PERCEPTIONS OF PHYSIOTHERAPISTS ON THEIR ROLE IN THE MANAGEMENT OF INTENSIVE CARE PATIENTS IN KHARTOUM, SUDAN

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Date: December 2020

DECLARATION

I declare that ***"Perceptions of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan"*** is my own work, and it has not been submitted, or part of it for any degree or examination, at any other university, and all the resources I have used, or quoted, have been indicated and acknowledged by complete references.

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ABSTRACT

Background: The professional status of physiotherapists in Sudan is reported to be low even though the profession was established in Khartoum, Sudan in 1969. Intensive care units are operating in Khartoum, Sudan. Physiotherapists have been reported to be integral to the management of intensive care patients. Globally, the role of ICU physiotherapists in the management of ICU patients have been explored and described; however, this information is lacking for Khartoum, where the profession is still in its infancy. Therefore, this study aimed to explore and describe the physiotherapists' perceptions of their role in the management of intensive care patients in Khartoum, Sudan. ***Methods:*** The study was conducted in Khartoum, using a qualitative, exploratory descriptive research design. Both academic and clinical physiotherapists who provide patient care in the ICUs in three government hospitals, two private hospitals and four university settings that house physiotherapy colleges/departments, were included in the population (N=48). Only those holding physiotherapy degrees (not diplomas), and with at least six months of general clinical physiotherapy experience were included (n=24) in the sample and were invited to participate in the study. Seventeen (71%) voluntarily participated, providing data saturation. The data were collected by the researcher via audiotaped individual face-to-face interviews in a place and at a time convenient to each participant and the researcher. A semi-structured interview guide designed by the researcher based on the aim and objectives of the study was used. The data was transcribed verbatim. Thematic content analysis using both deductive and inductive processes and the steps outlined by Braun and Clark (2006), was used to analyse the qualitative data. Trustworthiness was ensured through techniques that addressed credibility, dependability, transferability, and confirmability. Ethics clearance was obtained from the UWC Senate Research Ethics Committees and all aspects relating to informed written consent, voluntary participation, right to withdraw without consequence, anonymity and confidentiality were maintained. ***Results:*** There were more female (n=12/17, 70.6%) than male participants. The mean age was 31 years (SD+/-8) with female participants being younger (29 years, SD+/-5.6). The majority had bachelor's degrees (n=11/17, 65%), more male participants (n=3/5, 60%)

had a master's degree (not ICU specific) and no physiotherapists had PhD degrees. Most physiotherapists worked as both academics and clinicians in the area of ICU (n=11/17, 65%). The majority reported having expertise in general physiotherapy (n=13/17, 76.5%). Almost a third (n=5/17, 29.4%) reported having expertise in ICU physiotherapy with more females reporting expertise in general (n=10/13, 76.9%) and ICU physiotherapy (n=4/17, 23.5%) respectively. There were three major themes and related categories and subcategories that emerged from the data obtained. These were: Theme 1) ICU Environment or Setting: i) structure and organisation, ii) resources, iii) referral patterns, iv) multidisciplinary ICU teamwork including ICU team communication, and v) discharge procedures; Theme 2) Role of the ICU Physiotherapist: i) perceived importance of physiotherapists in the ICU, and ii) role in ICU patient management [treatment activities; use of evidence based practices and outcome measures]; and Theme 3) Training, Professional Status and Scope of Practice: i) training and competence, ii) awareness, and iii) autonomy. **Conclusion:** There was an overall perception of a lack of awareness of the role of the physiotherapist by doctors in the ICUs in Sudan. Their perceived role in the management of the ICU patient may be due to inadequate referral structures and collaborative decision making within the multidisciplinary ICU team, due to lack of communication between healthcare professionals. Furthermore, a shortage of resources such as equipment and other rehabilitation healthcare professionals for holistic ICU patient care, minimal knowledge of ICU physiotherapy related evidence-based protocols and outcome measures, and the implementation of the latter may affect the role of the physiotherapist in the management of ICU patients in Khartoum, Sudan. There is a need for the promotion of the physiotherapy profession and its role in the management of ICU patients in the ICU setting in Khartoum, Sudan to improve the professional status in this area of healthcare and maintain the scope of practice and autonomy in this specialised field of healthcare.

Keywords: *Academic, Clinical, Critical Care, Intensive Care Unit, Khartoum, Perception, Physiotherapy, Role, Sudan.*

Word Count: *663 with headings*

ABBREVIATIONS

ADLs: Activities of Daily Living

ACT: Airway Clearances Technique

AUW: Afhad University for Women

DVT: Deep Vein Thrombosis

EBPs: Evidence-based Protocols

EM: Early Mobilisation

HCPs: Healthcare Professionals

ICU: Intensive Care Unit

IPPB: Intermittent Positive Pressure Breathing

LOS: Length of Stay

MACT: Manual Airway Clearance Technique

MDT: Multidisciplinary Team

MH: Manual Hyperinflation

MOE: Ministry of Education

MOH: Military of Health

NES: Neuromuscular Electrical Stimulation

PD: Postural Drainage

WCPT: World Confederation for Physical Therapy

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ETHICS

Ethics approval was obtained from the Humanities and Social Science Research Ethics Committee of the University of the Western Cape (Ethics Reference Number HS/16/5/35) and data collected within the period of ethics approval [Addendum 1]. Detailed information regarding the ethics principles followed during the data collection period and entire research process can be found in the Methodology in Chapter Three of the thesis.

FUNDING AND CONFLICT OF INTEREST

The researcher acknowledges that the study was self-funded and there is no conflict of interest related to this study.

CHAPTER ONE: INTRODUCTION

Chapter one is an introduction to the research study and outlines the background of the study regarding the physiotherapists' role in the management of intensive care patients. This chapter also outlines the problem statement, research question, aim, and objectives of the research and the significance of the findings of this study. Finally, the chapter ends with an outline of the chapters in the thesis.

1.1 Background

Intensive care settings are a critical part of healthcare and while the majority have been set up in developed high income countries, they are growing in developing middle- and low-income countries (Marshall et al., 2017). Intensive care medicine is a specialised area of healthcare and involves the provision of services and treatments to patients who suffer from life-threatening signs and symptoms or who are at risk of developing these conditions (Cairns & Faulds, 2018; Marshall et al., 2017). Critical illness refers to conditions or disease processes that are life-threatening and that may lead to multisystem failure as well as mortality and morbidity (Robertson & Al-Haddad, 2013). Intensive or critical care services and treatment are offered by a dedicated multidisciplinary and/or interdisciplinary healthcare team including physiotherapists (Marshall et al., 2017). However, effective management of critically ill patients requires an approach beyond the ICU boundaries (Cairns & Faulds, 2018). The multidisciplinary approach with good patient follow-up and an early response system is required for ICU patient management (Cairns & Faulds, 2018). Intensive care units in sub-Saharan countries, including Sudan, lack financial resources, equipment, trained healthcare staff, and medications (Sulieman, El-Mahdi, Awadelkareem, & Nazer, 2018) that may affect the care of the critically ill patients.

Critically ill patients are cared for by specially trained medical staff and in specifically equipped hospitals (Marshall et al., 2017; Towey & Ojara, 2007). The specialised ICU staff includes doctors, nurses, respiratory therapists, clinical nurse specialists, physician assistants, dietitians, social workers, pharmacists and physical therapists or physiotherapists (Marshall et al., 2017), who need to be highly skilled and trained (Ambrosino, Janah, & Vaghegginia, 2011). According to Otterman, Van der Wees, Bernhardt, and Kwakkel (2012), physiotherapy is an essential part of patient management in intensive care, and it is crucial to have physiotherapists working in ICUs. The role of an intensive care physiotherapist starts with an assessment of the patient (Karachi, Hanekom, & Gosselink, 2018; Gosselink et al., 2008; Lewis, 2003) followed by evidence-based treatment, assessment of the outcome of that treatment and appropriate referral for holistic care. According to many authors (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Kumar, Maiya, & Pereira, 2007; Norrenberg & Vincent, 2000), the physiotherapist's role and responsibilities have been poorly defined throughout ICU development. In both developed and developing countries, there are challenges regarding the role of the physiotherapist in the ICU and their place in the ICU multidisciplinary patient care team (Peerbhay, Hanekom, Karachi, 2020; Ponto, Lupton-Smith, Karachi, 2019; Gupte & Swaminathan, 2016; Makalla, Karachi, Phillips, 2015). This challenge results from the variation in physiotherapy practices and availability of services across continents, countries, cities, and within hospitals and between ICUs in the same hospital (Lottering & Van Aswegan, 2016; Gosselink et al., 2008; Kumar et al., 2007). In Khartoum, Sudan, where most of the ICUs are located, it is not clear how the ICUs function, how they are organised and structured and whether there is a trained team of ICU specialists including ICU trained or skilled physiotherapists for the physiotherapeutic management of ICU patients and what role they play in these units.

In Sudan, as in some other developing countries, physiotherapy education and services are in an early stage, and the number of physiotherapists is relatively few to cover the population's needs (Chaboyer, Gass, & Foster, 2004; Rhodes, 1989). In earlier years, trained nurses in Sudan could do a special course to become a physiotherapy assistant and obtained a diploma. As of 2004, the first programme for a bachelor's in science degree in physiotherapy was established through the establishment of a Physiotherapy College now known as Ibn Sinha University, who produced their first graduates in 2009. The researcher was one of the physiotherapists that graduated from this college and during his work experienced a lack of ICU physiotherapy training and limited involvement in ICU patient management. The researcher and his peers had one-month clinical education blocks of which one included clinical practice training in the ICUs. The researcher noted the lack of input of physiotherapists in the ICU setting in Sudan as physiotherapists only worked in the ICU when called out for ICU patient management and worked in these ICUs on an adhoc or rotation basis, which may influence their role, integration, professional status and scope of practice in the ICU setting and thus their role in ICU patient management. Therefore, identifying the need for exploring the physiotherapists' perceptions on their role in the management of ICU patients.

There is an identified need for more focus on the physiotherapy profession in Sudan and a need to improve their professional status in the country (Chaboyer, Gass, & Foster, 2004; Rhodes, 1989). The physiotherapists' profile and the organisation and structure in the hospitals that have ICU facilities in Sudan is not available in the literature. Additionally, there is a shortage of information on the profile (who these physiotherapists are, their training, qualifications and years of experience) and their current services and practices in patient management in the ICUs in

Khartoum, Sudan. Therefore, the physiotherapists' perception of their role in these existing ICUs and particularly in the management of ICU patients, needs to be explored in order to improve their training needs, professional status, the scope of practice in ICU patient management in Sudan. In turn the latter could add to the services and healthcare provided to ICU patients in Sudan and possibly lead to improved short- and long-term patient outcomes such as decreased functional morbidity and improved quality of life.

Currently there is a lack of literature that explores the physiotherapists' perceptions of their role in managing ICU patients, and these perceptions of ICU physiotherapists in Sudan is still unknown. Knowing and understanding the perception of the physiotherapist regarding their role in the management of ICU patients can increase the awareness about the physiotherapists' role in the ICU and among the other ICU healthcare professionals with regard to ICU physiotherapy patient management and their awareness of the benefits of physiotherapy management of ICU patients in improving patient outcomes. An understanding of how physiotherapists in Sudan practice within the ICU and their perceived role in the management of ICU patients will provide a body of evidence not currently available in the African Literary Database and provide information relevant to the profession in the country. The information can then also be available for healthcare policy makers and government, including the National Medical and Allied Health Professions Association and other ICU healthcare professionals, to advocate for improvements in the physiotherapy training and competencies, ICU team integration and involvement through allocation of physiotherapists to ICU settings and patient management including improved referral systems for ICU physiotherapists in Sudan.

