	5 (0.5)	*	✓
The ICU multidisciplinary team should work together to formulate protocols and guidelines to facilitate the early mobilisation of patients in their units (Engel et al. 2013b; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Parry et al. 2017a).	5 (0.5)	*	✓
The focal person to initiate the formulation of the relevant discipline-specific protocols or guidelines should be the discipline-specific leader - in consultation with the entire ICU team.	5 (0)	*	✓
There is no need for a physician order for early mobilisation to be executed on a patient as physiotherapists are experts in exercise who can clinically reason when early mobilisation is to be initiated (Jolley et al. 2015).	3 (1)[a]	4(1)	×
The physiotherapist should be responsible for identifying patients who are ready for early mobilisation, implement mobilisation plans and make recommendations for the progression of patient management in relation to early mobilisation in conjunction with the other ICU team members (Gosselink et al. 2008; Engel et al. 2013b; van Willigen et al. 2016; Parry et al. 2017a).	5 (0.5)	*	✓
There is a need to employ a coordinator for early mobilisation in an ICU. He/she should be responsible for planning and communication within the entire ICU team responsible for patient care (Engel et al. 2013b; Eakin et al. 2015; Schaller et al. 2016).	5 (0.5)	*	✓

a-item modified based on comments of the panel of experts
*-consensus achieved after round 1 ✓-consensus of statement achieved
×-no consensus of statement achieved

A total of six statements were ranked by the panel of experts under this theme and consensus was reached for five (83.3%) of the items. The panel agreed that there is a need to develop early mobilisation protocols to facilitate implementation (SIQR: 0.5) through multidisciplinary teamwork (SIQR: 0.5) and a discipline-specific leader, in consultation with the entire ICU team, should initiate the formulation of discipline-specific protocols (SIQR: 0). The panel agreed on the need to have a coordinator for early mobilisation in the unit and one expert commented: *'.....Especially helpful where the type of mobilisation is assessed to be routine (e.g. bed to chair) and not requiring a physiotherapist's intervention, especially when the physiotherapist is needed elsewhere.'* (**Participant 03, manager)**.

The panel did not reach consensus on whether there should be a physician's instruction to initiate early mobilisation on a patient (SIQR: 1). Regarding the need for a physician's instruction, one expert commented *'Physician input/consensus on cardiovascular stability and readiness for early mobilisation is preferable, especially with inexperienced staff members. No orders are required for initiating (e.g. in bed activities and exercise programmes), or how and when to progress exercise.'* (**Participant 03, manager)**. Another expert commented as follows: *'The physician gives an outline on possible contra-indications and the likely complications of medical treatment, but the physician might not be readily available and more so, the physiotherapists can use their clinical reasoning to initiate mobilisation.'* (**Participant 02, manager)**.

5.4.12 The Environment within which the Implementation Process of Early Mobilisation Proceeds According to the Managers Working Outside the ICU

Table 5.13 summarises the results from the ranking of statements by the managers working outside the ICU on the environment within which the implementation process of early mobilisation proceeds.

Table 5.13: Ranking of Statements by the Managers Working Outside the ICU under the Environmental Conditions within which the Implementation Process of Early Mobilisation Proceeds

Implementation strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Promote the admission of patients into the relevant specialised ICUs so that delays in time to consultations can be reduced.	5 (0.5)	*	✓
Each unit should have discipline-specific leaders who remain in the unit and are responsible for educating the new staff on unit guidelines for early patient mobilisation (Engel et al. 2013b; Eakin et al. 2015; van Willigen et al. 2016).	5 (0.5)	*	✓
The medical consultants/physicians should be consulted before a final decision of early mobilisation is made. They should ensure that the practice is evidence-based, and embraces the innovations and changes put forward by the other disciplines in order to benefit the patient	3 (1.5) [a]	4(1)	×
The physiotherapist must be the champion leader of early mobilisation (Engel et al. 2013b).	5 (0.5)	*	✓
The ICU nurse has a bigger role to play in providing nursing care. Hence, he/she takes a leading role in early mobilisation which could overburden him/her, but they can assist during the implementation process as they are with the patients 24 hours around the clock and they will be aware of the patient's readiness for procedures, their physical stability and their psychological well-being.	3 (1.5)[a]	4(1.5)	×
Sedation protocols can be used to minimise over sedation or the continuous sedation of patients. (Barber et al. 2015; Taito et al. 2016; van Willigen et al. 2016; Goddard et al. 2018).	5 (0.5)	*	✓
ICU multidisciplinary team members should engage frequently for planning purposes through ward rounds or ward meetings (Engel et al. 2013b; Barber et al. 2015; Bakhru et al. 2016; van Willigen et al. 2016).	5 (0.5)	*	✓
The premise of multidisciplinary rounds is not the physical attendance of the health disciplines physically but rather the effectiveness and reliability of the communication, and that the communication channels are clear.	5 (1)[a]	2(1)	×
There is a need for clarity on the role of leadership in an interprofessional team. This is critical for effective team functioning (Bentley et al. 2016).	5 (0)	*	✓
There is a need to facilitate team interdependence. Team members should cooperate and work interactively to complete tasks related to patient care and rehabilitation (Bentley et al. 2016).	5 (0)	*	✓
Technologically advanced equipment in the ICU will benefit the patients and promote their mobilisation at an earlier stage and eliminate the physical strain on the clinicians. However, owing to the cost implications in	4 (0.5)[a]	5(0)	✓

Implementation strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
the government setting, the lack of the specialised equipment should not work against early mobilisation			

a-item modified based on the comments of a panel of experts
*-consensus achieved after round 1 ✓-consensus of statement achieved
×-no consensus of statement achieved

The panel reached consensus on eight (72.7%) out of a total of 11 statements relating to the ICU contextual factors. The participants agreed on the need to promote the admission of the patients into the relevant specialised units (SIQR: 0.5) and the appointment of discipline-specific leaders who remain in the ICUs (SIQR: 0.5). An expert commented as follows: *'Specialised ICUs ensure that patients get the specialist care they need timeously. Actually, they eliminate the bottleneck delays introduced because of referrals to specialist teams.'* **(Participant 02, manager)**.

Regarding the employment s of a discipline-specific leader, one expert commented: *'Physiotherapists may not have the resources to permit this, but all units should have a core medical and nursing staff, ideally (an) intensivist(s) and ICU trained nurses.'* **(Participant 03, manager)**.

No consensus was reached on the following statements: the need for a consultation with a physician before the final decision on mobilisation is made (SIQR: 1); nurses taking up the leading role in early mobilisation (SIQR: 1.5); and the premise of effective communication that is facilitated through multidisciplinary rounds, and not through the composition of the team (SIQR: 1).

An expert commented: *'The physicians should ensure that all involved disciplines embrace innovation, etc, in support of the physiotherapist's practice, but should not need to dictate what is required to the therapist'* **(Participant 03, manager)**. With regard to the nursing staff taking the lead role, one expert commented: *'The nursing staff must assist the physiotherapist. They know the patient, the nursing equipment and even though they may consider themselves overburdened, there are always more of them than there are of therapists. Their assistance is required from the perspective of physical (manual) handling, as well as risk reduction.'* **(Participant 03, manager)**.

5.4.13 Patient Needs, Resources and Hospital Administrative Support for the Implementation of Early Mobilisation as Ranked by Managers Working Outside the ICU

Statements related to the theme, patients' needs, the hospital's resources and administrative support for the implementation of early mobilisation activities, as ranked by managers working outside the ICU are presented in Table 5.14.

Table 5.14: Ranking of Statements Concerning the Theme, the Patients' Needs, the Hospital's Resources and Administrative Support for the Implementation of Early Mobilisation, as Ranked by Managers Working Outside the ICU

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
The creation of posts to support the manpower required for the successful implementation of early mobilisation should be considered. (Engel et al. 2013b; Eakin et al. 2015; Dubb et al. 2016)	5 (0.5)	*	✓
The restructuring of roles, responsibilities and care pathways for the available staff in the absence of increased staffing levels will promote the execution of early mobilisation activities in the ICU and this will assist the therapists to plan their work schedules (Eakin et al. 2015; Parry et al. 2017a).	3 (0.5)[a]	4(1)	×

a-item modified based on comments of the panel of experts
*-consensus achieved after Round 1 ✓-consensus of statement achieved
×-no consensus of statement achieved

The panel agreed on the need to create physiotherapy posts to support the manpower required for the successful implementation of early mobilisation (SIQR: 0.5). Experts commented as follows: *'Early mobilisation needs to be done frequently and in small sessions; therefore, the need for an increase in the manpower.'* **(Participant 02, manager)** and *'It is much easier to work with another physiotherapist as the same techniques and outcomes constitute the objectives of the treatment, especially in the case of a challenging patient. An increase in the number of physiotherapy posts reduces the number of nursing staff required to assist, especially when the nursing staff are in short supply, or reluctant, or the unit is very busy. At least two therapists assigned to a unit would also improve the continuity of care and communication.'* **(Participant 03, manager)**.

No consensus was reached on the need to restructure the roles and responsibilities of the available staff (SIQR: 1). Experts commented: *'Sticking to old routines is what is impeding progress.'* **(Participant 01, manager)** and *'Restructuring entails that there is enough coverage of patients.'* **(Participant 02, manager).**

5.4.14 Characteristics of the Individuals Responsible for the Implementation of Early Mobilisation as Ranked by Managers Working Outside the ICU

Statements related to the characteristics of the individuals responsible for the implementation of early mobilisation, as ranked by managers working outside the ICU are presented in Table 5.15.

Table 5.15: Ranking of Statements under the Theme, Characteristics of Individuals Responsible for the Implementation of Interventions by Managers Working Outside the ICU

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
The development of expertise and skill training to equip the clinicians to undertake successful early mobilisation interventions with patients should be introduced so as to raise the levels of early mobilisation in units (Parry et al. 2017a).	4 (1)	4(0.5)	✓
Knowledge and understanding of the different roles, boundaries, and responsibilities, and the expertise of health professionals are key factors in the successful implementation of early mobilisation (Bentley et al. 2016).	5 (0.5)	*	✓
Representatives of each profession are responsible for providing the information regarding their individualised roles in early mobilisation (Engel et al. 2013b).	5 (0.5)	*	✓
Physiotherapists should be responsible for implementing mobilisation plans and prescribing exercises. They make recommendations for the progression of patient management in conjunction with other team members (Gosselink et al. 2008; Engel et al. 2013b; van Willigen et al. 2016; Parry et al. 2017a).	5 (0)	*	✓
ICU doctors should be responsible for facilitating the timely delivery of early mobilisation through early referrals and by minimising the levels of pain experienced by the patients (Engel et al. 2013b; Hodgson et al. 2013; Jolley et al. 2015).	5 (0.5)	*	✓

Implementation Strategy	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Early mobilisation should be a collaborative role, with some being responsible for its delivery and others supporting the delivery of the programme.	4 (0.5)	*	✓
The ability to express one's opinion to others involved in the care of ICU patients will result in respect for teamwork and promote early mobilisation (Bentley et al. 2016).	5 (0.5)	*	✓
The ability to acknowledge the views and ideas of other ICU team members promotes interprofessional communication and thus the implementation of early mobilisation in the ICU (Bentley et al. 2016).	5 (0.5)	*	✓
The transfer of knowledge in the education of healthcare professionals as to the burden of ICU-acquired weakness and its impact on long-term patient outcomes will lead to the achievement of higher levels of early mobilisation of patients in ICUs (Jolley et al. 2014; Barber et al. 2015; Eakin et al. 2015; Bakhru et al. 2015; Dubb et al. 2016)	4 (0.5)	*	✓
The training of the ICU team members for the implementation of early mobilisation activities by experts will lead to higher levels of mobilisation of patients (Parry et al. 2017a) at an earlier stage.	5 (0.5)	*	✓
The importance of having senior experienced clinicians in the unit who are able to discern which patients will tolerate mobilisation, despite the marginal cardiac and/or respiratory reserves, and be able to educate or guide the junior staff, should be emphasised in all units so as to increase the rate of early mobilisation of the patients (Stiller, Phillips & Lambert 2004)	5 (0.5)	*	✓

*-consensus achieved after Round 1 ✓-consensus of statement achieved

Under this category, there were a total of 11 statements and consensus was reached in all of the statements (100%). The panel agreed that there is a need for the development of expertise and skills training for ICU clinicians (SIQR: 0.5). In fact, one expert commented: *'Improved expertise and skills has the effect of increasing confidence, the selection of the appropriate patients for the programme and goal setting.'* **(Participant 03, manager)**. Consensus was reached on the need to define roles during the early mobilisation programmes for the different disciplines (SIQR: 0.5), and on the acknowledgement that all disciplines working in the ICU are responsible for early mobilisation. As such, there is a need for collaboration (SIQR: 0.5).

5.4.15 Active Changes that should occur to Allow for the Implementation of Interventions as Ranked by Managers Working outside the ICU

Table 5.16 summarises the results concerning the active changes that should occur for the implementation of early mobilisation interventions from the ranking of statements by the managers working outside the ICU.

Table 5.16: Ranking of Statements under The Active Changes that should Occur to Allow for the Implementation of Interventions as ranked by Managers Working Outside the ICU

Implementation strategy	Round 1	Round 2	Consensus
	Median (SIQR)	**Median (SIQR)**	
Physiotherapists should assess all patients and screen those eligible for early mobilisation to achieve the successful implementation of the early mobilisation of patients (Engel et al. 2013b).	5 (0.5)	*	✓
To have prompts for physiotherapy referrals for early mobilisation as part of the physician's order form should be the standard practice so as to increase the rate of early mobilisation in the units. (Engel et al. 2013b).	5 (0.5)	*	✓

*-consensus achieved after Round 1 ✓-consensus of statement achieved

The panel agreed on the statements on active changes to the process that should be implemented. They would include such matters as the physiotherapist having to assess and screen all patients eligible for early mobilisation (SIQR: 0.5) and the use of prompts for physiotherapy referrals for early mobilisation as part of the physician's order form (SIQR: 0.5). Regarding the above statements, one of the experts commented as follows: *'Physiotherapists are experts in movement and exercise and assistive technology for early mobilisation.'* **(Participant 02, manager)** and *'This is useful especially when a ward round or meeting with the physician is not possible. Written prompts can act as reminders and therefore service can be rendered early.'* **(Participant 03, manager)**.

5.4.16 Equipment for the early mobilisation of ICU patients as ranked to be important by managers working outside the ICU

Table 5.17 presents the equipment that assists in the early mobilisation of ICU patients and that is considered to be important to managers working outside the ICU.

Table 5.17: Equipment to Facilitate the Early Mobilisation of ICU Patients as Ranked to be Important by Managers Working Outside the ICU

Type of equipment	Round 1	Round 2	Consensus
	Median (SIQR)	Median (SIQR)	
Wheelchair	5 (0)	*	✓
Cycle ergometry	4 (1)	4(0.5)	✓
Neuromuscular electrical stimulation	4 (1)	4(0.5)	✓
Ceiling track lift	3 (2)	3(1)	×
Air-assisted transfer system	3 (1)	4(1)	×
Mobile/portable ventilators	5 (0.5)	*	✓
Dynamic tilt table	5 (0.5)	*	✓
Portable monitors	5 (1)	*	✓
Adjustable bed	5 (0)	*	✓
Walking aid	5 (0)	*	✓
Transfer board	5 (1)	3(1)	×
Waffle cushions	3 (0.5)	3(1.5)	×
Adjustable chairs (“lazyboy”)	3 (0.5)	5(0)	✓
Custom-made walkers	3 (0.5)	4(0.5)	✓

*-consensus achieved after Round 1 ✓-consensus of statement achieved
×-no consensus of statement achieved

The panel of managers agreed on a set of equipment to assist with early mobilisation. It included a wheelchair (SIQR: 0), a cycle ergometer (SIQR: 0.5), portable ventilators (SIQR: 0.5), an adjustable bed (SIQR: 0), adjustable chairs (SIQR: 0.5) and custom-made walkers (SIQR: 0.5). No consensus was reached on the use of the following equipment to assist with early mobilisation: a transfer board (SIQR: 1), waffle cushions (SIQR: 1.5) and a ceiling track lift (SIQR: 1).

An expert commented as follows: *‘Hospital authorities require a buy-in in the programme in order to provide money for training or materials/equipment for mobilisation, as well as bidding for more staff.’* **(Participant 02, manager)**. Another

expert commented: *'Cycle ergometry - we have recently taken delivery. This definitely falls into the category of "nice to have", but is VERY expensive, and not essential. We are still to decide on the practicality and usability thereof. Our ICU has adjustable chairs, so I would recommend them, and budget for replacements.'* **(Participant 03, manager)**.

5.5 DISCUSSION

The aim of this study was to enable the clinicians working in ICUs in the SA and Zimbabwean government hospital setting to determine the strategies that should be implemented in the units to overcome the identified barriers to early mobilisation in such settings. Eakin et al. (2015) noted that success in the implementation of an early mobilisation programme in units is fully dependent on prior assessments and multidisciplinary team engagement for positive outcomes to be noted as there will be a drive to change the culture of the hospital unit. Designing specific implementation strategies to overcome barriers to early mobilisation through multidisciplinary team engagement should result in the successful implementation and sustainability of the interventions. The strategies developed need to consider the following: the practicality of the strategy (in relation to resources, time and commitment) and implementation (extent, likelihood or manner in which the intervention is fully implemented as planned and proposed) (Bowen et al. 2009).

Based on their experience and the context in which they work, the panel of experts contributed their opinions in respect of the attributes of the strategies that would need to be implemented in SA and Zimbabwean government hospital ICUs to overcome the barriers to early mobilisation. Phases I and II of this study identified the multifactorial barriers to early mobilisation in SA and Zimbabwean ICUs. The strategies used to overcome the barriers will be discussed in terms of the CFIR. The CFIR is a model that outlines the five areas that impact upon the implementation of early mobilisation programmes (see section 2.7 in Literature Review) (Eakin et al. 2015). This framework model was used as a guide in mapping the identified barriers in this phase of the study. This Modified Delphi study resulted in the consensus-based ranking of statements related to the intervention characteristics, the contextual factors of the ICUs, the patients' needs and the hospital resources, the characteristics of staff implementing the intervention, and the process or active change for successful implementation.

A consideration of the characteristics of the intervention domain, the definition of early mobilisation in relation to the time frame and the specific activities in question, was a

topic of discussion for the panel. This study resulted in a consensual statement on the definition of early mobilisation which factors in the time frame and the relevant activities. Early mobilisation was therefore defined as the programme for the intensification and early application of active exercises for a patient to embark upon within the first five days of critical illness or at the earliest signs of stability and cooperation in the patient. The panel agreed that early mobilisation which is achieved within the first five days of critical illness experienced by the patient in an ICU is more beneficial and will result in positive outcomes. This may, however, not always be feasible as the stability of the patients is dependent on their condition and the progress of the disease and their responses to the therapies received. The above definition is similar to that provided by others in relation to the time frame, patient stability, and the initiation of implementation (Berney et al. 2009; Mendez-Tellez et al. 2012; Denehy et al. 2013; Hodgson et al. 2013; Cameron et al. 2015; Lai et al. 2017; McWilliams et al. 2018).

The strong consensus shown by the experts in respect of the activities defined as early active mobilisation is consistent with findings from other studies on early mobilisation which include activities where the patient had to cooperate and voluntarily contract muscles in executing the activity (Hodgson et al. 2013; TEAM study 2015; Castro-Avila et al. 2015; Sommers et al. 2015; Koo et al. 2016; van Willigen et al. 2016; Nydahl et al. 2017; Doiron, Hoffmann & Beller 2018; Phelan et al. 2018).

The inclusion of passive mobilisation as part of early mobilisation met with controversy among the expert panel members. The panel reached consensus on including passive mobilisation as a component of early mobilisation but highlighted the fact that passive mobilisation should never be carried out in isolation owing to its limited benefits. These views are consistent with findings from other studies which showed that there were minimum benefits in terms of patient outcomes after passive mobilisation. They included reduced pain levels, increased ventilation and oxygenation, the prevention of articular contractures, antigravity postural responses, improved levels of consciousness, and autonomic cardiovascular control (Chang et al. 2004; Amidei & Sole 2013; Collings & Cusack 2015; Toccolini et al. 2015), with lack of evidence to support the actual technique (Berney, Haines & Denehy 2012; Hodgson et al. 2013).
For patients who are not able to follow instructions and cooperate in performing an exercise or activity, the available recommendations from the literature state that passive mobilisation should be conducted by using a tilt table, a cycle ergometer and through neuromuscular electrical stimulation (Cameron et al. 2015). In this study, it

was recognised that passive mobilisation is important for preventing complications such as joint stiffness, pain, and contractures, and can be used to create an optimal setting for active mobilisation, which is similar to what was reported in the literature on the benefits of passive mobilisation delivered through the use of equipment such as the tilt table (Chang et al. 2004; Asher 2013; Toccolini et al. 2015; McWilliams et al. 2017a). Therefore, the panellists' suggestion of including tilt table therapy as part of early mobilisation is supported by evidence.

Passive transfer to a chair or a tilt table has been recognised to be passive but for the patient to remain in a seated posture or an upright posture requires postural control, which is not passive; hence, the recommendation to use the equipment which facilitates passive out-of-bed mobilisation. The panel of experts did not reach consensus on the use of neuromuscular electrical stimulation in ICU patients which might be due to very low to low-quality evidence of the beneficial effects of electrical muscle stimulation delivered to sedated patients for improving muscle strength, muscle structure and for preventing critical illness, polyneuropathy and myopathy (Connolly et al. 2016).

The panel of experts reached consensus on a core set of codes and definitions for early mobilisation activities. Consensus was reached in respect of the definition and the use of the following codes: transferring from bed to chair without standing, sitting in bed/exercises in bed, tilt table/tilt bed, sitting on the edge of the bed, standing, transferring from bed to chair with standing, marching in one place, walking with the assistance of two or more people, walking with the assistance of one person, walking with a gait aid but without the assistance of any person (or wheel chair ambulation) and walking without a gait aid and without the assistance of any person.

There is a need to standardise the activities carried out during early mobilisation as variations in the type of interventions delivered to ICU patients have been noted. This makes it difficult to assess the impacts of these interventions (Tipping et al. 2017; Doiron, Hoffmann & Beller 2018). There were conflicting views among the members of the panel of experts on the definitions and codes for 'nothing' (lying in bed) and 'unknown'. The panel commented that for the 'nothing' code it has to be very clear on the specific activities that are being said to be contra-indicated. Then for the 'unknown' code, the panel commented that there should not be any room for that as early mobilisation is being advocated as the standard care, and proper documentation of what has been done is important for the continuity of the intervention in patients. It has

been noted that in most clinical trials the components of the active programmes are not adequately reported (de Queiroz et al. 2018), thus their coming up with standard definitions and codes for early mobilisation activities will result in their speaking the same language across different settings, and as such, the documentation becomes easier.

The high proportion of items related to the cultural changes that need to occur in the units which achieved consensus indicated that there is a strong multidisciplinary team agreement regarding the importance of protocols, flow diagrams detailing patient assessments and the role of leadership in the implementation of early mobilisation in government sector ICUs. Regarding protocols, the panel agreed that there is a need to develop protocols and guidelines which consider the local resources and environment, with the parameters included in the protocols not being read in isolation in order to assist with clinical decision making. This is consistent with findings from other studies which highlight the fact that having access to protocols in the units results in standardisation of practice, delivery of early mobilisation to severely ill patients, and higher levels of achievement in activity (Berney et al. 2013; Hanekom, Louw & Coetzee 2012; Barber et al. 2015; Harrold et al. 2015; Jolley et al. 2015).

The panel commented that protocols can assist with decision making but when it comes to dosage of exercises, this has to be patient specific. Protocols are not intended to replace but rather to complement professional knowledge and expertise by providing clinicians with a framework on which to base their clinical judgement (Bernhardsson et al. 2015). The availability of flow diagrams detailing content related to patient assessments in ICU prior to early mobilisation was considered to serve as an important tool to facilitate clinicians in their clinical reasoning (Hodgson et al. 2018). Consensus reached among the panellists regarding the role of leadership and having a coordinator for early mobilisation in government sector ICUs was consistent with reports in the literature (Engel et al. 2013b; Eakin et al. 2015; Schaller et al. 2016). It is noted that more time is spent in planning and preparing for early mobilisation as opposed to the delivery of active physical therapy itself (Iwashyna & Hodgson 2016). Hence there is a need for a focal person who is mainly in charge of planning and communication within the team responsible for the implementation of early mobilisation activities.

The Modified Delphi process resulted in consensus on the contextual factors of the ICU that should be considered for the successful implementation of early mobilisation

programmes. The panel commented that there is a need to promote the admission of patients into specialised units versus general units in order to reduce the bottleneck delays in consultation by various specialties for a particular ICU patient. The views by the panel are reflective of what was reported by Lott et al. (2009). These authors state that improved patient outcomes in specialised ICUs are observed owing to the purported benefits of ICU specialisation, such as the convenience of accessing physicians, a reduction in the number of diagnoses, and the variability in treatment, and improving the levels of nurse expertise and education (Lott et al 2009). However, there is little evidence in the literature to support the benefits of specialised ICUs, and Lott et al. (2009) highlighted the fact that the effects of ICU specialisation on patient outcomes have only been studied in the case of single diagnoses. The benefits of ICU specialisation for other diagnoses remain unexplored. Diringer & Edwards (2001) found that the admission of patients to a neurological ICU after intracranial haemorrhage rather than to general ICUs was found to be associated with a reduced mortality rate.

Expert consensus recommended the promotion of discipline-specific leaders with permanent posts in the units which are responsible for the training of junior staff or new ICU staff so that there is consistency and standardisation of care. It is known that high staff turnover rates result in unsustainable interventions as in the case of early mobilisation programmes (Engel et al. 2013a; van Willigen et al. 2016). The discipline-specific leaders are meant to become key persons in the provision of patient care and should be advocating for early mobilisation through their re-training of other colleagues (Eakin et al. 2015). Moreover, the presence of a full-time ICU physiotherapist, who does not rotate to other areas of the hospital, was found to be associated with early mobilisation being delivered at the right time when a patient was awake, medically stable and procedure-free (Engel et al. 2013a). However, there is a need to look at what is feasible in the SA and Zimbabwean context in terms of human resources and the practicality of having a static post for senior ICU physiotherapists. If it is not feasible to have static posts for physiotherapists, then clinical rotations can be done in such a way that there is always one person who is not new to the unit and who can assist with the training of a new team with regard to unit protocols.

Consensus among the experts recommended the creation of physiotherapy posts to facilitate early mobilisation, with at least two physiotherapists assigned to a unit, depending on the bed capacity of the ICU and the workload in order to improve on the continuity of care and communication. Based on the recommendation by Valentin and

Ferdinande (2011), which states that there should be one physiotherapist covering a five-bed level III ICU, there is a need to increase the number of physiotherapists in the units in order to achieve the best patient outcomes and to reduce the demand for assistance from the nursing staff. Besides the size of the unit, it is also important to take cognisance of the minimum number of people required for the safe out-of-bed mobilisation of a ventilated patient. A minimum of two people has been recommended for out-of-bed mobilisation for the guarding of vital lines and attachments (Needham, Truong & Fan 2009; Engel et al. 2013a), which is consistent with what is being recommended by the panellists. This finding is consistent with what has been implemented in quality-improvement projects on early mobilisation in which additional physiotherapy posts were created to increase the manpower responsible for the implementation of early mobilisation (Engel et al. 2013a; Bassett et al. 2015; van Willigen et al. 2016). The advantages of having more physiotherapists is that there will be two people who are experts in the execution of the necessary interventions to be used in treatment and who are familiar with the outcomes. Apart from monitoring cardiovascular and respiratory responses to activity, physiotherapists are concerned about the quality of movement and posture during early mobilisation as they are the known experts in the biomechanics of movement (Asher 2013).

Although consensus was reached on the statement that the medical consultant/physicians be consulted before a final decision for early mobilisation be made, there were controversial views among the members on the panel of experts as to who is supposed to give the instruction for early mobilisation. Panellists commented that the instruction for early mobilisation should not be restricted to only the physician's instructions, but that physiotherapists should also be involved in this process, with buy-in from the whole team, as they are the experts in exercise. Bakhru et al. (2016) reported that in a survey which was conducted in France, Germany, United Kingdom and USA, the ICUs that did not have early mobilisation protocols in place, required instructions from physicians to commence early mobilisation. Therefore, the availability of an early mobilisation protocol in a unit will solve the problem of ordering the initiation of early mobilisation through a physician, as the protocol would have been developed through multidisciplinary team engagement. In units where a doctor's instruction for early mobilisation is required, delays were observed in physiotherapy consultation and the strategy which was subsequently implemented was for prompts for referrals to be included on the physician's order form (Engel et al. 2013a).

The Modified Delphi study resulted in consensus on the importance of multidisciplinary teamwork and team communication, together with the clarification of roles among members of the multidisciplinary team, the development of expertise and skills training, and early mobilisation being seen more as a collaborative role than the responsibility of the physiotherapists or nurses alone. Skills training for staff has been implemented in quality- improvement studies as it was seen that there was a need for re-educating the clinicians and training the junior staff to ensure that they have the knowledge, confidence and skills to implement early mobilisation programmes for patients safely and effectively (Engel et al. 2013a; van Willigen et al. 2016; Cameron et al. 2015).

With regard to role clarity, the panel commented that physiotherapists should be the champions of early mobilisation. On account of the physiotherapy staffing models and numbers in most of the hospitals, if early mobilisation is driven by physiotherapists, it is important to note that it may be delivered late and it may be infrequent. This has led to the initiation of nurse-driven mobilisation protocols for more frequent mobilisation activities to be offered at an earlier stage. However, physiotherapists still remain a vital and integral part of the mobilisation process as the patient has to undergo an initial evaluation executed by the physiotherapist to determine the appropriate level of daily activity (Young et al. 2019). It has been reported that if nurses are empowered to independently mobilise patients to sit on the edge of the bed, stand and march in place and ambulate, this will permit physiotherapists to focus on performing the novel and advanced therapy techniques such as advanced gait training, cycle ergometry, and increasing the distance for ambulation to mitigate the most highly complex ailments in patients in the ICU (Young et al. 2019).

For a successful early mobilisation programme to be implemented, the first implementation strategy should focus on a team-centred approach by collaborating and engaging multiple disciplines to define roles and to evaluate the implementation process (Leditschke et al. 2012; Engel et al. 2013b; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; Iwashyna & Hodgson 2016). Since early mobilisation is a collaborative role, the team should clearly define the roles played by each individual during the planning phase before implementation in order to prevent the overlapping of responsibilities. The multidisciplinary team will need to agree on the protocol for evaluating mobilisation readiness in patients by assessing the indications for early mobilisation, the exclusion criteria and the procedures to be taken in the case of the presence of any defined mobilisation exclusion criteria. This finding is consistent with findings from other studies which indicate the importance of teamwork, defining roles

for the different disciplines and the importance of having a multidisciplinary team in charge of the implementation of an early mobilisation programme (Engel et al. 2013a; Jolley et al. 2015; Bassett et al. 2015; Young et al. 2019).

There was consensus on the statement that technologically advanced equipment will result in patients being mobilised earlier and in minimising the physical strain on clinicians. However, on account of the cost implications in government-sector settings, the equipment might not be available. However, this should not limit early mobilisation. Consensus was reached for the use of mobile/portable ventilators, portable monitors, adjustable beds, walking aids, transfer boards, adjustable chairs and custom-made walkers to achieve a higher level of mobilisation, and was consistent with findings from other studies reporting on early mobilisation (Needham, Truong & Fan 2009; Mendez-Tellez et al. 2012; Asher 2013; Engel et al. 2013a; Nydahl et al. 2014; Toccolini et al. 2015; van Willigen et al. 2016; Brissie et al. 2017; McWilliams et al. 2017a).

The panel commented that in order to purchase the equipment, there is a need for hospital administration to buy-in. The use of wheelchairs, cycle ergometers, neuromuscular electrical stimulation, ceiling track lifts, air-assisted transfer systems, dynamic tilt tables and waffle cushions generated conflicting views among the members of the panel. The views with regard to the above equipment which were highlighted by them were as follows: the use of electrotherapy modalities such as neuromuscular electrical stimulation, which requires patient feedback, is not possible in some ICU patients; wheelchairs can only be used when a patient is able to sit on the edge of the bed; some of the equipment is suitable for stable patients who can cooperate and are free from attachments; and lastly, some of the equipment is good to have (e.g. cycle ergometers) but is not essential because of the cost and its practicality and usability in terms of the infection-control protocols in ICU. Some of the views of the panellists were not evidence-based (e.g. the notion that equipment such as cycle ergometers cannot be used on patients who are not cooperative and have a number of attachments. Important to note, however, is that there are three possible activity modes on the cycle ergometer which are: passive (i.e. fully motorised, no patient initiation), active-assisted (i.e. partially initiated by the patient), or active (i.e. fully initiated by the patient) (Koo et al. 2016). It must be pointed out, however, that the views of the panellists are reflective of the very low-quality evidence available as to the beneficial effects of the equipment on patient function, which warrant further investigation (Connolly et al. 2016; Koo et al. 2016).

The panellists raised the issue of infection control when using mobility equipment such as the cycle ergometers. The panellists were genuinely concerned as it has been reported that the surfaces and equipment of such mobility equipment used in the ICU are heavily contaminated by bacteria and this may contribute to ICU-acquired infections (Russotto et a. 2015). There is a need for the units to formulate infection-control protocols so that, as documented in the protocol, the mobility equipment used for each patient must be cleaned prior to and following the use of the equipment to reduce the risk of infection and contamination.

The Modified Delphi study resulted in consensus with respect to patient needs, resources and hospital administrative support that should all be considered to promote the successful implementation of early mobilisation. In relation to patient needs, the expert panel reached consensus on a number of safety issues prior to active mobilisation. The parameters considered included the following: heart rate, the low dosage of vasoactive drugs, oxygen saturation levels, respiratory rate, ICP and platelet count. The overall concern by the panel of experts was that clinicians should not read these parameters in isolation to make decisions about early mobilisation as ICU patients present with deranged vitals most of the time; hence the need for clinical reasoning. The views of the panel of experts is reflective of the literature, which supports the notion that fluctuations in vital signs are a normal part of critical care and actually occur under any general nursing care procedures such as turning the patient for skin care (Stiller et al. 2004; Engel et al. 2013b). The panel of experts commented that protocols should not use vital sign parameters to determine for exclusion from early mobilisation. Instead, clinicians should use their clinical reasoning powers. This recommendation is consistent with what was reported in a study on the development of early mobilisation protocols for patients in neurological ICUs (Brissie et al. 2017).

The implementation of early mobilisation in patients who had their ICP well under control for the previous 24 hours emerged as a controversial issue among the panel members. The panel commented that this might reflect premature mobilisation, and evidence of having moved into dangerous territory which might pose a major risk to patients with traumatic brain injury. The views of the panellists were found not to be evidence-based, as according to the recommendations and considerations of early mobilisation in the neurological ICU, the time for initiating interventions in patients ranged between 24 to 48 hours (Olkowski & Shah 2017). The considered neurological conditions include the following: acute ischemic stroke, aneurysmal subarachnoid haemorrhage, spontaneous intracerebral haemorrhage, spinal cord injury and

traumatic brain injury 24 hours after symptom onset, stable haemorrhage volume, spinal stabilisation and aneurysm treatment (Olkowski & Shah 2017).