Global studies on the role of the physiotherapist in the ICU and the management of ICU patients are mainly quantitative, including survey outcomes (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Sigero et al., 2016; Malone, Ridgeway, Nordon-Craft, Moss, Schenkman, & Moss, 2015; Kumar et al., 2007; Norrenberg & Vincent, 2000) while qualitative studies in this area are lacking with limited in-depth information. Qualitative studies are important and valuable in research for evaluating areas of interest that lack baseline data and can be used to provide insight into the unknown for further exploration both quantitatively and qualitatively. Studies in both developed and developing countries have focused on the role of the physiotherapists in the ICU in an attempt to provide a clear definition for the role of the ICU physiotherapist, however they all conclude that the role is variable across continents, countries and hospitals across regions in countries (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Sigero et al., 2016; Malone, Ridgeway, Nordon-Craft, Moss, Schenkman & Moss, 2015; Kumar et al., 2007; Norrenberg & Vincent, 2000). This lack of standardisation may exist in other countries including underdeveloped countries like Sudan where healthcare education and healthcare services specifically in allied health including physiotherapy, has had many challenges over decades. As early as 1989, Rhodes (1989) reported that the physiotherapy profession in Sudan was struggling with challenges in education and training as well as in providing services in the healthcare system.

Only one study, an unpublished thesis by Alfadil (2017), speaks to physiotherapy in Sudan but focuses specifically on the knowledge attitudes and practices regarding physiotherapy management of patients admitted to intensive care units in Khartoum, Sudan. Alfadil (2017), determined other HCPs' knowledge and attitudes regarding physiotherapy management in the ICU and the current physiotherapy practices applied by physiotherapists in ICUs in Khartoum,

Sudan. However, the study used mainly a quantitative design, using a self-developed survey and checklist conducted in ICUs of 17 hospitals in Khartoum with 541 ICU healthcare professionals including 24 consultants, 150 doctors, 233 nurses, 56 dieticians, 19 medical technicians, 40 physiotherapists and 19 other allied health professionals. As the study was quantitative in nature, it lacked the depth of a qualitative enquiry which is beneficial when exploring a topic that is new and not well studied. The findings of the quantitative descriptive study conducted by Alfadil (2017), showed that 74.7% (374/501) of healthcare professionals (HCPs) had adequate knowledge about physiotherapy management in ICU. It also showed that 97% (486 /501) of HCPs demonstrated a positive attitude toward physiotherapists working in the ICU and had a significant positive relationship between knowledge and attitudes, that suggested that those HCPs with better knowledge were more likely to have a more positive attitude towards the physiotherapists in the ICU. Alfadil (2017), went further to determine the physiotherapy practices utilised in ICUs and showed that manual airway clearance techniques (MACTs) including percussion, vibration, suctioning and postural drainage (PD) were the most frequently used techniques as well as limb exercises, mobilisations and positioning as part of physiotherapy rehabilitation of ICU patients. Practices or techniques such as manual hyperinflation (MH) practice was not applied by physiotherapists in the ICU and some equipment such as suction equipment, spirometers and nebulizers was used by physiotherapists in the ICU; while hyperinflation bags, chest support and neuromuscular electrical stimulation (NES), were not used by them. Furthermore, the results highlighted that 1-2 treatment sessions per day is an ideal frequency for physiotherapy treatment sessions in the ICU, with 24 minutes as an average duration of a session. While the knowledge and attitudes about physiotherapy management by the other healthcare professionals of the ICU team and a description of the practices and techniques used was identified and is essential in order to facilitate efficient and effective

medical services, the study did not provide factors that affect the knowledge and attitudes towards physiotherapists in the ICU and why they use or don't use the practices or treatments described in ICU patient management. The study also did not delve into aspects such as ICU physiotherapy referral, discharge, use of evidence-based protocols and outcome measures and aspects relating to awareness, autonomy and scope of practice or professional status of the physiotherapist in the ICUs in Khartoum, Sudan. Therefore, this study aimed to explore the perceptions of the physiotherapists of their role in the management of intensive care patients in Khartoum, Sudan in order to obtain a deeper understanding of the current status of physiotherapy care in these ICUs.

1.2 Problem Statement

It is well known and well documented that physiotherapists have an invaluable role to play in the multi/interdisciplinary ICU team and in the management of ICU patients as well as in improving functional outcomes and health-related quality of life in the survivors of critical illness. These health outcomes in ICU patients can be affected by the level of the physiotherapists' skills, competency and experience working in intensive care as well as safety and minimisation of adverse events during physiotherapy ICU patient management. It has been argued in the literature that it is very important to clarify the skills and competencies required by physiotherapists for efficient and safe clinical management of patients (Plani, van Aswegen, Patman & Hanekom, 2017). In Sudan, the physiotherapy profession is still in its infancy and training and competencies of these healthcare professionals are not known. Available literature has indicated that one of the areas that Sudanese physiotherapists are not well trained in is cardiopulmonary rehabilitation (Abdo, Farah, Salih, & Abdelmgeed, 2013) which forms part of the competency required for effective and efficient management of ICU patients. How the

Sudanese physiotherapists therefore practise in the ICU and the role of Sudanese physiotherapists in intensive care patient management is still unknown. There is therefore a need for studies to be conducted to identify these practices in an attempt to define their role in this specialised healthcare setting in low to middle income countries such as Sudan as well. Challenges that may be faced by physiotherapists working in ICUs in Sudan can also be identified, as the possible challenges to their role in the management of ICU patients are not known. There is a general dearth of evidence regarding physiotherapy in Sudan and specifically no qualitative studies regarding the role of ICU physiotherapists in Sudan. Therefore, the perception of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan, provides new and novel evidence to add to the African Healthcare Literary database. The status, role and practices of the physiotherapy profession in Sudan and in particular in the ICU is not clear. The professional status of physiotherapists in Sudan is low even though the profession was established in Khartoum in 1969. There are intensive care units based in Khartoum, Sudan but the availability and access to physiotherapy services and care is not clear. Physiotherapists are integral to the management of intensive care patients. Globally, the role of ICU physiotherapists in the management of ICU patients have been explored and described. However, this information is lacking for Khartoum, Sudan, where the profession is still in its infancy. Therefore, it is unclear whether the profession requires improvement or further development and support in the area of intensive care in particular in Khartoum and should be explored.

1.3 Research Question

What are the perceptions of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan?

1.4 Research Aim

The aim of the study is to explore and describe the physiotherapists' perceptions on their role in the management of intensive care patients in Khartoum, Sudan.

1.5 Research Objectives

1.5.1 To explore and describe the physiotherapists' perceptions on their role in the management of intensive care patients in Khartoum, Sudan, in relation to the:

1.5.1.1 positioning of intensive care patients,

1.5.1.2 use of chest physiotherapy for intensive care patients,

1.5.1.3 early mobilisation of intensive care patients,

1.5.1.4 referral and discharge of intensive care patients, and

1.5.1.5 use of outcome measures and evidence-based protocols or clinical guidelines in ICU patient care; and

1.5.2 To explore and describe the barriers and facilitators facing the physiotherapists in the management of intensive care patients in Khartoum, Sudan.

1.6 Significance of the Study

To the researcher's knowledge this is the first study that explores the physiotherapists' perceptions of their role in the management of ICU patients and provides new and novel data on the topic. The findings of this study could guide the National Ministry of Allied Health Profession Association and the clinical and academically based physiotherapists to improve the professional status and role of the physiotherapists in ICU patient management in Sudan. The

findings are significant as they add to the body of evidence on physiotherapy in Sudan that is currently lacking. Physiotherapists could benefit from the findings by better understanding their role in managing intensive care patients and by having insight into the current situation of the profession in this specialised field of intensive care which could lead to improving service delivery standards in line with other local and international ICU settings. The Ministry of Health (MOH) and the Ministry of Education (MOE) in Sudan, could use the findings of the study to address the barriers and facilitators facing the physiotherapy profession in the intensive care setting that can improve the future of the physiotherapy profession in terms of training and qualifications, availability of ICU physiotherapy posts, physiotherapy services and patient care rendered in the intensive care setting in Khartoum, Sudan.

1.7 Ethics

Ethics clearance to conduct the study was obtained from the Health and Social Sciences Research Ethics Committee at the University of the Western Cape, South Africa, (Ethics Reference Number HS/16/5/35 – Addendum 1) and from the included participants from the hospitals included in the study. All participants were provided with an information sheet (Addendum 2) and a consent form (Addendum 3) that was available in English only as all the participants in the study were educated in and are fluent in the English language. All audiotaped data was transcribed into password protected word documents and kept in a password protected computer. During the study, specifically the interviews, if any participant experienced any problem or discomfort due to the nature of the interview, it was addressed by the researcher or through an appropriate referral for the participant to be appropriately assisted if the researcher was unable to do so. However, the latter was not required as participants did not report any discomfort or problems due to the interviews held. All participants were informed of their right

to withdraw from the study at any time without consequence. Codes, namely P1, P2, P3, … and so on until P17 as well as an annotation A, C or A/C for those who were either a clinician, academic or both a clinician and academic were used for each participant and thus ensured the anonymity and confidentiality of the data collected. The data will be stored for at least 5 years following completion of the study and publication. Further details regarding ethics principles for the study are outlined in the methods chapter of the thesis.

1.8 Thesis Structure

A conventional thesis structure with six chapters including an introduction, literature review, methodology, results, discussion and conclusion has been used. A description of the content of the chapters follows:

1.8.1 Chapter One: Introduction

Chapter One is an introduction to the research study and outlines the background of the study regarding the physiotherapists' role in the management of intensive care patients and current evidence available with particular focus on the needs of ICU physiotherapy research in Sudan. This chapter also outlines the problem statement, research question, aim, and objectives of the research and the significance of the findings of this study. Finally, the chapter ends with an outline of the chapters in the thesis.

1.8.2 Chapter Two: Literature Review

Chapter Two presents the literature relating to the physiotherapists' role in the management of ICU patients, including treatment techniques, the role in the prevention of complications and the benefits of physiotherapy on ICU patients. Additionally, the perceptions of ICU healthcare

professionals about the role of physiotherapy in ICU were reviewed. Lastly, the current status of the physiotherapy profession in Sudan is explained and the minimal evidence for the role of ICU physiotherapists in ICUs in Sudan (and thus the need for this research study) was highlighted in this chapter.

1.8.3 Chapter Three: Methodology

Chapter three describes the methodological approach and design applied in this study. The chapter includes a statement of the research question and rationale for the study, description of the study design, research setting, population and sampling, data collection instrument, the data collection procedure, data capturing and analysis, trustworthiness and ethics considerations. A report on the findings after the conclusion of the data analysis process follows this chapter.

1.8.4 Chapter Four: Results

Chapter Four presents the findings of the study including a presentation of the characteristics of the participants in the study and discusses the emerging themes, categories and subcategories following data analysis and presents these findings in a narrative format supported by verbatim quotes.

1.8.5 Chapter Five: Discussion, Strengths and Limitations, Recommendations

Chapter Five discusses the results of the study and compares it with the current related literature on the role of physiotherapy in the management of intensive care patients. The aim and objectives of the study are answered in line with the research findings. The researcher attempts to critically analyse the findings and integrate them with available evidence regarding the role of the physiotherapist in managing ICU patients and to highlight findings that are novel and not

documented in previous literature in the current context of ICU physiotherapy in Sudan. The strengths and limitations of the study and recommendations for future studies and suggested improvements for the profession based on the findings of the study are also highlighted.

1.8.6 Chapter Six: Conclusion

Chapter Six presents the conclusion of the research findings. This chapter presents the reader with the way forward and ways in which the findings can be utilised for future research and for future improvements that can be made by the various stakeholders in the higher education and health sector regarding physiotherapy in intensive care units in Sudan.

CHAPTER TWO: LITERATURE REVIEW

This chapter presents the literature relating to the physiotherapists' role in the management of ICU patients, including treatment techniques, the role in the prevention of complications and the benefits of physiotherapy on ICU patients. Additionally, the perceptions of ICU healthcare professionals about the role of physiotherapy in ICU were reviewed. Lastly, the current status of the physiotherapy profession in Sudan is explained and the minimal evidence for the role of ICU physiotherapists in ICUs in Sudan (and thus the need for this research study) was highlighted in this chapter.

2.1 The Intensive Care Setting

The earliest ICUs was developed in the 1950s. An intensive care unit (ICU) is a ward in the hospitals that is staffed with specialised healthcare professionals and hi-tech specialised equipment. It is an enclosed area in a hospital that is a separate and self-contained area of a hospital that is committed or devoted to the management and monitoring of patients with critical illness (Marshall et al., 2017). The ICU provides specialised expert care and facilities for the support of vital functions and uses the expert clinical skills of medical, nursing, and allied health personnel experienced in the managing critically ill patients (Marshall et al., 2017). The ICU is a distinct area in the hospital that provides high-level nursing and advanced monitoring and organ support to improve patient morbidity and mortality (Cairns & Faulds, 2018). The critically ill patient in the ICU is cared for by qualified staff that are ICU trained including physicians, nurses and nurse practitioners, nutritionists or dieticians, pharmacists, social workers, psychologists, microbiologists, technicians and respiratory or physical therapists or physiotherapists (Marshall et al., 2017; Bhat, Vasanthan, & Babu, 2017). Patients with life-threatening conditions such as trauma, multisystem failure, respiratory system failure, and cardiac surgery, can be admitted to

the ICU (Parry, Huang, & Needham, 2017; Shepherd, 2018). Intensive care management needs to be swift and holistic in order to minimise the detrimental effects of ICU care such as ICU acquired weakness, prolonged ventilation and functional deficits that can prolong ICU stay, increased disability and ultimately poor quality of life (Hermans & Van den Berghe, 2015). The intensive care physiotherapist can prevent the latter by providing early assessment and intervention that has proven to improve respiratory and physical function and thus reduce mechanical ventilation time, respiratory complications, ICU-related disability, ICU and hospital stay and ICU readmissions and thereby improve quality of life (Hodgson & Tipping, 2016). However, whether physiotherapists in all ICU contexts are able to provide early input in the care of ICU patients and are achieving the outcomes stated in the latter, is not clear and is an important aspect to explore in order to understand the role of the physiotherapists in different ICU settings and how these roles affect the incidence and prevalence of disabilities related to prolonged intensive care management and its effect on the surviving patients. Knowing how physiotherapists in Sudan manage patients in the ICU and their perceived role in this task may shed light on whether they are achieving improved patient outcome through reducing disability and improving quality of life.

The introduction of ICUs occurred over half a century ago and critical care has since progressed significantly particularly in the industrialised countries, resulting in a significant improvement in survival, quality of life and outcomes of critically-ill patients (Sulieman, El-Mahdi, Awadelkareem, & Nazer, 2018). But in sub-Saharan Africa and in developing countries including Sudan, the evolution of intensive or critical care medicine has been at a much slower pace. The hospitals in these countries are often unable to fully implement well-established standards of care in these ICUs due to the limited financial resources and the lack of equipment,

medications and trained clinical staff, including physiotherapists (Sulieman, El-Mahdi, Awadelkareem, & Nazer, 2018). A structured critical care training programme, increasing the nursing workforce and collecting data regarding patient outcomes are strategies and interventions that have been proposed to improve critical care services in developing countries (Sulieman et al., 2018). To augment these proposed strategies, understanding and identifying the challenges and needs of physiotherapists in their role in ICU patient management can assist in incorporating physiotherapy in the ICU setting and in improving the status of this profession in Sudan. This will in turn benefit the available ICU services and the patient outcomes.

There are approximately 40 million people in Sudan, of which nine million reside in Khartoum, the capital city. There are four tertiary care hospitals in Khartoum and all have government-funded critical care units which serve the entire country but these 74-bed ICUs are almost fully occupied year-round. Furthermore, there are only three respiratory physiotherapists located in one of these four hospitals, showing the limited availability of physiotherapy or respiratory therapists in this setting (Sulieman et al., 2018). There have been a few government-operated ICUs outside of Khartoum that have been developed recently but these ICUs generally have limited bed capacity, equipment and critical care specialists. There are nongovernmental critical care units available at teaching and private institutions but these institutions also have a limited number of ICU beds (Sulieman et al., 2018). There is no database or studies that provide information on ICU facilities nor information regarding the placement and numbers of physiotherapists in these ICUs providing patient care in Khartoum, Sudan. Therefore, for this study, the researcher will need to identify and determine the number of hospitals and ICUs in Khartoum, where physiotherapists are located and provide ICU services and patient care.

2.2 Physiotherapy in the ICU

According to the World Confederation for Physical Therapy (WCPT, 2011) physiotherapists within the spheres of promotion and prevention, maintenance, intervention and treatment and habilitation and rehabilitation identify and maximise quality of life of individuals. The latter includes addressing the physical, psychological, emotional and social wellbeing of individuals and consists of the interaction between the physiotherapist, patients, families, care givers, other healthcare providers and communities through a process of assessing function or movement potential and in establishing agreed upon goals and objectives using knowledge and skills unique to the physiotherapist.

In the intensive care unit, physiotherapy is reported to be an integral part of the multidisciplinary team in managing ICU patients (Berney, Haines, & Denehy, 2012; Tadyanemhandu & Manie, 2015; Skinner et al., 2015; Çakmak et al., 2019). Prompt management of ICU patients admitted with adverse signs could be treated through adequate intensive care teamwork and availability of facilities (Lilian & Halima, 2018). The specific role of physiotherapists in the intensive care unit (ICU) differs according to many factors such as the country in which the ICU is located, ICU culture, staffing levels, training, educational profile of physiotherapists, and expertise (Stiller, 2000; Denehy & Berney, 2006; Gosselink et al., 2008; Rotta et al., 2018). In developed areas such as Australia, European countries, and Canada, physiotherapists can assess and utilise treatment plans for ICU patient management independently as primary contact healthcare practitioners (Norrenberg & Vincent, 2000; Berney, Haines, & Denehy, 2012; Matmari, Uyeno, & Heck, 2014). On the contrary, direct access to physiotherapy is very limited in India (Arumugam, Thangaraj, Chandrasekaran, & Ramanathan, 2019), in Turkey (Çakmak et al., 2019), in Saudi Arabia (Al Mohammedali, O'Dwyer, & Broderick, 2016), and in Nepal (Baidya,

Acharya, & Coppieters, 2016). In South Africa, physiotherapists are seen as autonomous first line practitioners (Unger, 2010) but in the ICU are partly dependant on referral of ICU patients from the doctors, while in some units the physiotherapists assess and treat all patients or assess patients that can benefit from treatment and communicate the need and benefit for physiotherapy for the ICU patient with the doctors and nurses (Karachi et al., 2018, Lottering & Van Aswegan, 2016).

Despite this variation in the role of physiotherapy in ICUs between countries and continents, physiotherapists are part of a multidisciplinary team providing services for critically ill patients. There is substantial literature which supports the role of physiotherapy management and rehabilitation of critically ill patients in ICU (Reid et al., 2018; Lottering & Van Aswegen, 2016; Gosselink et al., 2008; Clini & Ambrosino, 2005). Patients in ICU undoubtedly have prolonged bed rest for a period of time and with being inactive and immobile, many complications might develop that may affect the respiratory, cardiovascular and musculoskeletal system, psychiatric state and integumentary conditions of ICU patients. Conditions related to the respiratory system include pneumonia or ventilator-associated pneumonia, atelectasis, and retained secretions (Newstead, Seaton, & Johnston, 2017; Pathmanathan, Beaumont, & Gratrix, 2015; Hodgin, Nordon-craft, Mcfann, & Mealer, 2010). The musculoskeletal system may be affected by ICU acquired weakness (ICUAW), muscle atrophy, joint stiffness and impairments in activities of daily living (ADL). Psychiatric states such as anxiety, panic, and depression may develop post intensive care stay (Desai, Law, & Needham, 2011; Gosselink et al., 2008). The cardiovascular system may show increased heart rate and decreased stroke volume, while integumentary conditions include delayed wound healing and skin breakdown (Vollman, 2010). The latter complications increase ICU and hospital length of stay (LOS), as well as decrease functional

ability and health-related quality of life (Clini & Ambrosino, 2005; Hodgin, Nordon-craft, Mcfann, & Mealer, 2010; McWilliams et al., 2015) of these patients. These can be prevented by the introduction of early physiotherapy care to the ICU patients (Hodgson & Tipping, 2016).

Numerous interventions including chest physiotherapy, used by physiotherapists in the management of intensive care patients, are recorded in the literature. According to Pathmanathan et al. (2015) and Mpempeletsi, Christakou, Patsaki and Grigoriadis (2015), chest physiotherapy intervention goals in the management of ICU patient are to decrease lung secretions, optimise oxygenation, enhance lung capacity, and prevent pulmonary complications in both intubated and non-intubated critically ill patients. In addition, chest physiotherapy has a significant effect on the acceleration of weaning from the mechanical ventilator, and on decreasing ICU patient length of stay (LOS) (Bhat, Vasanthan, & Babu, 2017). Many chest physiotherapy techniques such as positioning, vibration and percussion, manual hyperinflation (MH), and airway suctioning are performed on ICU patients (Stiller, 2013; Gosselink et al., 2011; Denehy & Berney, 2006; Chaboyer, Gass, & Foster, 2004). In addition, postural drainage has a great effect on lung secretion clearance (Griffiths & Gallimore, 2005; Stiller, 2000). A study done by Castro, Ramos, Oliveira, & Ferreira (2013) concludes that the existence of the chest physiotherapy intervention in ICU helps in critically ill patients' recovery as well as to decrease ICU and hospital length of stay (LOS), therefore lessening the impact on patient morbidity and mortality. Moreover, physiotherapy in ICU enhances the efficiency of ventilation, respiratory muscles strengthening, and accelerates weaning from mechanical ventilation by adjusting mechanical ventilation settings and supervision of weaning from mechanical ventilation, supervision of non-invasive ventilation and extubation (Moodie, Reeve, & Elkins, 2011; Lewis, 2003).

Mobilisation is a common part of physiotherapy used to treat the critically ill patient. There is substantial literature that supports the role of mobilisation on critically ill patient management (Green, Marzano, Leditschke, Mitchell, & Bissett, 2016; Hodgson & Tipping, 2016; Jette, Brown, Collette, Friant & Graves, 2009; Gosselink et al., 2008). Mobilisation refers to the adequate physical activity that leads to obtain acute physiological effects, which improves ventilation, central and peripheral perfusion, muscle metabolism and alertness, circulation, and prevents venous stasis and deep vein thrombosis (DVT) (Gosselink et al., 2008). The critically ill patient admitted to ICU may risk the loss of 20% of muscle power after one week of admission and this may decline further for each subsequent week that the patient is on bed rest and immobile in the ICU (Perme & Chandrashekar, 2009). According to Green, Marzano, Leditschke, Mitchell, and Bissett. (2016), early mobilisation of ICU patients has been reported to be safe and feasible and leads to decreased delirium, improved functional quality, decreased ICU and hospital length of stay, and decreased mortality in patients with acute pulmonary failure and ultimately improved quality of life.

In Sudan, the physiotherapy profession is in its infancy and was established in the late 1960s (Rhodes, 1989) with nurses who were trained to become physiotherapy assistants and later received formal training in the first physiotherapy college in Ibn Sina University in Khartoum, graduating with a bachelor's in science degree in physiotherapy as from 2009. Thus, the profession developed slowly until 2004 after which the progression became rapid with more physiotherapists also pursuing and obtaining master's degrees in physiotherapy. However, despite this growth of the profession in Sudan, it is not clear what their current status and role in patient management in the ICU is [Personal Communication and Own Experience]. The researcher was one of the first students who graduated with a bachelor in physiotherapy degree at

Ibn Sinha University and found that teaching and practice in intensive care physiotherapy was lacking and a need for exploration of intensive care physiotherapy and their role in the management of the ICU patient in Sudan existed.

2.3 Medical Staff Perceptions of the Physiotherapists Role in the ICU

A study done by Otterman et al. (2012) showed that the perceived importance of physiotherapy in ICU differs among the medical staff. While the neurologists, followed by medical specialist trainees rated the importance as high, the nurses and physicians rated the physiotherapists importance in the ICU as low. In contrast, other studies showed a good level of awareness among nurses about physiotherapy's role in the ICU and their importance in this setting (Nelson, Hasson, & Kernohan, 2012) and Gupte and Swaminathan, (2016) perceived the role of the intensive care physiotherapist as integral and agreed on the need for the inclusion of a therapist multidisciplinary critical care team. Nelson et al. (2012) however also noted the difficulty in collaboration and sharing of information between the nurses and physiotherapists within the ICU that may be one of the obstacles impeding sufficient rehabilitation service in the ICU. The awareness and importance of physiotherapists in ICUs in Sudan in unknown and needs to be explored. One unpublished study conducted by Alfadil (2017) in Sudan determined other Health Care Professionals' knowledge and attitudes regarding physiotherapy management in the ICU using a survey found that the majority of other health care professionals such as doctors, nurses, dieticians to name a few had adequate knowledge about the physiotherapy management in the ICU and also demonstrated a positive attitude toward physiotherapists working in the ICU. However, no in depth qualitative enquiry was included. Also, Alfadil (2017) did not conduct this survey with the ICU physiotherapists and thus could not provide the views or perceptions of the ICU physiotherapists regarding their perception of the awareness and attitudes of other health

care professionals toward their ICU management protocols, referral and discharge system, role in the MDT, professional status and holistic role in the ICU as they only asked the ICU physiotherapists about their management of ICU patients in terms of treatment techniques used and frequency of sessions. There is also no in depth qualitative evidence for the latter that was explored by Alfadil (2017).