Increased ICP has been reported to compromise early mobilisation in patients with traumatic brain injuries as the exercise is associated with further increases in pressure (Anekwe et al. 2017). In a study by Young et al. (2019), patients were permitted to participate in the mobilisation programme if they could sit in a chair with the external ventricular drain clamped for up to three hours at a time. Patients were excluded from mobilisation if they were unable to tolerate at least 30 minutes of external ventricular drain clamping in the supine position, if they exhibited sustained intracranial hypertension (ICP > 20 mmHg), or if they were experiencing symptomatic vasospasm (Young et al. 2019). Patients with unmanageable ICP would generally be excluded from participating in out-of-bed early mobilisation activities (Brissie et al. 2017). However, those with external ventricular drains would be able to be mobilised out-of-bed without any severe adverse events (Brissie et al. 2017). The early mobilisation of neurosurgical patients would require close monitoring and continuous adjustments in respect of the type and intensity of the exercise prescribed and according to the patient's clinical condition if they were to participate in the activities (Karic et al. 2015).

Consensus was reached in respect of the beneficial effects of early mobilisation in reducing the levels of depression and anxiety, and was consistent with the findings in the available literature. It is known that owing to the benefits derived from early mobilisation in patients with mental instability, impulsive behaviour, agitation and an inability to redirect should not form part of the exclusion criteria for early mobilisation (Klein et al. 2015; Brissie et al. 2017).

The timely management of fractures was ranked highly as important to facilitate with the implementation of the early mobilisation of patients in ICU. The panel commented that delays in fracture management are mainly observed in general ICUs on account of the delays in consultation. Therefore, as highlighted previously, the promotion of patient admission to specialised ICUs might be the solution to this barrier. A review reported that the ideal timing of the surgery for a fracture of the neck of the femur is probably within 12 hours to 48 hours in a relatively fit patient without any significant comorbidities that are correctable (Lewis & Waddell 2016). If the surgery to fix the fracture is performed within the recommended time frame, there will not then be a delay in the initiation of early mobilisation and patients will not succumb to the complications

of immobility whilst awaiting surgery. This indicates that there is a need for early surgery to be done to achieve optimal patient outcomes.

The large proportion of items related to the progression of exercise therapy during early mobilisation which achieved consensus in Round 1 of the Modified Delphi study, indicates that there was strong agreement amongst the members of the multidisciplinary team regarding what should be assessed to determine the progression of the treatment. Consensus was reached on the use of specific sedation levels, the specific dosages of vasoactive drugs, the strength of the patient, the level of fatigue and of mobility, as well as the adverse events after mobilisation, the level of function, changes in the vital signs and an objective assessment of the appearance of the patient to guide the progression of activity. The views of the panel were reflective of the literature which indicates that very low doses of vasoactive drug therapy or no sedation were found to be predictive factors for out-of-bed mobilisation (Taito et al. 2016; Vincent et al. 2016; Berney et al. 2018; Fontela et al. 2018; Goddard et al. 2018). In a study by Boyd et al. (2018), it was observed that the risk of an adverse event occurring when exercising a mechanically ventilated patient on vasoactive support was minimal; hence a dependency on vasoactive medication alone should not be a reason for withholding exercise rehabilitation.

The study design for this phase was specifically chosen as the objective was to solicit specific information from a panel of experts on the subject of strategies to be implemented to overcome barriers to early mobilisation. This study design was chosen due to its advantages of participant anonymity which can reduce the effects of dominant individuals which is often a concern when using group-based processes to collect and synthesise information (Dalkey 1972). As a result, all the participants were able to share their opinions freely, independent of what was said by the other participants s there was no interference. Another advantage is confidentiality, which is facilitated by the geographical dispersion of the subjects, as well as the use of electronic communication such as e-mail to solicit and exchange information (Hsu and Sandford 2007). Only the researcher had access to the identity of the participant and this was not shared with any person. The ability to statistically analyse the data obtained is a practice which further reduces the potential of group pressure to advocate conformity since statistical analysis can ensure that the opinions generated by each participant in a Modified Delphi study are well represented in the final iteration (Dalkey, 1972).

5.5.1 **Conclusion to the Discussion**

The strategies that need to be implemented in government-sector ICUs to promote early mobilisation cover a wide range of factors, which should be formulated through the engagement of a multidisciplinary team with the objective of achieving higher levels of acceptability and implementation.

There are changes which must happen in the ICU or hospital settings for the implementation process to advance. These changes include the following: multidisciplinary teamwork, effective communication, the availability of champion leaders, hospital staff administration buy-in, and skills training for staff. Investing in resources which include those aspects related to manpower and equipment is of paramount importance in order to facilitate the implementation of early mobilisation. The basic equipment to enhance early mobilisation which should be available in each unit includes the following: an adjustable bed, bedside chairs with armrests, mobile ventilators, standard walkers, stand-assist devices and portable patient-monitoring devices.

Considering the early mobilisation intervention itself, there is a need to standardise practice by clearly defining the type of activity, the dosage of exercise, and the progression of early mobilisation activities. For early mobilisation to be safely implemented in the ICU, there is a need for comprehensive and holistic clinical patient assessments and screenings prior to the commencement of an early mobilisation programme in order to prevent the occurrence of any major adverse events. With effective implementation strategies in place, early mobilisation can be successfully adopted as a standard of care in government sector units across SA and Zimbabwe.

CHAPTER SIX

6. CONCLUSION

6.1 INTRODUCTION

The overall purpose of the study was to determine whether research evidence related to early mobilisation is being implemented in clinical physiotherapy practice in government hospitals in Zimbabwe and South Africa. A mixed methods approach was used to address the aims of the study. The aims of the study which were answered in three phases include the following:

a) To establish the current practice related to the early mobilisation of patients by clinical staff in government hospital ICUs in SA and Zimbabwe.
b) To explore physiotherapists' perceived barriers and facilitators to the early mobilisation of patients in SA and Zimbabwean government hospital ICUs.
c) To attain consensus on the implementation strategies that are responsive to the identified barriers to the early mobilisation of patients in ICUs in government hospitals in SA and Zimbabwe by means of the CFIR.

The findings from Phase one (Chapter 3) of the study showed that very low rates of early mobilisation, especially out-of-bed activities, are being performed in the ICUs in SA and Zimbabwean hospitals (19.5% and 25% respectively). The prevalence of out-of-bed mobilisation found in the study falls in the range of 10% to 33% that has been reported in the point prevalence studies conducted to date in middle- and high-income countries (Berney et al. 2013; Nydahl et al. 2014; Jolley et al. 2017; Sibilla et al. 2017; Fontela et al. 2018). The physiotherapists and nurses are mainly responsible for early mobilisation activities, with doctors sometimes participating in some of the units in SA. However, the use of early mobilisation guidelines or protocols and the use of standardised outcome measures to assess the patients' mobility status are not common practice in these ICUs. This might contribute to the low levels of early mobilisation of patients that have been observed.

The absence of objective selection criteria for patients eligible for early mobilisation in the units might also have contributed to the low rates of early mobilisation observed, especially in units where junior physiotherapists work ,as they may still be developing their clinical reasoning skills. Also, no resident physiotherapists were found in the ICUs and those who covered the units were committed to a busy workload in other wards

and clinics across the hospitals in which they were employed. The shortage of resources, such as manpower and equipment, to promote the early mobilisation of patients was found to be a general characteristic of the ICUs in SA and Zimbabwean government hospitals.

The findings of the cross-sectional survey show that the ICU structures and practices in government sector hospitals in SA and Zimbabwe are heterogeneous and that a variety of factors are associated with the implementation of the early mobilisation of ICU patients in each unit. Zimbabwean government hospital ICUs are small in size and they are all general ICUs and located in central hospitals in the large cities. Anaesthetist doctors provide major medical inputs to these ICUs. There are no clinical protocols for sedation and the ventilator weaning and spontaneous breathing trials used in these units. As a result, the barriers to early mobilisation which were reported in Zimbabwe related to sedation and unresponsiveness, with the majority of the patients being in the unit on account of acute respiratory failure or for postoperative care.

On the other hand, the government sector ICUs in South Africa are at the regional hospital level and also at the quaternary or central level. These ICUs vary in bed capacity and number of units as some hospitals have smaller specialised ICUs for the management of patients with specific disease pathologies. In some of the units, all critically ill and injured persons receive care from integrated teams of dedicated experts directed by trained intensivists. The availability of intensivists in SA hospitals has resulted in the increased usage of the following protocols in most of the units: sedation vacations for patients, spontaneous breathing trials, ventilator weaning, enteral feeding and infection control protocols.

Another reason for the low prevalence of out-of-bed mobilisation might be due to the type of patients who were admitted in the units on the days that this survey was conducted. The burden of hospitalisation in these two countries at this particular time was found to be mainly due to trauma, post-surgical care and maternal complications. However, the incidence of trauma has proved to be very high in SA and involves mainly working-aged adolescents and adults (Laing et al. 2014; Nicol et al. 2014; Hardcastle et al. 2016). The three main causes of trauma identified in this study for patients in SA ICUs (in descending order) were road traffic accident/motor vehicle accidents; assault; and gunshot wounds on account of assaults or attempted homicides. From the findings of the study, it appears that trauma has been responsible for the heavy burden of

neurosurgical and general surgery cases in the SA ICUs. Furthermore, various comorbidities were identified in patients admitted to ICUs in SA and Zimbabwe. These included hypertension, diabetes mellitus, renal disease and HIV. Such comorbidities further complicate the critical-care service provision in these two countries and might contribute to the low rate of out-of-bed mobilisation reported here. This might be due to complicated procedures such as continuous renal replacement therapies or the demands made on the system by patients with low cardiorespiratory reserves resulting from comorbidities such as diabetes mellitus, hypertension and HIV.

The larger proportion of patients with traumatic injury and neurological conditions admitted to these ICUs should be considered during the implementation of an early mobilisation protocol as this group of patients has a different recovery trajectory as opposed to that of patients with complications or exacerbations of chronic cardiac or pulmonary conditions. These factors affect the implementation of early patient mobilisation and also the effectiveness of the monitoring devices and equipment required for safe patient mobilisation. As such, a delay in the implementation of the intervention may be inevitable.

The predictors identified for out-of-bed mobilisation were found to be the type of ICU, the method of ventilation and the number of days in ICU. High levels of mobilisation were recorded in a closed-type ICU setting with an intensivist providing medical input to all patients and in patients who were on spontaneous breathing. In relation to the prescribed number of days to be spent in ICU, the most likely patients to be mobilised out-of-bed were found to be those who had stayed in the ICU for a longer period than those who had stayed for a short period. The findings of the study are similar to those of international reports to the effect that the presence of an endotracheal tube, an open type of ICU, and a short LOS remain the major obstacles to the delivery of the early out-of-bed mobilisation of ICU patients (Berney et al. 2013; Nydahl et al. 2014; Berney et al. 2018; Brock et 2018; Capell, Tipping & Hodgson 2018; Fontela et al. 2018).

The literature reports that early mobilisation is safe and feasible even in mechanically ventilated patients as it is associated with very low reporting rates of adverse events (Berney et al. 2013; Jolley et al. 2017). The current study also found that the rate of reporting on adverse health events was also low (4.9% and 5% for SA and Zimbabwe respectively), with dizziness and fatigue being reported in the cohort from SA, and early mobilisation being terminated in the cohort from Zimbabwe on account of postural hypotension and pus oozing from incision sites.

The facilitators of early mobilisation which were found in some settings that had successfully implemented early mobilisation were also highlighted. The identified facilitators and barriers to the early mobilisation of patients in SA and Zimbabwean government hospital ICUs were classified under the categories of implementation process, organisation of ICU services, patient characteristics, and environmental context. The facilitators which were noted in some of the ICUs which had successfully implemented early mobilisation included advocacy for the early mobilisation of patients in ICU during undergraduate and postgraduate staff training, the dissemination of the benefits of early mobilisation to the entire ICU team through workshops and presentations, acceptance of the intervention as a standard of care by the entire ICU team, a motivated staff, and lastly, the ability of the ICU team to conduct research in their units with the main goal of improving patient outcomes.

Considering the organisation and structure of the ICUs, the following facilitators were seen to be effective in promoting the early mobilisation of ICU patients: availability of SOPs, non-rotational physiotherapy coverage, the diminished use of sedation therapy, the services of an ICU team found to be pro mobilisation, and of a multidisciplinary team respecting teamwork. Early mobilisation was reported to be more feasible to implement in patients in medical or general surgery units as opposed to those in the trauma or neurosurgical units.

The environmental facilitators to early mobilisation reported by the physiotherapy clinicians included adequate staff numbers, a supportive nursing staff, the availability of adjustable beds and chairs and of space to mobilise the patient, and all the necessary mobility equipment. The published literature shows similarities in respect of the factors listed here that facilitate the implementation of early mobilisation of ICU patients.

The real and perceived barriers to the early mobilisation of patients in ICU that were identified in Phase two of the study were multifactorial and the majority appeared to be modifiable. There was variability in how physiotherapy clinicians interpret early mobilisation in terms of its definition and the specific activities performed. These are dependent on the specific patient group and the disease pathology managed. There was controversy among the clinicians as to the inclusion of passive movements as part of an early mobilisation programme, and this resulted in variability in the activities performed on patients and how these were interpreted to constitute early mobilisation.

The activities which were reported to constitute early mobilisation include the following: progressive mobility activities from positioning to ambulation; activities to improve impairments that include range of motion exercises, limb exercises, strengthening and stretching exercises; and lastly, activities to regain independence of function which include transfer training, marching on the spot next to the bed, rolling and bridging.

Findings from the current study highlight the controversy which exists in the definition of early mobilisation, the time frame referred to as “early”, and, as mentioned in the literature, the specific activities which define early mobilisation. The lack of early mobilisation protocols in the units, as reported in Phase one of the study, might be a contributing factor to the variability in the activities observed and the time frame within which the activities were performed.

There seems to be no standardisation of practice considering the physiotherapy staffing models in the government sector hospitals, which operate on staff rotations after a particular period of time. Besides the differences in their interpretation of early mobilisation activities, the clinicians also showed that they hold different expectations in respect of the implementation of early mobilisation activities in their units. Those expectations which were highlighted include the wider availability of beds in the ICUs once early mobilisation had been implemented as this practice, resulting in the speedy stabilisation of patients and improving their functional independence, favours the discharge of the patient from ICU.

The necessity that recognition be given by the employer to the important role that physiotherapy clinicians in ICUs play in the early mobilisation of patients, and their willingness to conduct research in this setting, in order to improve patient outcomes, was highlighted in this research study. Postgraduate qualifications and the importance of restructuring the roles in hospital ICUs in line with the qualifications acquired were considered by the clinicians as motivational propellants, and therefore as facilitators for mobilisation, not only to the physiotherapists but also to the other staff members.
Implementation process issues which were identified as barriers to early mobilisation included undefined roles within the multidisciplinary team responsible for implementing early patient mobilisation; staff not being held accountable for carrying out their responsibilities; the lack of motivation in the physiotherapy clinicians to drive early patient mobilisation as a priority of care; the inadequate remuneration of the physiotherapy clinicians; negative perspectives among staff about early mobilisation;

the low prioritisation of the intervention owing to the unawareness of the staff as to its benefits; the unspecified patient category which benefits from early mobilisation; the poor handling skills of the staff; and the poor clinical reasoning skills of the clinicians, especially those members who are junior staff. In terms of the awareness of the benefits of early mobilisation, the results showed that some physiotherapy clinicians are unaware of the beneficial effects of early mobilisation on a patient's cardiorespiratory system. As a result of such ignorance, they were not prepared to consider the benefits of early mobilisation as part of the cardiopulmonary management of patients with sustained secretions or reduced lung volumes.

The real barriers which were reported in Phase one were mainly patient-related and emanating from the findings of the qualitative exploration of these barriers, are the many factors which affect the implementation of early mobilisation (e.g. knowledge of the benefits and the execution of early mobilisation) besides the patient-related barriers. The implementation process issues which were raised by the physiotherapy clinicians are similar to those reported in the literature (Parry et al. 2017a).

The organisational structure and practices of the ICU also affect the implementation of early patient mobilisation. The identified barriers under this theme include delayed consultation by specialists, especially in the case of patients admitted to the general ICUs; the unsustainability of the implementation owing to the rotational coverage by physiotherapists, as some physiotherapists do not mobilise patients; the high turnover rate in ICU staff (physiotherapists, nurses and doctors); the lack of champion leaders who advocate for early mobilisation; the lack of SOPs, which include clinical guidelines and protocols for patient management; and discord in communication between the members of the multidisciplinary team. The reported barriers related to the organisational structures and practices are similar to the significant finding from Phase one that the type of ICU is a predictor of early mobilisation, with most of the early mobilisation activities happening in closed-type ICU settings.

Patient-related factors which were reported by physiotherapy clinicians to affect the implementation of early mobilisation for ICU patients in SA and Zimbabwean hospitals included haemodynamic instability, thrombocytopenia and reluctance from the patients to participate in mobilisation activities. As regards those patients who suffered traumatic injury, most of the encountered barriers reported by the physiotherapy clinicians included increased ICP, mental instability, diminished levels of consciousness, and severe pain. The complexity of the condition was also reported to

be a barrier in the case of patients with polytrauma or medical patients with several comorbidities.

In SA, obesity was reported to be a major barrier in the implementation of early patient mobilisation in ICU. The reported patient-related barriers were similar to the findings in Phase one as the real barriers to early mobilisation include sedation, the unresponsiveness of the patient, traumatic injury, agitation, confusion and haemodynamic instability. The ICU's organisational structure, the patient-related barriers, and the issues which were raised by the physiotherapy clinicians, were also similar to what has been reported in the literature (Parry et al. 2017a; Hodgson et al. 2018).

The environment in which an intervention is implemented plays a large role in the success of implementation. The factors which were reported to be barriers to the implementation of early mobilisation within the environmental context include inadequate staff numbers (especially physiotherapists); a lack of the appropriate mobility equipment; the large number and positioning of the attachments to a patient; and time pressures. Although staffing levels were not a significant finding under the predictors of early mobilisation in Phase one, it was perceived by the majority of the physiotherapy clinicians as a major barrier to the provision of early mobilisation in ICU. The staff ratios of the physiotherapists in most of the units were not adequate to support the workload in these units. According to international standards, the recommendation is for one physiotherapist per five-bed ICU, which affects the implementation of early mobilisation in these units.

Overcoming the highlighted barriers will require a cultural change in the ICU that prioritises the following: the early mobilisation of patients, multidisciplinary team engagement, the coordinated execution of early mobilisation activities, and effective communication among the team members. It is of importance for the multidisciplinary team to know that early mobilisation is a complex intervention and its successful implementation and sustainability are entirely dependent on the elements and measures put in place during the planning phase.

The purpose of the Modified Delphi study (Phase three: Chapter 5) was to formulate strategies which may be responsive to the identified barriers and to attain consensus on the statements by the multidisciplinary team members who are responsible for the implementation of the early mobilisation of patients in SA and Zimbabwean

government hospitals. The implementation strategies were aligned with the implementation framework that outlines five areas that impact upon implementation.

There was agreement amongst the multidisciplinary team members that the implementation of early mobilisation within the first five days of ICU admission is beneficial; however, it should be delayed if the patient is not stable enough and uncooperative at this stage in the time frame. The multidisciplinary team also agreed that the successful implementation of early mobilisation is dependent on the availability of a detailed patient assessment flow diagram; access to protocols on sedation, early mobilisation and delirium assessments in the unit; the presence of discipline-specific leaders in ICUs; the presence of a resident physiotherapist in the ICU; and the presence of an early mobilisation coordinator responsible for planning in conjunction with the entire team, as well as communication with the members. The multidisciplinary team members agreed on the inclusion of passive mobilisation (not done in isolation) as part of early mobilisation activities, but disagreed on the inclusion of neuromuscular electrical stimulation as a passive mobilisation activity owing to a lack of evidence as to its benefits in the critically ill patient population.

Considering the contextual environment of the ICU, the patients' needs, the hospital resources and its administrative support system, the participants agreed that there is a need to promote the admission of patients into specialised units in hospitals which have specialist ICUs to allow for the timely management of patients (e.g. fracture reduction in polytraumatised patients). There was also agreement amongst the participants as to the importance of employing sedation protocols, the availability of basic equipment to assist with early mobilisation and the creation of physiotherapy posts to increase the available manpower for the successful implementation of early mobilisation activities for patients in the ICU. Despite the team agreeing on the limits for parameters which denote the stability of the patient, it was agreed that these parameters should not be read in isolation since ICU patients often present with deranged vital signs.

The clinical judgements of the members of the multidisciplinary team in terms of a patient's readiness for mobilisation should be emphasised. In relation to the characteristics of the individuals responsible for the implementation of early mobilisation, the participants agreed on the following: the importance of skills training for staff, the redefining of the roles and responsibilities of the team involved in early mobilisation, a senior staff contingent to mentor the junior staff in the units, and for

early mobilisation to be considered as a collaborative effort performed by a number of role players.

There was agreement amongst the team to the effect that physiotherapists should be an integral part of the multidisciplinary team involved in the implementation of early mobilisation as they are the experts in movement and exercise. However, acknowledgement was also given to the roles of the nurses, who can be empowered to carry out early mobilisation activities on patients with less complex ailments, with physiotherapists focusing on patients who require more advanced therapy techniques, as the nurses are always available in the units. The strategies which the multidisciplinary team agreed upon have been successfully implemented in quality-improvement projects in ICUs in the hospitals of other high-income countries as a way to overcome the barriers to early mobilisation (Engel et al. 2013a; Eakin et al. 2015; Parry et al. 2017a; Hodgson et al. 2018).

These implementation strategies emanating from the consensus reached by the panel of experts serve as the first step in guiding the development of a focused approach to using research evidence to promote better-quality patient care in daily clinical practice. All five areas that impact on the implementation of the early mobilisation of patients in SA and Zimbabwean government hospital ICUs have been thoroughly assessed, and strategies to overcome the identified barriers have been outlined. The findings of this study form the foundation from which the development of SOPs and protocols for the early mobilisation of patients in SA and Zimbabwean government hospital ICUs should be motivated and advocated.

CHAPTER SEVEN

7. STRENGTHS, LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

7.1 STRENGTHS AND LIMITATIONS

The conclusions drawn from this study should be considered in the context of the strengths and limitations of the study. Recommendations for both clinical practice and future research based on the conclusions are made towards the end of this chapter.

One of the strengths of this study is its design. The use of a mixed method design with a pragmatic approach allowed for quantification in terms of the prevalence of early mobilisation practices, the exploration of the barriers and facilitators to early mobilisation, and the active identification of strategies to be implemented in SA and Zimbabwean government hospital ICUs to promote early mobilisation practice as a standard of patient care.

Yet another strength of the study is the study setting. The results obtained were elicited from a wide range of ICU settings from different provinces in the two countries. An effort was made to represent the different types of ICUs, including specialised units from all the provinces in SA, which gave their approval for the study to be conducted. A further strength of the study is the nature and consistency of the members of the expert panel that participated in the Delphi study (Phase three). The panel included a heterogeneous group of researchers and clinicians, with diverse levels of clinical background and experience in ICU practices. The statements which were rated by the panel of experts were supported by high levels of research evidence, which included randomised controlled trials and systematic reviews.

The study had some limitations. The study design itself (a cross-sectional survey in Phase one) has been reported to be a limitation (Berney et al. 2013) since it may not represent actual clinical practice. The reason for this shortcoming is that there is a need to observe practice over a period of time which is achieved only through longitudinal studies. In a one-day survey, prevalence or cross-sectional study designs, seasonal selection bias cannot be ruled out. However, an attempt was made to reduce such bias through recruiting a large number of ICUs from different provinces in SA and Zimbabwe. The cross-sectional design of the survey (Phase one: Chapter 3) limits the identification of causal association although it allows for the identification of relationships amongst the variables. Since this study was essentially a cross-sectional

design, the type of patients who were admitted to the units during the days over which the survey extended might have contributed to the low rate of early mobilisation activities recorded.

Furthermore, the SA sample was limited as not all provinces gave permission for the study to be conducted. In fact, some of the hospitals in provinces where permission was obtained from the provincial Department of Health did not grant permission for the study to be conducted. Data collection was based on the reviews of patient notes and on what came out of discussions/ with the attending nurse or physiotherapist that clarified the mobilisation practices already executed and the reasons why some patients had not been mobilised. On account of the reliance on self-reporting and the documentation of the information by the clinicians in question, an element of bias might have been introduced in the answering of questions which assessed potential barriers to mobilisation as some information might not have been written down. Also, the documentation in the patient notes on the nature of the physiotherapy management varied within the ICUs as there did not seem to be a standardised way of reporting physiotherapy assessments and management across all the hospitals. This contributed in some instances to incomplete information. Furthermore, standardised severity scores such as those of APACHE II and SOFA were not routinely recorded in all of the units. Thus, comparisons could not be made between the two countries or with other international studies on early mobilisation in terms of the severity of the patient's condition.

In Phase two (Chapter 4), the target group that identified the barriers and facilitators to the early mobilisation of patients in ICU was composed of physiotherapists only. However, the perceptions of all the members of the ICU multidisciplinary team are necessary since their individual professional roles and clinical expertise are just as important in making decisions on mobilisation.

Another limitation of this study was the lack of time to conduct full interviews with the respective physiotherapists on account of their busy schedule and workload, which resulted in some physiotherapists rushing through the interview and not providing sufficient feedback on some of the questions.

In Phase three (Chapter 5), the questionnaire which was used included structured and close-ended questions, which might have limited or restricted the panel members' ability to express their opinions. The questionnaire used in the first round of the

Modified Delphi study was long and it is possible that this might have led to response fatigue, resulting in respondents not answering openly to the items which needed further comment or clarification. A further limitation when using a Modified Delphi study is that the question as to what constitutes consensus is debatable since what is featured in the published literature in respect of the considered items and the limits used to define consensus varies.

7.2 RECOMMENDATIONS

7.2.1 Clinical Recommendations

The findings of the study highlight the need to improve the implementation of the early mobilisation of ICU patients in government hospitals in SA and Zimbabwe. For the successful implementation of early mobilisation, there is a need for greater involvement of the multidisciplinary team members in the planning phase of such a project. The implementation plan should be devised by the multidisciplinary team after a thorough evaluation of the setting, available resources, the barriers which exist, and the best implementation strategies to adopt. The team members should evaluate all the elements which need to be put in place and the roles that should be defined for the effective delivery of the intervention. The implementation plan should be well documented so that every new staff member has access to it and is able to review it when necessary. It should be revised frequently to cater for changes in the environment and the availability of staff required for the safe and effective implementation of early mobilisation.

The multidisciplinary team should also develop formal protocols and guidelines on the following: sedation, ventilator weaning, delirium assessment, pain assessment and early patient mobilisation. A formal educative training session should be done to introduce the developed protocols and guidelines to the staff, especially to the new staff joining the unit for the first time. For the early mobilisation protocol, there is a need to standardise practice through the provision of a detailed protocol.

The protocol should include the following: the definition of early mobilisation to be used, the staff and unit to which the protocol applies, the disciplines responsible for the implementation of early mobilisation, and the roles of each member of the multidisciplinary team during the implementation process. Mobilisation assessment, including indications for early mobilisation and how to determine the appropriate level of daily activity for the patients with the specific activities to be done, should also be well defined in the early mobilisation protocol.

Lastly, the criteria specified for terminating the mobilisation interventions, as well as the documentation of the mobility activities to be done, including the use of outcome measures, with adverse events and infection control measures during early mobilisation, being noted, should be well elaborated upon in the protocol. Although there might be protocols and guidelines in place in the unit, the importance of individual patient assessments, clinician judgements and interprofessional consultations should still be emphasised. When it comes to an early mobilisation protocol, clinicians should use it to help them in clinical decision-making. However, progression with the activity should be dependent on the patient's response to the intervention. Patients respond to exercise and physical activity differently and it is not feasible to capture all the responses that one would expect from each and every patient in a protocol; hence the need to use clinical reasoning skills.

The ICU is a complex, daunting setting and the clinical status of the patients admitted is unpredictable as this could change at any given time. In most instances, there is a need for one to use clinical reasoning skills to make decisions on the best time and the best treatment to offer these patients. Clinical reasoning skills come with experience and self-reflection after assessing and treating a number of patients. As a result, there is a great need to mentor the junior staff in an ICU, with the objective of boosting their confidence and allowing them to acquire the necessary minimum standards of clinical practice to work effectively in the setting. For this to be possible, there should be senior members of staff in permanent posts who should serve the role of training and mentoring the new and junior staff in each unit. A way to standardise the documentation for all disciplines should be formulated through the completion of standardised ICU checklist forms which can be used to document everything done on a patient and mitigate variability and the omission of some of the procedures captured in the clinical notes pertaining to the patient.

In line with the above, physiotherapists must be more engaged with conducting research in their clinical practice, reading of literature in search for the latest evidence. From the study, physiotherapists highlighted the gap which exist between evidence and practice as they mentioned that they did not feel they were up to date with contemporary research and the available literature on early mobilisation. Strategies to facilitate dissemination or knowledge transfer are warranted. This can be implemented at departmental level or institutional level. At departmental level, staff can engage in continuous development workshops where each one research on a specific topic and

share with the rest of the department. At institutional level, all departments might engage in interdisciplinary workshops and funds have to be availed for this to be successful.

Based on the findings of this study, it is recommended that the number of physiotherapy posts in each government hospital be revised. The practice of physiotherapy involves the movement and transfers of patients, owing to the severity of the illness in some of them, require the assistance of more than one person in an ICU setting. The current ratios of physiotherapists to patients in some hospitals in SA and Zimbabwe allow one physiotherapist to be in charge of more than one ward or unit, resulting in a high level of dependence on the other staff to assist with mobilisation or transferring patients.

Since physiotherapists are movement experts, they should be the ones leading the implementation of early mobilisation, whilst the doctors and nurses should play a supporting role for the smooth execution of the treatment. The physiotherapist-to-patient ratios should therefore allow for the physiotherapists to work independently without depending on the other disciplines for assistance. Based on the literature, which states that one physiotherapist should be available per five beds and that a minimum of two people are required for the safe mobilisation of mechanically-ventilated patients (Needham, Truong & Fan 2009; Valentin & Ferdinande 2011; Engel et al. 2013a), it is recommended that the number of physiotherapists covering ICUs in the government hospitals should be revised. In units with a bed capacity of more than five beds, there should be at least two physiotherapists covering the unit and in the case of hospitals with smaller units, two physiotherapists should be allocated to the unit for the safe mobilisation of the patients.

As the importance of mobilisation equipment has been emphasised in its facilitation of the early mobilisation of patients, the hospital administration’s buy-in is required in order to purchase the equipment. The multidisciplinary team should communicate on the basic equipment which should be purchased in line with the budget allocation. From the literature, the basic equipment which should be present in each unit includes the following: an adjustable hospital bed, an overhead lift system, bedside chairs with armrests, a foam mattress rather than an air mattress for mobility activities, ergometers, standard walkers, stand-assist devices and a tilt table for patients who do not possess the lower extremity strength to stand with a walker or the upper extremity strength to use a stand-assist device (Asher 2013). The multidisciplinary team should

prioritise on the equipment which should be purchased only once cognisance has been taken of the needs of the unit and the funds available.

Lastly, as it has been indicated that the success of the implementation of interventions such as early mobilisation in the ICU relies entirely on multidisciplinary teamwork, coordination and communication, there is a need to ensure that there is full participation in such a campaign and the recognition of each individual or profession. A culture of frequent multidisciplinary ward rounds should be promoted as this allow for a structured daily communication, goal setting and decision making around early mobilisation within the multidisciplinary team. Respect for others 'opinions and choices are very important in a multidisciplinary team context as it makes the members feel valued. There is a need to empower the practitioners of particular disciplines such as the physiotherapists and nurses in a multidisciplinary team as they are experts in their fields and their opinions should be valued. This will promote positive dynamics within the multidisciplinary team and improve the quality of care given to the patients admitted to ICUs.

7.2.2 **Recommendations for Future Research**

Although the current study explored and identified the barriers to early patient mobilisation, there is a need for a further in-depth analysis of the opinions of other healthcare professionals and patients in ICUs on the barriers to early mobilisation. As the levels of expertise differ within the ICU multidisciplinary team, this might also contribute to differences in the identified barriers which have to be explored. With the patients being the recipients of the interventions, there is also a need to analyse the barriers to early mobilisation from their point of view. The involvement of all stakeholders will allow for a more comprehensive implementation plan to be formulated.

For an intervention such as early mobilisation, the use of standardised outcome measurement tools to assess the levels of pain, sedation, and delirium, and early mobilisation activities, should be common practice. Future research could then be focused on the assessment of the outcome measurement tools that are used in the setting of government hospital ICUs. Cognisance should be taken of a number of factors associated with the use of outcome measurement tools. These factors include the following: the acceptability of the outcome measurement tools by the clinicians who should be using them on a daily basis; the practicality of using them; the adaptations to be made when changes are made (e.g. translating the measurement tool into a local

language); and lastly, the integration of the standardised outcome measurement tools into standard practice. The psychometric properties of the standardised outcome measurement tools that can be used in SA and Zimbabwean hospitals should be established.

There is a need to conduct further research into the area of early mobilisation in SA and Zimbabwe through the application of a study design, which offers greater opportunities to observe practice over a period of time. It is recommended that the ICUs engage in plan-do-study-act (PDSA) models (Engel et al. 2013b) to improve their units for the purpose of implementing early mobilisation. The application of such a model in ICUs would provide for tests for change on a small scale which could then be escalated to either the whole hospital or nationwide. The implementation of this model will highlight the strategies which work and those which do not work in SA and Zimbabwe. The use of this model will result in sustainable early mobilisation practices being introduced into ICUs and it can then be adopted as the standard of care.

REFERENCES

Abbenbroek, B., Duffield, C.M. and Elliott, D., 2014. The intensive care unit volume–mortality relationship, is bigger better? An integrative literature review. *Australian Critical Care*, *27*(4), pp.157-164.

Adhikari, N.K., Fowler, R.A., Bhagwanjee, S., et al., 2010. Critical care and the global burden of critical illness in adults. *The Lancet*, *376*(9749), pp.1339-1346.

Adler, J. and Malone, D., 2012. Early mobilisation in the intensive care unit: A systematic Review. *Cardiopulmonary Physical Therapy Journal*, *23*(1), pp.5-13.

Amidei, C. and Sole, M.L., 2013. Physiological responses to passive exercise in adults receiving mechanical ventilation. *American Journal of Critical Care*, *22*(4), pp.337-348.

Anekwe, D.E., Koo, K.K.Y., de Marchie, M., et al., 2019. Interprofessional survey of perceived barriers and facilitators to early mobilization of critically ill patients in Montreal, Canada. *Journal of intensive care medicine*, *34*(3), pp.218-226.