Atwal and Caldwell (2005) recommended that in order to improve the performance of medical staff they must be involved in both practical and academic fields. Therefore, the medical professions should be updated within the latest evidence-based practice and research regardless of their age or qualifications. Moreover, the educational system plays a huge role in strengthening the relationship between the medical staff in the rehabilitation team. More focus on the medical science curriculum on the rehabilitation team participants will work towards improving the awareness of and collaboration with this team of allied health professionals such as physiotherapists and improve quality of the services in the ICU. A qualitative study conducted by Ponto et al. (2019) to explore and describe the perception of doctors, nurses, and physiotherapists of the role of the physiotherapist in neonatal intensive care units in South Africa, showed that neonatal ICU nurses and doctors have limited awareness of the role of the physiotherapists in the neonatal ICU and also found that physiotherapists providing care to neonates in the ICU lacked autonomy as doctors referred and prescribed treatments required.

A study done by Lefmann and Sheppard (2014) concluded that medical staff described the benefits of having physiotherapists located in the emergency department, and the physiotherapists were eager to advance their roles and responsibilities, but were, at times, restricted by a complicated organisational landscape influencing professional autonomy and

capacity for professional advocacy. This is clearly presented in developing countries where policy regarding the medical professions has not yet been accomplished. For example, in Sudan the physiotherapy role, application, education, policy, curriculum, and qualification still are lacking detail and information (Rhodes, 1989) and need to be explored in order to make necessary changes and improvements to benefit the profession and improve their status including the ICU setting.

Little research has been published investigating the medical staff's perception of the physiotherapy role in ICU. Further understanding on how each discipline interacts in the ICU multidisciplinary team is important (Atwal & Caldwell, 2006). Ongoing evidence supporting the breadth of physiotherapy practice in the emergency department is needed to further advocate the usefulness of the profession in this acute setting. Therefore, as ICU physiotherapy in Sudan is fairly new and physiotherapists in this setting are not yet well established in the ICUs, there is a need to explore their perception of their current role in these Sudanese units and to explore any challenges that need to be addressed and improved followed later by the perceptions of other medical professions for further enhancement and improvement of the profession in the ICU.

2.4 Studies on the Role of Physiotherapists in the ICU

Recently, a study conducted by Anekwe et al. (2019) in Canada aimed to identify the possible perceived gaps in clinical practice and to assess the perceived barriers and facilitators of early mobilisation (EM) in critically ill patients. The findings of the study showed that chest physiotherapy, active and passive ROM exercises and transfers were mostly used by the ICU physiotherapists for patients who were critically ill while gait training, neuromuscular electrical stimulation (NES), treadmill, cycle ergometer, and dynamic tilt table were never used. In terms

of availability and workload, the finding showed that only one-third of the physiotherapists work full time in the ICU and 100% of the physiotherapists in this study were not available during the evening times, with limited physiotherapy services on the weekends (Anekwe et al., 2019).

In Scotland, a study conducted by Appleton, Mackinnon, Booth, Wells, and Quasim, (2011) to determine the current rehabilitation practice in Scottish ICUs, showed that most ICU patients receive chest physiotherapy, positioning, limb splinting, and strengthening exercises routinely. A study by Karachi et al. (2018) to describe the ICU physiotherapists' practices in ICUs in South Africa, showed that the most common treatment techniques used in chest physiotherapy were manual techniques (percussion, vibration and shaking), breathing techniques, secretion removal via suctioning and positioning to improve ventilation/perfusion ratios, passive movements and active exercises in bed, sitting over the edge of the bed and active/passive transfer to chair and sitting out in chair as the most used mobilisation activity and lastly active exercises in the chair and resisted exercises in chair and marching on the spot the most used rehabilitation activities. There was limited or no use of ventilator activities reported (Karachi et al., 2018). Karachi et al. (2018) also showed that most of ICU physiotherapists used evidence-based protocols but limited functional and quality of life outcome measures and while they had some involvement in the referral system they lacked participation in discharge decisions. Lottering & Van Aswegen (2016) also concluded that chest physiotherapy techniques, mobilisation, and exercises are the most used physiotherapy interventions for patient care in South African ICUs. On the contrary, in Nepal, a study conducted by Baidya, Acharya, and Coppieters (2016) aimed to identify the common physiotherapist practices in ICUs, observed that chest physiotherapy was the most common intervention for critically ill patients in Nepali ICUs.

A survey study in Greece conducted by Christakou et al. (2018) regarding the role of physiotherapists in the management of ICU patients, noted that most of the physiotherapists who worked permanently in the ICU applied early mobilisation compared to the physiotherapists working part-time. With regard to chest physiotherapy, 42.8% of the physiotherapists always applied postural drainage techniques, and 28.6% used the suction process, while 10.3% of the part-time physiotherapists used suction for the patients (Christakou et al., 2018). These results highlight that early functional activity in the management of their ICU patients is minimal compared to the passive management techniques implemented such as chest physiotherapy.

A study in Turkey by Çakmak at el. (2018) aimed to determine the characteristics of physiotherapy practice and critical barriers toward applying physiotherapy in ICUs. The results which were analysed by using quantitative and qualitative methods showed that the most frequent interventions were positioning techniques, active and passive range of motion exercises, breathing exercises, percussion and vibration, mobilisation, and postural drainage. Furthermore, regarding the barriers facing the physiotherapists in implementing their role in the ICU, the results showed a low level of employment; lack of training and practical education; lack of ICU healthcare professional awareness about the role of physiotherapy in the ICU; lack of communication with the ICU team; lack of referral from the ICU physician to the physiotherapists; and lack of assistive equipment [e.g., walkers, in-bed bicycles, and elastic bands] (Çakmak et al., 2019).

It is clear that the studies discussed all show variability in treatment techniques used and the importance placed on certain treatments. It is not clear which treatments the physiotherapists working in ICUs in Sudan are using and why. In Sudan, physiotherapy does not fall under the

Ministry of Health (MOH) and physiotherapists are not employed by the MOH as there is no job description nor post for such a position but they are registered with the National Council for Medical and Health Professionals Association. Information about the scope of physiotherapy practice in Sudan is hard to find. To date, only one study conducted by Alfadil (2017) to determine the current physiotherapy practice in ICU in Khartoum, showed that the most common physiotherapy intervention applied for ICU patients was mobilisation, positioning, suctioning, percussion, and vibration. In addition, the frequency and duration of the physiotherapy session provided to the ICU patients was one to two sessions per day, and the average duration of these sessions was 24 minutes per session (Alfadil, 2017). However, according to the researcher, no studies have explored the physiotherapists' perception of their role in the management of ICU patients in Sudan. Therefore, it is unclear whether the physiotherapist's role in the ICU is acknowledged as a means of providing services to ICU patients in Sudan.

CHAPTER THREE: RESEARCH METHODOLOGY

This chapter describes the methodological approach and design applied in this study. The chapter includes a statement of the research question and rationale for the study, description of the study design, research setting, population and sampling, data collection instrument, the data collection procedure, data capturing and analysis, trustworthiness and ethics considerations. A report on the findings after the conclusion of the data analysis process follows this chapter.

3.1 Statement of the Research Question

Globally, physiotherapists have an indispensable role in the management of the intensive care patient. However, in Sudan, the role of physiotherapy in the management of the intensive care patients is still unknown. Physiotherapy has faced many challenges since its inception in Sudan in 1989 with the first bachelor's degree programmes only starting in 2004. Thus, physiotherapy and in particular physiotherapy in the care of the intensive care patient in Sudan, is in its infancy and evidence of the role in the management of ICU patients in Sudan is lacking. There is therefore a need for studies to be conducted in this area to provide a baseline assessment of the situation in order to improve and expand the profession in ICUs, including Sudan. The perception of physiotherapists on their role in the management of intensive care patients in Sudan can assist in highlighting the current role and practices used in the management of ICU patients as well as the challenges faced by physiotherapists providing services in intensive care units in Khartoum and allow these physiotherapists to benchmark their services against other developing and developed countries. Consequently, a study conducted in this field can provide information that can help to improve and develop physiotherapy services currently offered to the intensive care patients in Khartoum. Therefore, the researcher asked: "What are the perceptions of physiotherapists of their role in the management of ICU patients in Khartoum, Sudan"?

3.2 Research Design

A research design is a plan or a "blue print" of how the researcher intends to conduct the research and includes planning how the research will be conducted by deciding on the best design for the best results or outcomes (Mouton, 2001). For this study, the researcher wanted to diagnose the current situation and discover the perceptions of the physiotherapists of their role in the management of ICU patients, and to explore their current practices and challenges faced in the ICUs in Sudan. As there is no available research on this topic to the researcher's knowledge a **qualitative approach** using an **exploratory descriptive design** was deemed to be most effective in achieving the research aim and objectives. According to Burns and Bush (2006) an exploratory research design is defined as collecting data in a natural and unstructured way. The exploratory research design is appropriate when the researcher knows little about the topic or issue (Burns & Bush, 2006). An exploratory research design is not restricted to a particular model but may use either qualitative or quantitative approaches (Burns & Bush, 2006) and thus for this study the qualitative approach was most suited. Taking into consideration the nature of the present study, the researcher preferred to use a qualitative approach to explore the perception of physiotherapists on their role in the management of intensive care patients. This exploration included barriers and opportunities ICU physiotherapists perceived regarding their role in the management of ICU patients in Khartoum, Sudan. This qualitative approach using an exploratory descriptive research design was best suited to explore the ICU physiotherapists' perceptions in order to reflect on their understanding of the meanings, individual experiences, feeling and perceptions of a diverse group of people, in this case a group of physiotherapists who are involved in the management of ICU patients in ICUs in Khartoum, Sudan (Yates, Partridge & Bruce, 2012; Scharlach et al., 2006). This method allowed the researcher to present an in-depth

report of the context in which ICU physiotherapists in ICUs in Sudan find themselves (Guba & Lincoln, 1994).

3.3 Research Setting and Sites Included

The study was conducted in Sudan and more particularly in Khartoum the capital. Sudan is located in north-east Africa. The population of Sudan is currently approximately 44 million with almost two million in the state of Khartoum (https://www.worldometers.info/world-population/sudan-population/ accessed 22.11.2020). Khartoum state consists of three main areas namely Khartoum, Khartoum North, and Omdurman. The choice of Khartoum as the site for data collection is its strategic (administrative and political) position in the country and the number of public and private health centres in the state that include physiotherapy services and provide a sufficient physiotherapy population size for the study. Khartoum state is a microcosm of Sudan as it encapsulates the characteristics of the country on a miniature scale. The healthcare system in Sudan is also two tiered, including both public and private sectors. According to the Ministry of Health's annual report (2015) the number of private healthcare institutions and diagnostic centres in Khartoum state were 138, while the number of public and government healthcare institutions were 34. In the public sector, services are provided and funded by the Ministries of Health (MOH), Health Insurance Organisations, Medical Departments of Armed Forces, Police and Security Forces. In addition, the Ministry of Education through the university hospitals also provide public healthcare facilities for members of the population that do not have adequate financial resources (Ministry of Health, annual report, 2015). There are both non-profit and market-based institutions in the private sector and these have expanded rapidly in the last 20 years (Ministry of Health, annual report, 2015). These private healthcare services are for those who have an adequate number of financial resources and can afford private healthcare. In both

the private and public sectors there are healthcare professionals who practice allopathic and traditional medicine besides western medicine, which includes preventive, promotive, curative, and rehabilitative services (Federal Ministry of Health, 2009). Some of the public and private hospitals house intensive care units that treat critically ill patients, and universities and their affiliated hospitals are involved in the training of healthcare professionals, including physiotherapists, who will work in these hospitals. Not all the hospitals in Khartoum that house ICUs have physiotherapists who work in the ICU or who are allocated to work, specifically in the ICU. Physiotherapists are called out to manage certain patients in only some hospitals that house ICUs. Physiotherapists do not fall under the Ministry of Health but are registered under the National Council for Medical and Health Professions body in Sudan and therefore their posts are not funded through the Ministry of Health. In this study, the medical settings were private and public hospitals including the university-affiliated hospitals that had physiotherapy clinicians and academics who specifically provided services and managed ICU patients in these ICUs identified in Khartoum state.