Angus, D.C. and Carlet, J., 2003. Surviving intensive care: a report from the 2002 Brussels Roundtable. *Intensive Care Medicine*, *29*(3), pp.368-377.

Angus, D.C., Shorr, A.F., White, A., et al., 2006. Critical care delivery in the United States: distribution of services and compliance with Leapfrog recommendations. *Critical Care Medicine*, *34*(4), pp.1016-1024.

Appleton, R. and Kinsella, J., 2012. Intensive care unit-acquired weakness. *Continuing Education in Anaesthesia, Critical Care and Pain*, *12*(2), pp.62-66.

Argov, Z. and Latronico, N., 2014. Neuromuscular complications in intensive care patients. In *Handbook of Clinical Neurology*, *121*(3), pp.1673-1685. Elsevier, Amsterdam, Netherlands.

Asher, A., 2013. Equipment used for safe mobilization of the ICU patient. *Critical Care Nursing Quarterly*, *36*(1), pp.101-108.

Avella, J.R., 2016. Delphi panels: Research design, procedures, advantages, and challenges. *International Journal of Doctoral Studies*, *11*(1), pp.305-321.

Bailey, P., Thomsen, G.E., Spuhler, V.J., et al., 2007. Early activity is feasible and safe in respiratory failure patients. *Critical Care Medicine*, 35(1), pp.139–45.

Baker, T., 2009. Critical care in low-income countries. *Tropical Medicine and International Health*, *14*(2), pp.143-148.

Bakhru, R.N., Wiebe, D.J., McWilliams, D.J., et al., 2015. An environmental scan for early mobilization practices in US ICUs. *Critical Care Medicine*, *43*(11), pp.2360-2369.

Bakhru, R.N., McWilliams, D.J., Wiebe, D.J., et al., 2016. Intensive care unit structure variation and implications for early mobilization practices. An international survey. *Annals of the American Thoracic Society*, *13*(9), pp.1527-1537.

Balas, M.C., Burke, W.J., Gannon, D., et al., 2013. Implementing the ABCDE bundle into everyday care: Opportunities, challenges and lessons learned for implementing the ICU pain, agitation and delirium (PAD) guidelines. *Critical Care Medicine*, *41*(901), p.S116.

Barber, E.A., Everard, T., Holland, A.E., et al., 2015. Barriers and facilitators to early mobilisation in intensive care: a qualitative study. *Australian Critical Care*, *28*(4), pp.177-182.

Barr, J., Fraser, G.L., Puntillo, K., et al., 2013. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Critical Care Medicine*, *41*(1), pp.263-306.

Bassett, R., Adams, K.M., Danesh, V., et al., 2015. Rethinking critical care: decreasing sedation, increasing delirium monitoring, and increasing patient mobility. *The Joint Commission Journal on Quality and Patient Safety*, *41*(2), pp.62-74.

Bassett, R.D., Vollman, K.M., Brandwene, L., et al., 2012. Integrating a multidisciplinary mobility programme into intensive care practice (IMMPTP): a multicentre collaborative. *Intensive and Critical Care Nursing*, *28*(2), pp.88-97.

Batt, J., Dos Santos, C.C. and Herridge, M.S., 2013. Muscle injury during critical illness. *Journal of American Medical Association*, *310*(15), pp.1569-1570.

Bauer, M.S., Damschroder, L., Hagedorn, H., et al., 2015. An introduction to implementation science for the non-specialist. *British Medical Council Psychology*, *3*(1), p.32.

Baxter, P. and Jack, S., 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, *13*(4), pp.544-559.

Bello, A.I., 2012. Utilizing research findings in physiotherapy: a call for gap bridging. *Journal of Nigerian Society of Physiotherapy*, *18*(1-2), pp.54-58.

Bentley, M., Kerr, R. and Powell, S., 2016. The use of a modified Delphi technique to inform the development of best practice in interprofessional training for collaborative primary healthcare. *Journal of Research in Interprofessional Practice and Education*, *6*(1), pp.1-39.

Berney, S., Haines, K. and Denehy, L., 2012. Physiotherapy in critical care in Australia. *Cardiopulmonary Physical Therapy Journal*, *23*(1), pp.19–25.

Berney, S., Harrold, M., Webb, S., et al., 2013. Intensive care unit mobility practices in Australia and New Zealand: a point prevalence study. *Critical Care and Resuscitation*, *15*(4), pp.260-265.

Berney, S., Skinner, E.H., Denehy, L., et al., 2009. Development of a physical function outcome measure (PFIT) and a pilot exercise training protocol for use in intensive care. *Critical Care and Resuscitation*, *11*(2), p.110.

Berney, S.C., Rose, J.W., Denehy, L., et al., 2019. Commencing Out-of-Bed Rehabilitation in Critical Care—What Influences Clinical Decision-Making?. *Archives of physical medicine and rehabilitation*, *100*(2), pp.261-269.

Bernhardsson, S., Öberg, B., Johansson, K., et al., 2015. Clinical practice in line with evidence? A survey among primary care physiotherapists in western Sweden. *Journal of Evaluation in Clinical Practice*, *21*(6), pp.1169-1177.

Bevan, H., 2010. How can we build skills to transform the healthcare system? *Journal of Research in Nursing*, *15*(2), pp.139-148.

Bigatello, L.M., George, E. and Hurford, W.E., 2003. Ethical considerations for research in

critically ill patients. *Critical Care Medicine*, *31*(3), pp.S178-S181.

Boehm, L.M., Vasilevskis, E.E. and Mion, L.C., 2016. Interprofessional perspectives on ABCDE bundle implementation: a focus group study. *Dimensions of Critical Care Nursing: DCCN*, *35*(6), p.339.

Bolton, C.F., 2005. Neuromuscular manifestations of critical illness. *Muscle Nerve*, 32(2), pp.140–163.

Bourdin, G., Barbier, J., Burlem, J.F., et al., 2010. The feasibility of early physical activity in intensive care unit patients: a prospective observational one-center study. *Respiratory Care*, *55*(4), pp.400-407.

Bowen D.J., Kreuter, M., Spring, B., et al., 2009. How we design feasibility studies. *American Journal of Preventative Medicine*, *36*(5), pp.452–457.

Boyd, J., Paratz, J., Tronstad, O., et al., 2018. When is it safe to exercise mechanically ventilated patients in the intensive care unit? An evaluation of consensus recommendations in a cardiothoracic setting. *Heart and Lung*, *47*(2), pp.81-86.

Bradshaw, D., Groenewald, P., Laubscher, R., et al., 2003. Initial burden of disease estimates for South Africa, 2000. *South African Medical Journal*, *93*(9), pp.682-688.

Breslow, M.J., 2007. Remote ICU care programs: current status. *Journal of Critical Care*, *22*(1), pp.66-76.

Brissie, M.A., Zomorodi, M., Soares-Sardinha, S., et al., 2017. Development of a neuro early mobilisation protocol for use in a neuroscience intensive care unit. *Intensive and Critical Care Nursing*, *42*, pp.30-35.

Brock, C., Marzano, V., Green, M., et al., 2018. Defining new barriers to mobilisation in a highly active intensive care unit – have we found the ceiling? An observational study. *Heart and Lung*, *47*(4), pp.380-385.

Brouwers, M., Browman, G., Burgers, J., et al., 2010. Guideline adaptation: a resource toolkit. *ADAPTE.: Guideline International Network*, pp.1-95.

Brouwers, M.C., De Vito, C., Bahirathan, L., et al., 2011. Effective interventions to facilitate the uptake of breast, cervical and colorectal cancer screening: an implementation guideline. *Implementation Science*, *6*(1), p.112.

Brower, R.G., 2009. Consequences of bed rest. *Critical Care Medicine*, *37*(10), pp.S422-S428.

Burtin, C., Clerckx, B., Robbeets, C., et al., 2009. Early exercise in critically ill patients enhances short-term functional recovery. *Critical Care Medicine*, *37*(9), pp.2499-2505.

Byrnes, M.C., Schuerer, D.J., Schallom, M.E., et al., 2009. Implementation of a mandatory checklist of protocols and objectives improves compliance with a wide range of evidence-based intensive care unit practices. *Critical Care Medicine*, *37*(10), pp.2775-2781.

Calvo-Ayala, E., Khan, B.A., Farber, M.O., et al., 2013. Interventions to improve the physical function of ICU survivors: a systematic review. *Chest*, *144*(5), pp.1469-1480.

Cameron, S., Ball, I., Cepinskas, G., et al., 2015. Early mobilization in the critical care unit: a

review of adult and pediatric literature. *Journal of Critical Care*, *30*(4), pp.664-672.

Capell, E.L., Tipping, C.J. and Hodgson, C.L., 2019. Barriers to implementing expert safety recommendations for early mobilisation in intensive care unit during mechanical ventilation: A prospective observational study. *Australian Critical Care*, *32*(3), pp.185-190.

Carrothers, K.M., Barr, J., Spurlock, B., et al., 2013. Contextual issues influencing implementation and outcomes associated with an integrated approach to managing pain, agitation, and delirium in adult ICUs. *Critical Care Medicine*, *41*(9), pp.S128-S135.

Caspersen, C.J., Powell, K.E. and Christenson, G.M., 1985. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Reports*, *100*(2), p.126.

Castro, E., Turcinovic, M., Platz, J., et al., 2015. Early mobilization: changing the mindset. *Critical Care Nurse*, *35*(4), pp.e1-e6.

Castro-Avila, A.C., Serón, P., Fan, E., et al., 2015. Effect of early rehabilitation during intensive care unit stay on functional status: systematic review and meta-analysis. *PloS one*, *10*(7), p.e0130722.

Cavallazzi, R., Saad, M. and Marik, P.E., 2012. Delirium in the ICU: an overview. *Annals of intensive care*, *2*(1), p.49.

Chaboyer, W., James, H. and Kendall, M., 2005. Transitional care after the intensive care unit: current trends and future directions. *Critical Care Nurse*, *25*(3), pp.16-28.

Chamberlain, D., Pollock, W. and Fulbrook, P., 2018. ACCCN Workforce Standards for Intensive Care Nursing: Systematic and evidence review, development, and appraisal. *Australian Critical Care*, *31*(5), pp.292-302.

Chang, A., Boots, R., Hodges, P., et al., 2004: Standing with the assistance of a tilt table in intensive care: a survey of Australian physiotherapy practice. *Australian Journal of Physiotherapy, 50*, pp.51-54.

Chenaud, C., Merlani, P. and Ricou, B., 2007. Research in critically ill patients: standards of informed consent. *Critical Care*, *11*(1), p.110.

Chiarici, A., Andrenelli, E., Serpilli, O., et al., 2019. An Early Tailored Approach Is the Key to Effective Rehabilitation in the Intensive Care Unit. *Archives of physical medicine and rehabilitation*

Chowdhury, D. and Duggal, A.K., 2017. Intensive care unit models: Do you want them to be open or closed? A critical review. *Neurology India*, *65*(1), p.39.

Clarissa, C., Salisbury, L., Rodgers, S., et al., 2019. Early mobilisation in mechanically ventilated patients: a systematic integrative review of definitions and activities. *Journal of Intensive Care*, *7*(1), p.3.

Collings, N. and Cusack, R., 2015. A repeated measures, randomised cross-over trial comparing the acute exercise response between passive and active sitting in critically ill patients. *British Medical Council: Anesthesiology*, *15*(1), p.1.

Connolly, B., O'Neill, B., Salisbury, L., et al., 2016. Physical rehabilitation interventions for adult patients during critical illness: an overview of systematic reviews. *Thorax*, *71*(10), pp.881-890.

Connolly, B.A., Mortimore, J.L., Douiri, A., et al., 2017. Low Levels of Physical Activity during Critical Illness and Weaning: The Evidence–Reality Gap. *Journal of Intensive Care Medicine*, p.0885066617716377.

Corcoran, J.R., Herbsman, J.M., Bushnik, T., et al., 2017. Early rehabilitation in the medical and surgical intensive care units for patients with and without mechanical ventilation: an interprofessional performance improvement project. *American Academy of Physical Medicine and Rehabilitation, 9*(2), pp.113-119.

Costa, D.K., White, M.R., Ginier, E., et al., 2017. Identifying barriers to delivering the awakening and breathing coordination, delirium, and early exercise/mobility bundle to minimize adverse outcomes for mechanically ventilated patients: a systematic review. *Chest*, *152*(2), pp.304-311.

Creswell, J.W. and Plano Clark, V.L., 2011. *Designing and Conducting Mixed Methods Research*, 3rd Edition, Sage Publications, Thousand Oaks, California.

Creswell, J.W. and Poth, C.N., 2017. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 4th Edition, Sage publications. Thousand Oaks, California.

Cullinan, K., 2006. Health services in South Africa: A basic introduction. *Health-e News Service*. http://www.health-e.org.za/uploaded/cb1f388f3b351708d915c12cfb4c3cf.pdf.

Dafoe, S., Chapman, M.J., Edwards, S., et al., 2015. Overcoming barriers to the mobilisation of patients in an intensive care unit. *Anaesthesia and Intensive Care*, *43*(6), p.719.

Dalkey, N. C. (1972). The Delphi method: An experimental study of group opinion. In N. C. Dalkey, D. L. Rourke, R. Lewis, & D. Snyder (Eds.). *Studies in the quality of life: Delphi and decision-making* (pp. 13-54). Lexington, MA: Lexington Books.

De Jonghe, B., Bastuji-Garin, S., Durand, M.C., et al., 2007. Respiratory weakness is associated with limb weakness and delayed weaning in critical illness*. *Critical Care Medicine*, 35(9), pp.2007–2015.

De Jonghe, B., Sharshar, T., Lefaucheur, J.P., et al., 2002. Paresis acquired in the intensive care unit: a prospective multicenter study. *Journal of American Medical Association*, *288*(22), pp.2859-2867.

de Queiroz, R.S., Saquetto, M.B., Martinez, B.P., et al., 2018. Evaluation of the description of active mobilisation protocols for mechanically ventilated patients in the intensive care unit: a systematic review of randomized controlled trials. *Heart and Lung, 47*(3), 253-260.

Denehy, L., Lanphere, J. and Needham, D.M., 2017. Ten reasons why ICU patients should be mobilized early. *Intensive Care Medicine*, *43*(1), pp.86-90.

Denehy, L., Skinner, E.H., Edbrooke, L., et al., 2013. Exercise rehabilitation for patients with critical illness: a randomized controlled trial with 12 months of follow-up. *Critical Care*, *17*(4), p.R156.

Department of Health, National Health Act: Regulations Categories of hospitals 2012. http://www.health.gov.za/index.php/2014-03-17-09-09-38/legislation/joomla-split-menu/category/84-2012r?download=138:regulations-relating-to-categories-of-hospitals-r185-2012

Der, Y., 2009. Multidisciplinary rounds in our ICU: improved collaboration and patient outcomes. *Critical Care Nurse*, *29*(4), pp.84-83.

Devlin, J.W., Skrobik, Y., Gélinas, C., et al., 2018. Executive summary: clinical practice guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. *Critical Care Medicine*, *46*(9), pp.1532-1548.

Dijkers, M.P., Murphy, S.L. and Krellman, J., 2012. Evidence-based practice for rehabilitation professionals: concepts and controversies. *Archives of Physical Medicine and Rehabilitation*, *93*(8), pp.S164-S176.

Diringer, M.N. and Edwards, D.F., 2001. Admission to a neurologic/neurosurgical intensive care unit is associated with reduced mortality rate after intracerebral hemorrhage. *Critical Care Medicine*, *29*(3), pp.635-640.

Dodek, P., Chanques, G., Brown, G., et al., 2012. Role of organisational structure in implementation of sedation protocols: a comparison of Canadian and French ICUs. *British Medical Journal Quality and Safety, 21*, pp.715–721

Dogherty, E.J., Harrison, M.B., Baker, C., et al., 2012. Following a natural experiment of guideline adaptation and early implementation: a mixed-methods study of facilitation. *Implementation Science*, *7*(1), p.9.

Doiron, K.A., Hoffmann, T.C. and Beller, E.M., 2018. Early intervention (mobilization or active exercise) for critically ill adults in the intensive care unit. *Cochrane Database of Systematic Reviews*, (3), pp.1-58. DOI: 10.1002/14651858.CD010754.pub2.

Donchin, Y. and Seagull, F.J., 2002. The hostile environment of the intensive care unit. *Current Opinion in Critical Care*, *8*(4), pp.316-320.

Dubb, R., Nydahl, P., Hermes, C., et al., 2016. Barriers and strategies for early mobilization of patients in intensive care units. *Annals of the American Thoracic Society*, *13*(5), pp.724-730.

Duffy, J., 2017. Evaluating utilization of an early mobility protocol in an adult ICU in the Veterans Administration System. DNP Projects. 130. https://uknowledge.uky.edu/dnp_etds/130

Dünser, M.W., Baelani, I. and Ganbold, L., 2006. A review and analysis of intensive care medicine in the least developed countries. *Critical Care Medicine*, *34*(4), pp.1234-1242.

Eakin, M.N., Ugbah, L., Arnautovic, T., et al., 2015. Implementing and sustaining an early rehabilitation program in a medical intensive care unit: a qualitative analysis. *Journal of Critical Care*, *30*(4), pp.698-704.

Eccles, M.P. and Mittman, B.S., 2006. Welcome to implementation science. *Implementation Science, 1*(1).

Elliott, S.R., 2014. ICU delirium: a survey into nursing and medical staff knowledge of current practices and perceived barriers towards ICU delirium in the intensive care unit. *Intensive and Critical Care Nursing*, *30*(6), pp.333-338.

Engel, H.J., Needham, D.M., Morris, P.E., et al., 2013b. ICU early mobilization: from recommendation to implementation at three medical centers. *Critical Care Medicine*, *41*(9), pp.S69-S80.

Engel, H.J., Tatebe, S., Alonzo, P.B., et al., 2013a. Physical therapist–established intensive care unit early mobilization program: quality improvement project for critical care at the University of California, San Francisco Medical Center. *Physical Therapy*, *93*(7), pp.975-985.

Fan, E., 2012. Critical illness neuromyopathy and the role of physical therapy and rehabilitation in critically ill patients. *Respiratory Care*, *57*(6), pp.933-946.

Fan, E., Cheek, F., Chlan, L., et al., 2014a. An official American Thoracic Society Clinical Practice guideline: the diagnosis of intensive care unit–acquired weakness in adults. *American Journal of Respiratory and Critical Care Medicine*, *190*(12), pp.1437-1446.

Fan, E., Dowdy, D.W., Colantuoni, E., et al., 2014b. Physical complications in acute lung injury survivors: a 2-year longitudinal prospective study. *Critical Care Medicine*, *42*(4), p.849.

Farley, A., 2009. The challenges of implementing evidence-based practice: ethical considerations in practice, education, policy, and research. *Social Work and Society*, *7*(2), pp.246-259.

Ferdinande, P., 1997. Recommendations on minimal requirements for intensive care departments. *Intensive Care Medicine*, *23*(2), pp.226-232.

Ferri, M., Zygun, D.A., Harrison, A., et al., 2015. Evidence-based design in an intensive care unit: End-user perceptions. *British Medical Council Anesthesiology*, *15*(1), p.57.

Fetters, M.D., Curry, L.A. and Creswell, J.W., 2013. Achieving integration in mixed methods designs - principles and practices. *Health Services Research*, *48*(6pt2), pp.2134-2156.

Field, M.J. and Lohr, K.N. eds., 1990. *Clinical practice guidelines: directions for a new program*. National Academies Press.

Flierl, M.A., Stoneback, J.W., Beauchamp, K.M., et al., 2010. Femur shaft fracture fixation in head-injured patients: when is the right time? *Journal of Orthopaedic Trauma*, *24*(2), pp.107-114.

Fontela, P.C., Forgiarini Jr, L.A. and Friedman, G., 2018. Clinical attitudes and perceived barriers to early mobilization of critically ill patients in adult intensive care units. *Revista Brasileira de terapia intensiva*, *30*(2), pp.187-194.

Fontela, P.C., Lisboa, T.C., Forgiarini-Júnior, L.A., et al., 2018. Early mobilization practices of mechanically ventilated patients: a one-day point-prevalence study in southern Brazil. *Clinics*, *73*, e241

Foy, R., Ovretveit, J., Shekelle, P.G., et al., 2011. The role of theory in research to develop and evaluate the implementation of patient safety practices. *British Medical Journal: Quality and Safety*, *20*(5), pp.453-459.

Franco, R. and Nanchal, R., 2018. Long-term outcomes after mechanical ventilation. in *mechanical ventilation in the critically ill obese patient* (pp. 287-306), 1st Edition, Springer, Cham.

Gagliardi, A.R., 2012. Translating knowledge to practice: optimizing the use of guidelines. *Epidemiology and Psychiatric Sciences*, *21*(3), pp.231-236.

Garland, A. and Gershengorn, H.B., 2013. Staffing in ICUs: physicians and alternative staffing models. *Chest*, *143*(1), pp.214-221.

Garzon-Serrano, J., Ryan, C., Waak, K., et al., 2011. Early mobilisation in critically ill patients: patients' mobilisation level depends on health care provider's profession. *Physical Medicine and Rehabilitation Journal, 3*(4), pp.307-13.

Gasperino, J., 2011. The Leapfrog initiative for intensive care unit physician staffing and its impact on intensive care unit performance: a narrative review. *Health Policy*, *102*(2-3), pp.223-228.

Girard, T.D., Jackson, J.C., Pandharipande, P.P., et al., 2010. Delirium as a predictor of long-term cognitive impairment in survivors of critical illness. *Critical Care Medicine*, *38*(7), p.1513.

Goddard, S.L., Lorencatto, F., Koo, E., et al., 2018. Barriers and facilitators to early rehabilitation in mechanically ventilated patients—a theory-driven interview study. *Journal of Intensive Care*, *6*(1), p.4.

Goodson, C.M., Friedman, L.A., Mantheiy, E., et al., 2018. Perceived barriers to mobility in a medical ICU: the patient mobilization attitudes and beliefs survey for the ICU. *Journal of Intensive Care Medicine*, p.0885066618807120.

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*(7), pp.1188-1199.

Greenhalgh, T., Robert, G., Macfarlane, F., et al., 2004. Diffusion of innovations in service organizations: systematic review and recommendations. *The Milbank Quarterly*, *82*(4), pp.581-629.

Grimshaw, J., Thomas, R., MacLennan, G., et al., 2004. Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess*, 8(6), iii–v. 1-72

Grol, R. and Grimshaw, J., 1999. Evidence-based implementation of evidence-based medicine. *The Joint Commission Journal on Quality Improvement*, *25*(10), pp.503-513.

Grüne, F., Ottens, T. and Klimek, M., 2007. Standards of care in operating theatres. In *Anaesthesia, Pain, Intensive Care and Emergency A.P.I.C.E* (pp. 281-290),1st Edition, Springer Nature, Milano.

Gurses, A.P. and Xiao, Y., 2006. A systematic review of the literature on multidisciplinary rounds to design information technology. *Journal of the American Medical Informatics Association*, *13*(3), pp.267-276.

Gusmao-Flores, D., Salluh, J.I.F., Chalhub, R.Á., et al., 2012. The confusion assessment method for the intensive care unit (CAM-ICU) and intensive care delirium screening checklist (ICDSC) for the diagnosis of delirium: a systematic review and meta-analysis of clinical studies. *Critical Care*, *16*(4), p.R115.

Hanekom, S., Gosselink, R., Dean, E., et al., 2011. The development of a clinical management algorithm for early physical activity and mobilization of critically ill patients: synthesis of evidence and expert opinion and its translation into practice. *Clinical rehabilitation*, *25*(9), pp.771-787.

Hanekom, S.D., Louw, Q. and Coetzee, A., 2012. The way in which a physiotherapy service

is structured can improve patient outcome from a surgical intensive care: a controlled clinical trial. *Critical Care*, *16*(6), p.R230.

Hardcastle, T.C., Oosthuizen, G., Clarke, D., et al., 2016. Trauma, a preventable burden of disease in South Africa: review of the evidence, with a focus on KwaZulu-Natal. *South African Health Review*, *2016*(1), pp.179-189.

Hariohm, K., Jeyanthi, S., Kumar, J.S., et al., 2017. Description of interventions is under-reported in physical therapy clinical trials. *Brazilian Journal of Physical Therapy*, *21*(4), pp.281-286.

Harrold, M.E., Salisbury, L.G., Webb, S.A., et al., 2015. Early mobilisation in intensive care units in Australia and Scotland: a prospective, observational cohort study examining mobilisation practices and barriers. *Critical Care*, *19*(1), p.336.

Hawn, M.T., Houston, T.K., Campagna, E.J., et al., 2011. The attributable risk of smoking on surgical complications. *Annals of Surgery*, *254*(6), pp.914-920.

Hayashi, Y., Morisawa, K., Klompas, M., et al., 2013. Toward improved surveillance : The impact of ventilator-associated complications on length of stay and antibiotic use in patients in intensive care units. *Clinical Infectious Diseases*, *56*(4), pp.471–477.

Henneman, E.A., Gawlinski, A., Blank, F.S., et al., 2010. Strategies used by critical care nurses to identify, interrupt, and correct medical errors. *American Journal of Critical Care*, *19*(6), pp.500-509.

Hermans, G., De Jonghe, B., Bruyninckx, F., et al., 2014. Interventions for preventing critical illness polyneuropathy and critical illness myopathy. *Cochrane database of systematic reviews*, (1).

Hermans, G. and Van den Berghe, G., 2015. Clinical review: intensive care unit acquired weakness. *Critical Care*, *19*(1), p.274.

Herridge, M.S., Moss, M., Hough, C.L., et al., 2016. Recovery and outcomes after the acute respiratory distress syndrome (ARDS) in patients and their family caregivers. *Intensive Care Medicine*, *42*(5), pp.725-738.

Herridge, M.S., Tansey, C.M., Matté, A., et al., 2011. Functional disability five years after acute respiratory distress syndrome. *New England Journal of Medicine*, *364*(14), pp.1293-1304.

Hills, A.P., Mokhtar, N. and Byrne, N.M., 2014. Assessment of physical activity and energy expenditure: an overview of objective measures. *Frontiers in Nutrition*, *1*, p.5.

Hodgson, C.L., Bailey, M., Bellomo, R., et al., 2016. A binational multicenter pilot feasibility randomized controlled trial of early goal-directed mobilization in the ICU. *Critical Care Medicine*, *44*(6), pp.1145-1152.

Hodgson, C.L., Berney, S., Harrold, M., et al., 2013. Clinical review: early patient mobilization in the ICU. *Critical Care*, *17*(1), p.207.

Hodgson, C.L., Capell, E. and Tipping, C.J., 2018. Early mobilization of patients in intensive care: organization, communication and safety factors that influence translation into clinical practice. *Critical Care*, *22*(1), p.77.

Hodgson, C.L., Stiller, K., Needham, D.M., et al., 2014. Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults. *Critical Care*, *18*(6), p.658.

Hofer, S.M., Sliwinski, M.J. and Flaherty, B.P., 2002. Understanding ageing: Further commentary on the limitations of cross-sectional designs for ageing research. *Gerontology*, *48*(1), p.22.

Holdorf, J.D. and Lilly, C.M., 2015, December. Intensivist staffing: Evolving challenges and solutions. In *Seminars in Respiratory and Critical Care Medicine, 36*(06), pp.842-850. Thieme Medical Publishers.

Holdsworth, C., Haines, K.J., Francis, J.J., et al., 2015. Mobilization of ventilated patients in the intensive care unit: an elicitation study using the theory of planned behavior. *Journal of Critical Care*, *30*(6), pp.1243-1250.

Hopkins, R.O. and Spuhler, V.J., 2009. Strategies for promoting early activity in critically ill mechanically ventilated patients. *AACN Advanced Critical Care*, *20*(3), pp.277-289.

Hopkins, R.O., Spuhler, V.J. and Thomsen, G.E., 2007. Transforming ICU culture to facilitate early mobility. *Critical Care Clinics*, *23*(1), pp.81-96.

Hoyer, E.H., Brotman, D.J., Chan, K., et al., 2015. Barriers to early mobility of hospitalized general medicine patients: survey development and results. *American Journal of Physical Medicine and Rehabilitation/Association of Academic Psychiatrists*, *94*(4), p.304.

Hoyt, B.W., Pavey, G.J., Pasquina, P.F., et al., 2015. Rehabilitation of lower extremity trauma: a review of principles and military perspective on future directions. *Current Trauma Reports*, *1*(1), pp.50-60.

Hsieh, H.F. and Shannon, S.E., 2005. Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), pp.1277-1288.

Hsu, C.C. and Sandford, B.A., 2007. The Delphi technique: making sense of consensus. *Practical Assessment, Research and Evaluation*, *12*(10), pp.1-8.

Ivankova, N.V., Creswell, J.W. and Stick, S.L., 2006. Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods*, *18*(1), pp.3-20.

Iwashyna, T.J. and Hodgson, C.L., 2016. Early mobilisation in ICU is far more than just exercise. *Lancet (London, England)*, *388*(10052), p.1351.

Iwashyna, T.J., Kramer, A.A. and Kahn, J.M., 2009. Intensive care unit occupancy and patient outcomes. *Critical Care Medicine*, *37*(5), p.1545.

Jackson, J.C., Pandharipande, P.P., Girard, T.D., et al., 2014. Depression, post-traumatic stress disorder, and functional disability in survivors of critical illness in the BRAIN-ICU study: a longitudinal cohort study. *The Lancet Respiratory Medicine*, *2*(5), pp.369-379.

Jerome, E., Laing, G.L., Bruce, J.L., et al., 2017. An audit of traumatic brain injury (TBI) in a busy developing-world trauma service exposes a significant deficit in resources available to manage severe TBI. *South African Medical Journal*, *107*(7), pp.621-625.

Jolley, S.E., Dale, C.R. and Hough, C.L., 2015. Hospital-level factors associated with report of physical activity in patients on mechanical ventilation across Washington State. *Annals of the*

American Thoracic Society, *12*(2), pp.209-215.

Jolley, S.E., Moss, M., Needham, D.M., et al., 2017. Point prevalence study of mobilization practices for acute respiratory failure patients in the United States. *Critical Care Medicine*, *45*(2), p.205.

Jolley, S.E., Regan-Baggs, J., Dickson, R.P., et al., 2014. Medical intensive care unit clinician attitudes and perceived barriers towards early mobilization of critically ill patients: a cross-sectional survey study. *British Medical Council Anesthesiology*, *14*(1), p.84.

Kayambu, G., Boots, R. and Paratz, J., 2013. Physical therapy for the critically ill in the ICU: a systematic review and meta-analysis. *Critical care medicine*, *41*(6), pp.1543-1554.

Karic, T., Røe, C., Nordenmark, T.H., et al., 2017. Effect of early mobilization and rehabilitation on complications in aneurysmal subarachnoid hemorrhage. *Journal of Neurosurgery*, *126*(2), pp.518-526.

Karic, T., Sorteberg, A., Haug Nordenmark, T., et al., 2015. Early rehabilitation in patients with acute aneurysmal subarachnoid hemorrhage. *Disability and Rehabilitation*, *37*(16), pp.1446-1454.

Kennedy, P.J., Leathley, C.M. and Hughes, C.F., 2010. Clinical practice variation. *Medical Journal of Australia*, *193*(8), p.S97.

Khan, J., Harrison, T.B., Rich, M.M., et al., 2006. Early development of critical illness myopathy and neuropathy in patients with severe sepsis. *Neurology*, 67, pp.1421–1425.

Khullar, D. and Maa, J., 2012. The impact of smoking on surgical outcomes. *Journal of the American College of Surgeons*, *215*(3), pp.418-426.

Kim, M.J., Sung, E., Choi, E.Y., et al., 2017. Delphi survey for designing an intervention research study on childhood obesity prevention. *Korean Journal of Family Medicine*, *38*(5), p.284.

Kislov, R., Waterman, H., Harvey, G., et al., 2014. Rethinking capacity building for knowledge mobilisation: developing multilevel capabilities in healthcare organisations. *Implementation Science*, *9*(1), p.166.

Klein, K., Mulkey, M., Bena, J.F., et al., 2015. Clinical and psychological effects of early mobilization in patients treated in a neurologic ICU: a comparative study. *Critical Care Medicine*, *43*(4), pp.865-873.

Klooster, E., dos Reis Miranda, D. and Spronk, P., 2017. Awareness of success factors and barriers to early mobilisation of ICU patients. *Education*, *8*(7), pp.8-5.

Koo, K.K., Choong, K., Cook, D.J., et al., 2016. Early mobilization of critically ill adults: a survey of knowledge, perceptions and practices of Canadian physicians and physiotherapists. *Canadian Medical Association Journal Open*, *4*(3), p.E448.

Kredo, T., Bernhardsson, S., Machingaidze, S., et al., 2016. Guide to clinical practice guidelines: the current state of play. *International Journal for Quality in Health Care*, *28*(1), pp.122-128.

Kress, J.P. and Hall, J.B., 2014. ICU-acquired weakness and recovery from critical illness. *New England Journal of Medicine*, *370*(17), pp.1626-1635.

Lai, C.C., Chou, W., Chan, K.S., et al., 2017. Early mobilization reduces duration of mechanical ventilation and intensive care unit stay in patients with acute respiratory failure. *Archives of physical medicine and rehabilitation*, *98*(5), pp.931-939.

Laing, G.L., Skinner, D.L., Bruce, J.L., et al., 2014. Understanding the burden and outcome of trauma care drives a new trauma systems model. *World Journal of Surgery*, *38*(7), pp.1699-1706.

Lamond, E., Murray, S. and Gibson, C.E., 2018. Delirium screening in intensive care: A life saving opportunity. *Intensive and Critical Care Nursing*, *44*, pp.105-109.

LeBlanc, A., Bourbonnais, F.F., Harrison, D., et al., 2018. The experience of intensive care nurses caring for patients with delirium: A phenomenological study. *Intensive and Critical Care Nursing*, *44*, pp.92-98.

Leditschke, I.A., Green, M., Irvine, J., et al., 2012. What are the barriers to mobilizing intensive care patients? *Cardiopulmonary Physical Therapy Journal*, *23*(1), p.26.

Levin, K.A., 2006. Study design III: Cross-sectional studies. *Evidence-based Dentistry*, *7*(1), p.24.

Levine, C., Faden, R., Grady, C., et al., 2004. The limitations of “vulnerability” as a protection for human research participants. *The American Journal of Bioethics*, *4*(3), pp.44-49.

Lewis, P.M. and Waddell, J.P., 2016. When is the ideal time to operate on a patient with a fracture of the hip? A review of the available literature. *The Bone and Joint Journal*, *98*(12), pp.1573-1581.

Li, Z., Peng, X., Zhu, B., et al., 2013. Active mobilization for mechanically ventilated patients: a systematic review. *Archives of Physical Medicine and Rehabilitation*, *94*(3), pp.551-561.

Lott, J.P., Iwashyna, T.J., Christie, J.D., et al., 2009. Critical illness outcomes in specialty versus general intensive care units. *American Journal of Respiratory and Critical Care Medicine*, *179*(8), pp.676-83.

Majid, S., Foo, S., Luyt, B., et al., 2011. Adopting evidence-based practice in clinical decision making: nurses' perceptions, knowledge, and barriers. *Journal of the Medical Library Association*, *99*(3), p.229.

Malone, D., Ridgeway, K., Nordon-Craft, A., et al., 2015. Physical therapist practice in the intensive care unit: results of a national survey. *Physical Therapy*, *95*(10), pp.1335-1344.

Marshall, J.C., Bosco, L., Adhikari, N.K., et al., 2017. What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *Journal of Critical Care*, *37*, pp.270-276.

Mathivha, L.R., 2002. ICUs worldwide : An overview of critical care medicine in South Africa. *Critical Care*, 6, pp.22–23.

McCluskey, A. and Lovarini, M., 2005. Providing education on evidence-based practice improved knowledge but did not change behaviour: a before and after study. *British Medical Council: Medical Education*, *5*(1), p.40.

McWilliams, D., Atkins, G., Hodson, J., et al., 2017a. The Sara Combilizer® as an early

mobilisation aid for critically ill patients: a prospective before and after study. *Australian Critical Care*, *30*(4), pp.189-195.

McWilliams, D., Jones, C., Atkins, G., et al., 2018. Earlier and enhanced rehabilitation of mechanically ventilated patients in critical care: a feasibility randomised controlled trial. *Journal of Critical Care*, *44*, pp.407-412.

McWilliams, D.J., 2017b. Reading between the lines, the key to successfully implementing early rehabilitation in critical care. *Intensive and Critical Care Nursing*, *42*, pp.5-7.

Mendez-Tellez, P.A., Nusr, R., Feldman, D., et al., 2012. Early physical rehabilitation in the ICU: a review for the neurohospitalist. *The Neurohospitalist*, *2*(3), pp.96-105.

Michie, S., 2008. Designing and implementing behaviour change interventions to improve population health. *Journal of Health Services Research and Policy*, *13*(3_suppl), pp.64-69.

Miles, M. B., & Huberman, A. M., 1994. *Qualitative data analysis: An expanded source book* (2nd ed.). Thousand Oaks, CA: Sage.

Ministry of Health and Child Welfare., 2005. Zimbabwe Demographic and Health Survey. Available at: http://www.measuredhs.com/pubs/pdf/FR186/FR186.pdf

Moffett, P. and Moore, G., 2011. The standard of care: legal history and definitions: the bad and good news. *Western Journal of Emergency Medicine*, *12*(1), p.109.

Morandi, A., Brummel, N.E. and Ely, E.W., 2011. Sedation, delirium and mechanical ventilation: the 'ABCDE'approach. *Current opinion in critical care*, *17*(1), pp.43-49.

Morgan, D.L., 2007. Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, *1*(1), pp.48-76.

Morgan, D.L., 2013. *Integrating Qualitative and Quantitative Methods: A Pragmatic Approach*, 1st Edition, Sage publications, Thousand Oaks, California.

Morris, P.E. and Herridge, M.S., 2007. Early intensive care unit mobility: future directions. *Critical Care Clinics*, *23*(1), pp.97-110.

Morris, P.E., Berry, M.J., Files, D.C., et al., 2016. Standardized rehabilitation and hospital length of stay among patients with acute respiratory failure: a randomized clinical trial. *Journal of American Medical Association*, *315*(24), pp.2694-2702.

Morris, P.E., Goad, A., Thompson, C., et al., 2008. Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Critical Care Medicine*, *36*(8), pp.2238-2243.

Morse, J.M., 1995. The significance of saturation. *Qualitative Health Research*, *5*(2), pp.147-149

Murthy, S. and Adhikari, N.K., 2013. Global health care of the critically ill in low-resource settings. *Annals of the American Thoracic Society*, *10*(5), pp.509-513.

Naidoo, K., Singh, J. and Lalloo, U., 2013. Critical analysis of ICU/HC beds in South Africa: 2008-2009. *South African Medical Journal*, *103*(10), pp.751-753.

Needham, D.M. & Korupolu, R., 2010. Rehabilitation quality improvement in an intensive care unit setting: implementation of a quality improvement model. *Topics in Stroke Rehabilitation*, *17*(4), pp.271-281.

Needham, D.M., Truong, A.D. and Fan, E., 2009. Technology to enhance physical rehabilitation of critically ill patients. *Critical Care Medicine*, *37*(10), pp.S436-S441.

Nelson, A., Powell-Cope, G., Gavin-Dreschnack, D., et al., 2004. Technology to promote safe mobility in the elderly. *Nursing Clinics of North America*, *39*(3), pp.649-672.

Nicol, A., Knowlton, L.M., Schuurman, N., et al., 2014. Trauma surveillance in Cape Town, South Africa: an analysis of 9 236 consecutive trauma center admissions. *Journal of American Medical Association Surgery*, *149*(6), pp.549-556.

Nydahl, P., Ruhl, A.P., Bartoszek, G., et al., 2014. Early mobilization of mechanically ventilated patients: a one-day point-prevalence study in Germany. *Critical Care Medicine*, *42*(5), pp.1178-1186.

Nydahl, P., Sricharoenchai, T., Chandra, S., et al., 2017. Safety of patient mobilization and rehabilitation in the intensive care unit. Systematic review with meta-analysis. *Annals of the American Thoracic Society*, *14*(5), pp.766-777.

O'Connor, E.D. and Walsham, J., 2009. Should we mobilise critically ill patients?: a review. *Critical Care and Resuscitation*, *11*(4), p.290.

Ohtake, P.J., Strasser, D.C. and Needham, D.M., 2013. Translating research into clinical practice: the role of quality improvement in providing rehabilitation for people with critical illness. *Physical Therapy*, *93*(2), pp 128-133.

Olkowski, B.F. and Shah, S.O., 2017. Early mobilization in the neuro-ICU: how far can we go? *Neurocritical Care*, *27*(1), pp.141-150.

Osika, J., Altman, D., Ekbladh, L., et al. 2010. Zimbabwe health system assessment 2010. Bethesda MD: Health Systems 20/20 Project. Abt Associates Inc, (November).

Paratz, J.D. and Kayambu, G., 2011. Early exercise and attenuation of myopathy in the patient with sepsis in ICU. *Physical Therapy Reviews*, *16*(1), pp.58-65.

Parker, A.M., Sricharoenchai, T. and Needham, D.M., 2013. Early rehabilitation in the intensive care unit: preventing impairment of physical and mental health. *Current Physical Medicine and Rehabilitation Reports*, *1*(4), pp.307-314.

Parry, S.M., Knight, L.D., Connolly, B., et al., 2017a. Factors influencing physical activity and rehabilitation in survivors of critical illness: a systematic review of quantitative and qualitative studies. *Intensive Care Medicine*, *43*(4), pp.531-542.

Paton, M., Lane, R. and Hodgson, C.L., 2018. Early mobilization in the intensive care unit to improve long-term recovery. *Critical care clinics*, *34*(4), pp.557-571.

Parry, S.M., Remedios, L., Denehy, L., et al., 2017b. What factors affect implementation of early rehabilitation into intensive care unit practice? A qualitative study with clinicians. *Journal of Critical Care*, *38*, pp.137-143.

Parry, S.M., Nydahl, P. and Needham, D.M., 2018. Implementing early physical rehabilitation and mobilisation in the ICU: institutional, clinician, and patient considerations. *Intensive care*

medicine, *44*(4), pp.470-473.

Penoyer, D.A., 2010. Nurse staffing and patient outcomes in critical care: a concise review. *Critical Care Medicine*, *38*(7), pp.1521-1528.

Phelan, S., Lin, F., Mitchell, M., et al., 2018. Implementing early mobilisation in the intensive care unit: an integrative review. *International Journal of Nursing Studies*, *77*, pp.91-105

Pillay-van Wyk, V., Msemburi, W., Laubscher, R., et al., 2016. Mortality trends and differentials in South Africa from 1997 to 2012: second National Burden of Disease Study. *The Lancet Global Health*, *4*(9), pp.e642-e653.

Pinsky, M.R., Clermont, G. and Hravnak, M., 2016. Predicting cardiorespiratory instability. *Critical Care*, *20*(1), p.70.

Plani, N., van Aswegen, H., Patman, S., et al., 2017. Developing minimum clinical standards for physiotherapy in South African intensive care units: a mixed method approach. *European Journal of Physiotherapy*, *19*(sup1), pp.31-33.

Portney, L.G. and Watkins, M.P., 2009. *Foundations of clinical research: applications to practice* (Vol. 892). Upper Saddle River, NJ: Pearson/Prentice Hall.

Prabhu, R.K., Swaminathan, N. and Harvey, L.A., 2013. Passive movements for the treatment and prevention of contractures. *Cochrane Database of Systematic Reviews*, (12), DOI: 10.1002/14651858.CD009331.pub2.

Pronovost, P.J., Angus, D.C., Dorman, T., et al., 2002. Physician staffing patterns and clinical outcomes in critically ill patients: a systematic review. *Journal of American Medical Association*, *288*(17), pp.2151-2162.

Puthucheary, Z.A. and Denehy, L., 2015. Exercise interventions in critical illness survivors: understanding inclusion and stratification criteria. *American Journal of Respiratory and Critical Care Medicine*, *191*(12), pp.1464-1467.

Puthucheary, Z.A., Rawal, J., McPhail, M., et al., 2013. Acute skeletal muscle wasting in critical illness. *Journal of American Medical Association*, *310*(15), pp.1591-1600.

Ramesh, A., Fezeu, F., Fidele, B., et al., 2014. Challenges and solutions for traumatic brain injury management in a resource-limited environment: example of a public referral hospital in Rwanda. *Cureus*, *6*(5), e179. DOI 10.7759/cureus.179

Rao, T.S., Radhakrishnan, R. and Andrade, C., 2011. Standard operating procedures for clinical practice. *Indian Journal of Psychiatry*, *53*(1), p.1.

Reddy, P., Zuma, K., Shisana, O., et al., 2015. Prevalence of tobacco use among adults in South Africa: results from the first South African National Health and Nutrition Examination Survey. *South African Medical Journal*, *105*(8), pp.648-655.
Resnick, S., Inaba, K., Okoye, O., et al., 2014. Impact of smoking on trauma patients. *Ulus Travma Acil Cerrahi Derg*, *20*(4), pp.248-52.

Reubi, D., Herrick, C. and Brown, T., 2016. The politics of non-communicable diseases in the global South. *Health and Place*, *39*, pp.179-187.

Riviello, E.D., Letchford, S., Achieng, L., et al., 2011. Critical care in resource-poor settings: lessons learned and future directions. *Critical Care Medicine*, *39*(4), pp.860-867.

Rivosecchi, R.M., Kane-Gill, S.L., Svec, S., et al., 2016. The implementation of a nonpharmacologic protocol to prevent intensive care delirium. *Journal of Critical Care*, *31*(1), pp.206-211.

Roberson, A.R., Starkweather, A., Grossman, C., et al., 2018. Influence of muscle strength on early mobility in critically ill adult patients: Systematic literature review. *Heart & Lung*, *47*(1), pp.1-9.

Roberts, M.B., Glaspey, L.J., Mazzarelli, A., et al., 2018. Early interventions for the prevention of posttraumatic stress symptoms in survivors of critical illness: A qualitative systematic review. *Critical Care Medicine*, *46*(8), pp.1328-1333.

Rose, L., 2011. Interprofessional collaboration in the ICU: how to define?. *Nursing in critical care*, *16*(1), pp.5-10.

Rosman, J., Slane, S., Dery, B., et al., 2013. Is there a shortage of neurosurgeons in the United States? *Neurosurgery*, *73*(2), pp.354-366.

Ross, A.G. and Morris. P.E., 2010. Safety and barriers to care. *Critical Care Nurse*, *30*(2), pp.S11-S3.

Rothschild, J.M., 2001. “Closed” intensive care units and other models of care for critically ill patients. *Making Health Care Safer: A Critical Analysis of Patient Safety Practices*, (43), p.413-422.

Rowley-Conwy, G., 2018. Barriers to delirium assessment in the intensive care unit: a literature review. *Intensive and Critical Care Nursing*, *44* (2), pp.99-104.

Russotto, V., Cortegiani, A., Raineri, S.M., et al., 2015. Bacterial contamination of inanimate surfaces and equipment in the intensive care unit. *Journal of Intensive Care*, *3*(1), p.54.

Sackett, D.L., Rosenberg, W.M.C., Gray, J.A.M., et al., 1996. Evidence-based medicine: what it is and what it isn’t. *British Medical Journal*, *312*(7023), pp.71–72.

Sackett, D.L., Strauss, S.E., Richardson, W.S., et al., 2000. *Evidence-based medicine: how to practise and teach EBM*, 2nd Edition, Churchill Livingstone, New York.

Salluh, J.I., Soares, M., Teles, J.M., et al., 2010. Delirium epidemiology in critical care (DECCA): an international study. *Critical Care*, *14*(6), p.R210.

Sawyer, R.G. and Leon, C.A.T., 2010. Common complications in the surgical intensive care unit. *Critical Care Medicine*, 38(9), pp.S483–S493.

Schaller, S.J., Anstey, M., Blobner, M., et al., 2016. Early, goal-directed mobilisation in the surgical intensive care unit: a randomised controlled trial. *The Lancet*, *388*(10052), pp.1377-1388.

Schaller, S.J., Scheffenbichler, F.T., Bose, S., et al., 2019. Influence of the initial level of consciousness on early, goal-directed mobilization: a post hoc analysis. *Intensive Care Medicine*, pp.1-10.

Schweickert, W.D., Pohlman, M.C., Pohlman, A.S., et al., 2009. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. *Lancet (London, England)*, *373*(9678), pp.1874-1882.

Setia, M.S., 2016. Methodology series module 3: cross-sectional studies. *Indian Journal of Dermatology*, *61*(3), p.261.

Seymour, B., Kinn, S. and Sutherland, N., 2003. Valuing both critical and creative thinking in clinical practice: narrowing the research-practice gap? *Journal of Advanced Nursing*, *42*(3), pp.288-296.

Seymour, C.W., Iwashyna, T.J., Ehlenbach, W.J., et al., 2012. Hospital-level variation in the use of intensive care. *Health Services Research*, *47*(5), pp.2060-2080.

Shaw, J.A., Connelly, D.M. and Zecevic, A.A., 2010. Pragmatism in practice: mixed methods research for physiotherapy. *Physiotherapy Theory and Practice*, *26*(8), pp.510-518.

Sibilla, A., Nydahl, P., Greco, N., et al., 2017. Mobilization of mechanically ventilated patients in Switzerland. *Journal of Intensive Care Medicine*, pp.1-8.DOI: 10.1177/0885066617728486

Singh, T.D., O'horo, J.C., Gajic, O., et al., 2018. Risk factors and outcomes of critically ill patients with acute brain failure: A novel end point. *Journal of Critical Care*, *43*, pp.42-47.

Skinner, E.H., Berney, S., Warrillow, S., et al., 2009. Development of a physical function outcome measure (PFIT) and a pilot exercise training protocol for use in intensive care. *Critical Care and Resuscitation*, 11(2), pp.110-115.

Skinner, E.H., Thomas, P., Reeve, J.C., et al., 2016. Minimum standards of clinical practice for physiotherapists working in critical care settings in Australia and New Zealand: a modified Delphi technique. *Physiotherapy Theory and Practice*, *32*(6), pp.468-482.

Smith, M., Joy, H. and Ellis, E., 2010. Effect of experience on clinical decision making by cardiorespiratory physiotherapists in acute care settings. *Physiotherapy Theory and Practice*, *26*(2), pp.89-99.

Sommers, J., Engelbert, R.H., Dettling-Ihnenfeldt, D., et al., 2015. Physiotherapy in the intensive care unit: an evidence-based, expert-driven, practical statement and rehabilitation recommendations. *Clinical Rehabilitation*, *29*(11), pp.1051-1063.

Sosnowski, K., Lin, F., Mitchell, M.L., et al., 2015. Early rehabilitation in the intensive care unit: an integrative literature review. *Australian Critical Care*, *28*(4), pp.216-225.

Stevens, R.D., Marshall, S.A., Cornblath, D.R., et al., 2009. A framework for diagnosing and classifying intensive care unit-acquired weakness. *Critical care medicine*, *37*(10), pp.S299-S308.

Stiller, K., 2013. Physiotherapy in intensive care: an updated systematic review. *Chest*, *144*(3), pp.825-847.

Stiller, K., Phillips, A.C. and Lambert, P., 2004. The safety of mobilisation and its effect on haemodynamic and respiratory status of intensive care patients. *Physiotherapy Theory and Practice*, 20, pp.175-186.

Svenningsen, H., Egerod, I., Videbech, P., et al., 2013. Fluctuations in sedation levels may contribute to delirium in ICU patients. *Acta Anaesthesiologica Scandinavica*, *57*(3), pp.288-293.

Tadyanemhandu, C. and Manie, S., 2015. Profile of patients and physiotherapy patterns in

intensive care units in public hospitals in Zimbabwe: a descriptive cross-sectional study. *British Medical Council: Anesthesiology*, *15*(1), p.136.

Taito, S., Shime, N., Ota, K., et al., 2016. Early mobilization of mechanically ventilated patients in the intensive care unit. *Journal of Intensive Care*, *4*(1), p.50.

TEAM Study Investigators, 2015. Early mobilization and recovery in mechanically ventilated patients in the ICU: a bi-national, multi-centre, prospective cohort study. *Critical Care*, *19*(1), p.81.

Thangaratinam, S. and Redman, C.W.E., 2005. The Delphi technique. *The Obstetrician and Gynaecologist, 7*, 120-125.

Thomas, D.R., 2006. A general inductive approach for analysing qualitative evaluation data. *American Journal of Evaluation*, *27*(2), pp.237-246.

Thompson, D.R., Hamilton, D.K., Cadenhead, C.D., et al., 2012. Guidelines for intensive care unit design. *Critical Care Medicine*, *40*(5), pp.1586-1600.

Tipping, C.J., Harrold, M., Holland, A., et al., 2017. The effects of active mobilisation and rehabilitation in ICU on mortality and function: a systematic review. *Intensive Care Medicine*, *43*(2), pp.171-183.

Titsworth, W.L., Hester, J., Correia, T., et al., 2012. The effect of increased mobility on morbidity in the neurointensive care unit. *Journal of Neurosurgery*, *116*(6), pp.1379-1388.

Toccolini, B.F., Osaku, E.F., de Macedo Costa, C.R.L., et al., 2015. Passive orthostatism (tilt table) in critical patients: Clinicophysiologic evaluation. *Journal of Critical Care*, *30*(3), pp.655-e1.

Tomasi, C.D., Grandi, C., Salluh, J., et al., 2012. Comparison of CAM-ICU and ICDSC for the detection of delirium in critically ill patients focusing on relevant clinical outcomes. *Journal of Critical Care*, *27*(2), pp.212-217.
Topp, R., Ditmyer, M., King, K., et al., 2002. The effect of bed rest and potential prehabilitation on patients in the intensive care unit. *American Association of Critical Care Nurse Clinical Issues*, *13*(2), pp.263-276.

Tran, T.M., Fuller, A.T., Kiryabwire, J., et al., 2015. Distribution and characteristics of severe traumatic brain injury at Mulago National Referral Hospital in Uganda. *World Neurosurgery*, *83*(3), pp.269-277.

Treggiari, M.M., Martin, D.P., Yanez, N.D., et al., 2007. Effect of intensive care unit organizational model and structure on outcomes in patients with acute lung injury. *American Journal of Respiratory and Critical Care Medicine*, *176*(7), pp.685-690.

Truong, A.D., Fan, E., Brower, R.G., et al., 2009. Bench-to-bedside review: mobilizing patients in the intensive care unit--from pathophysiology to clinical trials. *Critical Care*, *13*(4), p.216.

Twose, P., Jones, U. and Cornell, G., 2018. Minimum standards of clinical practice for physiotherapists working in critical care settings in United Kingdom: a modified Delphi technique. *Journal of the Intensive Care Society*, 0(0), pp.1-14.

Valentin, A., Ferdinande, P. and ESICM Working Group on Quality Improvement., 2011. Recommendations on basic requirements for intensive care units: structural and organizational aspects. *Intensive Care Medicine*, *37*(10), p.1575

.
van Aswegen, H., Patman, S., Plani, N., et al., 2017. Developing minimum clinical standards for physiotherapy in South African ICUs: A qualitative study. *Journal of Evaluation in Clinical Practice*, *23*(6), pp.1258-1265.

van der Lee, L., Hill, A.M. and Patman, S., 2019. Expert consensus for respiratory physiotherapy management of mechanically ventilated adults with community-acquired pneumonia: A Delphi study. *Journal of evaluation in clinical practice*, *25*(2), pp.230-243.

van der Sluis, F.J., Slagt, C., Liebman, B., et al., 2011. The impact of open versus closed format ICU admission practices on the outcome of high-risk surgical patients: a cohort analysis. *British Medical Council: Surgery*, *11*(1), p.18.

van Willigen, Z., Collings, N., Richardson, D., et al., 2016. Quality improvement: The delivery of true early mobilisation in an intensive care unit. *British Medical Council: Open Quality*, *5*(1), pp.u211734-w4726.

Vernon, W., 2009. The Delphi technique: a review. *International Journal of Therapy and Rehabilitation*, *16*(2), pp.69-76.

Vincent, J.L., 2013. Critical care - where have we been and where are we going? *Critical Care*, *17*(1), p.S2.

Vincent, J.L., Shehabi, Y., Walsh, T.S., et al., 2016. Comfort and patient-centred care without excessive sedation: the eCASH concept. *Intensive Care Medicine*, *42*(6), pp.962-971.

Vollman, K.M., 2010. Progressive mobility in the critically ill. *Critical Care Nurse*, *30*(2), pp.3–17.

Vollman, K.M., 2012. Hemodynamic instability: is it really a barrier to turning critically ill patients? *Critical Care Nurse*, *32*(1), pp.70-75.

Walton, V., Hogden, A., Johnson, J., et al., 2016. Ward rounds, participants, roles and perceptions: literature review. *International Journal of Health Care Quality Assurance*, *29*(4), pp.364-379.

Ward, N.S., Afessa, B., Kleinpell, R., et al., 2013. Intensivist/patient ratios in closed ICUs: a statement from the Society of Critical Care Medicine Taskforce on ICU Staffing. *Critical Care Medicine*, *41*(2), pp.638-645.

Ward, V., House, A. and Hamer, S., 2009. Knowledge brokering: the missing link in the evidence to action chain?. *Evidence and Policy: A Journal of Research, Debate and Practice*, *5*(3), pp.267-279.

Watson, G.A. and Alarcon, L.H., 2010. Intensivists: don't quit your day job... yet! *Critical Care, 14,* pp.305.

Wegner, M., Helmich, I., Machado, S., et al., 2014. Effects of exercise on anxiety and depression disorders: review of meta-analyses and neurobiological mechanisms. *CNS & Neurological Disorders-Drug Targets (Formerly Current Drug Targets-CNS & Neurological Disorders)*, *13*(6), pp.1002-1014.

Weinhouse, G.L., Schwab, R.J., Watson, P.L., et al., 2009. Bench-to-bedside review: delirium in ICU patients - importance of sleep deprivation. *Critical Care*, *13*(6), p.234.

West, E., Barron, D.N., Harrison, D., et al., 2014. Nurse staffing, medical staffing and mortality in intensive care: an observational study. *International Journal of Nursing Studies*, *51*(5), pp.781-794.

Wilcox, M.E., Brummel, N.E., Archer, K., et al., 2013b. Cognitive dysfunction in ICU patients: risk factors, predictors, and rehabilitation interventions. *Critical Care Medicine*, *41*(9), pp.S81-S98.

Wilcox, M.E., Chong, C.A., Niven, D.J., et al., 2013a. Do intensivist staffing patterns influence hospital mortality following ICU admission? A systematic review and meta-analyses. *Critical Care Medicine*, *41*(10), pp.2253-2274.

World Medical Association., 2013. Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects. *Journal of American Medical Association, 310*(20).

Wright, S.E., Thomas, K., Watson, G., et al., 2018. Intensive versus standard physical rehabilitation therapy in the critically ill (EPICC): a multicentre, parallel group, randomised controlled trial. *Thorax*, *73*(3), pp.213-221.

Yataco, R.A., Arnold, S.M., Brown, S.M., et al., 2018. Early progressive mobilization of patients with external ventricular drains: Safety and feasibility. *Neurocritical Care*, *30(2)*, pp.414-420.

Yin, R.K., 2003. *Case Study Research: Design and Methods,* 3rd Edition, Sage, Thousand Oaks, CA.

Young, B., Moyer, M., Pino, W., et al., 2019. Safety and Feasibility of Early Mobilization in Patients with Subarachnoid Hemorrhage and External Ventricular Drain. *Neurocritical Care*, Jan 18, pp.1-9. DOI: 10.1007/s12028-019-00670-2.

Zaal, I.J., Devlin, J.W., Peelen, L.M., et al., 2015. A systematic review of risk factors for delirium in the ICU. *Critical Care Medicine*, *43*(1), pp.40-47.
Zhang, G., Zhang, K., Cui, W., et al. 2018. The effect of early mobilization for critical ill patients requiring mechanical ventilation: a systematic review and meta-analysis. *Journal of Emergency and Critical Care Medicine*, *2*(1), pp.1-13.

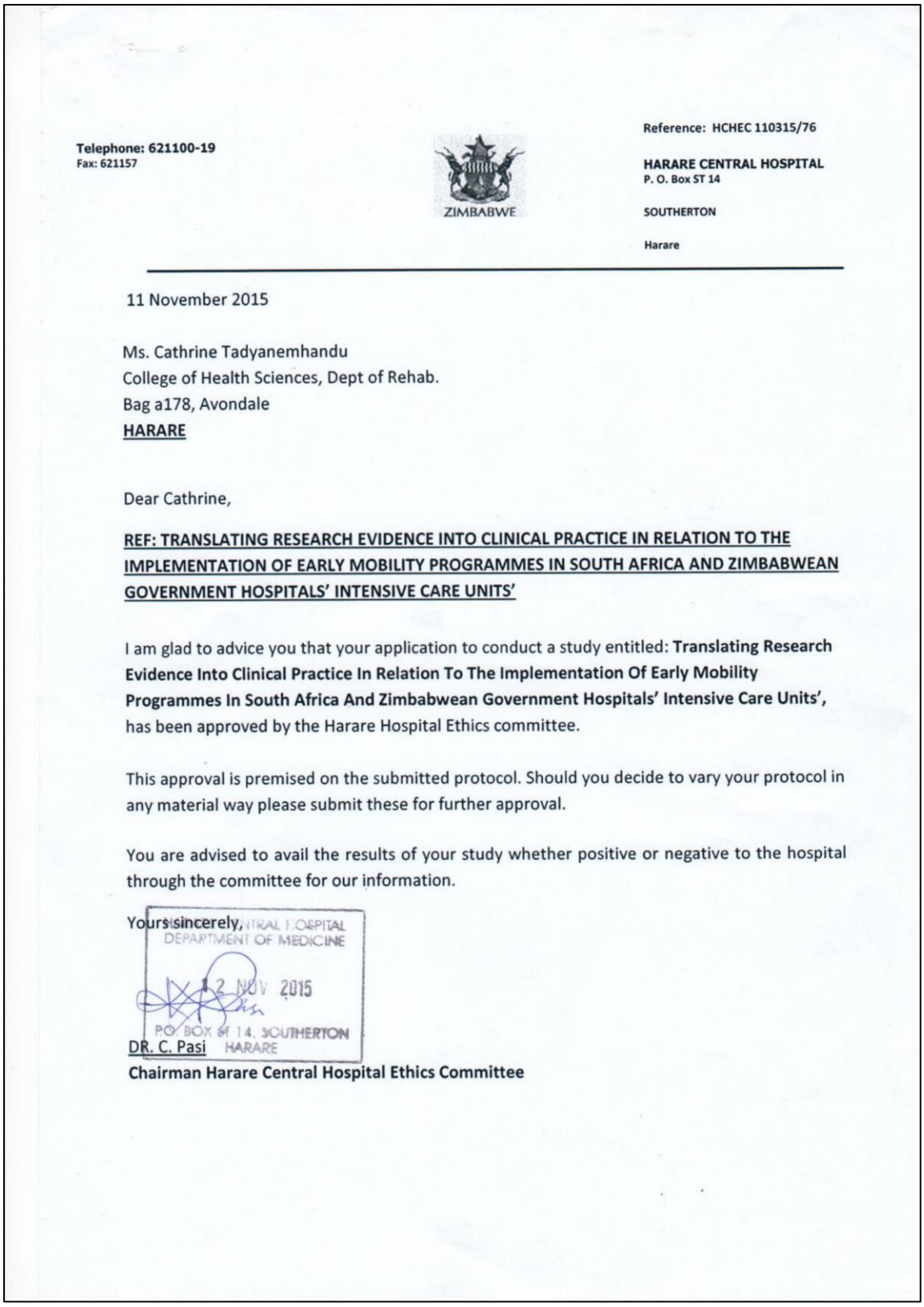
Zhang, Z., Pan, L. and Ni, H., 2013. Impact of delirium on clinical outcome in critically ill patients: a meta-analysis. *General Hospital Psychiatry*, *35*(2), pp.105-111.

Zimbabwe Service Availability and Readiness Assessment 2015, http://ncuwash.org/newfour/wp-content/uploads/2017/08/Zimbabwe-Service-Availability-and-Readiness-Assessment-Report.pdf

Zorowitz, R.D., 2016. ICU-acquired weakness: A rehabilitation perspective of diagnosis, treatment, and functional management. *Chest*, *150*(4), pp.966-971.

APPENDIX 1

- **PERMISSION LETTER FROM HARARE CENTRAL HOSPITAL**



Telephone: 621100-19
Fax: 621157

ZIMBABWE

Reference: HCHEC 110315/76

HARARE CENTRAL HOSPITAL
P. O. Box ST 14
SOUTHERTON
Harare

11 November 2015

Ms. Cathrine Tadyanemhandu
College of Health Sciences, Dept of Rehab.
Bag a178, Avondale
HARARE

Dear Cathrine,

REF: TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICA AND ZIMBABWEAN GOVERNMENT HOSPITALS' INTENSIVE CARE UNITS'

I am glad to advice you that your application to conduct a study entitled: **Translating Research Evidence Into Clinical Practice In Relation To The Implementation Of Early Mobility Programmes In South Africa And Zimbabwean Government Hospitals' Intensive Care Units',** has been approved by the Harare Hospital Ethics committee.

This approval is premised on the submitted protocol. Should you decide to vary your protocol in any material way please submit these for further approval.

You are advised to avail the results of your study whether positive or negative to the hospital through the committee for our information.

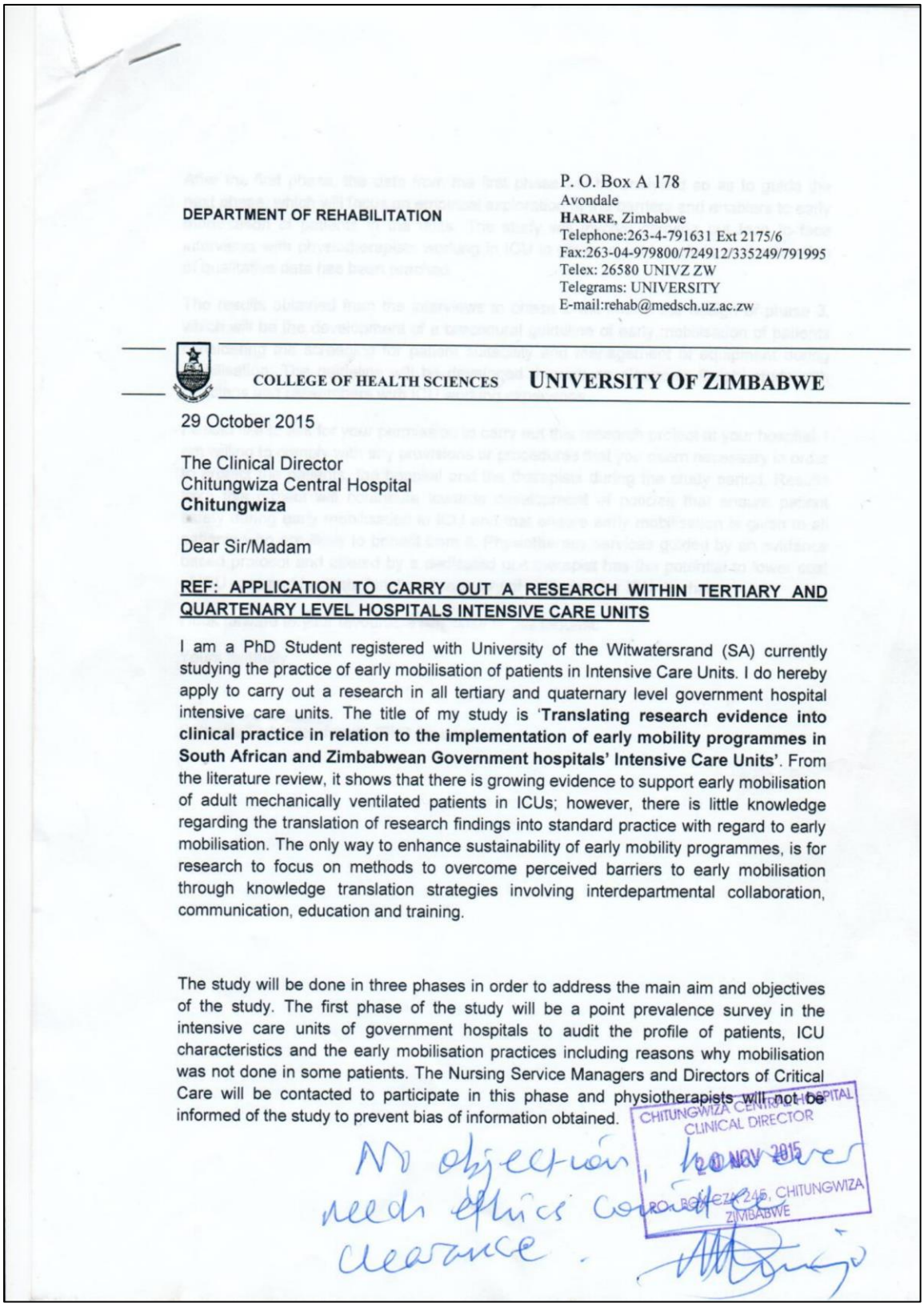
Yours sincerely,

CENTRAL HOSPITAL
DEPARTMENT OF MEDICINE
12 NOV 2015
P.O. BOX ST 14, SOUTHERTON
HARARE

DR. C. Pasi
Chairman Harare Central Hospital Ethics Committee

APPENDIX 2

- **PERMISSION LETTER FROM CHITUNGWIZA CENTRAL HOSPITAL**



DEPARTMENT OF REHABILITATION

P. O. Box A 178
Avondale
HARARE, Zimbabwe
Telephone:263-4-791631 Ext 2175/6
Fax:263-04-979800/724912/335249/791995
Telex: 26580 UNIVZ ZW
Telegrams: UNIVERSITY
E-mail:rehab@medsch.uz.ac.zw

COLLEGE OF HEALTH SCIENCES UNIVERSITY OF ZIMBABWE

29 October 2015

The Clinical Director
Chitungwiza Central Hospital
Chitungwiza

Dear Sir/Madam

REF: APPLICATION TO CARRY OUT A RESEARCH WITHIN TERTIARY AND QUARTENARY LEVEL HOSPITALS INTENSIVE CARE UNITS

I am a PhD Student registered with University of the Witwatersrand (SA) currently studying the practice of early mobilisation of patients in Intensive Care Units. I do hereby apply to carry out a research in all tertiary and quaternary level government hospital intensive care units. The title of my study is '**Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units'**. From the literature review, it shows that there is growing evidence to support early mobilisation of adult mechanically ventilated patients in ICUs; however, there is little knowledge regarding the translation of research findings into standard practice with regard to early mobilisation. The only way to enhance sustainability of early mobility programmes, is for research to focus on methods to overcome perceived barriers to early mobilisation through knowledge translation strategies involving interdepartmental collaboration, communication, education and training.