The identified and included teaching and specialised hospitals in Khartoum state that have ICUs are presented in Table 3.1. The number of total physiotherapists working in the hospitals and the number who fit the criteria for inclusion (i.e., bachelor's, master's, PhD in physiotherapy and six months of general (including ICU) physiotherapy experience) are also presented in Table 3.1. The hospitals identified provide different levels of care. The levels of care include emergency services, ICU services, and in- and out-patient services. The hospitals are also training hospitals for both undergraduate and postgraduate physiotherapy and other healthcare students (A-Rahman & Jacquet, 2014). A total of eight hospital/clinical and educational institutions were identified as appropriate to draw the target population (Table 3.1) as clinical and academic physiotherapists

(who also work in the hospitals) were available and suitable for this study. A description of each setting included is provided following Table 3.1.

A total of three government hospitals and two private hospitals housing mainly general, surgical, medical and coronary care ICUs, with a total of 63 beds and 24 physiotherapists who work in these units were identified and included in the study population. A total of four university settings with physiotherapy departments and physiotherapists who trained and supervised as well as involved in clinical ICU patient care were identified and included a total of 32 physiotherapists, of which three worked in both the university and hospitals included in the study.

Table 3.1 Hospitals, Universities, ICU Types, ICU Bed Numbers and Physiotherapists

Hospitals	Type/s of ICUs	ICU beds (N)	Number of physiotherapists (N)
Governmental Hospitals			***Physiotherapy Clinicians***
Khartoum hospital	*Surgical ICU* *Medical ICU*	N=6 N=6	N= 1/1 (on call)
Police hospital	*General ICU* *CCU*	N=8 N=6	N=4/7 (on rotation)
Military Hospital	*General ICU* *Medical ICU* *Surgical ICU*	N=7 N=8 N=3	N=7/8
TOTAL		**N=44**	N= **12/16**
Private Hospitals			***Physiotherapy Clinicians***
Dar Al-Elaj Specialized Hospital *Alia Specialist Hospital*	*General ICU* *General ICU* *CCU*	N=6 N=6 N=7	N=1/1 N=1/2
TOTAL		**N=19**	**N=2/3 →**
Universities			**Physiotherapy Lecturer/Lecturer Assistant**
Ibn Sinha (Khartoum College of Medical Sciences) *Ahfad University for Women (AUW)* *National Ribat University* *Al-Neelain University*			N=2/9 N=8/8 N=0/7 N=0/8
TOTAL			**N=10/32**
COMPLETE TOTAL		**N=63**	**N=48[#]**

**N: Numerator in the Population were those who were mainly involved in ICU patient care and/or ICU teaching and supervision who were invited to participate in the study. [#] There were three who worked in both academic and clinical settings and thus were counted only once.*

Each hospital is described below to provide context to each setting.

i) Khartoum Teaching Hospital

It is the oldest and biggest governmental hospital in Khartoum, founded by the British colony in 1904. It receives referred patients with all cases from all over the country. It has two different types of intensive care units with a total of 12 ICU beds (Table 3.1). There was one physiotherapist that was employed in the hospital at the time of the study who worked on an "on call" basis in the ICUs.

ii) Military Hospital

Military Hospital was established in 1959. The hospital has three different ICUs with a total of 18 ICU beds. The medical staff work in two shifts with a total of seven physiotherapists that worked in the hospital at the time of the study and that worked on an "on call" basis in the ICUs.

iii) Police (Ribat University Hospital)

Police or Ribat University Hospital, as it is currently known, is the teaching hospital for Ribat University in Khartoum state. There are two different ICUs with a total of 14 ICU beds. There are four physiotherapists that were employed in the hospital at the time of the study and that worked on an "on call" basis in the ICUs.

iv) Dar Al-elaj Specialised Hospital

The hospital was established in 2009, it is in Khartoum state. The general ICU capacity is 6 beds. Only one physiotherapist was employed at the hospital at the time of the study and worked on an "on call" basis in the ICUs but also worked at Ibn Sinha University teaching and supervising in the area of intensive care physiotherapy.

v) Alia Specialist Hospital

Alia specialist hospital is a private hospital located in Omdurman and was established in 2014. There are two types of ICUs (general and coronary care unit [CCU]) with six and seven ICU beds respectively, with a total of one physiotherapist that was employed in the hospital at the time of the study and that worked on an "on call" basis in the ICUs.

vi) Ahfad University for Women (AUW)

This is a university for women located in Omdurman and established in 1966. The Physiotherapy College was established in this university which started with their first cohort of students in 2005 and who graduated in 2007. AUW started physiotherapy education in collaboration with international partners from Norway and Italy (Badri, 2005). In the physiotherapy school there were about eight physiotherapy lecturers identified at the time of the study who also worked in the hospitals and provided ICU services and ICU patient care and took part in the study.

vii) Ibn Sina University

This university is in Khartoum and was established in 2000. The Physiotherapy College was established in 2004. The physiotherapy programme is a four-year degree programme and physiotherapists graduate with a bachelor's degree. There were about nine physiotherapy lecturers working in the physiotherapy department identified at the time of the study who also worked in the hospitals and two who taught and supervised in ICU physiotherapy and provided ICU services and ICU patient care.

viii) National Ribat University Academic

This university is in Khartoum and was established in 2001. It is a governmental funded university and uses Police Hospital as its teaching hospital. The physiotherapy programme started in 2010 under the College of Medicine. There were about seven physiotherapy lecturers working in the school of physiotherapy in this university identified at the time of the study but none who fit the study criteria for inclusion.

ix) Al Neelain University

It is in Khartoum and was established in 1955. Physiotherapy education was established in 2005. There were about eight physiotherapy lecturers working in the school of physiotherapy but none who fit the study criteria for inclusion.

3.4 Population and Sampling

3.4.1 Population Recruitment

Polit and Hungler (1999) refer to the population as a combined or full amount of all the objects, subjects or fellows that fit in a set of conditions. Assuming that all members of such a population are willing to provide access to information at their convenience in harmony with the schedule and interest of the researcher, it may become necessary for the researcher to think of drawing "the most appropriate" sample from this population to maximise the credibility of study results. As there is no specific database of physiotherapists who provide patient care in the ICU or provide clinical supervision or teach in the area of ICU, the researcher had to contact each of the hospitals and universities in Khartoum and determine the ICU sites and the number of physiotherapists at each site who had a bachelor's, master's or PhD degree in physiotherapy and at least 6 months of clinical or academic experience or experience in both.

3.4.2 Study Population

The population included all physiotherapists (N=48) who worked in governmental and private hospitals with ICUs and educational institutions (university and college) with physiotherapy departments in Khartoum, Sudan. In this study the target population included physiotherapists working in Khartoum state hospitals (governmental and private) as well as those working in educational institutions (university and college) and provided ICU patient management, ICU training or both at the time of the study. The physiotherapists who had a bachelor's, master's or PhD degree in physiotherapy and at least six months of general physiotherapy clinical, academic experience or experience in both working in the hospitals with ICUs were identified (Table 3.1) and recruited for the study. There was a total of 48 physiotherapists (16 hospital-based and 32 academic-based physiotherapists) and three of these worked in both the hospital and academia. Of the 16 hospital-based clinicians, 14 rotated to work in the ICU as was required based on referrals. Of the 32 academics, 10 either clinically supervised students in ICU or taught on the ICU module but they also all worked in the clinical settings but only three of these were the same participants who worked in the selected hospitals (Table 3.1). Thus, a target population of 24 physiotherapists were invited to participate in the study.

3.4.3 Sampling Frame and Method

The sampling frame is the list from which units are drawn for the sample (Stasny, 2001). The most appropriate sample in this study was represented by individuals with the ability and opportunity to provide the most accurate information or data related to physiotherapists' practices in Sudan. To select them the researcher used the purposive sampling method. Purposeful sampling necessitates access to key informants in the field who can help in pinpointing information-rich cases. Purposeful sampling procedures for primary research like

this one, have been well defined by Patton (2002) who has defined it to give its clear meaning. He supported that it is: “The logic and power of purposeful sampling lie in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the inquiry, thus the term purposeful sampling. Studying information-rich cases yields insights and in-depth understanding rather than empirical generalisations” (Patton, 2002, p. 230). Participants were selected based on their qualifications. This implies that only physiotherapist holding BSc, MSc, and PhD degrees were considered for this study. Apart from the above qualifications, they should be registered at the National Council for Medical and Health Professions body in Sudan, employed in hospitals that provide physiotherapy services in ICU based in Khartoum state and having at least 6months general physiotherapy related clinical and/or academic experience. The sample excluded all physiotherapists who had only a diploma in physiotherapy, who did not work in the area of ICU (clinical nor academic), had less than 6 months of general physiotherapy clinical or academic experience, were not registered with the National Council for Medical and Health Professions body in Sudan and who did not consent to participate.

3.4.4 Sample Size

Methodologists suggest that the sample size should be carefully fixed so that it will be adequate to draw valid and generalised conclusions. The fixation of the adequate sample size requires specific information about the problems under investigation and the knowledge of the understanding of those issues by the population. Sample size determination is the technique of selecting the number of observations to include in a sample (Sandelowski, 1995). In qualitative research, a small number of participants may be extremely valuable and represent adequate numbers for a research project. This is especially true for studying hidden or hard to access

populations such as deviants or elites like in this study. In this case, relatively few people may offer insights into issues of investigation (Baker, Edwards, & Doidge, 2012). The sample size in this study was dependant on consent to participate and data saturation and evidence states that between 8 to twelve participants is sufficient for qualitative research. In this study 17 participants participated in the face-to-face individual interviews.

3.5 Research Instrument

The researcher developed a semi-structured interview guide (Addendum 4) to collect data. The interview guide included questions based on the objectives of the study and was also based on studies that described the role of physiotherapists in the management of ICU patients available in the literature (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Sigero et al., 2016; Malone at al., 2015; Kumar et al., 2007; Norrenberg & Vincent, 2000). The semi-structured interview guide consisted of three main sections. The first section included questions on the socio-demographic information to determine the profile of participants such as age, gender, workplace, qualification (BSc, MSc, PhD Physiotherapy), occupation (physiotherapy clinician or academic or both), area of expertise, years of work experience (clinician, academic), and years of experience specially in ICU (teaching, supervision, and clinical work). The second section focused on the perception of physiotherapists on their role in the management of intensive care patients. This section included questions regarding their role in terms of patient care, so for example their role in positioning, use of chest physiotherapy, early mobilisation, involvement in the referral and discharge system, use of outcome measures and evidence-based protocols or clinical guidelines, and involvement with the rest of ICU team (doctors, nurses, dietician, etc.) during the management of ICU patients. The third section focused on the perceived challenges (barriers) and positive factors (facilitators) on the role of physiotherapists in the management of

the intensive care patient. The latter included addressing the ways in which reported barriers can be overcome, the reasons for the perceived barriers to ICU physiotherapy care and their recommendations in order to overcome those barriers. In addition, questions to determine the perceived opportunities or facilitators in their role in the management of ICU patients were included (Addendum 4).

3.5.1 Pilot Study

A pilot study implies generation of primary data but on a smaller scale. The data collected can be analysed quantitatively and/or qualitatively. These findings can be used to scientifically formulate the research problem and finalise the research proposal. To ensure the credibility of the semi-structured interview guide, two interviews were conducted with two participants who were not included in the study (one physiotherapy clinician and one physiotherapy educator). The interview guide did not require any changes and was able to gather the appropriate data required to answer the aim and objectives of the study. The pilot was also conducted to determine the approximate timespan required to complete each interview. One face-to-face individual interview took approximately 30 to 45 minutes.