The study will be done in three phases in order to address the main aim and objectives of the study. The first phase of the study will be a point prevalence survey in the intensive care units of government hospitals to audit the profile of patients, ICU characteristics and the early mobilisation practices including reasons why mobilisation was not done in some patients. The Nursing Service Managers and Directors of Critical Care will be contacted to participate in this phase and physiotherapists will not be informed of the study to prevent bias of information obtained.

CHITUNGWIZA CENTRAL HOSPITAL
CLINICAL DIRECTOR
10 NOV 2015
P.BAG 7245, CHITUNGWIZA
ZIMBABWE

No objection, however needs ethics Committee clearance.

After the first phase, the data from the first phase will be analysed so as to guide the next phase, which will focus on empirical exploration of the barriers and enablers to early mobilisation of patients in the units. The study will involve carrying out face to face interviews with physiotherapists working in ICU in government hospitals until saturation of qualitative data has been reached.

The results obtained from the interviews in phase 2 will inform the design of phase 3, which will be the development of a procedural guideline of early mobilisation of patients considering the screening for patient suitability and management of equipment during mobilisation. The guideline will be developed through an electronic Delphi study with clinicians and researchers with ICU working experience.

I would like to ask for your permission to carry out this research project at your hospital. I am willing to comply with any provisions or procedures that you deem necessary in order to protect the patients, the hospital and the therapists during the study period. Results from this project will contribute towards development of policies that ensure patient safety during early mobilisation in ICU and that ensure early mobilisation is given to all patients who are likely to benefit from it. Physiotherapy services guided by an evidence based protocol and offered by a dedicated unit therapist has the potential to lower cost of ICU care and facilitate functional recovery of patients after ICU discharge

I look forward to your favourable response to this request.

Yours faithfully

Tadyanemhandu
Cathrine Tadyanemhandu (PhD Student)

APPENDIX 3

- **PERMISSION LETTER FROM MPILO CENTRAL HOSPITAL**

Telephone: 09-212011
Fax: 09-205078
www: mpilohospital.org

MINISTRY OF HEALTH
AND CHILD CARE
MPILOCENTRAL HOSPITAL
P O BOX 2096
Vera Road
Mzilikazi
BULAWAYO

ZIMBABWE

05 November 2015

Department of Rehabilitation
P O Box A 178
Harare

ATTENTION: CATHERINE TADYANEMHANDU (PhD Student)

RE: APPLICATION TO CARRY OUT A RESEARCH ON TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICAN AND ZIMBABWEAN GOVERNMENT HOSPITALS' INTENSIVE CARE UNITS'..

Reference is made to your minute in connection with the above matter.

The Institution has no objection in you undertaking your study.

May you give us the results of your study.

Thank you

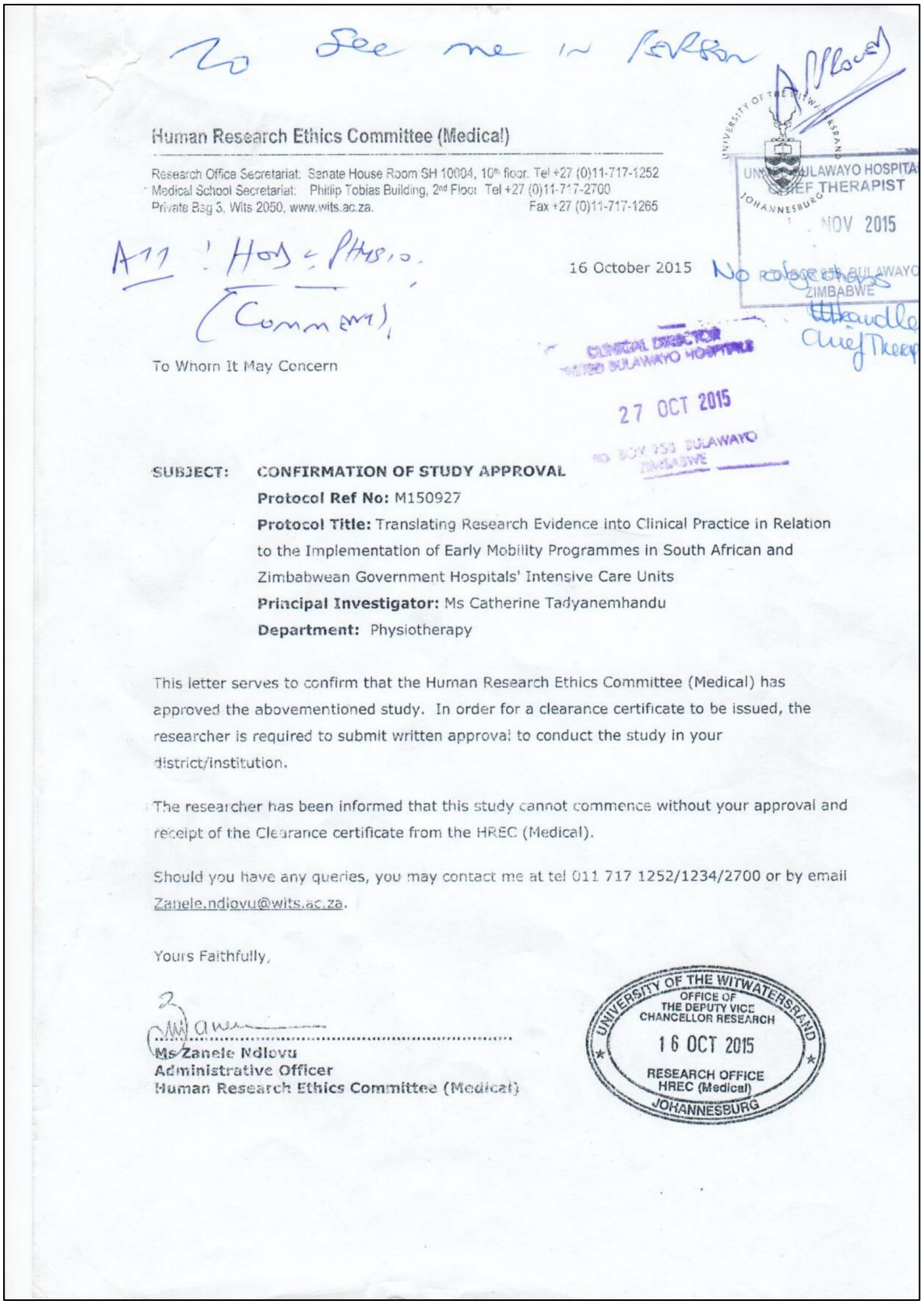
MPILO CENTRAL HOSPITAL
CLINICAL DIRECTOR
06 NOV 2015
BULAWAYO

Dr T.V Mubako
A/Clinical Director
MPILO CENTRAL HOSPITAL

Board Members: Mrs Sichelesile Moyo Ncube-Chairperson, Dr L.O.S. Mantiziba-Chief Executive Officer, Mr Siqokoqela Mphoko , Mr Hudson Hlabangana , Mr Prince Kunaka, Dr Nomathemba Ndiweni Dr Goodness N. Msimanga

APPENDIX 4

- **PERMISSION LETTER FROM UNITED BULAWAYO HOSPITALS**



To see me in person

Human Research Ethics Committee (Medical)

Research Office Secretariat: Senate House Room SH 10004, 10th floor. Tel +27 (0)11-717-1252
Medical School Secretariat: Phillip Tobias Building, 2nd Floor Tel +27 (0)11-717-2700
Private Bag 3, Wits 2050, www.wits.ac.za. Fax +27 (0)11-717-1265

All HODs Physio. (Comment)

16 October 2015

No research BULAWAYO ZIMBABWE

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG
UNITED BULAWAYO HOSPITALS
CHIEF THERAPIST
NOV 2015

CLINICAL DIRECTOR UNITED BULAWAYO HOSPITALS

27 OCT 2015
P.O. BOX 939 BULAWAYO ZIMBABWE

To Whom It May Concern

SUBJECT: **CONFIRMATION OF STUDY APPROVAL**

Protocol Ref No: M150927

Protocol Title: Translating Research Evidence into Clinical Practice in Relation to the Implementation of Early Mobility Programmes in South African and Zimbabwean Government Hospitals' Intensive Care Units

Principal Investigator: Ms Catherine Tadyanemhandu

Department: Physiotherapy

This letter serves to confirm that the Human Research Ethics Committee (Medical) has approved the abovementioned study. In order for a clearance certificate to be issued, the researcher is required to submit written approval to conduct the study in your district/institution.

The researcher has been informed that this study cannot commence without your approval and receipt of the Clearance certificate from the HREC (Medical).

Should you have any queries, you may contact me at tel 011 717 1252/1234/2700 or by email Zanele.ndlovu@wits.ac.za.

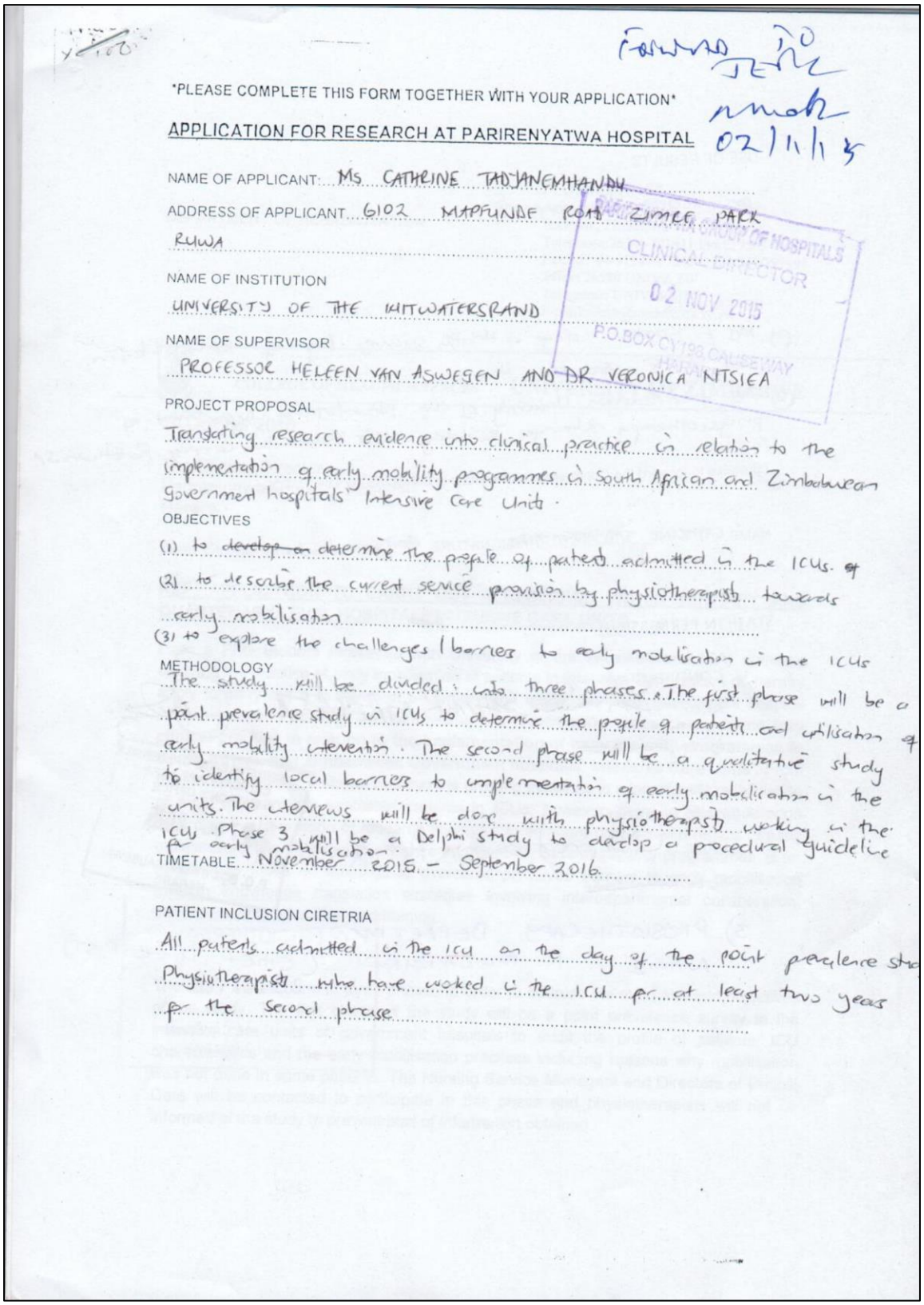
Yours Faithfully,

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

UNIVERSITY OF THE WITWATERSRAND
OFFICE OF THE DEPUTY VICE CHANCELLOR RESEARCH
16 OCT 2015
RESEARCH OFFICE HREC (Medical)
JOHANNESBURG

APPENDIX 5

- **PERMISSION LETTER FROM PARIRENYATWA GROUP OF HOSPITALS**



FORWARD TO DR NMOH 02/11/15

PLEASE COMPLETE THIS FORM TOGETHER WITH YOUR APPLICATION

APPLICATION FOR RESEARCH AT PARIRENYATWA HOSPITAL

NAME OF APPLICANT: MS CATHRINE TADJANEMHANDU

ADDRESS OF APPLICANT: 6102 MAPFUNDE ROAD ZIMRE PARK RUWA

NAME OF INSTITUTION

UNIVERSITY OF THE WITWATERSRAND

NAME OF SUPERVISOR

PROFESSOR HELEEN VAN ASWEGEN AND DR VERONICA NTSIEA

PARIRENYATWA GROUP OF HOSPITALS CLINICAL DIRECTOR 02 NOV 2015 P.O.BOX CY198 CAUSEWAY HARARE

PROJECT PROPOSAL

Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units.

OBJECTIVES

(1) to ~~develop~~ determine the profile of patients admitted in the ICUs. of

(2) to describe the current service provision by physiotherapists towards early mobilisation

(3) to explore the challenges / barriers to early mobilisation in the ICUs

METHODOLOGY

The study will be divided into three phases. The first phase will be a point prevalence study in ICUs to determine the profile of patients and utilisation of early mobility intervention. The second phase will be a qualitative study to identify local barriers to implementation of early mobilisation in the units. The interviews will be done with physiotherapists working in the ICUs. Phase 3 will be a Delphi study to develop a procedural guideline for early mobilisation.

TIMETABLE: November 2015 – September 2016

PATIENT INCLUSION CIRETRIA

All patients admitted in the ICU on the day of the point prevalence study. Physiotherapists who have worked in the ICU for at least two years for the second phase

USE OF RESULTS

for academic purposes.

REFERENCES

(1) Mrs F Kaseke · College of Health sciences · Dept of Rehabilitation · Bag A178 Avondale Harare

(2) Prof H van Aswegen · University of the Witwatersrand · Department of physiotherapy · Khanya Building · Wits Education campus · Parktown, S

I promise to forward the Conclusions of the study to the CLINICAL DIRECTOR

NAME CATHERINE TADYANEMHINDU SIGNATURE

STATION PERMISSION

1. CONSULTANT

NAME: Dr. S. STUMBAREKWA

Agree/~~Do not Agree~~

PARIRENYATWA GROUP OF HOSPITALS
CRITICAL CARE AREA
MATRON'S OFFICE
27 OCT 2015
P. O. BOX CY 198, CAUSEWAY
HARARE

2. WARD MANAGER

NAME: Nyamadzawo Acting SNO III

Agree/~~Do not Agree~~

3) PHYSIOTHERAPY DEPARTMENT

NAME : R MUZARURWI (CHIEF THERAPIST)

PARIRENYATWA GROUP OF HOSPITALS
PHYSIOTHERAPY
29 OCT 2015
198, CAUSEWAY
ZIMBABWE

APPENDIX 6

- **PERMISSION LETTER FROM EASTERN CAPE DEPARTMENT OF HEALTH**

Eastern Cape Department of Health

Enquiries:	Zonwabele Merile	Tel No:	040 608 0830
Date:	03 December 2015	Fax No:	043 642 1409
E-mail address:	zonwabele.merile@echealth.gov.za		

Dear Ms C. Tadyonemhandu

RE: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African & Zimbabwean Government hospitals. (EC_2015RP14_363)

The Department of Health would like to inform you that your application for conducting a research on the abovementioned topic has been approved based on the following conditions:

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department of Health in writing.
2. You are advised to ensure, observe and respect the rights and culture of your research participants and maintain confidentiality of their identities and shall remove or not collect any information which can be used to link the participants.
3. The Department of Health expects you to provide a progress on your study every 3 months (from date you received this letter) in writing.
4. At the end of your study, you will be expected to send a full written report with your findings and implementable recommendations to the Epidemiological Research & Surveillance Management. You may be invited to the department to come and present your research findings with your implementable recommendations.
5. Your results on the Eastern Cape will not be presented anywhere unless you have shared them with the Department of Health as indicated above.

Your compliance in this regard will be highly appreciated.

SECRETARIAT: EASTERN CAPE HEALTH RESEARCH COMMITTEE

PGDP EASTERN CAPE 2004 - 2014

Ikamva eliqaqambileyo!

APPENDIX 7

- **PERMISSION LETTER FROM NORTHERN CAPE DEPARTMENT OF HEALTH**

DEPARTMENT OF HEALTH
LEFAPHA LA BOITEKANELO
ISEBE LEZEMPILO
DEPARTEMENT VAN GESONDHEID

Department of Health
Private Bag X5049
KIMBERLEY
8301

Enquiries : Dr. Eshetu Worku
Dipatlisiso :
Imibuzo :
Navrae :

Reference :
Tshupelo :
Isalathiso :
Verwysings :

Tel: 053 830 2122
Fax: 086 541 7122

Date : 02 December 2015
Letlha :
Umhla :
Datum :

Ms. Cathrine Tadyanemhandu
University of the Witwatersrand
Khanya Building, WITS Education Campus
St Andrew's road
Park Town, 2193

Dear. Dr Eshetu Worku

PROJECT TITLE: TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICA AND ZIMBABWEAN GOVERNMENT HOSPITAL'S INTENSIVE CARE UNITS.

Reference Number: NC_2015RP50_643

The application to conduct the study was received and has been reviewed by the Provincial Health Research and Ethics Committee (PHREC)

Approval is hereby granted to conduct the above-mentioned study in the Northern Cape Province

Please note: This approval is valid for a period of one year from the date of approval.

We are committed to achieving our vision through a decentralized, accountable, accessible and constantly improving health care system within available resources. Our caring, multi-skilled, effective personnel will use evidence-based, informative health care and maturing partnerships for the benefit of our clients and patients.

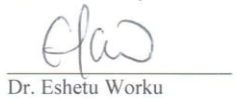
The following conditions have to be noted:

1. This project shall be conducted at **no** cost to the Northern Cape Department of Health
2. The approval is limited to the research proposal as submitted in the application.
3. Variation or modification on the research must be notified formally to PHREC for further consideration.
4. The PHREC may monitor the project at any time.
5. A six months progress report ***must*** be submitted to the PHREC
6. At the completion of your study a copy of the final report must be submitted to the Research and Development Directorate.
7. The Northern Cape Senior Management Committee will be briefed on the outcome of the study prior to publishing.

Furthermore, after the completion of you project, you may be requested to do a presentation on the final findings of your study.

The committee wishes you success on your study

Yours Faithfully



03/12/2015

Dr. Eshetu Worku
Chairperson: PHREC
E-mail: eworku@ncpg.gov.za
Tel: 053 830 2122
Fax: 086 541 7122

Date

APPENDIX 8

- **PERMISSION LETTER FROM FREE STATE DEPARTMENT OF HEALTH**



health
Department of Health
FREE STATE PROVINCE

01 December 2015

Ms. C Tadyanemhandu
Dept. of Physiotherapy
WITS

Dear Ms. C Tadyanemhandu

Subject: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government Hospital's Intensive Care Unit.

- Permission is hereby granted for the above – mentioned research on the following conditions:
- Participation in the study must be voluntary.
- A written consent by each participants must be obtained
- Serious adverse events to be reported and/or termination of the study.
- Ascertain that your data collection exercise neither interferes with the day to day running of the Dihlabeng , Pelonomi and Universitas Hospital nor the performance of duties by the respondents or health care workers
- Confidentiality of information will be ensured and no names will be used.
- Research results and a complete report should be made available to the Free State Department of Health on completion of the study (a hard copy plus a soft copy).
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of the University of Witwatersrand and to Free State Department of Health.
- Any amendments, extension or other modifications to the protocol or investigators must be submitted to the Ethics Committee of the University of Witwatersrand and to Free State Department of Health.
- Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to khusemj@fshealth.gov.za or sebeelats@fshealth.gov.za before you commence with the study
- No financial liability will be placed on the Free State Department of Health
- Please discuss your study with the institution managers/CEOs on commencement for logistical arrangements
- Department of Health to be fully indemnified from any harm that participants and staff experiences in the study
- Researchers will be required to enter in to a formal agreement with the Free State department of health regulating and formalizing the research relationship (document will follow)
- You are encouraged to present your study findings/results at the Free State Provincial health research day
- Future research will only be granted permission if correct procedures are followed see http://nhrd.hst.org.za

Trust you find the above in order.

Kind Regards

Dr D Motau
HEAD: HEALTH
Date: 3/12/2015

Head : Health
PO Box 227, Bloemfotein, 9300
4th Floor, Executive Suite, Bophelo House, cnr Maitland and, Harvey Road, Bloemfotein
Tel: (051) 408 1646 Fax: (051) 408 1556 e-mail:khusemj@fshealth.gov.za@fshealth.gov.za/chikobvup@fshealth.gov.za

www.fs.gov.za

APPENDIX 9

- **PERMISSION LETTER FROM MPUMALANGA DEPARTMENT OF HEALTH**

health
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

No.3, Government Boulevard, Riverside Park, Ext. 2, Mbombela, 1200, Mpumalanga Province
Private Bag X11285, Mbombela, 1200, Mpumalanga Province
Tel I: +27 (13) 766 3429, Fax: +27 (13) 766 3458

Litiko Letemphilo | Departement van Gesondheid | UmNyango WezeMaphilo

Enquiries: Themba Mulungo (013) 766 3511

23 November 2015

Ms. Cathrine Tadyanemhandu
Khanya Building
Wits Education Campus
St Andrew's Road
PARKTOWN
2193

Dear Ms. Cathrine Tadyanemhandu

APPLICATION FOR RESEARCH & ETHICS APPROVAL: TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICAN AND ZIMBABWEAN GOVERNMENT HOSPITALS ICUS

The Provincial Health Research and Ethics Committee has approved your research proposal in the latest format that you sent.

PHREC REF: MP_2015RP7_204

Kindly ensure that you provide us with the soft and hard copies of the report once your research project has been completed.

Kind regards

MR. JERRY SIGUDLA
RESEARCH AND EPIDEMIOLOGY

MPUMALANGA PROVINCE
DEPARTMENT OF HEALTH
PLANNING & INFORMATION
2015 -11- 23
DATE
PRIVATE BAG X 11285
NELSPRUIT 1200

MPUMALANGA
THE PLACE OF THE RISING SUN

APPENDIX 10

- **PERMISSION LETTER FROM GAUTENG DEPARTMENT OF HEALTH**

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

OUTCOME OF PROVINCIAL PROTOCOL REVIEW COMMITTEE (PPRC)

Researcher's Name (Principal investigator)	Ms. Cathrine Tadyanemhandu
Organization / Institution	Wits
Research Title	Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals Intensive Care Units.
Contact number	Address: Contact no: 011 717 3702 Cell: Email: 1305353@students.wits.ac.za
Protocol number	GP_2015RP30_259
Date submitted	2015/11/20
Date reviewed	2016/03/31
Outcome	Approved

It is a pleasure to inform that the Gauteng Health Department has approved your research on "Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals Intensive Care Units".

Study sites: CMJAH, CHBAH, DGMAH, SBAH, Helen Joseph, Kalafond & Tembisa Hospitals

The Provincial Protocol Review Committee kindly requests that you to submit a report after completion of your study and present your findings to the Gauteng Health Department.

Recommended/Not recommended

Dr. B. Ikalafeng
On behalf of PPRC

Date: 13/05/16

Approved/Not approved

Dr. L.R.R. Lebethe
DDG: Clinical Services

Date: 25 05 2016

APPENDIX 11

- **PERMISSION LETTER FROM KWAZULU NATAL DEPARTMENT OF HEALTH**

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

330 Langalibalele street,
Private Bag X9051 PMB, 3200
Tel: 033 395 2805/3189/3123 Fax: 033 394 3782
Email: hrkm@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management (HKRM)

Reference: **HRKM339/15**
KZ_2015RP10_981

24 November 2015

Ms C Tadyanemhandu
(University of Witwatersrand)

Subject: Approval of a Research Proposal

1. The research proposal titled **'Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals ICUs'** was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

   The proposal is hereby **approved** for research to be undertaken at selected tertiary and quaternary facilities with ICUs in KZN-DoH.

2. You are requested to take note of the following:
   a. Seek support for the study from the relevant districts or facilities and make the necessary arrangement with the identified facility **before** commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Ms G Khumalo on 033-395 3189.

Yours Sincerely

Dr E Lutge
Chairperson, Health Research Committee
Date: 26/11/15

Fighting Disease, Fighting Poverty, Giving Hope

APPENDIX 12

- **PERMISSION LETTER FROM LIMPOPO DEPARTMENT OF HEALTH**

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Latif Shamila Ref:4/2/2

Tadyanemhandu C
University of Witwatersrand

Greetings,

RE: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government Hospitals Intensive Care Units

The above matter refers.

1. Permission to conduct the above mentioned study is hereby granted.
2. Kindly be informed that:-
   - Research must be loaded on the NHRD site (http://nhrd.hst.org.za) by the researcher.
   - Further arrangement should be made with the targeted institutions, after consultation with the District Executive Manager.
   - In the course of your study there should be no action that disrupts the services.
   - After completion of the study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
   - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
   - The above approval is valid for a 3 year period.
   - If the proposal has been amended, a new approval should be sought from the Department of Health.
   - Kindly note, that the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated.

Head of Department Date 18/02/16

18 College Street, Polokwane, 0700, Private Bag x9302, POLOLKWANE, 0700
Tel: (015) 293 6000, Fax: (015) 293 6211/20 Website: http/www.limpopo.gov.za

The heartland of Southern Africa – *development is about people*

APPENDIX 13

- **PERMISSION LETTER FROM UNIVERSITAS ACADEMIC HOSPITAL**

health
Department of Health
FREE STATE PROVINCE

28 July 2016

Ms C Tadyanemhandu
Department of Physiotherapy
WITS

Dear Ms Tadyanemhandu

TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICAN AND ZIMBABWEAN GOVERNMENT HOSPITAL's INTENSIVE CARE UNIT

Universitas Academic Hospital will only grant permission when the following criteria have been met:

√ that you obtain Ethical Clearance from the Human Research Ethics Committee of the relevant University;

√ that the Hospital incurs no cost in the course of your research;

√ that access to the staff and patients at Universitas Academic Hospital will not interrupt the daily provision of services; and

√ that prior to conducting the research you will liaise with the supervisors of the relevant sections and introduce yourself with permission letter and to make arrangements with them in a manner that is convenient to the sections.

Yours sincerely

DR B A BENGANGA
ACTING HEAD: CLINICAL SERVICES

Dr. B.A. Benganga
29 JUL 2016
Acting Head of Clinical Services
Universitas Academic Hospital

UNIVERSITAS ACADEMIC HOSPITAL
Private Bag X20660, Bloemfontein, 9300
Clinical Services, First Floor, Logeman Street, Universitas, Bloemfontein, 9301
Tel: (051) 405 3557 Fax: (051) 405 3634
E-mail address: bengangaba@universitas.fs.gov.za

APPENDIX 14

- **PERMISSION LETTER FROM KING EDWARD VII HOSPITAL**

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

KING EDWARD VIII HOSPITAL

Private Bag X02, CONGELLA, 4013
Corner of Rick Turner (Francois Road) & Sydney Road
Tel: 031-3603853, Fax:031-2061457; Email: rejoice.khuzwayo@kznhealth.gov.za
www.kznhealth.gov.za

Ref.: KE 2/7/1/(05/2016
Enq.: Mrs. R. Sibiya
Research Programming

12 February 2016

Ms. C. Tadyanemhandu
Physiotherapy Department
University of Witwatersrand
UNIVERSITY OF WITWATERSRAND

Dear MS. Tadyanemhandu

Protocol: Translating Research Evidence into Clinical Practice in Relation to the Implementation of Early Mobility Programmes in South African and Zimbabwean Government Hospitals' Intensive Care Units.
Protocol Ref. No. M150927

Permission to conduct research at King Edward VIII Hospital is provisionally granted, pending approval by the Provincial Health Research Committee, KZN Department of Health.

Kindly note the following:-

- The research will only commence once confirmation from the Provincial Health Research Committee in the KZN Department of Health has been received.
- Signing of an indemnity form at Room 8, CEO Complex before commencement with your study.
- King Edward VIII Hospital received full acknowledgment in the study on all Publications and reports and also kindly present a copy of the publication or report on completion.

The Management of King Edward VIII Hospital reserves the right to terminate the permission for the study should circumstances so dictate.

Yours faithfully

SUPPORTED/~~NOT SUPPORTED~~

15/02/2016

DR. SA MOODLEY **DATE**
ACTING SENIOR MEDICAL MANAGER

Fighting Disease, Fighting Poverty, Giving Hope

APPENDIX 15

- **PERMISSION LETTER FROM FRERE HOSPITAL**

Province of the
EASTERN CAPE
HEALTH

Non Interventional Hospital Review Board

Postal Address:
Frere Hospital
Private bag x 9047
Amalinda
East London
5200
Enquiries: B. Willie

Tel: 043 709 2389

Physical Address:
Frere Hospital
4th Floor Room 4.18
Amalinda
East London
5200

Email:babalwa.willie@impilo.ecprov.gov.za

12th August 2016

Ms C. Tadyanemhandu
Witwatersrand University
Faculty of Health Sciences
Department of Physiotherapy
Braamfontein
2000

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN RADIOGRAPHY

"Translation Research Evidence into Clinical Practice in Relation to the Implementation of Early Mobili Programmes in South Africa and Zimbabwean Government Hospital's Intensive Care Units".

We acknowledge receipt of the above mentioned proposal.

Having gone through your proposal, the committee has no ethical problems noted.

Please be advised that the committee has granted you the consent to do the research and confidentiality be maintained.

Yours sincerely

.....
Dr J. Thomas
Clinical Governance Frere Hospital

APPENDIX 16

- **PERMISSION LETTER FROM GREYS HOSPITAL**

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

GREYS HOSPITAL
OFFICE OF THE CEO
Private Bag X 9001, Pietermaritzburg, 3200
Town Bush Road, Chase Valley, Pietermaritzburg, 3201
Tel.:033 – 897 3321 Fax.: 033 - 8973398

To:	**Cathrine Tadyanenemhandu** **Department of Physiotherapy - Wits University**
From:	**Dr. K. B. Bilenge** **CEO - Greys Hospital**
Date:	**9 March 2016**
Re:	**Request for permission to conduct research at Grey's Hospital:** ***Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals ICUs.***

Dear Cathrine Tadyanenemhandu

Your request to conduct research at Grey's Hospital refers.
Subsequent to raising our concerns regarding the "nursing staff will capture data" in the first phase of the trial, you have changed your protocol and indicated that data collection will be done by a research assistant and not the nurses (as per annexure attached herewith).

Permission to conduct the above study is hereby granted under the following conditions:

- Your ethics approval and research protocol are assumed to be valid;
- You are also required to obtain approval for your study from the Provincial Department of Health KZN Health Research Unit prior to commencing your study at Grey's Hospital. You will find more information on their website: *http://www.kznhealth.gov.za/hrkm.htm*
- Confidentiality of hospital information, including staff and patient medical and/or contact information, must be kept at all times; Patient records are **not** to be removed from the hospital premises nor are you allowed to photocopy/ photograph them.
- You are to ensure that your data collection process will not interfere with the routine services at the hospital;
- **You are to ensure that hospital resources are not used in data collection, e.g. any hospital staff collecting/collating data for you; photocopying; telephone; Internet, facsimile, etc. Nurses, doctors and physiotherapists will NOT collect data for you.**
- Informed consent is to be obtained from all participants in your study, if applicable;
- Policies, guidelines and protocols of the Department of Health and Grey's Hospital must be adhered to at all times;
- Professional attitude and behaviour whilst dealing with research participants must be exhibited;
- The Department of Health, hospital and its staff will not be held responsible for any negative incidents and/or consequences, including injuries and illnesses that may be contracted on site, litigation matters, etc. that may arise as a result of your study or your presence on site;
- You are required to submit to this office a summary of study findings upon completion of your research.
- You are requested to make contact with the Head of Critical Care, **Dr. R. von Rahden,** and Head of Physiotherapy, **Ms. Heidi Shanahan**, at Grey's Hospital once you are ready to commence data collection.