3.6 Procedure

3.6.1 Ethics

Ethics clearance from the UWC Senate Research Ethics Committees (Ethics Reference Number HS/16/5/35 – Addendum 1) and permission to conduct this study from the relevant stakeholders (settings included in study) was obtained. The researcher verbally made contact with each head/manager of each physiotherapy department in each hospital and university included in the study and asked permission verbally from them to contact the purposively selected

physiotherapists (those who work in the ICUs) to inform them of the study, its nature and purpose and to request participation in the study. In Sudan, there is no specific board that provides ethics or permission to include physiotherapists working in the hospital or university in research. Thus the researcher had to go directly, in person to each hospital and university to ask permission from the heads/managers of the physiotherapy departments in the included hospitals and universities to approach the physiotherapists who work and teach in the area of ICU. The researcher provided each participant an information sheet (Addendum 2) explaining the nature and purpose of the study and obtained written consent (Addendum 3) from the participants before they took part in the study. The signed consent forms have been scanned and stored electronically on the password protected computer and not attached in the thesis to protect the participants' details and maintain anonymity and confidentiality. The researcher informed the participants about their free and voluntarily consent to participate in the study as well as their right to withdraw from the study at any time without any consequences. As indicated by Babbie and Mouton (2012) the researcher ensured that the information and the names of participants was kept anonymous and confidential under the research ethics confidentiality and anonymity requirements. To deal with this issue, the researcher used codes instead of names during the whole process of the data collection, analysis and interpretation of the results. Participants were assured that only the researcher would have access to identified codes. For the maximum possible protection of the participants' identity during the publishing of results, pseudonyms will be used. All electronic data collected (interviews and transcripts) were kept in password protected files on a password protected computer accessible only to the researcher and research supervisor. Following completion of the study and dissemination of the results via publication, all electronic data will be destroyed after a period of five years. The researcher will inform the institutions and participants of the resultant findings of the study.

3.6.2 Data Collection

Kvale (1996, p.14) defines an interview as "an interchange of views between two or more people on a topic of mutual interest". Keats (1997) states that interviews are controlled conversations during which the interviewer tries to obtain information from the interviewees. Based on this definition, interviews are human interactions for knowledge production. In research, interviews as data collection techniques are systematic ways of talking and listening to people in order to collect data. This conversation usually takes the form of series of questions. There are different types of interviews used in qualitative research studies (Alshenqeeti, 2014) but in this study qualitative data was collected using face-to-face individual interviews that were audiotaped.

Thanks to his experience as a former physiotherapist in Khartoum state, the researcher had contacted the selected participants through personal telephonic communication. Each of them had given his/her consent and together with the researcher they agreed and made an appointment for the interview session. Each interview was conducted by the researcher using the semi-structure interview guide for about 45 minutes to one hour depending on the depth and richness of data to collect from each individual participant. The place where each interview was conducted was decided based on the comfort and ease of accessibility for the participant. Each session was conducted in quiet and isolate place to ensure that it was very private. The interviews were conducted in the English language as all participants were trained in English during their academic studies. The researcher used probing techniques to obtain more information from participants. The use of probing provided richer information to the researcher (Fielding & Thomas, 2001). The wording and the order of the questions to the participants were kept as basic as possible (Simmons, 2001) in order to maintain consistency across participants.

3.6.3 Data Capturing and Analysis

The quantitative data obtained in section one of the research instrument relating to the profile of the physiotherapists in Khartoum working in the area of ICU was captured in a Microsoft Excel spreadsheet and exported to the latest version of the Statistical package for Social Sciences (SPSSv24) for descriptive statistical analysis using frequencies, means, standard deviations (SD), ranges and percentages and presented in a table in the results chapter.

The audiotaped qualitative data was transcribed verbatim by the researcher into a Microsoft Word Document. In the current study, thematic content analysis as described by Braun and Clarke (2006) was used to analyse the verbal responses from the physiotherapists on their role, barriers and facilitators in the management of patients in the intensive care units in Khartoum, Sudan. Both deductive and inductive methods of this thematic content analysis was used to generate the codes, categories and themes. Content analysis is the appropriate means of analysing information gathered in its context where there is no previous study conducted with the same phenomenon (Elo & Kyngäs, 2008; Braun & Clarke, 2006). This type of analysis was found appropriate for this study.

The verbal data were analysed step by step using a manual process of analysis. Firstly, the researcher familiarised himself with the transcribed data by reading the transcripts several times and listening to the audiotaped material to make sure that the transcripts reflect the information provided by the participants. The latter allowed the researcher to immerse himself in the data and familiarise himself with the content of the data and get a general sense of the phenomena described by the participants. This was followed by the researcher identifying codes by writing initial minutes and headings in the text while reading the transcribed document (Braun & Clarke,

2006; Hsieh & Shannon, 2005). A number of codes were distinguished and coded by using different colours. Furthermore, the researcher worked through the interview data and made notes alongside the quote of the idea (code) and the key thought of the participants as seen to correlate to the research question. Lastly, the dominant codes were identified and grouped together with those that are similar and dissimilar into specific categories. Thirdly, the categories that were similar or dissimilar were grouped under broad headings, namely themes in relation to the research question, aims and objectives. Even though some codes or categories appeared many times the researcher considered the statement of Braun and Clarke (2006) that it is not the frequency of codes that is important but rather its significance in relation to the research question. The researcher examined the themes by comparing them independently. In addition, the themes were substantiated with quotes from the interview participants that best represent their views.

While the researcher identified those themes that answered the research question and relevant objectives, themes from the inductive content analysis were also included as it related to the study topic as a whole and provided further insight on the research aim and objectives of the study and the role of the physiotherapists in the management of ICU patients in ICUs in Khartoum, Sudan. The themes were highlighted and the researcher explained how and why they were significant (Braun & Clarke, 2006). Hence a description was made around the data to present its content and relevance to the intended research question and respective research objective.

Finally, the researcher has written the content analysis in the final report, which included the story originating from the verbal data by reporting the themes, categories and subcategories

generated substantiated by verbatim quotes and finally discussed in an integrated manner using literary evidence to support the data or findings from the thematic content analysis. The latter is presented in the results and discussion chapter. The whole process of data analysis involved constantly going back and forth to the original verbal and transcribed data, codes that were found and the final themes generated (Braun & Clarke, 2006).

3.8 Trustworthiness

In conducting this study, the researcher has attempted to apply the aspects of trustworthiness in order to validate the results or findings of the data collected and analysed. The following four paradigms of trustworthiness namely credibility, dependability, transferability and confirmability were observed as suggested by the methodologists Lincoln and Guba (1985).

3.8.1 Credibility

Credibility is referred to as internal validity. This is the confidence in the truth of the data collected by the researcher and its interpretations (Polit & Beck, 2004) and that what was intended to be measured or tested was done so in the study (Shenton, 2004, p.64). In this study, the credibility was ensured by transcribing the data verbatim and checking the transcriptions against the recorded audiotapes. Member checking was done to confirm the participants' intention and if the transcribed information had the same meaning as to what they intended to express. Whenever they hesitated about the information transcribed, the audio recorded interview was re-played to the participant and the information clarified. However, no additional information or elaborations was provided. To build a more credible process regarding semi-structured interviews, field notes were written by the researcher and were also used to complement the themes identified and to facilitate the interpretation of the findings.

3.8.2 Dependability

Dependability is also referred to as reliability of the research study and refers to the evidence that the process of data collection and analysis is consistent and if repeated in a similar context would yield the same results (Polit & Beck, 2004; Lincoln & Guba, 1985). Dependability in this study was ensured by keeping accurate records of all the steps followed in conducting the study and in the process of data analysis as described in the method section of this study. Each step in the research study process was documented clearly so that it is possible to retrace all the research steps for reproducibility and thus ensuring dependability as a form of data trustworthiness.

3.8.3 Transferability

This aspect of trustworthiness is noted as the magnitude to which the findings can be useful in other contexts and is also referred to as external validity (Lincoln & Guba, 1985). To ensure transferability of this study, the researcher used a thick description of the results through quotations while maintaining the meaning of the participant responses.

3.8.4 Confirmability

Confirmability refers to the objectivity of the study. In confirmability the outcomes of the study are supported by the collected data (Shenton, 2004; Polit & Beck, 2004; Lincoln & Guba, 1985). Furthermore, audit of the data can be done followed by agreement between two or more independent people about the relevance of the data. Confirmability in this study was ensured by an audit which was done by the research supervisor reading transcripts and generating themes independently and through the audiotaped data collection process, verbatim transcription and the researchers field notes kept during interviews.

3.9 Conclusion:

This chapter has presented the statement of the research question, research study approach and design, research setting, population recruitment, sampling frame, sampling method and sample size and the data collection methods, including the data collection instrument used to explore the perceptions of physiotherapists working and managing patients in ICUs in Khartoum, Sudan. The process of descriptive quantitative and thematic content analysis of the data collected, the aspects of trustworthiness and ethics considered and implemented in the study was described. and the report on the findings follows in the next chapter, Chapter Four of this thesis.

CHAPTER FOUR: RESULTS

This chapter presents the findings of the study including a presentation of the characteristics of the participants in the study and discusses the emerging themes, categories and subcategories following data analysis and presents these findings in a narrative format supported by verbatim quotes.

4.1 The Profile of Physiotherapists Rendering ICU Services in Khartoum, Sudan

A total of 17 (71%) of the 24 physiotherapists who fit the inclusion criteria participated in the study and the number that participated from each included hospital is presented in red in Table 4.1. The majority of ICU physiotherapy clinicians were from Police Hospital and ICU physiotherapy academics from Ahfad University for Women [AUW] (Table 4.1).

Table 4.1 Number of Physiotherapists who participated from each included Hospital

Hospitals	Number of physiotherapists (N)
Governmental Hospitals	***Physiotherapy Clinicians***
Khartoum hospital *Police hospital* *Military Hospital*	N= 1/1 (on call) → (n=1) N=4/7 (on rotation) → (n=4) N=7/8 → (n=2[a])
TOTAL	**N= 12/16 → (n=6)**
Private Hospitals	***Physiotherapy Clinicians***
Dar Al-Elaj Specialized Hospital *Alia Specialist Hospital*	N=1/1 → (n=1[b]) same as academic N=1/2 → (n=1)
TOTAL	**N=2/3 → (n=1)**
Universities	**Physiotherapy Lecturer/Lecturer Assistant**
Ibn Sinha (Khartoum College of Medical Sciences) *Ahfad University for Women (AUW)* *National Ribat University* *Al-Neelain University*	N=2/9 → (n=2[b]) N=8/8 → (n=8[a]) N=0/7 → (n=0) N=0/8 → (n=0)
TOTAL	**N=10/32→ (n=10)**
COMPLETE TOTAL	**N=48[#] → (n=17)**

*[a] = same participant from Afhad University therefore only counted once. [b] = same participant from Ibn Sinha University therefore only counted once. *N: Numerator in the Population were those who were mainly involved in ICU patient care and/or ICU teaching and supervision who were invited to participate in the study. [#] There were three who worked in both academic and clinical settings and thus were counted only once.*

The profile of the 17 participants is presented in Table 4.2. All (n=17, 100%) ICU physiotherapists were of Sudanese nationality. There were more females (n=12/17, 70.6%) than males. The mean age of the physiotherapists working in the ICUs was 31 years (SD±8) with females being younger (29 years, SD±5.6). The majority of physiotherapists had only bachelor's degrees (n=11/17, 65%), more males (n=3/5, 60%) had a master's degree in physiotherapy but not specifically in ICU and no physiotherapists had PhD degrees. Only one ICU physiotherapist

Table 4.2: Characteristics of the Participants (n=17)