Dr L. Naidoo
Senior Manager: Medical Services

Dr K. B. Bilenge
Hospital CEO

uMnyango Wezempilo . Departement van Gesondheid

Fighting Disease, Fighting Poverty, Giving Hope

APPENDIX 17

- **PERMISSION LETTER FROM CHRIS HANI BARAGWANATH HOSPITAL**

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

MEDICAL ADVISORY COMMITTEE
CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 19 Oct 2016

TITLE OF PROJECT: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' intensive care units

UNIVERSITY: Witwatersrand

Principal Investigator: C Tadyanemhandu

Department: Physiotherapy

Supervisor (If relevant): H van Aswegen

Permission Head Department (where research conducted): Yes

Date of start of proposed study: October 2016
Date of completion of data collection: December 2020

The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Hospital. The CEO /management of Chris Hani Baragwanath Hospital is accordingly informed and the study is subject to:-

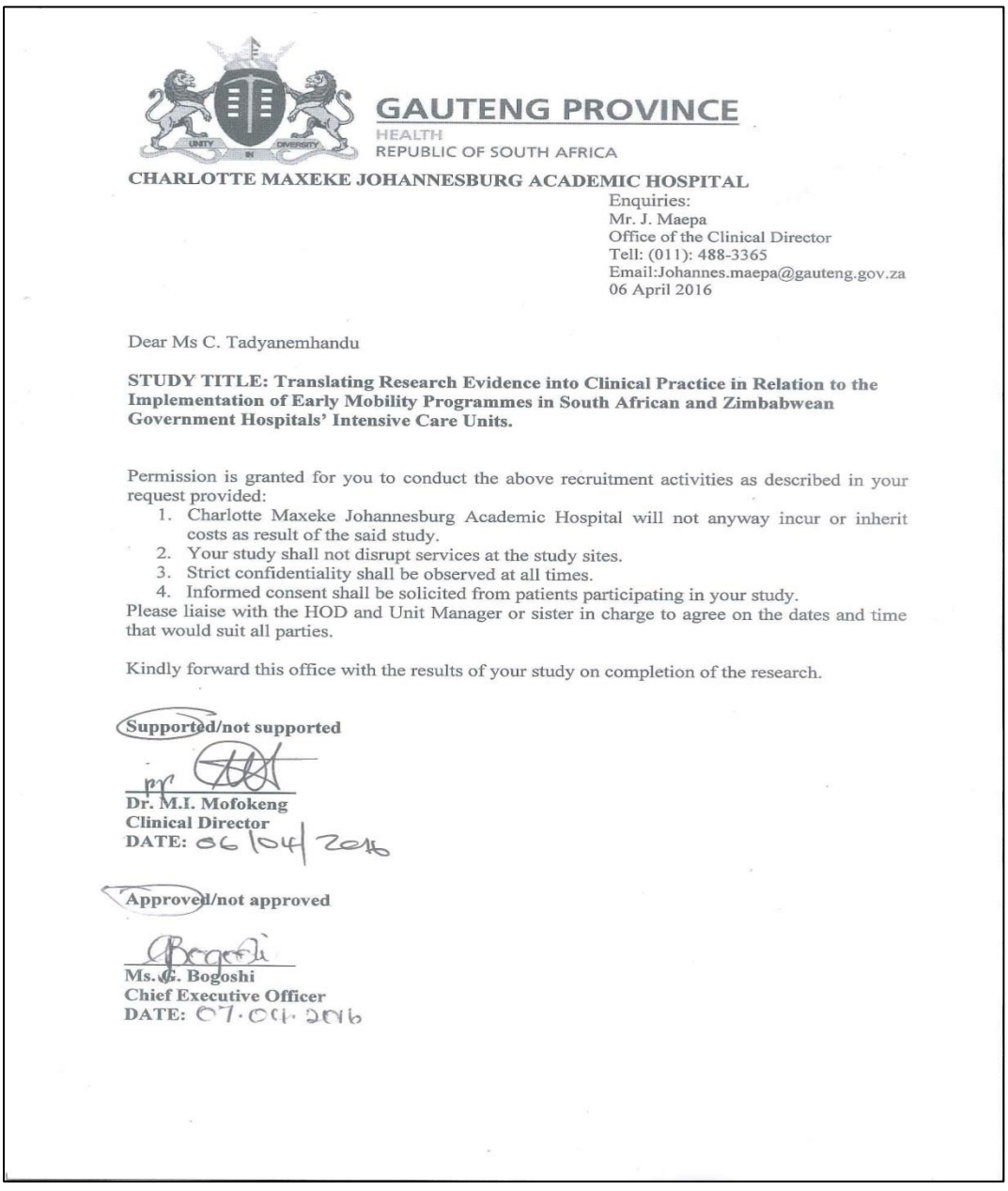
- Permission having been granted by the Human Research Ethics Committee of the University of the Witwatersrand.
- the Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- the MAC will be informed of any serious adverse events as soon as they occur
- permission is granted for the duration of the Ethics Committee approval.

Recommended
(On behalf of the MAC)
Date: 19 October 2016

Approved/Not Approved
Hospital Management
Date: 27/10/16

APPENDIX 18

- **PERMISSION LETTER FROM CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL**



GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Mr. J. Maepa
Office of the Clinical Director
Tell: (011): 488-3365
Email:Johannes.maepa@gauteng.gov.za
06 April 2016

Dear Ms C. Tadyanemhandu

STUDY TITLE: Translating Research Evidence into Clinical Practice in Relation to the Implementation of Early Mobility Programmes in South African and Zimbabwean Government Hospitals' Intensive Care Units.

Permission is granted for you to conduct the above recruitment activities as described in your request provided:

1. Charlotte Maxeke Johannesburg Academic Hospital will not anyway incur or inherit costs as result of the said study.
2. Your study shall not disrupt services at the study sites.
3. Strict confidentiality shall be observed at all times.
4. Informed consent shall be solicited from patients participating in your study.

Please liaise with the HOD and Unit Manager or sister in charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the results of your study on completion of the research.

Supported/not supported

pp

Dr. M.I. Mofokeng
Clinical Director
DATE: 06/04/2016

Approved/not approved

Ms. G. Bogoshi
Chief Executive Officer
DATE: 07.04.2016

APPENDIX 19

- **PERMISSION LETTER FROM GROOTE SCHUUR HOSPITAL**

Western Cape Government
Health

GROOTE SCHUUR HOSPITAL
Enquiries: Dr Bernadette Eick
E-mail : Bernadette.Eick@westerncape.gov.za

Ms C. Tadyanemhandu
University of the Witwatersrand
Department of Physiotherapy

E-mail: 1305353@students.wits.ac.za

Dear Ms Tadyanemhandu

RESEARCH PROJECT: Translating Research Evidence into Clinical practice in Relation to the Implementation of Early Mobility Programmes in South Africa and Zimbabwean Government Hospitals' Intensive Care Units

Your recent letter to the hospital refers.

You are hereby granted permission to proceed with your research which is valid until **24 May 2018.**

Please note the following:

a) Your research may not interfere with normal patient care.
b) Hospital staff may not be asked to assist with the research.
c) No additional costs to the hospital should be incurred i.e. Lab, consumables or stationary may be used.
d) **No patient folders may be removed from the premises or be inaccessible.**
e) Please introduce yourself to the person in charge of an area before commencing.
f) Please discuss the study with the HOD before commencing.
g) Please provide the research assistant/field worker with a copy of this letter as verification of approval.
h) Confidentiality must be maintained at all times.
i) Should you require additional research time beyond the stipulated expiry date, please apply for an extension.
j) **Once research is complete, please submit a copy of the publication or report.**

I would like to wish you every success with the project.

Yours sincerely

DR BERNADETTE EICK
CHIEF OPERATIONAL OFFICER
Date: 23rd June 2016
BE/vms

C.C. Mr L. Naidoo
Ms C. Davids

G46 Management Suite, Old Main Building,
Observatory 7925

Tel: +27 21 404 6288 fax: +27 21 404 6125

Private Bag X,
Observatory, 7935

www.capegateway.go.v.za

APPENDIX 20

- **PERMISSION LETTER FROM KALAFONG HOSPITAL**

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

KALAFONG HOSPITAL
PRIVATE BAG X396
PRETORIA
0001

ENQUIRIES : MS NT LEDIGA
TEL : 012 318 6995
FAX : 012 373 6791
EMAIL : Nelly.Lediga@gauteng.gov.za
REF : KPTH 38/2016

TO: CATHRINE TADYANEMHANDU

RE: PERMISSION TO CONDUCT RESEARCH

TITLE: TRANSLATING RESEARCH EVIDENCE INTO CLINICAL PRACTICE IN RELATION TO THE IMPLEMENTATION OF EARLY MOBILITY PROGRAMMES IN SOUTH AFRICA AND ZIMBABWEAN GOVERNMENT HOSPITALS INTENSIVE CARE UNITS

Permission is hereby granted for the research to be conducted at **Kalafong Provincial Tertiary Hospital**.

Approved:

DR K.E LETEBELE-HARTELL
SENIOR MANAGER: MEDICAL SERVICES

DATE: 02/08/2016

APPENDIX 21

- **PERMISSION LETTER FROM DR GEORGE MUKHARI ACADEMIC HOSPITAL**

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Dr. George Mukhari Academic Hospital

Office of the Director Clinical Services
Enquiries : Dr. PMT. Mabusela
Tel : (012) 529 3880
Fax : (012) 560 0099
Philly.Mabusela@gauteng.gov.za
Kedibone.Matsimela@gauteng.gov.za

TO : Ms. Cathrine Tadyanemhandu
: Department of Physiotherapy
: University of Witwatersrand
: Johannesburg
: 2000

DATE : 29th June 2016

PERMISSION TO CONDUCT RESEARCH

The Dr. George Mukhari Academic Hospital hereby grants you permission to conduct research on "Translating Research Evidence into Clinical Practice in Relation to the Implementation of early mobility programmes in South African and Zimbabwean Government Hospitals' Intensive Care Units at Dr. George Mukhari Academic Hospital."

The hospital is aware that you have already obtained Clearance from the University of Witwatersrand

This permission is granted subject to the following conditions:

☑ That the Hospital incurs no cost in the course of your research

☑ That access to the staff and patients at the Dr. George Mukhari Academic Hospital will not interrupt the daily provision of services.

☑ That prior to conducting the research you will liaise with the supervisors of the relevant sections to introduce yourself (with this letter) and to make arrangements with them in a manner that is convenient to the sections.

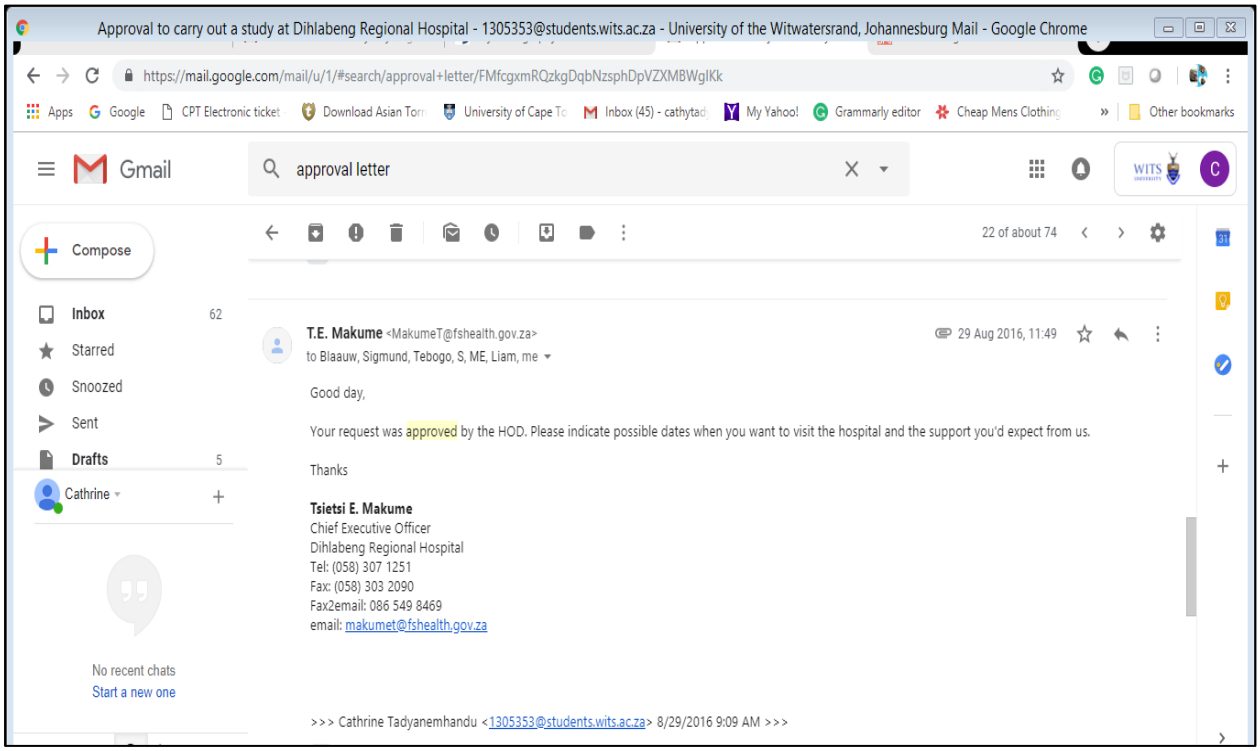
Yours sincerely

DR. RMT MABUSELA
DIRECTOR: CLINICAL SERVICES

GAUTENG PROVINCIAL GOVERNMENT
DIRECTOR CLINICAL SERVICES
2016 -06- 29
PRIVATE BAG X422
PRETORIA 0001
DR GEORGE MUKHARI HOSPITAL

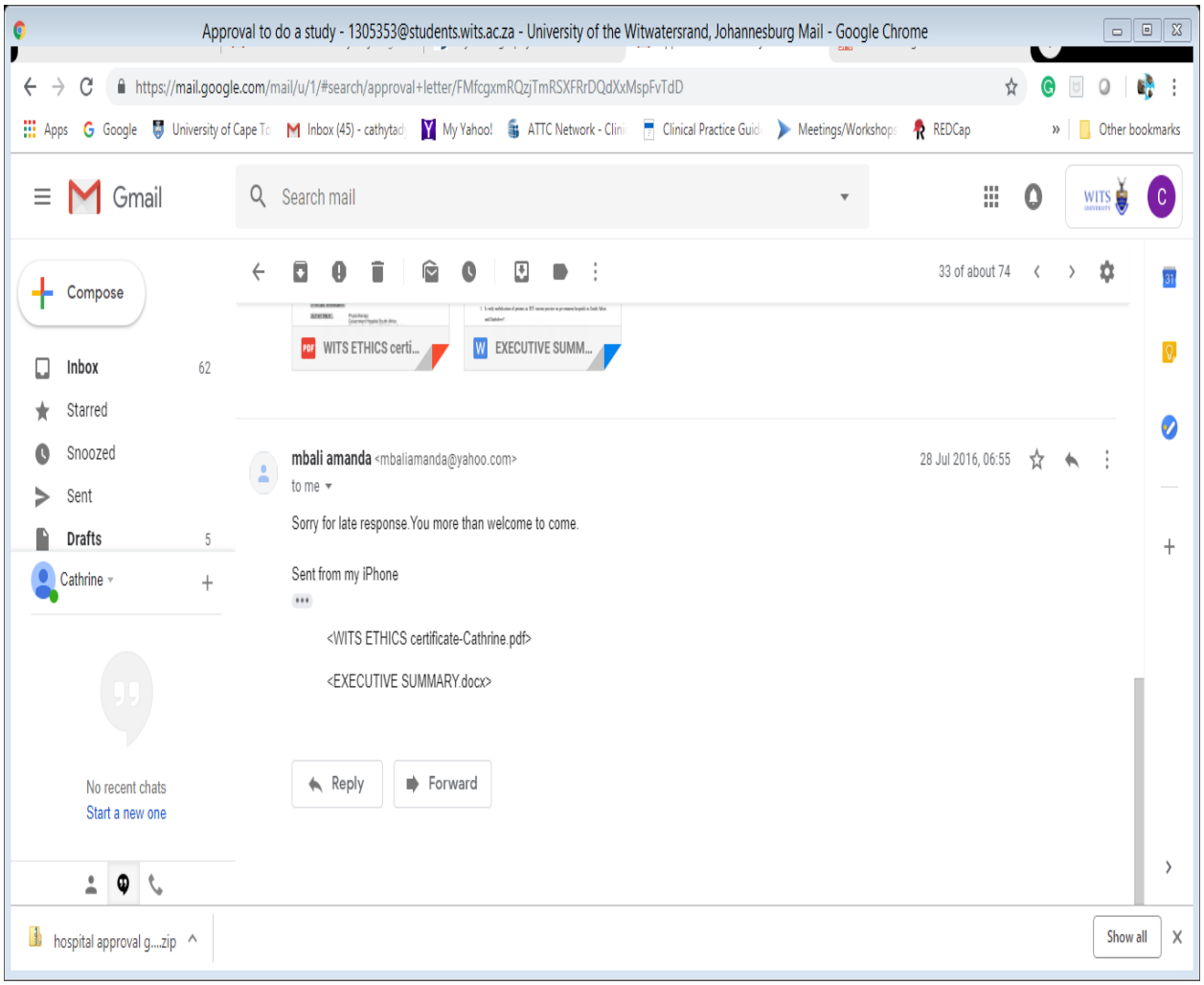
APPENDIX 22

- **PERMISSION LETTER FROM DIHLABENG HOSPITAL**



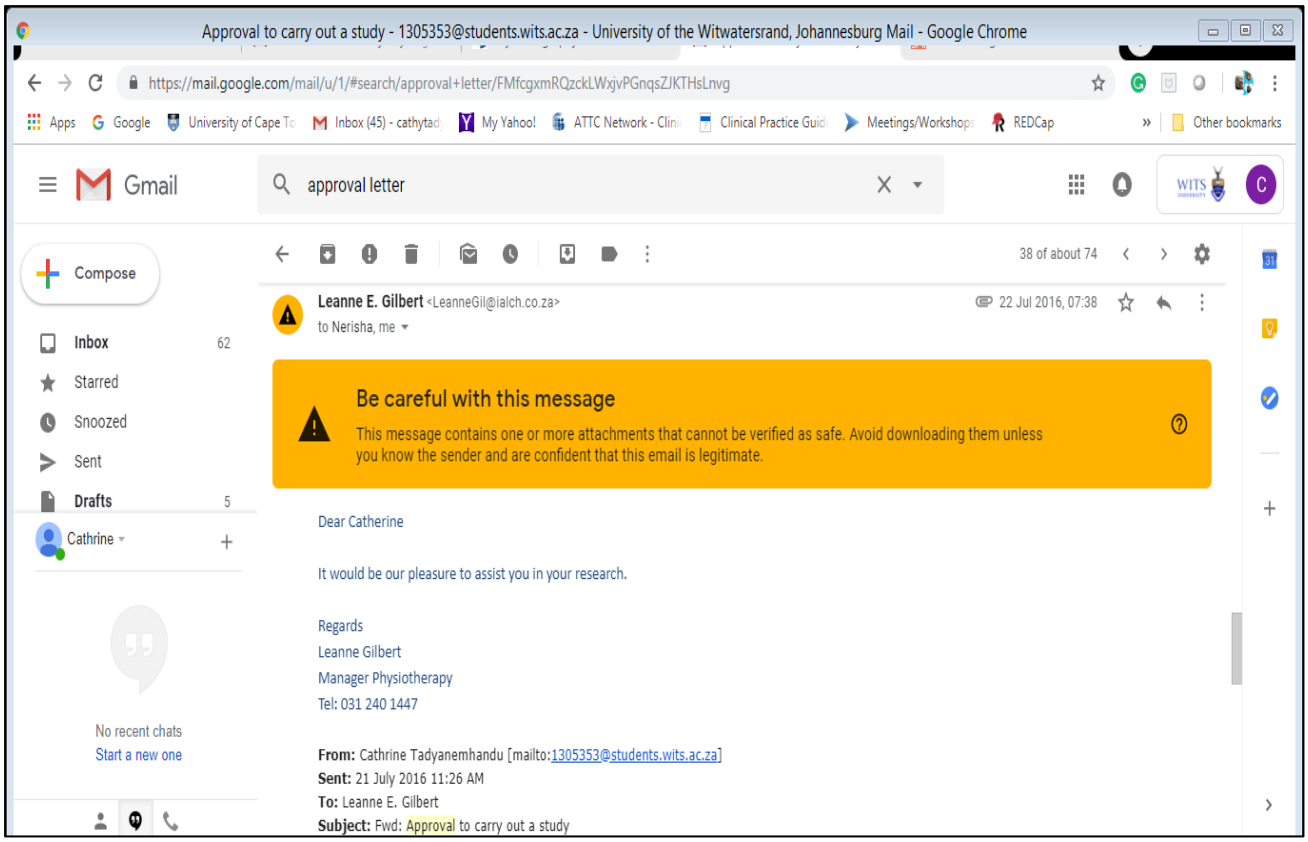
APPENDIX 23

- **PERMISSION LETTER FROM TEMBISA HOSPITAL**



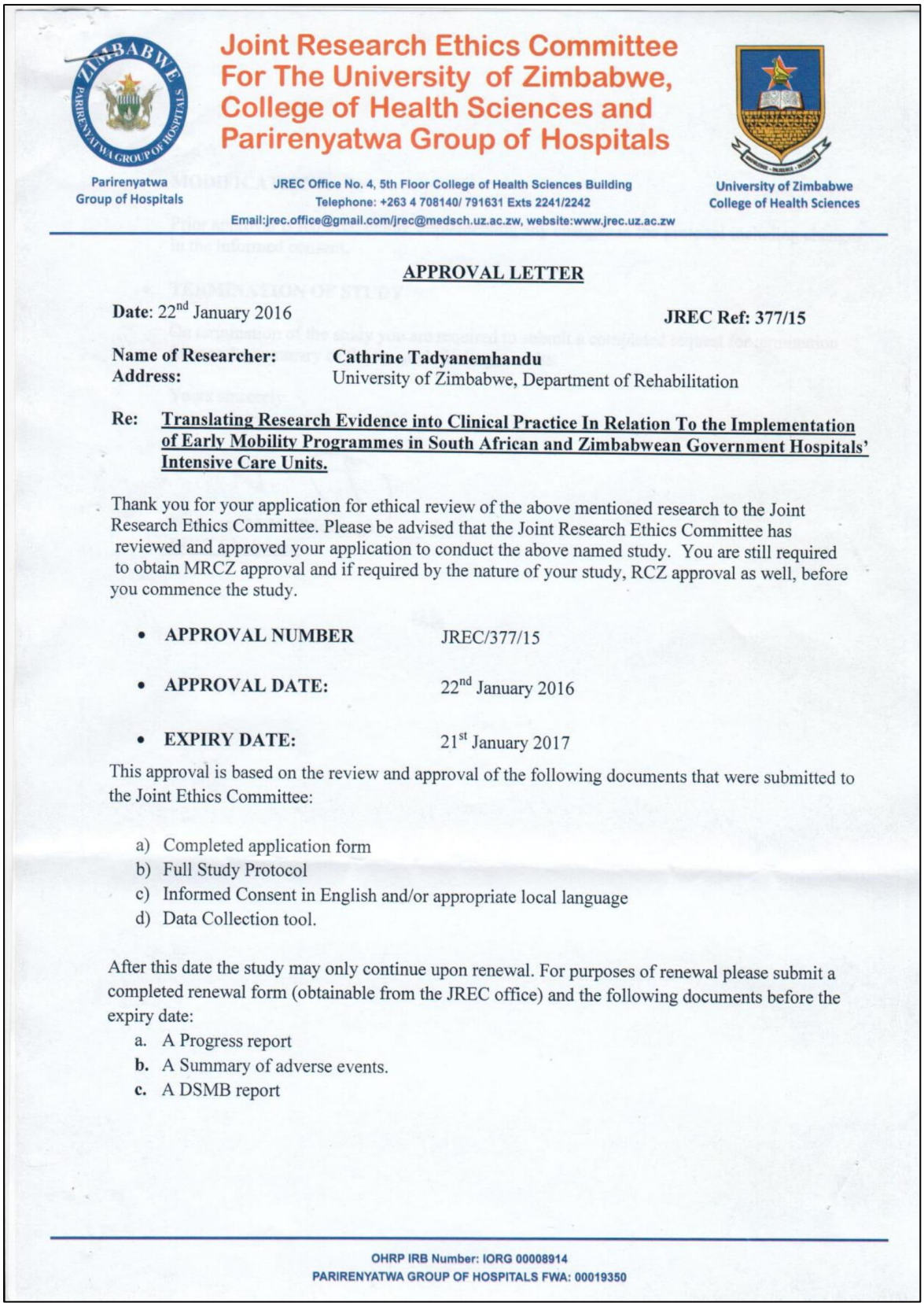
APPENDIX 24

- **PERMISSION LETTER FROM ALBERT SISULI ACADEMIC HOSPITAL**



APPENDIX 25

- **JREC APPROVAL LETTER**



Joint Research Ethics Committee
For The University of Zimbabwe,
College of Health Sciences and
Parirenyatwa Group of Hospitals

Parirenyatwa
Group of Hospitals

JREC Office No. 4, 5th Floor College of Health Sciences Building
Telephone: +263 4 708140/ 791631 Exts 2241/2242
Email:jrec.office@gmail.com/jrec@medsch.uz.ac.zw, website:www.jrec.uz.ac.zw

University of Zimbabwe
College of Health Sciences

APPROVAL LETTER

Date: 22nd January 2016 **JREC Ref: 377/15**

Name of Researcher: **Cathrine Tadyanemhandu**
Address: University of Zimbabwe, Department of Rehabilitation

Re: **Translating Research Evidence into Clinical Practice In Relation To the Implementation of Early Mobility Programmes in South African and Zimbabwean Government Hospitals' Intensive Care Units.**

Thank you for your application for ethical review of the above mentioned research to the Joint Research Ethics Committee. Please be advised that the Joint Research Ethics Committee has reviewed and approved your application to conduct the above named study. You are still required to obtain MRCZ approval and if required by the nature of your study, RCZ approval as well, before you commence the study.

- **APPROVAL NUMBER** JREC/377/15
- **APPROVAL DATE:** 22nd January 2016
- **EXPIRY DATE:** 21st January 2017

This approval is based on the review and approval of the following documents that were submitted to the Joint Ethics Committee:

a) Completed application form
b) Full Study Protocol
c) Informed Consent in English and/or appropriate local language
d) Data Collection tool.

After this date the study may only continue upon renewal. For purposes of renewal please submit a completed renewal form (obtainable from the JREC office) and the following documents before the expiry date:

a. A Progress report
b. A Summary of adverse events.
c. A DSMB report

OHRP IRB Number: IORG 00008914
PARIRENYATWA GROUP OF HOSPITALS FWA: 00019350

- **MODIFICATIONS:**

  Prior approval is required before implementing any changes in the protocol including changes in the informed consent.

- **TERMINATION OF STUDY**

  On termination of the study you are required to submit a completed request for termination form and a summary of the research findings/results.

Yours sincerely

Professor M.M Chidzonga
JREC Chairman

APPENDIX 26

- **MRCZ APPROVAL LETTER**

Telephone: 791792/791193
Telefax: (263) - 4 - 790715
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

APPROVAL

REF: MRCZ/A/2040 **10 May 2016**

Cathrine Tadyanemhandu
University of Zimbabwe
College of Health Sciences
P.O Box A 178
Avondale
Harare

RE:- Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in Southern African and Zimbabwean government hospital's Intensive Care Units

Thank you for the application for review of Research Activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above titled study.

Thisapproval is based on the review and approval of the following documents that were submitted to MRCZ for review:-

a) Full Proposal
b) Informed Consent Forms (English and Shona)

- **APPROVAL NUMBER : MRCZ/A/2040**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **TYPE OF MEETING : Full Board**
- **EFFECTIVE APPROVAL DATE : 10 May 2016**
- **EXPIRATION DATE : 09 May 2017**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted three months before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2016 -05- 10
APPROVED
P.O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

Telephone: 791792/791193
Telefax: (263) - 4 - 790715
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

APPROVAL

REF: MRCZ/A/2040 **10 May 2018**

Cathrine Tadyanemhandu
University of Zimbabwe
College of Health Sciences
P.O Box A 178
Avondale
Harare

RE:- Translating Research Evidence Into Clinical Practice In Relation To The Implementation Of Early Mobility Programmes In Southern African And Zimbabwean Government Hospital's Intensive Care Units

Thank you for the application for review of Research Activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to continue conducting the above titled study.

This approval is based on the review and approval of the following documents that were submitted to MRCZ for review:-

a) MRCZ Form 102
b) Progress Report

- **APPROVAL NUMBER : MRCZ/A/2040**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **TYPE OF MEETING : Full Board**
- **EFFECTIVE APPROVAL DATE : 10 May 2018**
- **EXPIRATION DATE : 09 May 2019**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted three months before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2018 -05- 10
APPROVED
P.O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

APPENDIX 27

- **WITS ETHICAL CLEARANCE**

R14/49 Ms Cathrine Tadyanemhandu

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M150927

NAME: (Principal Investigator)	Ms Cathrine Tadyanemhandu
DEPARTMENT:	Physiotherapy Government Hospital South Africa Ministry of health and Child Care, Zimbabwe
PROJECT TITLE:	Translating Research Evidence into Clinical Practice in Relation to the Implementation of Early Mobility Programmes in South African and Zimbabwean Government Hospitals' Intensive Care Units
DATE CONSIDERED:	02/10/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof Heleen van Aswegen and Dr Veronica Ntsiea
APPROVED BY:	Professor P. Cleaton-Jones,Chairperson, HREC (Medical)
DATE OF APPROVAL:	27/05/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 10004,10th floor, Senate House/2nd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated,from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially review in September and will therefore be due in the month of September each year.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX 28

- **INFORMED CONSENT FORM FOR PATIENTS IN PHASE ONE**

 MRCZ NO------A/2040

Physiotherapy

Faculty of Health Sciences · Private Bag 3, Wits, 2050, South Africa
Tel: +27 11 717 3702 · Fax : 27 11 717 3719 · E-mail: maryanne.cannon@wits.ac.za

PATIENT"S INFORMED CONSENT FORM

Project Title: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units: a Survey Study.

Principal Investigator_____Cathrine Tadyanemhandu, [*MS*]

Phone number(s)_____0773 430 792

Email address _____**cathytadya@gmail.com/1305353@students.wits.ac.za**

What you should know about this research study:

We give you this consent so that you may read about the purpose, risks, and benefits of this research study. Routine care is based upon the best known treatment and is provided with the main goal of helping the individual patient. The main goal of research studies is to gain knowledge that may help future patients. We cannot promise that this research will benefit you. Just like regular care, this research can have side effects that can be serious or minor. You have the right to refuse to take part, or agree to take part now and change your mind later. Whatever you decide, it will not affect your regular care. Please review this consent form carefully. Ask any questions before you make a decision. Your participation is voluntary.

Purpose of Study

You are being asked to participate in a research study of translating research evidence to clinical practice in early mobilisation. The purpose of the study is to investigate the disparities in the practice of early mobilisation of patients in ICU in terms of activities done, barriers faced, and patient safety criteria used in government hospitals in South Africa and Zimbabwe. You were selected as a possible participant in the first phase of this study because you are admitted into the Intensive care unit during the time of study.

Procedures and Duration

If you decide to participate, you will not undergo any specific procedures for the purpose of the study. We only need to take information from your ICU chart or file on treated that you received in the last 24 hours of your stay in ICU for this study. Your consent to access your hospital notes will be sought by either the researcher or a research assistant. From the hospital notes, we seek to document the following: personal information eg age, sex; admission history including the clinical diagnosis and the physiotherapy mobilisation practice you have received during the time of your admission. The

information will be collected over the course of one day, considering the mobilisation activities done by physiotherapists with you in your unit in the previous 24 hours using a survey questionnaire.

Risks and Discomforts

There is no risk involved in taking part in the study.

Benefits /Or Compensation

The study will not directly benefit you as a participant but the results will be used to improve health care system delivery for future intensive care unit patients.

Alternative Procedures Or Treatments

We would like to let you know that this is a survey study and you will receive no treatment from the researchers. The treatment that you normally receive from the physiotherapists who work in your unit will continue and will not be interrupted because of this survey.

Confidentiality

If you indicate your willingness to participate in this study by signing this document, we promise that confidentiality of your information will be maintained and kept private. A research number only known by the researcher and research assistant will be used during the data collection to identify your data. Information gathered from your notes will only be disclosed to the other co-investigators so that they can assist in the data analysis of the results. Any information that is obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission. Under some circumstances, the MRCZ may need to review patient records for compliance audits.

Additional Costs

The costs which are borne by the study are mainly on the researcher and research assistant and there are no costs which are your responsibility as the participant of the study.

Voluntary Participation

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with the University of Zimbabwe/ University of the Witwatersrand, its personnel, and associated hospitals. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

SIGNATURE PAGE

PROJECT TITLE

Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units

Protocol Version Number/date : Version 2:1 02 APRIL 2016

Offer To Answer Questions

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorization

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

_____ _____

Name of Research Participant (please print) Date

_____ _____

Signature of Participant or legally authorized representative Time

_____

Relationship to the Participant

_____ _____

Name of Staff Obtaining Consent Signature Date

_____ _____

Name of Witness (*if required)* Signature Date

YOU WILL BE OFFERED A COPY OF THIS CONSENT FORM TO KEEP.

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research participant or research-related injuries; or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Medical Research Council of Zimbabwe (MRCZ) on telephone (04)791792 or (04) 791193 and cell phone lines 0772 433 166 or 0779 439 564. The MRCZ Offices are located at the National Institute of Health Research premises at Corner Josiah Tongogara and Mazowe Avenue in Harare.

APPENDIX 29

- **INFORMATION LETTER AND CONSENT FORM FOR ICU DIRECTORS**

 MRCZ NO-------A/2040

Physiotherapy

Faculty of Health Sciences · Private Bag 3, Wits, 2050, South Africa
Tel: +27 11 717 3702 · Fax : 27 11 717 3719 · E-mail: maryanne.cannon@wits.ac.za

INFORMED CONSENT FORM: DIRECTORS AND HODs COPY

Project Title: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units: a Survey Study.

PRINCIPAL INVESTIGATOR_____Cathrine Tadyanemhandu, [*MS*]

PHONE NUMBER(S)_____0773 430 792

EMAIL ADDRESS _____**cathytadya@gmail.com/1305353@students.wits.ac.za**

What you should know about this research study:

We give you this consent so that you may read about the purpose, risks, and benefits of this research study. Routine care is based upon the best known treatment and is provided with the main goal of helping the individual patient. The main goal of research studies is to gain knowledge that may help future patients. We cannot promise that this research will benefit you. Just like regular care, this research can have side effects that can be serious or minor. You have the right to refuse to take part, or agree to take part now and change your mind later. Whatever you decide, it will not affect your regular care. Please review this consent form carefully. Ask any questions before you make a decision. Your participation is voluntary.

Purpose of Study

Your hospital/unit is being invited to participate in a research study that investigates translationof research evidence into clinical practice regarding early mobilisation of patients in ICU. The purpose of the study is to investigate the disparities in the practice of early mobilisation of patients in ICU in terms of activities done, barriers faced, and patient safety criteria used in government hospitals in South Africa and Zimbabwe. You are being invited to take part in the first phase of the study only which is a point prevalence survey. Your hospital and or unit has been selected to participate in this study and you have given approval for participation.

Procedures and Duration

If you decide to participate, we assure you that there will not be any interference with the routine care of patients. Your approval to participate in the study will not burden either the hospital or the ICU staff. Your consent to participate will give the research assistant permission to enter into your unit and ask for consent from the patients admitted or their next of kin in order to access their hospital notes. From the hospital notes, we seek to document the following: personal information eg age, sex; admission history including the clinical diagnosis and the physiotherapy mobilisation practice received by patients during

the time of their admission. The information will be collected over the course of one day, considering the mobilisation activities done by physiotherapists in your unit in the previous 24 hours using a survey questionnaire.

Risks and Discomforts

There is no risk involved to any patients in taking part in the study as no patient interventions will be performed for this survey..

Benefits /or Compensation

The study will not directly benefit youas a hospital but the results will be used to improve health care system delivery in the intensive care unit patients from a rehabilitation point of view.

Confidentiality

If you indicate your willingness to participate in this study by signing this document, we promise that confidentiality of your hospital/unit information will be maintained and kept private. A research number only known by the researcher and research assistant will be used during the data collection to identify data from your hospital/unit. Information gathered from the patients' notes will only be disclosed to the other co-investigators so that they can assist in the data analysis of the results. Under some circumstances, the MRCZ may need to review patient records for compliance audits.

Additional Costs

The costs which are borne by the study are mainly on the researcher and research assistant and there are no costs which are your responsibility as the participant of the study.

Voluntary Participation

Participation in this study is voluntary. If you decide not to grant permission for your ICU to participate in this study, your decision will not affect your future relations with the University of Zimbabwe/ University of the Witwatersrand, its personnel, and associated hospitals**.** If you decide to grant permission for your ICU to participate in this survey, you are free to withdraw your consent and to discontinue participation at any time without penalty.

SIGNATURE PAGE

PROJECT TITLE

Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units

Protocol Version Number/date: Version 2:1 02 APRIL 2016

Offer To Answer Questions

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorization

You are making a decision whether or not to allow your ICU to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

_____		_____
Name of ICU Director (please print)		Date
_____	_____	
Name of Staff Obtaining Consent	Signature	Date
_____	_____	
Name of Witness (*if required)*	Signature	Date

YOU WILL BE OFFERED A COPY OF THIS CONSENT FORM TO KEEP.

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research participant or research-related injuries; or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Medical Research Council of Zimbabwe (MRCZ) on telephone (04)791792 or (04) 791193 and cell phone lines 0772 433 166 or 0779 439 564. The MRCZ Offices are located at the National Institute of Health Research premises at Corner Josiah Tongogara and Mazowe Avenue in Harare.

APPENDIX 30

- **VALIDATION RESULTS OF SURVEY QUESTIONNAIRE**

The following suggestions were highlighted by the experts:

Suggestions regarding face validity:

a) Spacing and technical editing is needed in order to improve the "look and feel" of the questionnaire.
b) Its not always clear where the participant should indicate/tick their answer and provide their comments (maybe create a division between ticking options and open ended questions).
c) Be mindful that an individual e.g. physiotherapist might be working in more than one ICUs in a day, give the option to tick any that apply on name of the ICU
d) Subheadings, change in colour could also assist in separating the different sections.
e) It might be helpful to also mention in your attached cover letter how long completing the questionnaire might take.
f) Give an indication that this is the end of the questionnaire and thank the participants for their time.

Suggestions on content validity:

a) More context and background on your participants (job description, qualifications, years qualified, special interest in ….etc).
b) Insert instructions that the responder provides information specific to their own work environment and not report what is known in the literature in general in the introductory section.
c) Insert a question on whether the nurses and physiotherapists working in the units are permanent staff.
d) Physiotherapists coverage to be included, other areas covered besides the specific ICU.
e) Frequency of multidisciplinary ward rounds in the unit and participation by physiotherapists.
f) Indicate if any educational sessions related to any critical care aspect are conducted for the staff.
g) If staff are encouraged to attend external continuous professional development activities.
h) Indicate the type of beds in the unit.

i) Indicate the availability and the type of transfer/mobility equipment in the unit.

j) Indicate the type of chairs in the unit.

k) Include assessment of patient's mobility status and use of standard outcome measures to assess mobility status under activities/procedures available to promote early mobilisation (Section B).

l) Add frequencies for mobilisations (this could maybe add value to your data).

m) A definition list/operational definitions might be helpful to add to the questionnaire, to ensure that when participants answer they have a similar understanding.

APPENDIX 31

- **SURVEY QUESTIONNARE FOR PHASE ONE**

Survey Questionnaire

Thank you for agreeing to participate in this survey which forms part of a larger study titled: "Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units".

Please complete the questionnaire by either ticking where indicated or complete the space provided where needed. The information requested includes the ICU characteristics, the profile of patients admitted in ICU and physiotherapy practices relating to early mobilisation. When answering the questionnaire kindly report on your own work environment as it relates to the ICU information requested above.

Questionnaire code for survey: _____

Section A: HOSPITAL SPECIFIC INFORMATION

Name of your Hospital: _____ Date _____
ICU Name/Number: _____

A.1 Type of hospital (please tick any that apply)

Quaternary ☐

Tertiary ☐

Provincial ☐

A.2 Number of ICUs in your hospital _____

A.3 From which ICU is this data being collected?

Medical ICU ☐

Surgical ICU ☐

Trauma ICU ☐

Cardiac ICU ☐

Cardiothoracic ICU ☐

Neurology & neurosurgical ICU ☐

Mixed ICU (medical and surgical) ☐

A.4 Description of the ICU (Tick the applicable option)

1

Open ICU (patient care provided by a variety of doctors with no chief in charge ☐

Closed ICU (one doctor/intensivists is responsible for all patients in the unit ☐

A.5 What is the bed capacity in your unit _____

A.6 What was the average monthly admissions (over the last 3 months) to your unit

First month _____
Second month _____
Third month _____

A.7 How many beds are currently (at the time of completing this survey) occupied by patients in your unit _____

A.8 How many physicians/anaesthetists are currently working in your unit? _____

A.9 How many physiotherapists are currently working in your unit? _____

A.10 How many ICU nurses are currently working in your unit? _____

A.11 What is the current nurse to patient ratio in your unit? _____

A.12 Is the majority of nursing staff working in your unit permanent staff

Yes ☐

No ☐

A.13 Is the majority of the physiotherapists working in your unit permanent staff

Yes ☐

No ☐

A.14 Do the physiotherapists working in your ICU only work in ICU

Yes ☐

No ☐

A.15 If you answered no to the above question where else do they work? Select any of the following

Other ICUs in the hospital ☐

High Care Units ☐

Wards ☐

Outpatient Department ☐

Hospital Clinics ☐

I do not know where else they work ☐

A.16 Are multidisciplinary ward rounds conducted in the ICU where you work?

Yes ☐

No ☐

A.17 If you answered yes to the above question, how frequent are multidisciplinary ward rounds conducted in the ICU where you work?

Daily ☐

Weekly ☐

Monthly ☐

No specific frequency noted ☐

A.18 What type of beds do you have in the ICU where you work? Select all that applies

Standard hospital bed (non-adjustable) ☐

Standard hospital bed (adjustable e.g. height can be adjusted) ☐

Electronic hospital bed ☐

Rotational hospital bed ☐

A.19 Do you have any clinical protocols in your unit?

Yes ☐

No ☐

A.20 If you answered Yes to the previous question, please indicate which clinical protocols you currently have in your unit (Please tick any that apply)

Sedation protocol ☐

Early mobilisation protocol ☐

Ventilator weaning protocol ☐

Synchronized daily wake-up and spontaneous breathing trial protocol ☐

Daily interruption of sedation infusions protocol ☐

Standardized evaluations for delirium protocol ☐

Pain evaluation protocol ☐

Early mobilisation written protocol ☐

Other: (please specify) _____

A.21 If protocols are available in your ICU, how are staff educated regarding the protocols

Verbal information is given ☐

Written information is given ☐

Formal education session regarding protocols are conducted ☐

Other (state method if above don't apply) _____

A.22 Are there portable oxygen cylinders available in your unit?

Yes ☐

No ☐

A.23 Are there ambubaggs available in your unit?

Yes ☐

No ☐

A.24 Are there portable ventilators available in your unit?

Yes ☐

No ☐

A.25 Are there mobility aids e.g. walking frames available in your unit?

Yes ☐

No ☐

A.26 Are there transfer equipment in your unit?

Yes ☐

No ☐

A.27 If you answered 'yes' to the following please select the type of transfer equipment that is available in your unit.

Sliding board ☐

Transfer board ☐

Non-standing hoist ☐

Standing hoist ☐

Walker ☐

Tilt Table ☐

Standing Frame ☐

Other (please name) _____

A.28 Are there bedside patient chairs available in your ICU?

Yes ☐

No ☐

A.29 If you answer 'yes' to the above question please select the type of chair available.

Standard upright chair with back support but no arm rests ☐

Standard upright chair with back and arm rests ☐

Adjustable reclining chair with back and arm rests ☐

Adjustable reclining chair with head, back and arm support ☐

Other (please explain any other type of chair) _____

A.30 Does your unit have a cycle ergometer?

Yes ☐

No ☐

Section B: ICU Demographics

B.1: Type of patients admitted to your ICU (Please tick all the appropriate options for your unit)

	Tick		Tick
B.1.1 Acute Spinal cord injury		B.1.8 General surgery	
B.1.2 Respiratory		B.1.9 Orthopaedic	
B.1.3 Medical		B.1.10 Neurology	
B.1.4 Cardiothoracic surgery		B.1.11 Vascular surgery	
B.1.5 Obstetrics and gynaecology		B.1.12 Head Injury	
B.1.6 Burns		B.1.13 Infectious diseases	
B.1.7 Oncology		B.1.14 Malaria	
B.1.15 Other (Please describe)			

B.2: Please indicate the number of patients currently admitted to your unit for the following conditions:

	Tick		Tick
B.2.1 Acute Spinal cord injury		B.2.8 General surgery	
B.2.2 Respiratory		B.2.9 Orthopaedic	
B.2.3 Medical		B.2.10 Neurology	
B.2.4 Cardiothoracic surgery		B.2.11 Vascular surgery	
B.2.5 Obstetrics and gynaecology		B.2.12 Head Injury	
B.2.6 Burns		B.2.13 Infectious disease	
B.2.7 Oncology		B.2.14 Malaria	
B.2.15 Other (Please indicate the number of patients for each additional condition listed here)			

		Tick
B.3: Which of the following staff members in your unit are usually involved with mobilisation of patients? (Please tick all appropriate options)	B.3.1 Nurse	
	B.3.2 Physiotherapist	
	B.3.3 Physician	
	B.3.4 Occupational Therapist	
	B.3.5 Other (Please specify)	
B.4: In your unit, do you have the following activities/procedures which promote early mobilisation of patients? (Please tick all appropriate options)	B.4.1 Documentation of daily goals for each patient	
	B.4.2 Setting daily sedation goals for each patient	
	B.4.3 Utilisation of a standardised sedation scoring system	
	B.4.4 A guideline for eligibility criteria for early mobilisation	
	B.4.5 Presence of a PT covering ICU only	
	B.4.6 Assessment of patients' mobility status	
	B.4.7 The use of standard outcome measures to assess mobility status	
	B.4.8 Specify the name of the standard outcome measure used	

Proceed to Section C on the next page.

Section C: Patient specific information – Remember to obtain informed consent from patients before recording information for this section.

C.1: Information for those with ICU length of stay ≤ 24 hours

C.1.1 General Information													
	Pt 1	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.1.1.1 Age (years)													
C.1.1.2 Gender (Male/Female)													
C.1.1.3 Is the patient receiving mechanical ventilation (Y/N)?													
C.1.1.4 If yes, for how long (hours)?													
C.1.1.5 APACHE score on admission (if available)													
C.1.1.6 SOFA score (if available)													
C.1.1.7 Primary reason for ICU admission (please use the keys provided below to indicate the patient's primary reason for admission): a. Postoperative care *a.1 Elective surgery* *a.2 Emergency surgery* b. Exacerbation of chronic disease *b.1 COPD* *b.2 Diabetes mellitus* *b.3 Ischemic heart disease* *b.4 Hypertension* *b.5 Restrictive lung disease* *b.6 Cancer* *b.7 Renal disease* c. HIV-related illness d. Tuberculosis e. Sepsis f. ALI g. ARDS h. Respiratory failure i. Cardiac failure j. Trauma *j.1 Burns* *j.2 Acute spinal cord injury* *j.3 Traumatic brain injury* *j.4 Other orthopaedic injuries* j.5 Penetrating trauma													
C.1.1.8 Comorbidities (please use the keys provided below to indicate the patient's comorbidities): a. HIV b. TB													

c. COPD d. Restrictive lung disease e. Diabetes mellitus f. Cancer g. Renal disease h. Hypertension i. Thyroid-related disorder j. Ischemic heart disease k. Peripheral vascular disease l. Smoking													
C.1.2 Mobilisation Activities that were Performed with These Patients in the Previous 24 Hours													
For each activity, indicate frequency too during 24hr period if available	**Pt 1**	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.1.2.1 Remained in bed with treatment mostly in supine position (Y/N)													
C.1.2.2 Turned in bed during treatment (Y/N)													
C.1.2.3 Passive range of motion exercises performed in bed (Y/N)													
C.1.2.4 Active-assisted exercises performed (Y/N)													
C.1.2.5 Active exercises performed (Y/N)													
C.1.2.6 Sat up in bed (Y/N)													
C.1.2.7 Sat up over edge/side of bed (Y/N)													
C.1.2.8 Sat out of bed in a chair (Y/N)													
C.1.2.9 Stood up right next to the bed (Y/N)													
C.1.2.10 Stepping (marching) by the bed side (Y/N)													
C.1.2.11. Walked away from the bed side (Y/N)													
C.1.3 Reasons for treatment received in bed mostly in supine													
Tick the most appropriate option listed below for each patient	**Pt 1**	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.1.3.1 Not applicable for this patient													
C.1.3.2 Sedated													
C.1.3.3 Unresponsive													
C.1.3.4 Multiple													

orthopaedic injuries													
C.1.3.5 Unstable intracranial pressure (ICP)													
C.1.3.6 Unstable spine													
C.1.3.7 Patient receiving dialysis/renal replacement therapy													
C.1.3.8 Patient not in ICU (theatre/radiology)													
C.1.4 Adverse events recorded as a direct result of mobilisation													
Tick the most appropriate option listed below for each patient	**Pt 1**	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.1.4.1 No adverse events occurred													
C.1.4.2 Death													
C.1.4.3 Cardiac arrest													
C.1.4.4 Desaturation (SpO_2< 90%)													
C.1.4.5 Respiratory arrest													
C.1.4.6 Fall													
C.1.4.7 Reduction in mean arterial blood pressure (MAP)													
C.1.4.8 Sudden development of cardiac arrhythmias													
C.1.4.9 Development of bronchospasm													
C.1.4.10 Development of reduced mental status													
C.1.4.11.Loss of artificial airway (ETT)													
C.1.4.12 Loss of intercostal drain													
C.1.4.13 Loss of intravenous line/s													
C.1.4.14 Loss of arterial line													
C.1.4.15 Loss of central venous pressure (CVP) line													

C.2: Information for those with ICU length of stay longer than 24 hours

C.2.1 General Information													
	Pt 1	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.2.1.1 Age (years)													
C.2.1.2 Gender (Male/Female)													
C.2.1.3 Is the patient receiving mechanical													

ventilation (Y/N)?													
C.2.1.4 If yes, for how long (days)?													
C.2.1.5 APACHE score on admission (if available)													
C.2.1.6 SOFA score (if available)													
C.2.1.7 Primary reason for ICU admission (please use the keys provided below to indicate the patient's primary reason for admission): a. Postoperative care *a.1 Elective surgery* *a.2 Emergency surgery* b. Exacerbation of chronic disease *b.1 COPD* *b.2 Diabetes mellitus* *b.3 Ischemic heart disease* *b.4 Hypertension* *b.5 Restrictive lung disease* *b.6 Cancer* *b.7 Renal disease* c. HIV-related illness d. Tuberculosis e. Sepsis f. ALI g. ARDS h. Respiratory failure i. Cardiac failure j. Trauma *j.1 Burns* *j.2 Acute spinal cord injury* *j.3 Traumatic brain injury* *j.4 Other orthopaedic injuries* j.5 Penetrating Trauma													
C.2.1.8 Comorbidities (please use the keys provided below to indicate the patient's comorbidities): a. HIV b. TB c. COPD d. Restrictive lung disease													

e. Diabetes mellitus f. Cancer g. Renal disease h. Hypertension i. Thyroid-related disorder j. Ischemic heart disease k. Peripheral vascular disease l. Smoking													
C.2.2 Mobilisation Activities that were Performed with These Patients in the Previous 24 Hours													
For each activity, indicate frequency too during 24hr period if available	**Pt 1**	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.2.2.1 Remained in bed with treatment mostly in supine position (Y/N)													
C.2.2.2 Turned in bed during treatment (Y/N)													
C.2.2.3 Passive range of motion exercises performed in bed (Y/N)													
C.2.2.4 Active-assisted exercises performed (Y/N)													
C.2.2.5 Active exercises performed (Y/N)													
C.2.2.6 Sat up in bed (Y/N)													
C.2.2.7 Sat up over edge/side of bed (Y/N)													
C.2.2.8 Sat out of bed in a chair (Y/N)													
C.2.2.9 Stood up right next to the bed (Y/N)													
C.2.2.10 Stepping (marching) by the bed side (Y/N)													
C.2.2.11 Walked away from the bed side (Y/N)													
C.2.3 Reasons for treatment received in bed mostly in supine													
Tick the most appropriate option listed below for each patient	**Pt 1**	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.2.3.1 Not applicable for this patient													
C.2.3.2 Sedated													
C.2.3.3 Unresponsive													
C.2.3.4 Multiple orthopaedic injuries													

C.2.3.5 Unstable intracranial pressure (ICP)													
C.2.3.6 Unstable spine													
C.2.3.7 Patient receiving dialysis/renal replacement therapy													
C.2.3.8 Patient not in ICU (theatre/radiology)													
C.2.4 Adverse events recorded as a direct result of mobilisation													
Tick the most appropriate option listed below for each patient	**Pt 1**	**Pt 2**	**Pt 3**	**Pt 4**	**Pt 5**	**Pt 6**	**Pt 7**	**Pt 8**	**Pt 9**	**Pt 10**	**Pt 11**	**Pt 12**	**Pt 13**
C.2.4.1 No adverse events occurred													
C.2.4.2 Death													
C.2.4.3 Cardiac arrest													
C.2.4.4 Desaturation (SpO_2< 90%)													
C.2.4.5 Respiratory arrest													
C.2.4.6 Fall													
C.2.4.7 Reduction in mean arterial blood pressure (MAP)													
C.2.4.8 Sudden development of cardiac arrhythmias													
C.2.4.9 Development of bronchospasm													
C.2.4.10 Development of reduced mental status													
C.2.4.11 Loss of artificial airway (ETT)													
C.2.4.12 Loss of intercostal drain													
C.2.4.13 Loss of intravenous line/s													
C.2.4.14 Loss of arterial line													
C.2.4.15 Loss of central venous pressure (CVP) line													

APPENDIX 32

- **INFORMATION LETTER AND INFORMED CONSENT FORM FOR PHYSIOTHERAPISTS**

Physiotherapy

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PHYSIOTHERAPIST INFORMED CONSENT FORM

Project Title: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units: Face-to-face Interviews.

Principal Investigator_____Cathrine Tadyanemhandu, [*MS*]

Phone number(s)_____0773 430 792

Email address _____**cathytadya@gmail.com/1305353@students.wits.ac.za**

What you should know about this research study:

We give you this consent so that you may read about the purpose, risks, and benefits of this research study. Routine care is based upon the best known treatment and is provided with the main goal of helping the individual patient. The main goal of research studies is to gain knowledge that may help future patients. We cannot promise that this research will benefit you. Just like regular care, this research can have side effects that can be serious or minor. You have the right to refuse to take part, or agree to take part now and change your mind later. Whatever you decide, it will not affect your regular care. Please review this consent form carefully. Ask any questions before you make a decision. Your participation is voluntary.

Purpose of Study

You are being asked to participate in a research study of translating research evidence to clinical practice in early mobilisation. The purpose of the study is to investigate the disparities in the practice of early mobilisation of patients in ICU in terms of activities done, barriers faced, and patient safety criteria used in government hospitals in South Africa and Zimbabwe. You were selected as a possible participant in the second phase of this study only because you are currently working in intensive care unit.

Procedures and Duration

If you decide to participate, you will be asked to participate in a face to face interview for data collection. In order to describe the physiotherapists' attitude, perception and knowledge about early mobilisation in ICUs, face to face interviews will be conducted with individual physiotherapists who are currently working in the ICU at the time of the study. The researcher will contact you and agree on a suitable date and time for the interview to be done at your place of work. Before the interview, the researcher will explain the purpose of the study and the objectives prior to signing of informed consent forms. The interview sessions will be audio recorded and you will be asked to fill in another consent form for audio

recording of the interview. The interviews will be carried out by the researcher and a research assistant who will be responsible for writing down the notes from the interviews while the researcher will be conducting the interviews. The interview will be done for a day and the expected duration of the session will be 60minutes. You will not undergo any specific procedures for the purpose of the study.

Risks and Discomforts

There is no risk involved in taking part in the study.

Benefits /or Compensation

The results from this phase of the study will be used in phase three of the study which will aim at developing a procedural guideline aiming at improving the early mobilisation practices performed in the ICUs. This guideline will benefit the physiotherapist working in ICU by offering practical advice and it will benefit the patient receiving the early mobilisation by improving their long term outcomes after discharge.

Confidentiality

If you indicate your willingness to participate in this study by signing this document, we promise that confidentiality of your information will be maintained and kept private. Your answers will be used for data analysis and only the researcher will be able to associate your name and voice with the comment. The results of the study will also be published and only your initials will be used when directly quoting your comments. Any information that is obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission.

Additional Costs

The costs which are borne by the study are mainly on the researcher and research assistant and there are no costs which are your responsibility as the participant of the study.

Voluntary Participation

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with the University of Zimbabwe/ University of the Witwatersrand, its personnel, and associated hospitals. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

SIGNATURE PAGE

PROJECT TITLE

Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units

Protocol Version Number/date : Version 2:1 02 APRIL 2016

Offer To Answer Questions

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorization

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

_____ _____

Name of Research Participant (please print) Date

_____ _____

Name of Staff Obtaining Consent Signature Date

_____ _____

Name of Witness (*if required)* Signature Date

YOU WILL BE OFFERED A COPY OF THIS CONSENT FORM TO KEEP.

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research participant or research-related injuries; or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Medical Research Council of Zimbabwe (MRCZ) on telephone (04)791792 or (04) 791193 and cell phone lines 0772 433 166 or

0779 439 564. The MRCZ Offices are located at the National Institute of Health Research premises at Corner Josiah Tongogara and Mazowe Avenue in Harare.

APPENDIX 33

- **INFORMED CONSENT FORM FOR AUDIO RECORDING DURING INTERVIEWS**

MRCZ NO----A/2040

Physiotherapy

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CONSENT TO AUDIORECORDING & TRANSCRIPTION

Project Title: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units.

Principal Investigator_____Cathrine Tadyanemhandu, [*MS*]

Phone number(s)_____0773 430 792

Email address _____**cathytadya@gmail.com/1305353@students.wits.ac.za**

This study involves the audio recording of your interview with the researcher. Neither your name nor any other identifying information will be associated with the audio or audio recording or the transcript. Only the research team will be able to listen (view) to the recordings.

The tapes will be transcribed by the researcher and erased once the transcriptions are checked for accuracy. Transcripts of your interview may be reproduced in whole or in part for use in presentations or written products that result from this study. Neither your name nor any other identifying information (such as your voice or picture) will be used in presentations or in written products resulting from the study.

I (full name and surname) _____ give permission to …… OR any of her appointed research assistants to tape record the interview for their research to find out the barriers and enabling factors to early mobilization of patients in ICU

I understand why this research is done and know that:

- I can terminate the interview at any time
- Information that I will give will be treated with confidentiality
- The interview will be maximum 45-60 minutes long
- I will not be paid for taking part in this research

I understand that photographs / audio recordings / video recordings will be taken during the study. *(For each statement, please choose YES or NO by inserting your initials in the relevant box)*

- I agree to having my **photograph taken** **Yes** ☐
  No ☐

- I agree to **being audio recorded** **Yes** ☐
  No ☐

[delete the options that are not appropriate for this study]

_____	_____	_____
Name of Participant (please print)	Signature	Date

APPENDIX 34

- **INTERVIEW GUIDE FOR PHASE TWO**

Interview guide to be used in face-to-face interviews for Phase 2- Explortion of Barriers and Facilitators

1. What is your years of experience working as a physiotherapist and also working in the ICU?
2. What do you understand regarding the term early mobilisation of patients in ICU?
3. Is early mobilisation of patients a priority of care in your ICU? Please explain. (definition of early in relation to time, dose/frequency. The activities involved)
4. In your opinion, has early mobilisation of patients been successfully implemented in your ICU? Please explain.
5. Do you have a guideline for eligibility criteria for early mobilisation in your unit?
6. In your opinion, what enablers to early mobilisation of patients in your ICU do you experience?
7. In your opinion, what barriers to early mobilisation of patients do you experience in your ICU? [Guiding question: type of barriers for example staff attitude; lack of equipment or lack of knowledge of benefits reported in research literature].
8. Availability of portable vents, hoists, chairs, nurse assistance, type of population, knowledge of how to move attachments on the patient) sedation practices in the unit?
9. What factors influence your decision as to whether or not to mobilise your patients in ICU?
10. Do you make use of any standardized outcome measure to assess mobility status? Which one?
11. If you could change one thing to improve the rate of early mobilisation of patients in your ICU, what would that be?
12. What is your view towards receiving education and training with regards to early mobilisation of patients in ICU?

APPENDIX 35

- **INFORMATION LETTER FOR DELPHI PARTICIPANTS**

Physiotherapy

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Invitation and information letter to participate in a Delphi Study

From : Cathrine Tadyanemhandu **1305353@students.wits.ac.za** or **cathytadya@gmail.com**

To : .....

Subject: Invitation to participate in a Delphi study to design implementation interventions that are responsive to identified barriers to early mobilisation within government sector ICUs in Zimbabwe and South Africa using the Consolidated Framework for Implementation Research (CFIR).

Attachments: Consent Form

Greetings to you. My name is Cathrine Tadyanemhandu and I am a PhD student registered with the University of the Witwatersrand (South Africa). I have a special interest in investigating early mobilisation of patients in the intensive care unit. You are being invited to take part in an electronic Delphi study. The purpose of the study is to design implementation interventions that are responsive to the barriers to early mobilisation identified within government sector ICUs in Zimbabwe and South Africa using the Consolidated Framework for Implementation Research (CFIR) as a way to improve the standard of current health care delivery. Strategies to overcome the multifactorial barriers to early mobilisation of patients in ICU which have been identified will be formulated through multidisciplinary team engagement.

Key findings of phase 1 and phase 2 of the study which are informing this Delphi Process are as follows:

a) Low out of bed mobilisation of patients, especially those on mechanical ventilator and have been in ICU for a longer duration period of time
b) Cohort from SA had a high incidence of male trauma patients as compared to the Zimbabwe cohort
c) Differences in ICU cultures and structures in terms of activities or procedures to promote early mobilisation (clinical protocols, staffing levels, availability of resources) were noted across the units
d) The following were found to be predictors of out of bed mobilisation in the two countries; type of ICU (open vs closed), method of ventilation (spontaneous breathing vs artificial airway) and number of days in ICU
e) The common barriers for out of bed mobilisation highlighted included sedation and haemodynamic instability for Zimbabwe and unresponsiveness and raised intracranial pressure for SA

Results from the qualitive study (phase 2) brought about themes related to the implementation, barriers and enablers of early mobilisation. Under implementation, there was variability in how early mobilisation was defined in terms of the specific activities (active vs passive) to be done on a patient and the progression of the mobilisation activities. Variability in implementation based on confidence of the clinician was also noted resulting in variability of practice. On exploring the perceived barriers and enablers to early mobilisation, the four themes which are implementation process (undefined roles, lack of motivation); organisation of ICU services (lack of standard operating procedures, ineffective interprofessional communication); patient characteristics (haemodynamic instability, complexity of condition) and environmental context (inadequate staffing and lack of appropriate equipment) emerged. More attention needs to be paid to the factors related to the environment, intervention characteristics and implementation strategies. From the barriers which were highlighted, it showed that there was need to engage the ICU multidisciplinary team first before implementation of early mobilisation.

You have been selected to participate in the study because of your contribution in the field of critical care based on either your publication records and/or your clinical experience in the ICU setting. Your participation will be completely confidential and you will remain completely anonymous throughout this process. An interactive website has been created for this Delphi study. The website, linked to a password-protected data base, will be used as a means to distribute information and to collate responses from everyone on the Delphi panel. The password will also be revealed to you after I have received your acceptance to participate and the signed consent form from you. The Delphi process is likely to last for two months. During this time, you will have unlimited access to the database and be allowed to add anonymous text comments.

The statements received from participants will be divided into categories which will potentially include the following: Category A for statements on characteristics of the early mobilisation intervention; Category B for statements on the ICU contextual barriers; Category C for statements on barriers related to the outer setting/hospital organisation; Category D for statements on characteristics of the individuals responsible for implementing early mobilisation and Category E for statements on the active changes that should occur to encourage implementation of early mobilisation. It is anticipated that two rounds of panel discussions will be held and in each round the discussion will focus on all categories. Consensus for a statement will be defined as a priori if there is a 75% agreement.

The consent form for participation is attached.

Please reply to the message to indicate your agreement to participation within two weeks. Please also indicate whether you would be interested in contributing to a publication of the findings of the study as a co-author.

Kind Regards

Cathrine Tadyanemhandu (PhD Student)

APPENDIX 36

- **INFORMED CONSENT FORM FOR DELPHI STUDY**

Physiotherapy

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INFORMED CONSENT FORM

Project Title: Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units.

PRINCIPAL INVESTIGATOR____Cathrine Tadyanemhandu, [*Ms*]

PHONE NUMBER(S)_____0773 430 792

EMAIL ADDRESS _____**cathytadya@gmail.com/1305353@students.wits.ac.za**

Purpose of Study

You are being asked to participate in a research study of translating research evidence to clinical practice in early mobilisation. The purpose of the study is to determine expert consensus on designing implementation interventions that are responsive to the barriers to early mobilisation within ICUs in Zimbabwe and South Africa using the Consolidated Framework for Implementation Research (CFIR). You were selected as a possible participant in this study because of your contribution in the field of critical care and/or your work in early mobilisation programmes.

Procedures and Duration

If you decide to participate, you will participate in a Delphi study with other panel of experts. The process has two rounds. In each round, you will have to comment on each statement and rank each statement so that implementation interventions for early mobilisation will be formulated. The comments will cover the categories which have to be assessed and addressed for successful implementation of early mobilisation in ICUs. You have to understand that the process will be anonymous and a consensus will be reached when there is a 75% agreement by the panel. You will have to also understand that you will be asked to return the completed datasheets within three weeks for each round.

Risks and Discomforts

There is no risk involved in taking part in the study.

Benefits /Or Compensation

The study will not directly benefit you as a participant but the results of the study will be implemented and evaluated in the ICUs for its effectiveness on improving the current physiotherapy practice. This will benefit the patient receiving the physiotherapy treatment by improving their long term outcomes after discharge.

Confidentiality

If you indicate your willingness to participate in this study by signing this document, we promise that confidentiality of your information will be maintained and kept private. Your answers will be used for data analysis and only the researcher will be able to associate your name with the comment. The results of the study will also be published and only your initials will be used when directly quoting your comments. Any information that is obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission.

Additional Costs

The costs which are borne by the study are mainly on the researcher and there are no costs which are your responsibility as the participant of the study.

Voluntary Participation

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with the University of Zimbabwe/ University of the Witwatersrand, its personnel, and associated hospitals. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

SIGNATURE PAGE

PROJECT TITLE

Translating research evidence into clinical practice in relation to the implementation of early mobility programmes in South African and Zimbabwean Government hospitals' Intensive Care Units

Protocol Version Number/date: Version 2:1 02 August 2018

Offer To Answer Questions

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorization

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

_____ _____

Signature of Participant or legally authorized representative Time

_____ _____

Name of Staff Obtaining Consent Signature Date

APPENDIX 37

- **ROUND I DELPHI QUESTIONNAIRE FOR CLINICIANS**

Confidential

Multidisciplinary team approach to overcome barriers to early mobilisation in ICU

Dear Colleague

Welcome to Round 1 of this Delphi Process to determine expert consensus for implementation strategies to overcome barriers to early mobilisation of ICU patients.

This study is phase 3 of a bigger study that was focusing on translating research evidence to clinical practice concerning early mobilisation of patients in ICU. Phase 1 of the project was a survey which aimed to describe the current early mobilisation practices in ICUs in Zimbabwean and South African government hospitals. Phase 2 was a qualitative study to explore the barriers and facilitators to early mobilisation as perceived by the physiotherapists working in the units. The study results from phase 1 and phase 2 were then used to inform the current Delphi study.

Before answering this Delphi questionnaire, we expect you to have read the list of barriers to early mobilisation reported in Zimbabwean and South African ICUs in phase 1 and 2 that we shared with you via email a few days ago. You may click on the link below to access the document that outlines the list of barriers identified if you have not had time to read through it yet.

Keeping in mind the list of the barriers that was shared with you, we are asking you to now rate and comment on a series of statements in relation to implementation strategies to overcome the identified barriers to early mobilisation. The strategies listed are possible solutions to the barriers identified for the context of the government hospital setting in Zimbabwe and South Africa. The strategies with references have either been implemented in other ICUs in a different context or were recommended as possible solutions to overcome the barriers to early mobilisation identified in other studies.

In Round 1 the questionnaire consists of four parts (A, B, C and D) and part B consists of five categories (A-E). It will take about 15 minutes to complete this electronic round of the Delphi.

Barriers to early mobilisation of ICU patients identified in Zimbabwe and South African government hospitals

[Attachment: "Barriers to early mobilisation of ICU patients in SA and Zimbabwean government sector hospitals.docx"]

Part A : Demographic details

Profession	◯ Doctor ◯ Physiotherapist ◯ Nurse
Current position	◯ Intensivist ◯ Head of Critical Care ◯ Head of Physiotherapy ◯ Head of ICU Nursing Services ◯ ICU Nurse ◯ ICU Physiotherapist ◯ Academia/Lecturer ◯ ICU Anaesthetist ◯ Other (specify)

Please specify Other	_____
Type of ICU	◯ Medical ◯ Surgical ◯ Trauma ◯ Cardiac ◯ Cardiothoracic ◯ Neurology & neurosurgical ◯ General ◯ Acute Spinal Cord Injury ◯ Burns
Years of ICU experience	_____

Part B: The following statements relate to the barriers to early mobilisation of ICU patients identified in phases 1 and 2 of this project and the proposed implementation strategy/ies to overcome each of these barriers.
Indicate to what extent you agree or disagree with the proposed implementation strategy and please provide comments to make further suggestions.