VARIABLE	MALE (n=5, 29.4%)	FEMALE (n=12, 70.6%)	TOTAL PARTICIPANTS
NATIONALITY (n, %)			
Sudanese	n=5, (29.4%)	n=12, (70.6%)	**n=17, (70.6%)**
AGE *(mean, SD)*	37 years (±8.5)	**29 years (±5.6)**	31 years (±8)
QUALIFICATION *(n, %)*			
BSc Physiotherapy	n=2/5, (40%)*	**n=9/12, (75%)**	**n=11/17, (65%)**
MSc Physiotherapy	**n=3/5, (60%)#**	n=3/12, (25%)	n=6/17, (35%)α
PhD Physiotherapy	n=0/5, (0%)	n=0/12, (0%)	n=0/17, (0%)
OCCUPATION *(n, %)*			
Academic	n=0/5, (0%)	n=1/12, (9%)	n=1/17, (6%)
Clinician	n=1/5, (20%)	n=4/12, (33%)	n=5/17, (29%)
Both Academic & Clinician	**n=4/5, (80%)**	**n=7/12, (58%)**	**n=11/17, (65%)**
YEARS OF EXPERIENCE *(mean, SD, range)*			
Academic (general)	5 (±1.2) (2-25 years)	1.5 (±1.3) (0-3 years)	2.4 (±3) (0-25 years)
Clinician (general)	**13.6 (±5.3) (0-10years)**	4.5 (±5.2) (0-20 years)	**7.2 (±8) (0-20 years)**
ICU teaching/supervision	3.3 (±3.1) (0.5-8 years)	1.8 (±3) (0-11 years)	2.2 (±3.1) (0-11years)
ICU clinical work	7.8 (±1) (1-23 years)	1.2 (±1) (0-3 years)	3.1 (±5.6) (0-23years)
AREA OF EXPERTISE *(n, %)*			
Community Based Rehabilitation	n=2/3 (66.7%)	n=1/3 (33.3%)	n=3/17 (17.7%)
General	**n=3/13 (23.1%)**	**n=10/13 (76.9%)**	n=13/17 (76.5%)
Intensive Care**	**n=1/5 (20.0%)**	**n=4/5 (80.0%)**	**n=5/17 (29.4%)**
Neurology	n=1/1 (100%)	n=0/1 (0%)	n=1/17 (5.9%)
Orthopaedics	n=1/2 (50.0%)	n=1/2 (50.0%)	n=2/17 (11.8%)
Paediatric	n=1/1 (100%)	n=0/1 (0%)	n=1/17 (5.9%)
Sport	n=1/1 (100%)	n=0/1 (0%)	n=1/17 (5.9%)
Therapeutic Exercise	n=1/1 (100%)	n=0/1 (0%)	n=1/17 (5.9%)

*Completed Bachelor Degree in India, # Completed Master's Degree in South Africa, α All not in the area of ICU

completed their bachelor degree in India and one completed their master's degree in South Africa and both were male (Table 4.2). Most physiotherapists worked as both academics and clinicians in the area of ICU (n=11/17, 65%). The physiotherapists reported having more years (7.2 years, SD ±8, range: 0-20 years) of clinical work experience than academic or teaching years of experience and males had more years (13.6 years, SD ±5.3, range: 0-10 years) of clinical work experience than females. With regards to their reported area of expertise, the majority reported having expertise in general physiotherapy (n=13/17, 76.5%) whereas only almost a third (n=5/17, 29.4%) reported having expertise in the area of ICU physiotherapy with more females in particular reporting expertise in the area of general (n=10/13, 76.9%) and ICU physiotherapy (n=4/17, 23.5%) respectively [Table 4.2].

4.2 Emerging Themes

There were three major themes that emerged from the data obtained. These were: 1) ICU Environment or Setting (i. structure and organisation; ii. resources; iii. referral patterns; iv. multidisciplinary ICU teamwork [subcategory a) ICU team communication]; v. discharge procedures), 2) Role of the ICU physiotherapist (i. Perceived importance of physiotherapists in the ICU; ii. Role in ICU patient management [subcategories a) perceived role in treatment activities; b) perceived use of evidence based practices and outcome measures], 3) Training, Professional Status and Scope of Practice (i. training and competence; ii. awareness and iii. autonomy). These three emerged delineated themes are epitomised by verbatim quotes from seventeen physiotherapists who participated in the interviews.

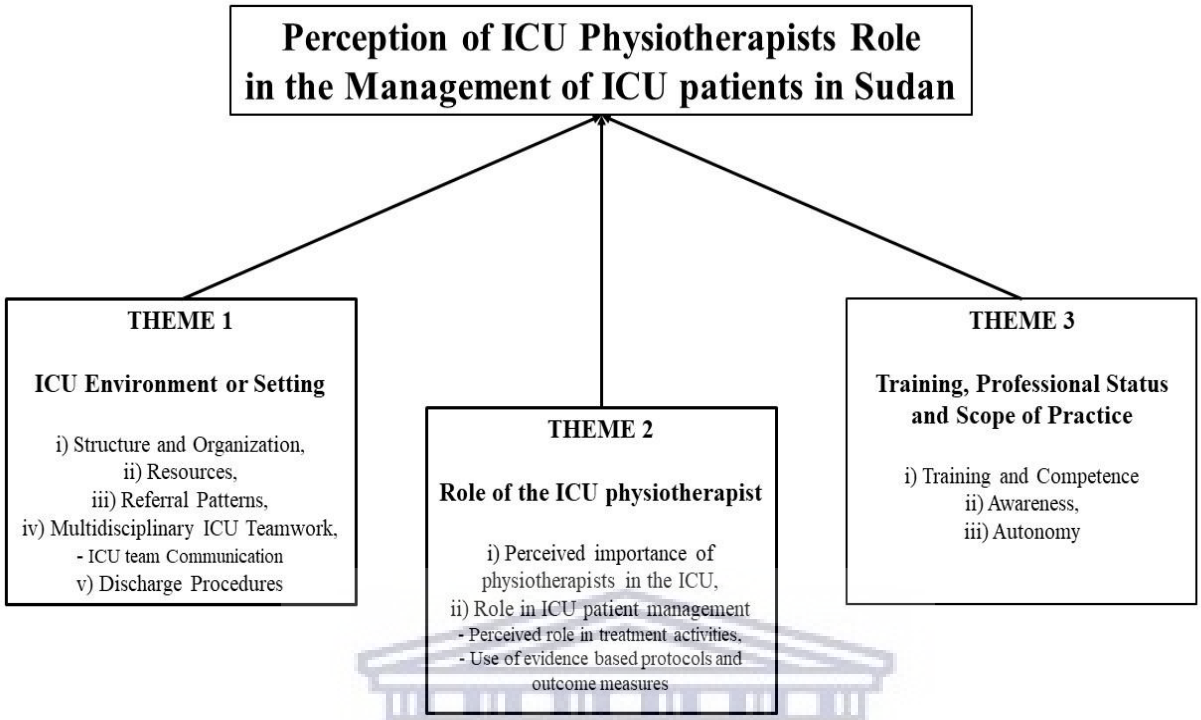

Figure 4.1 Presentation of the Emerging Themes, Categories and Subcategories

4.2.1 THEME 1: ICU Environment and Setting

In this theme the main perceptions regarding the ICU environment and setting revolved around how the structure and organisation of the ICU in terms of the care team, resources such as equipment, referral and discharge procedures and involvement in the ICU multidisciplinary team were discussed and described by the participants. Each category relating to this theme is presented with supporting verbatim quotes.

4.2.1.1 Structures and Organisations

Some of the ICU physiotherapists reported that they are not on par with international ICUs where there are other team members like the occupational therapist, speech therapist and

pathologist. In addition, they said that ICU patients' management and treatment depended on physician orders as illustrated below.

P1 A/C: "…doctors, nurses, specialists, dietician, social worker and occupational therapy they all, plus the physiotherapists we all in one rehabilitation team, but finding all this professional in one ICU sector in one hospital is almost very difficult here in Sudan."

P2 A/C: "…a lot of main rehabilitation members in this country are missing especially occupational therapist, speech therapist and pathologist per international criteria we don't have in Sudan and specialised trained rehab nurse."

P4 A/C: "the patient in the ICU I think is not under the responsibility of the physiotherapist."

P7 A/C: "I think patient in ICU they need an intensive care, the intensive care has to be followed by regular visit by the doctor, nurse, physiotherapy to check the patient status and it has to be reported, discussed, and presented in group to check the patient improvement or deterioration."

Furthermore, some physiotherapists mentioned that their role in the ICU does not only include the management of respiratory conditions, but that their role also includes the management of the conscious or unconscious patients with neurological and orthopaedic disorders as well, clarifying

that the ICUs admit different types of patients with different types of conditions to be managed by them.

P2 A/C: "In ICU you expect all main various disciplines to be admitted in ICU not only respiratory conditions, you can even expect a neurological condition to be admitted in ICU for example; Guillain-Barre syndrome can be admitted, Parkinson disease, and motor neuron diseases could be admitted in the ICU for certain respiratory complications and muscular dystrophy, and multiple trauma or orthopaedics and post-surgical patients could be admitted in ICU."

P8 A/C: "As a physiotherapist of course all the physiotherapist their having a big role in the ICU for example when the patients having fracture or having hip or total knee replacement or whatever as disc prolapse [...] so we have big role in the ICU as physiotherapist even for the conscious patient or the unconscious patient."

4.2.1.2 Resources and Equipment

The Sudanese physiotherapists who manage patients in the ICU experience difficulties to access the tools and equipment to implement their role in the management of ICU patients. The following excerpts can serve as evidence to support this point of view.

P7 A/C: "The availability of equipment in the hospital to measure the breathing rate or whatever, we miss the equipment."

P8 A/C: "there is not a lot of machines even the bed at the ICU, the environment is bad, there is no AC (air conditioner), there is no fans so the patient will be suffering, the therapist will be suffering as well."

P9 A/C: "the availability of the tools […], sometimes in the ICU maybe I need special bed so I can fix it and adjust it, but sometimes if I am working in hospital and there is lack of this facilitations and tools, I cannot do what I have to do so it depends on the tools and availability of tools."

P15 A/C: "Equipment, all physiotherapists working manually."

P14 C: "The sucker machine, sometime there is no sucker in the ICU and that is a problem."

P13 C: "Lack of equipment and some difficulties."

P12 C: "There is not enough equipment, there is no proper lifting (equipment)."

4.2.1.3 Referral Patterns

The physiotherapy referral system in the ICUs in Khartoum, Sudan was described by the physiotherapists. They described the referral process as receiving notes from the doctors or through direct communication with the doctors regarding referral of ICU patients to physiotherapists for management. In addition, depending on the patient's assessment and situation or condition, patients can be referred to the doctors by the physiotherapists. The

following quotes support the latter analysis of the perceptions of the physiotherapists who work in the ICUs regarding referral patterns.

P1 A/C: "In Sudan, our relationship as a physiotherapist with referral that we receive the patient referred from the specialist for example, the specialist surgeons or respiratory therapy specialist doctor when referring the patient to us he will state he requires a physiotherapy for this patient. Therefore, our role will start, we will involve in starting our physiotherapy treatment, if I found in my assessment or during the progression of the patient that something needs to be refer to other part of the rehabilitation team, I do."

P6 C: "The referral system, I only write my suggestion for this patient and recommendation for the doctors and they refer the patient depending on the case."

P9 A/C: "Like send note that there is patient in the ICU need physiotherapy so we go there and will start our physiotherapy sessions."

P14 C: "Sometimes the consultant of the ICU is ask me if the role of the physiotherapy is need the patient to stay at the ICU or we can refer them to the ward, and [we] discuss the case together if he (patient) is stable and we can work with him (patient) outside (of the ICU), they will refer them to the ward."

Some physiotherapists reported having minimal referrals in the ICU as they explained that the lack of referrals is because of the lack of the doctor's knowledge and awareness about the role of physiotherapists in ICU as illustrated.

P7 A/C: "I am going to talk about Sudan, here is very difficult to take this decision to refer the patient, use my own decision to refer the patient … is very difficult here, you cannot do something like this because the ICU is missing the part of being manage by a physiotherapist it is already managed by a doctor and the doctors they don't consider physiotherapist has a main role in the ICU that is why the only decision to refer the patient comes from the doctor."

P12 C: "In Sudan, we cannot apply it (self-referral/blanket assessment) because the knowledge about the role of physiotherapy is not known from other clinicians or other physicians [...] I'm not involving in [...] Referral system."

P17 C: "Honestly, it is my role but here it is not applicable because the knowledge and awareness of the medical staff it is not involving me in this decision (to refer)."