Category A-Characteristics of the intervention

Early mobilisation should be done within day 2-5 after ICU admission for it to be key to successful clinical outcomes (Hodgson et al. 2013; Hodgson et al. 2015; Schaller et al. 2016)	◯ Strongly disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
Early mobilisation which is initiated after 8 days in ICU should be discouraged as this will not result in improved functional independence of patients (Moss et al. 2016)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating on the above statement	_____
Early mobilisation should be defined as the intensification and early application of any active exercises where the patient could assist with the activity using their own muscle strength and muscle control. (Hodgson et al. 2013; TEAM study investigators 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
Passive mobilisation should be considered as early mobilisation	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Passive mobilisation should include the following activities done for patients who are either unconscious or unable to cooperate with instructions (Cameron et al. 2015) (Rate each activity listed)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Manual passive joint movements	◯	◯	◯	◯	◯
Tilt table therapy	◯	◯	◯	◯	◯
Neuromusculoskeletal electrical stimulation	◯	◯	◯	◯	◯
Cycle ergometers	◯	◯	◯	◯	◯
Continuous passive motion machines	◯	◯	◯	◯	◯

Comment on your rating for the above statement _____

Passive mobilisation should not be considered as early mobilisation as Hodgson et al. (2013) reported that the level of evidence to support the use of passive movements as part of an early mobilisation program is weak and clinical observation suggests that more than simple passive movements should be done to help preserve muscle strength

◯ Strongly Disagree
◯ Disagree
◯ Neutral
◯ Agree
◯ Strongly Agree

Comment on your rating for the above statement _____

Active mobilisation should be characterised by the following activities: (Castro-Avila et al. 2015; Koo et al. 2016; van Willigen et al. 2016; Nydahl et al. 2017; Phelan et al. 2018). (Rate each activity)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Rolling	◯	◯	◯	◯	◯
Bridging	◯	◯	◯	◯	◯
Upper and lower limb flexion and extension exercises	◯	◯	◯	◯	◯
Sitting at the edge of the bedside	◯	◯	◯	◯	◯
Standing by the bedside	◯	◯	◯	◯	◯
Stand transfer to a chair	◯	◯	◯	◯	◯
Marching on the spot	◯	◯	◯	◯	◯
Walking away from the bedside	◯	◯	◯	◯	◯

Comment on your rating for above statement

_____

Availability of a flow diagram detailing content related to patient assessment in ICU prior to early mobilisation is a useful tool in clinical practice (Hodgson et al. 2018).

◯ Strongly Disagree
◯ Disagree
◯ Neutral
◯ Agree
◯ Strongly Agree

comment on your rating for the above statement

_____

Development of early mobilisation protocols for each unit will facilitate implementation of the treatment (Dubb et al. 2016; Parry et al. 2017a).

◯ Strongly Disagree
◯ Disagree
◯ Neutral
◯ Agree
◯ Strongly Agree

Comment on your rating for the above statement

_____

Parameters (e.g. heart rate, respiratory rate and blood pressure) indicated in early mobilisation guidelines or protocols are not intended to be contraindications to mobilisation or interpreted in isolation, but they should be used in conjunction with sound clinical judgement (Stiller et al. 2004).

◯ Strongly Disagree
◯ Disagree
◯ Neutral
◯ Agree
◯ Strongly Agree

Comment on your rating for the above statement

_____

The ICU multidisciplinary team should work together to formulate protocols and guidelines to early mobilisation of patients in their units (Engel et al. 2013; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Parry et al. 2017a).

◯ Strongly Disagree
◯ Disagree
◯ Neutral
◯ Agree
◯ Strongly Agree

Comment on your rating for above statement

The focal person to initiate formulation of relevant specific protocols or guidelines should be the discipline specific leader, in consultation with the whole ICU team.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
There should first be a physician order for early mobilisation before it is executed on a patient (Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
The physiotherapist should be responsible for identifying patients who are ready for early mobilisation, implement mobilisation plans and make recommendations for progression of patient management in relation to early mobilisation in conjunction with the other ICU team members (Gosselink et al. 2008; Engel et al. 2013; van Willigen et al. 2016; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
There is a need to have a coordinator of early mobilisation in an ICU who is responsible for planning and communication within the whole ICU team responsible for patient care (Engel et al. 2013; Eakin et al. 2015; Schaller et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Category B-ICU contextual Factors (inner setting)

There is need to promote admission of patients into the relevant specialised ICUs (e.g trauma ICU, neurosurgical ICU or medical ICU) so that delays in time to consultations by specialists can be reduced.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
Each unit should have discipline-specific leaders who do not rotate between units/wards so that they will be responsible for educating new staff on unit guidelines for early patient mobilisation (Engel et al. 2013; Eakin et al. 2015; van Willigen et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The medical consultant should be the champion leader of early mobilisation (Eakin et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The physiotherapist must be the champion leader of early mobilisation (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The ICU nurse should be the champion leader of early mobilisation (Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
All units should adopt use of sedation protocols to minimise over sedation or continuous sedation of patients (Barber et al. 2014; Taito et al. 2016; van Willigen et al. 2016; Goddard et al. 2018).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Implementation of daily sedation interruptions should be a pre requisite for early mobilisation in each unit (Balas et al. 2013; Taito et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
ICU multidisciplinary team members should engage frequently for planning purposes through ward rounds or ward meetings (Engel et al. 2013; Barber et al. 2015; Bakhru et al. 2016; van Willigen et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The premise of multidisciplinary rounds is not the composition of health disciplines physically in attendance but rather the interdisciplinary communication, shared planning and decision making that should occur (Rose et al. 2011)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
There is a need for clarity on the role of leadership in an interprofessional team. This is critical for effective team functioning (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
There is a need to facilitate team interdependence. Team members should cooperate and work interactively to complete tasks related to patient care and rehabilitation (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A sign with the target mobility goal should be posted at each patient's bedside and the clinical team should work towards achieving the mobility goal throughout that day (Schaller et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

There is no need for specialised equipment to promote early mobilisation of patients in ICU (Hodgson et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Only a minimum level of equipment is necessary to facilitate early mobilisation in a unit (Asher et al. 2013; Eakin et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Reducing the number of attachments to a patient when possible whilst mobilising them will promote early mobilisation (Leditschke et al. 2012; Harris et al. 2014; Nydahl et al. 2014; Castro et al. 2015; Koo et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your above statement	_____
ICU nurses should be responsible for reducing the number of lines and attachments on a patient to promote early mobilisation.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
ICU physiotherapists should be responsible for reducing the number of lines and attachments on a patient to promote early mobilisation.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
ICU doctors/physicians should be responsible for reducing the number of lines and attachments on a patient to promote early mobilisation.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Changing the site (e.g. subclavian rather than femoral) for vascular catheters may promote early mobilisation activities in ICU (Leditschke et al. 2012; Harris et al. 2014; Nydahl et al. 2014; Castro et al. 2015; Koo et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

Comment on your rating for above statement

Category C- Inner setting/hospital organisation (refers to patient needs and resources)

Overview of safety issues prior to active mobilisation of ICU patients.

Resting heart rate should be between 50%-60% of age predicted maximal heart rate at rest prior to early mobilisation (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Interpretation of the resting heart rate should be done in conjunction with other safety parameters (e.g blood pressure, ECG tracing and respiratory reserve) (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The administration of vasoactive drugs should not be an absolute contraindication to mobilisation (Hodgson et al. 2014).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The appropriateness of mobilisation is influenced by the absolute vasoactive drugs dose, the change in dose (for example, rising doses should result in caution or contraindication to mobilisation) (Hodgson et al. 2014).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A fraction of inspired oxygen (FiO2) less than 0.6 is a safe criterion for in- and out-of-bed mobilisation if there are no other contraindications (Hodgson et al. 2014)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Recent variability in blood pressure should be less than 20% to indicate adequate cardiac reserve for mobilisation activities (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

PaO2/FiO2 of greater than 300 is a strong indicator for suitability for mobilisation (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
PaO2/FiO2 of a range of below 200 indicates virtually no respiratory reserve and early mobilisation should be contraindicated (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
SpO2 of above 90% is usually recommended to initiate early mobilisation (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008; Hodgson et al. 2014)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
SpO2 of less than 90% is has a potential risk for adverse events when in bed activities are done but out of bed mobilisation is associated with significant potential risk of adverse events (Hodgson et al. 2014)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Respiratory rate of less than 30 breaths/minute is safe for both in bed and out of bed mobilisation activities (Hodgson et al. 2014)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Respiratory rate of above 30breaths/minute is associated with potential risk for adverse events therefore early mobilisation should be contraindicated (Hodgson et al. 2014)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Patients are not allowed to progress with early mobilisation in the case of increased ICP (>15-20 mmHg) (Olkowski & Shah 2016; Brissie et al 2017).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Patients may proceed with early mobilisation if their ICP is well controlled for 24 hrs with no administration of mannitol or hypertonic saline (Olkowski & Shah 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Early mobilisation should not be initiated on patients with an ICP greater than 20 mmHg (Olkowski & Shah 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A single ICP spike related to an acceptable reason (i.e during bowel movement, needle insertion) should not preclude mobilisation (Olkowski & Shah 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A platelet count of above 20 x 109 /L should be considered safe for out of bed mobilisation (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Activity restrictions are not necessary for patients who have thrombocytopenia (Koo et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Exercise therapy has a large effect size on reducing levels of depression experienced by patients and should therefore commence in ICU (Wegner et al. 2014).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Impulsive behaviour, agitation and/or inability to re-direct should not be considered as a barrier in neurological patients as early mobilisation has been shown to reduce delirium and anxiety (Titsworth et al. 2012; Klein et al. 2015; Karic et al. 2017).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Adjusting treatment plans with patient input and providing patient education will promote early mobilisation activities (Leditschke et al. 2012; Dubb et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Screen for levels of pain experienced using standardised outcome measures in ICU and provide pain medication before mobilisation (Castro et al. 2015; Dubb et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Screening of patients should be done through interprofessional meetings to make a decision on initiation of early mobilisation activities in ICU (Eakin et al. 2015; Dubb et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Timely management of fractures sustained by patients in ICU should be done to allow for early mobilisation and improved patient outcomes.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Use of machines eg electronic hoists to assist with transfer of patients from bed to standing position should be standard practice (Castro et al. 2015; van Willigen et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Creation of physiotherapy posts to support manpower required for the successful implementation of early mobilisation should be considered. (Engel et al. 2013; Eakin et al. 2015; Dubb et al. 2016)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Restructuring of roles, responsibilities and care pathways for the available staff in the absence of increased staffing levels will promote execution of early mobilisation activities in ICU (Eakin et al 2015; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Category C- Inner setting/hospital organisation (refers to patient needs and resources)

Criteria for terminating early mobilisation

Early mobilisation should be terminated if a heart rate of more than 70% age predicted maximal heart rate is recorded (Adler & Malone 2012).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating fo above statement	_____
Active mobilisation should be stopped if heart rate falls below 40 beats/min or is above 130 beats /min (Adler & Malone 2012).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
More than 20% decrease in systolic or diastolic blood pressure should result in termination of active mobilisation (Adler & Malone 2012).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Early mobilisation should be stopped when a respiratory rate of either less than 5breaths/minute or above 40breaths/minute has been recorded (Adler et al. 2012).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Early mobilisation should be stopped when there is a more than 4% decrease in SpO2 (Adler & Malone 2012).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Category D- Characteristics of the individuals responsible for implementation of early mobilisation

Expertise development and skill training to equip the clinicians to undertake successful early mobilisation interventions with patients should be introduced so as to increase levels of early mobilisation in units (Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Knowledge and understanding of the different roles, boundaries, responsibilities and expertise of health professionals is key to successful implementation of early mobilisation (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Representatives of each profession are responsible for providing the information regarding their individualised roles in early mobilisation (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A physician should be the most visible leader regarding implementation and continuity of the early mobilisation program, leading the implementation process and fostering growth of the program by gaining staff and administrative buy in (Eakin et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Physiotherapists should be responsible for implementing mobilisation plans and exercise prescription and make recommendations for progression of patient management in conjunction with other team members (Gosselink et al. 2008; Engel et al. 2013; van Willigen et al. 2016; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
ICU doctors should be responsible for facilitating timely delivery of early mobilisation through early referral and minimising levels of pain experienced by patients (Engel et al. 2013; Hodgson et al. 2013; Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

ICU nurses should be responsible for facilitating timely delivery of early mobilisation through minimising levels of pain experienced by patients and temporarily disconnecting feeding tubes and other attachments to patients where applicable (Engel et al. 2013; Hodgson et al. 2013; Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Early mobilisation should be a collaborative role, with others being responsible in the delivery and others supporting the delivery of the program.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Ability to express one's opinion to others involved in the care of ICU patients will result in respect of teamwork and promote early mobilisation (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Ability to acknowledge views and ideas of other ICU team members promotes interprofessional communication and therefore promotes implementation of early mobilisation in ICU (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Knowledge transfer and education of healthcare professionals about the burden of ICU acquired weakness and its impact on long-term patient outcomes will lead to achievement of higher levels of early mobilisation of patients in ICU (Jolley et al. 2014; Barber et al. 2015; Eakin et al. 2015; Bakhru et al. 2015; Dubb et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Training of the ICU team members on the implementation of early mobilisation activities by experts will lead to higher levels of early mobilisation of patients (Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

The importance of having experienced senior clinicians in the unit who are able to discern which patients will tolerate mobilisation despite marginal cardiac and/or respiratory reserve and be able to educate or guide the junior staff should be emphasised in all units so as to increase the rate of early mobilisation of patients (Stiller, Phillips & Lambert 2004)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

Comment on your rating for above statement

Category E- **Process (changes to promote early mobilisation)**	
Physiotherapists should assess all patients and screen those eligible for early mobilisation for successful implementation of early mobilisation of patients to be achieved (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Units should have prompts for physiotherapy referrals for early mobilisation as part of the physician's order form so as to increases the rate of early mobilisation in the units. (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Please list any additional implementation strategies that you would like to share from your experience to overcome the listed barriers:	_____

Part C: Equipment for early mobilisation

Access to rehabilitation equipment in an ICU setting facilitates the implementation of early mobilisation of patients in the unit. Using your experience in critical care, please rate the importance of the following list of equipment to assist with/facilitate early mobilisation of patients in your unit

	Not Important At All	Of Little Importance	Of Average Importance	Very Important	Absolutely Essential
Wheelchair	○	○	○	○	○
Cycle ergometry	○	○	○	○	○
Neuromuscular electrical stimulation	○	○	○	○	○
Ceiling track lift	○	○	○	○	○
Air assisted transfer system	○	○	○	○	○
Mobile/portable ventilators	○	○	○	○	○
Dynamic tilt table	○	○	○	○	○
Portable monitors	○	○	○	○	○
Adjustable bed	○	○	○	○	○
Walking aid	○	○	○	○	○
Transfer board	○	○	○	○	○
Waffle cushions	○	○	○	○	○
Adjustable chairs (lazyboy)	○	○	○	○	○
Custom made walkers	○	○	○	○	○

Comment on your rating for above statement

Part D: Implementation of early mobilisation

In your opinion, according to the identified barriers to early mobilisation, what are the main priority focus areas for successful implementation of early mobilisation of patients in the government units (List a maximum of 5 areas)	_____

There is variability in the exact activities considered as early mobilisation. In your opinion, should the following ICU activity codes and definitions be adopted to standardise the implementation of early mobilisation in the units? (Adopted from Needham & Hodgson 2012; www.mobilization-network.org)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Nothing (lying in bed)-Passively rolled or exercised by staff, but not actively moving	○	○	○	○	○
Transferring from bed to chair without standing-Hoist, passive lift or slide transfer to the chair without standing	○	○	○	○	○
Sitting in bed/exercises in bed-Any activity in bed, including rolling, bridging, active exercises, cycle ergometer, or active assisted exercises; not moving out of bed or over the edge of the bed	○	○	○	○	○
Tilt table/tilt bed-Use of tilt table or title table function with hospital bed	○	○	○	○	○
Sitting at edge of bed-Actively sitting over the side of the bed with some trunk control (may be assisted by staff)	○	○	○	○	○
Standing-Weight bearing through the feet in the standing position with or without assistance; may include use of a standing lifter	○	○	○	○	○
Transferring from bed to chair with standing-Able to step or shuffle through standing to the chair; this involves actively transferring weight from one leg to another to move to the chair. If the patient has been stood with a machine, they must step to the chair.	○	○	○	○	○
Marching in place-Able to walk in place by lifting alternate feet (must be able to step at least 4 times = 2 on each foot), with or without assistance	○	○	○	○	○

Walking with assistance of 2 or more people-Walking away from the bed/chair by at least 4 steps (2 for each foot) assisted by 2 or more people	○	○	○	○	○
Walking with assistance of 1 person-Walking away from the bed/chair by at least 4 steps (2 for each foot) assisted by 1 person	○	○	○	○	○
Walking with gait aid, but without assistance of any person (or wheel chair ambulation)-Walking away from the bed/chair by at least 4 steps (2 for each foot) with a gait aid, but no assistance from another person. In a wheelchair bound person, this includes wheeling the chair without assistance	○	○	○	○	○
Walking without a gait aid and without assistance of any person-Walking away from the bed/chair by at least 4 steps (2 for each foot) without assistance from a person or a gait aid	○	○	○	○	○
Unknown-It is unknown regarding what activity, if any, occurred	○	○	○	○	○

Comment on your rating for above statement

Should the following be used to determine the progression of exercise therapy during patient mobilisation					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Sedation levels	◯	◯	◯	◯	◯
Vasoactive drugs	◯	◯	◯	◯	◯
Strength of the patient	◯	◯	◯	◯	◯
Fatigue	◯	◯	◯	◯	◯
Level of mobility	◯	◯	◯	◯	◯
Function	◯	◯	◯	◯	◯
Consequences which occur after mobilisation (pus oozing, depression, increased fluid drain)	◯	◯	◯	◯	◯
Changes in vital signs (HR, BP, RR and SpO2)	◯	◯	◯	◯	◯
Subjective appearance of the patient	◯	◯	◯	◯	◯

Comment on your rating for above statement

APPENDIX 38

- **ROUND I DELPHI QUESTIONNAIRE FOR PHYSIOTHERAPY MANAGERS**

Confidential

Overcoming barriers to Early mobilisation in ICU patients

Dear Colleague

Welcome to Round 1 of this Delphi Process to determine expert consensus for implementation strategies to overcome barriers to early mobilisation of ICU patients.

This study is phase 3 of a bigger study that was focusing on translating research evidence to clinical practice concerning early mobilisation of patients in ICU. Phase 1 of the project was a survey which aimed to describe the current early mobilisation practices in ICUs in Zimbabwean and South African government hospitals. Phase 2 was a qualitative study to explore the barriers and facilitators to early mobilisation as perceived by the physiotherapists working in the units. The study results from phase 1 and phase 2 were then used to inform the current Delphi study.

Before answering this Delphi questionnaire, we expect you to have read the list of barriers to early mobilisation reported in Zimbabwean and South African ICUs in phase 1 and 2 that we shared with you via email a few days ago. You may click on the link below to access the document that outlines the list of barriers identified if you have not had time to read through it yet.

Keeping in mind the list of the barriers that was shared with you, we are asking you to now rate and comment on a series of statements in relation to implementation strategies to overcome the identified barriers to early mobilisation. The strategies listed are possible solutions to the barriers identified for the context of the government hospital setting in Zimbabwe and South Africa. The strategies with references have either been implemented in other ICUs in a different context or were recommended as possible solutions to overcome the barriers to early mobilisation identified in other studies.

In Round 1 the questionnaire consists of strategies to overcome barriers to early mobilisation in relation to human resources, delivery of service to the ICUs and equipment for early mobilisation. It will take about 10 minutes to complete this electronic round of the Delphi.

Barriers to early mobilisation of ICU patients identified in Zimbabwe and South African government hospitals

[Attachment: "Barriers to early mobilisation of ICU patients in SA and Zimbabwean government sector hospitals.docx"]

Section A: Demographic Information

Years of experience as clinician _____

Years of experience as head of the department _____

Section B: Service delivery in ICU

Development of early mobilisation protocols for each unit will facilitate implementation of the treatment (Dubb et al. 2016; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
The ICU multidisciplinary team should work together to formulate protocols and guidelines to early mobilisation of patients in their units (Engel et al. 2013; Eakin et al. 2015; Bassett et al. 2015; Dubb et al. 2016; van Willigen et al. 2016; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	
The focal person to initiate formulation of relevant specific protocols or guidelines should be the discipline specific leader, in consultation with the whole ICU team.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
There should first be a physician order for early mobilisation before it is executed on a patient (Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
The physiotherapist should be responsible for identifying patients who are ready for early mobilisation, implement mobilisation plans and make recommendations for progression of patient management in relation to early mobilisation in conjunction with the other ICU team members (Gosselink et al. 2008; Engel et al. 2013; van Willigen et al. 2016; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
There is a need to have a coordinator of early mobilisation in an ICU who is responsible for planning and communication within the whole ICU team responsible for patient care (Engel et al. 2013; Eakin et al. 2015; Schaller et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

There is need to promote admission of patients into the relevant specialised ICUs (e.g trauma ICU, neurosurgical ICU or medical ICU) so that delays in time to consultations by the specialists can be reduced.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
Each unit should have discipline-specific leaders who do not rotate between units/wards so that they will be responsible for educating new staff on unit guidelines for early patient mobilisation (Engel et al. 2013; Eakin et al. 2015; van Willigen et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The medical consultant should be the champion leader of early mobilisation (Eakin et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The physiotherapist must be the champion leader of early mobilisation (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The ICU nurse should be the champion leader of early mobilisation (Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
All units should adopt use of sedation protocols to minimise over sedation or continuous sedation of patients (Barber et al. 2014; Taito et al. 2016; van Willigen et al. 2016; Goddard et al. 2018).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

ICU multidisciplinary team members should engage frequently for planning purposes through ward rounds or ward meetings (Engel et al. 2013; Barber et al. 2015; Bakhru et al. 2016; van Willigen et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The premise of multidisciplinary rounds is not the composition of health disciplines physically in attendance but rather the interdisciplinary communication, shared planning and decision making that should occur (Rose et al. 2011)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____
There is a need for clarity on the role of leadership in an interprofessional team. This is critical for effective team functioning (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
There is a need to facilitate team interdependence. Team members should cooperate and work interactively to complete tasks related to patient care and rehabilitation (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
There is no need for specialised equipment to promote early mobilisation of patients in ICU (Hodgson et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Only a minimum level of equipment is necessary to facilitate early mobilisation in a unit (Asher et al. 2013; Eakin et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Creation of physiotherapy posts to support manpower required for the successful implementation of early mobilisation should be considered. (Engel et al. 2013; Eakin et al. 2015; Dubb et al. 2016)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Restructuring of roles, responsibilities and care pathways for the available staff in the absence of increased staffing levels will promote execution of early mobilisation activities in ICU (Eakin et al 2015; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Expertise development and skill training to equip the clinicians to undertake successful early mobilisation interventions with patients should be introduced so as to increase levels of early mobilisation in units (Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Knowledge and understanding of the different roles, boundaries, responsibilities and expertise of health professionals is key to successful implementation of early mobilisation (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Representatives of each profession are responsible for providing the information regarding their individualised roles in early mobilisation (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A physician should be the most visible leader regarding implementation and continuity of the early mobilisation program, leading the implementation process and fostering growth of the program by gaining staff and administrative buy in (Eakin et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Physiotherapists should be responsible for implementing mobilisation plans and exercise prescription and make recommendations for progression of patient management in conjunction with other team members (Gosselink et al. 2008; Engel et al. 2013; van Willigen et al. 2016; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
ICU doctors should be responsible for facilitating timely delivery of early mobilisation through early referral and minimising levels of pain experienced by patients (Engel et al. 2013; Hodgson et al. 2013; Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
ICU nurses should be responsible for facilitating timely delivery of early mobilisation through minimising levels of pain experienced by patients and temporarily disconnecting feeding tubes and other attachments to patients where applicable (Engel et al. 2013; Hodgson et al. 2013; Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Early mobilisation should be a collaborative role, with others being responsible in the delivery and others supporting the delivery of the program.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Ability to express one's opinion to others involved in the care of ICU patients will result in respect of teamwork and promote early mobilisation (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Ability to acknowledge views and ideas of other ICU team members promotes interprofessional communication and therefore promotes implementation of early mobilisation in ICU (Bentley et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Knowledge transfer and education of healthcare professionals about the burden of ICU acquired weakness and its impact on long-term patient outcomes will lead to achievement of higher levels of early mobilisation of patients in ICU (Jolley et al. 2014; Barber et al. 2015; Eakin et al. 2015; Bakhru et al. 2015; Dubb et al. 2016).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Training of the ICU team members on the implementation of early mobilisation activities by experts will lead to higher levels of early mobilisation of patients (Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The importance of having experienced senior clinicians in the unit who are able to discern which patients will tolerate mobilisation despite marginal cardiac and/or respiratory reserve and be able to educate or guide the junior staff should be emphasised in all units so as to increase the rate of early mobilisation of patients (Stiller, Phillips & Lambert 2004)	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Section C: Process (changes to promote early mobilisation)

Physiotherapists should assess all patients and screen those eligible for early mobilisation for successful implementation of early mobilisation of patients to be achieved (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Units should have prompts for physiotherapy referrals for early mobilisation as part of the physician's order form so as to increases the rate of early mobilisation in the units. (Engel et al. 2013).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Please list any additional implementation strategies that you would like to share from your experience to overcome the listed barriers:	_____

Section D: Equipment needs

Access to rehabilitation equipment in an ICU setting facilitates the implementation of early mobilisation of patients in the unit. Please rate your likelihood of budgeting for the listed equipment to assist with/facilitate early mobilisation of patients in ICU at your hospital

	Extremely unlikely	Unlikely	Neutral	Likely	Extremely likely
Wheelchair	○	○	○	○	○
Cycle ergometry	○	○	○	○	○
Neuromuscular electrical stimulation	○	○	○	○	○
Ceiling track lift	○	○	○	○	○
Air assisted transfer system	○	○	○	○	○
Mobile/portable ventilators	○	○	○	○	○
Dynamic tilt table	○	○	○	○	○
Portable monitors	○	○	○	○	○
Adjustable bed	○	○	○	○	○
Walking aid	○	○	○	○	○
Transfer board	○	○	○	○	○
Waffle cushions	○	○	○	○	○
Adjustable chairs (lazyboy)	○	○	○	○	○
Custom made walkers	○	○	○	○	○

Comment on your rating for above statement

APPENDIX 39

- **ROUND II DELPHI QUESTIONNAIRE FOR CLINICIANS**

Confidential

Round 2 Multidisciplinary team approach to overcome barriers to early mobilisation in ICU

Dear Colleague

Welcome to Round 2 of this Delphi Process to determine expert consensus for implementation strategies to overcome barriers to early mobilisation of ICU patients.

The Round 2 questionnaire consist of a mixture of modified statements which did not meet consensus in Round 1, and some few new statements developed from the themes emerging from panel comments in Round 1. The questionnaire is shorter and will take you approximately 5-8 minutes to complete.

Part A: The following statements relate to the barriers to early mobilisation of ICU patients identified in phases 1 and 2 of this project and the proposed implementation strategy/ies to overcome each of these barriers.
Indicate to what extent you agree or disagree with the proposed implementation strategy and please provide comments to make further suggestions.

Category A-Characteristics of the intervention

Early mobilisation should be preferably done earlier but sometimes some patient's conditions restrict early mobilisation to be done between day 1 to day 5, therefore it should be instituted at the patient's earliest signs of stability and cooperation as it is better to be late than not at all.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating on the above statement	_____
A better definition of early mobilisation which incorporates the physiological effect intended and placed in the context of the physiological, psychological and the physical state of the patient should be provided.	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
Passive joint movements should not be considered as early mobilisation but passive transfer of patient out of bed to a chair is early mobilisation as this stimulate the neural pathways for the patient to have postural control and remain in a seated posture	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Passive mobilisation should include the following activities or use of the following technologically advanced equipment to mobilise the patients out of bed sooner even when there is no active participation of the patient

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Manual passive joint movements	○	○	○	○	○
Tilt table therapy-use of a tilt table (Passive orthostatism) to achieve the vertical position in critically ill patients for motor stimulation, cardiovascular function improvement and alertness	○	○	○	○	○
Neuromusculoskeletal electrical stimulation-can provide some muscular activity even very early during critical illness and it is nonvolitional and can be administered without causing cardiopulmonary instability while a patient remains in bed	○	○	○	○	○
Cycle ergometers-allows patient activity to move back and forth between passive cycling (where the patient does not contribute to pedaling motion), active assisted cycling (where the patient can augment the motorized cycle), and active cycling (with the option for a PT to add resistance to cycling).	○	○	○	○	○
Continuous passive motion machines-devices are used during the first phase of rehabilitation following a soft tissue surgical procedure or trauma and helps in prevention of stiffness,	○	○	○	○	○

Comment on your rating for the above statement _____

Passive mobilisation should be included as part of early mobilisation activities but should not be done in isolation as they only preserve joint range, muscle length and do not actively involve the muscle to improve the strength

- ○ Strongly Disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly Agree

Comment on your rating for the above statement _____

The physiotherapist must always be present in the ICU for them to take the role of identifying patients who are ready for early mobilisation, implement mobilisation plans and make recommendations for progression of patient management in relation to early mobilisation in conjunction with the other ICU team members as the once daily visit will not make this possible	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____

Category B-ICU contextual Factors (inner setting)

The medical consultant/physicians should be consulted before a final decision of early mobilisation is made and they should ensure that practice is evidence-based, embrace innovation and change put forward by other disciplines where it will benefit the patients	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The ICU nurse has a bigger role of providing nursing care hence taking a leading role in early mobilisation will overburden the nurse but they can assist during implementation as they are with the patients 24 hours around the clock and they will be aware of the patient's readiness for procedures, physical stability, and psychological well being	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Technologically advanced equipment in ICU will benefit to mobilise patients earlier and eliminate physical strain on clinicians, but due to cost implications in public setting, unavailability of the specialised equipment should not limit early mobilisation	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Reducing the number of lines/attachments should be considered as part of preparation for mobilisation and should be done by the person most knowledgeable and/or who works consistently with the lines, ICU physiotherapists should not be responsible for reducing the number of lines and attachments as they might not be aware of the ongoing need for the lines and attachments	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Catheter sites should not preclude mobilisation if clinically assessed as secure and suitable	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Category C- Inner setting/hospital organisation (refers to patient needs and resources)

Overview of safety issues prior to active mobilisation of ICU patients.

Prolonged tachycardia is common in many ICU patients due to autonomic neuropathy hence the need to consider the cause of tachycardia before one decides not to mobilise due to increased resting heart rate	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The administration of vasoactive drugs should not be an absolute contraindication to mobilisation as patients can be on a low dose of vasopressors for vasodilation and can handle mobilisation (Hodgson et al. 2014).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Vital signs can not be looked at in isolation as some patients may actually present with deranged vitals but which will benefit significantly with early mobilisation eg low oxygen saturation in a patient with basal atelectasis	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Patients may proceed with early mobilisation if their ICP is well controlled for 24 hrs with no administration of mannitol or hypertonic saline as this should be dependent on the overall condition of the patient	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
A platelet count of above 20 x 109 /L with no other bleeding risks should be considered safe for out of bed mobilisation, however at times that information is not known in a clinical setting (Stiller, Phillips & Lambert 2004; Gosselink et al. 2008).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree

Comment on your rating for above statement

Part B: Equipment for early mobilisation

Access to rehabilitation equipment in an ICU setting facilitates the implementation of early mobilisation of patients in the unit. Using your experience in critical care, please rate the importance of the following list of equipment to assist with/facilitate both passive or active early mobilisation of patients in your unit

	Not Important At All	Of Little Importance	Of Average Importance	Very Important	Absolutely Essential
Wheelchair	○	○	○	○	○
Cycle ergometry	○	○	○	○	○
Neuromuscular electrical stimulation	○	○	○	○	○
Ceiling track lift	○	○	○	○	○
Air assisted transfer system	○	○	○	○	○
Dynamic tilt table	○	○	○	○	○
Transfer board	○	○	○	○	○
Waffle cushions	○	○	○	○	○

Comment on your rating for above statement

Part C: Implementation of early mobilisation

In your opinion, should the following ICU activity codes and definitions be adopted to standardise the implementation of early mobilisation in the units?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
No mobilisation-Passively rolled or exercised by staff, but not actively moving	○	○	○	○	○
Passive Transfer-Hoist, passive lift or slide transfer to the chair without standing	○	○	○	○	○
Passive Orthostatism/Tilt table-Use of tilt table or title table function with hospital bed	○	○	○	○	○
Unknown-It is unknown regarding what activity, if any, occurred	○	○	○	○	○

Comment on your rating for above statement

APPENDIX 40

- **ROUND II DELPHI QUESTIONNAIRE FOR PHYSIOTHERAPY MANAGERS**

Confidential

Round 2 Overcoming barriers to Early mobilisation in ICU patients (Managers)

Dear Colleague

Welcome to Round 2 of this Delphi Process to determine expert consensus for implementation strategies to overcome barriers to early mobilization of ICU patients.

The Round 2 questionnaire consist of a mixture of modified statements which did not meet consensus in Round 1, and some few new statements developed from the themes emerging from panel comments in round 1. The questionnaire is shorter and will take you approximately 5-8 minutes to complete.

Section A: Service delivery in ICU

There is no need for a physician order for early mobilisation to be executed on a patient as physiotherapists are experts in exercise who can clinically reason when early mobilisation is to be initiated(Jolley et al. 2015).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for the above statement	_____
The medical consultant/physicians should be consulted before a final decision of early mobilisation is made and they should ensure that practice is evidence-based, embrace innovation and change put forward by other disciplines where it will benefit the patient	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The ICU nurse has a bigger role of providing nursing care hence taking a leading role in early mobilisation will overburden the nurse but they can assist during implementation as they are with the patients 24 hours around the clock and they will be aware of the patient's readiness for procedures, physical stability, and psychological well being	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
The premise of multidisciplinary rounds is not the composition of health disciplines physically in attendance but rather the effectiveness of the communication, reliability and clear communication channels	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
comment on your rating for above statement	_____

Technologically advanced equipment in ICU will benefit to mobilise patients earlier and eliminate physical strain on clinicians, but due to cost implications in public setting, unavailability of the specialised equipment should not limit early mobilisation	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____
Restructuring of roles, responsibilities and care pathways for the available staff in the absence of increased staffing levels will promote execution of early mobilisation activities in ICU as this will assist the therapist to plan their work schedules (Eakin et al 2015; Parry et al. 2017a).	◯ Strongly Disagree ◯ Disagree ◯ Neutral ◯ Agree ◯ Strongly Agree
Comment on your rating for above statement	_____

Section B: Equipment needs

Access to rehabilitation equipment in an ICU setting facilitates the implementation of early mobilisation of patients in the unit. Please rate your likelihood of budgeting for the listed equipment to assist with/facilitate early mobilisation of patients in ICU at your hospital

	Extremely unlikely	Unlikely	Neutral	Likely	Extremely likely
Cycle ergometry-allows patient activity to move back and forth between passive cycling (where the patient does not contribute to pedaling motion), active assisted cycling (where the patient can augment the motorized cycle), and active cycling (with the option for a PT to add resistance to cycling).	◯	◯	◯	◯	◯
Neuromuscular electrical stimulation-can provide some muscular activity even very early during critical illness and it is nonvolitional and can be administered without causing cardiopulmonary instability while a patient remains in bed	◯	◯	◯	◯	◯
Ceiling track lift	◯	◯	◯	◯	◯
Air assisted transfer system	◯	◯	◯	◯	◯

Walking aid	○	○	○	○	○
Transfer board	○	○	○	○	○
Waffle cushions	○	○	○	○	○
Adjustable chairs (lazyboy)	○	○	○	○	○
Custom made walkers	○	○	○	○	○

Comment on your rating for above statement