Lastly, one physiotherapist stated that the referral system is at the disposal of the doctor and does not involve the physiotherapists as reported below.

P2 A/C: "See here in Sudan, this programme is not teamwork, it is a single man job. I mean the patient management is doctor-centred…"

In summary, there is ambivalence about the physiotherapists' perception of their role in the referral of patients in the ICU for physiotherapy management as some feel that there is a referral system where patients are referred for physiotherapy in the ICU whereas others feel that there are

minimal or no referrals due to a lack of knowledge and awareness of the role of the physiotherapists in the management of the ICU patient and a few state that they are involved in referring the ICU patients to the doctor depending on the medical stability of the patient and need for further medical intervention.

4.2.1.4 Discharge Procedures

With regard to the involvement of the physiotherapists in the discharge of ICU patients from the ICU, most of the physiotherapists expressed that discharge procedures and criteria for discharge is under the control of the ICU doctors who decide when patients should be discharged. Physiotherapists are not involved in discharge decisions and did not have any discharge protocols themselves; however, the physiotherapists felt that they had the skills and knowledge that should allow them to be a part of patient discharge decisions as illustrated below.

> *P7 A/C: "No, I cannot discharge the patient, here it is protocol, here it is like evidence, the doctor only one have the right to discharge the patient but I think as a physiotherapist and what I learned about physiotherapy is one of the multidisciplinary team I should be involved in this decision."*

> *P8 A/C: "Not really, this is doctors have to tell, this is a thing the doctor has to tell when the patient is allowed to go and discharge, although we have the right to do that, this is not our job, it considers it is not, it is our right I have the right because I am seeing the patient, I have studied as much as what they studied, I am assessing, I do the evaluation, and I can do the discharge or the re-evaluation from the beginning again, as a*

physiotherapist I am having the right that, everywhere else in the world I have but in Sudan, unfortunately, we can't. No, I can't discharge."

P12 C: "Here, they mainly to discharge the patient? It is directed by physicians [...] I am not involving in referral and discharge system."

Other physiotherapists said that they are participating with the ICU doctors in the discharge of ICU patients whereby the discharge is based on the physiotherapist's suggestions and recommendations as well.

P6 C: "The patient is not discharge unless I agree that this patient ok to be discharged outside the ICU and there is no need for ICU physiotherapy for this patient."

P10 A/C: "I write that this patient can discharge from ICU by my opinion this patient is clear from chest and circulatory is proper and I finished my role in the ICU."

P13 C: "Discharge system, in some cases it depends on physiotherapy opinion or physiotherapist opinion."

P14 C: "Sometimes the consultant of the ICU is asking me if the role of the physiotherapy is needed the patient to stay at the ICU or we can refer them to the ward and discuss the case together if he is stable and we can work with him outside, they will refer them to the ward, or discharge from the ICU."

Lastly, as far as the physiotherapist role in discharge system is concerned, some physiotherapists revealed that the physiotherapists have no role in discharge system for ICU patients, only the specialist, the doctor or the consultant has that role as stated in the following extracts.

P1 A/C: "In the discharge system, we don't have any role for discharge in the discharge system for the patient. The discharge order or the discharge instruction came from the specialist."

P3 A: "We are not responsible for discharge the patient unless the doctor says that."

P4 A/C: "Discharge system, I do believe the patient in the ICU I think is not under the responsibility of the physiotherapist."

P15 A/C: "Discharge system in ICU It is the role of the physician."

4.2.1.5 Multidisciplinary ICU Teamwork

Most physiotherapists felt that they are not part of the multidisciplinary team in the ICU in Sudan. Some of them said that most of the ICU teamwork is missing in the ICUs in Sudan and that involvement in the ICU multidisciplinary team is lacking due to lack of awareness and knowledge of the role of the physiotherapist in the ICU and in the management of the ICU patient. They also say that they are not on par with international ICUs where there are other team members like the occupational therapists, speech therapists and pathologists. They perceived their role in the multidisciplinary team and thus decision making within a team regarding their care or management of the ICU patient lacking or non-existent.

P1 A/C: "doctors, nurses, specialists, dietician, social worker and occupational therapy they all, plus the physiotherapists we all in one rehabilitation team, but finding all these professionals in one ICU sector in one hospital is almost very difficult here in Sudan. And somehow each of this is working in individual base."

P2 A/C: "but as you know there is a lot of main rehabilitation members in this country they are missing specifically occupational therapist we don't have, speech therapist and pathologist per international criteria we don't have in Sudan and specialise trained rehab nurse."

P3 A: "Not actually, not as much as one part, and like one team you are not involved most of the time unless in an emergency situation."

P10 A/C "There is no relation between the team. I think there is no knowledge about the role of physiotherapy and there is no sense of working as a team."

P11 A/C: "The team role, there is no team role in some hospitals otherwise there are no difficulties in the ICU."

P17 C: "Honestly the multidisciplinary team in the ICU; it difficult to get a great result and I am suffering from dealing with others because they haven't an idea about me and my role, the importance of my role in the ICU."

In addition, other physiotherapists described their integration with the ICU teamwork as a partial integration, and it varies from team to team as pointed out in the quotes.

P5 A/C: "We have nice communications with almost all of the people but some of them they don't knew about physio and they don't like, and they think that we are interfering, some of them they think the patient no need for physiotherapy and some of them they don't like physiotherapy so they don't try physio for the patient."

P9 A/C: "Ok, for this in my experience it depends on the doctor or the nurse or the dietitian himself or herself, some doctors are very cooperative, are aware of the role of physiotherapy so they involve us."

P11 A/C: "In some hospitals they work as a team in the ICU, in other, they don't."

4.2.1.5.1 Communications in the ICU team

As far as communication in the ICU was concerned, some Sudanese physiotherapists working in the ICU said that involvement with the rest of the ICU team is founded on communications between the doctors and the physiotherapists through the nurses from the doctors. There seemed to be better communication between the nurses and physiotherapists in the ICU. Furthermore, some physiotherapists stated that the communication between and within the ICU team especially regarding the ICU patient cases is limited, and that there are no periodic meetings and fruitful exchange between the healthcare professionals such as doctors, nurses and allied healthcare professionals, including physiotherapists working in the ICU and managing ICU patients. The following extracts can serve as evidence to support this point of view.

P1 A/C: "The communication can be between the doctor and the physiotherapist and can be through the nurses through the doctor instructions, rarely that we have a conversation with the doctor regarding the case conversation".

P4 A/C: "Nurses or the ICU consultant or whoever whose working in the ICU are collaborating with you and you are getting more information from them about the patient situation [...] so there is a level of cooperation with the team."

P9 A/C: "in my experience, it depends on the doctor or the nurse or the dietitian himself or herself, some doctors are very cooperative, are aware of the role of physiotherapy so they involve us more, and some they think the physiotherapy is not very important, so sometimes they skip our role, so it depends on the person him or herself."

P15 A/C: "The medical staff must be working as a team, but here there are no periodic meetings, No the physiotherapist and nurse they don't meet at all at the same time, yeah we are not working as a team."

Other physiotherapists felt that they are not being involved in ICU team discussions, that multidisciplinary teamwork is lacking and that there is a lack of communication with and within the ICU team as well as a lack of awareness and knowledge with regards to the role of the physiotherapist in the management of the ICU patient as described by the quotes from the participants.

P8 A/C: "If it comes to the professional side, there are like everyone having this professional ego so everyone is thinking that he is superior to the other one."

P10 A/C: "There is no communication to produce very high-quality services for the patient."

P12 C: "...we are completely separated from each other's, even when they call us they don't have a lot of background a lot of knowledge about our roles to integrate with them or to discuss with them, no collaboration between the physiotherapist and the other medical staff."

P14 C: "The therapists sometimes don't know the details information about the condition of this patient, there is a lack of communication between the ICU team."

4.2.2 THEME 2: Role of the ICU Physiotherapist

The ICU physiotherapists in Sudan described their role in patient management to include the prevention of complications such as pneumonia, bedsores, joint stiffness, muscle contracture, muscle weakness, and deep vein thrombosis (DVT). They also described the treatment techniques that they use to treat or manage patients in the ICU and their role in the use of these treatments. This theme has been divided into two categories namely i) the perceived importance of physiotherapists in the ICU and ii) the role of the physiotherapists in the management of the ICU patient.

4.2.2.1 Perceived Importance of Physiotherapists in the ICU

Most of the physiotherapists stated that they have a big role to play in the ICU setting and that their role in the management of ICU patients is to maintain the hemodynamic stability and functioning of the patient, enhancing optimal function, and to reduce the chances of the ICU patients developing complications. This is supported by the following quotes.

P7 A/C: "I think we have a big role in ICU with the patient in the ICU, we try to maintain the patient in a good position inside the ICU, mobilising the patient to prevent other complications that could happen especially when the patient becomes unconscious, facilitate perfect way or a proper way for the patient to breath in the right way."

P9 A/C: "physiotherapy has a very big role in the ICU, since we start with positioning also we help and maintain the range of motion, the strength of the muscle, and we work also in breathing exercises, chest physiotherapy, so we have a big role in ICU."

P11 A/C: "I think my role in physiotherapy in The ICU is to maintain the patient status at least maintain their situation, maintain their joints, the mobility if it available and the other role in the positioning of patient and chest physiotherapy if they need."

P12 C: "Management of ICU patient is a very important thing because we are helping the patients to eliminate the secretions, and to let them turn, and to maintain the integrity of their joints and muscles, and to prevent further complications that facing the patient as aspiration pneumonia or bedsores, so we have a strong role."

P13 C: "ICU patient always suffered from prolonged bedridden, we try to prevent the complications for ICU patient such as stiffness, oedema, respiration, and we try to prevent it by range of motion, by positioning, by postural drainage and by elevation."

P14 C: "physiotherapy role is to prevent chest complications like pneumonia and accumulation of the secretions, and to prevent joint stiffness, muscle contracture, muscle weakness and to prevent the bedridden secondary complications like bedsores, the oedema…"

P17 C: "The role of the physiotherapist is divided into two parts; prevention and treatment. Prevention of complications, deformities, deep vein thrombosis (DVT) and treatment of lung problems and lung collapse, treatment of pulmonary diseases, mucus stagnation and atelectasis and infections of the chest."

4.2.2.2 Role in ICU Patient Management:

The role of the physiotherapist in ICU patient management is described under the following subcategories namely: i) the perceived role in treatment activities such as positioning, chest physiotherapy and early mobilisation and ii) use of evidence based practice and outcome measures.

4.2.2.3 Perceived Role in Treatment Activities

4.2.2.3.1 Role in Positioning

The majority of Sudanese ICU physiotherapists maintained that they play a very important role in the positioning of the ICU patient and showed awareness and knowledge of the importance of this treatment technique in the management of ICU patients and the prevention of complications and improved limb and respiratory functioning as illustrated in the following quotes.

P1 A/C: "We play a big role and we have a very important role in positioning the patient in the intensive care unit, … as a physiotherapist's one of our techniques we are using in order to get the patient to the maximum function is to maintain the good positioning."

P4 A/C: "Actually I do believe it's very important for the patient in the ICU to prevent the problems that might happen, mainly the contracture of the joints and the bedsores."

P7 A/C: "we have a big role, you know because the patient in the ICU they in laying position for several hours that become hours, days, weeks and maybe months, positioning is very important because you need to change the position of the patient to prevent the complications that may happen like bed ulcers […] and to facilitate the perfect way to breath."

P9 A/C: "Positioning is very important in ICU especially if the patient is unconscious because if the patient cannot move and he is like bedridden for a long period of time, he can generate and develop bedsores, muscle weakness, and also restriction of movement."

P12 C: "It is a very unique thing because positioning helps patient to do several things, positioning may reduce risk of secretions, and may reduce muscles contractions and may reduce further complication that facing the patients."

P15 A/C: "One of the important things in the ICU is to put the patient or changing the position of the patient to avoid the bedsores and something like this, it's so important."

P16 A: "Yeah I have a great role in positioning to prevent the complication, to prevent bedsores and you have to position the patient to prevent joints stiffness […], also for the clearance of the airways."

P6 C: "My role in the positioning of intensive care patients is, I examine the patient and I find out which side there is secretion or which side he supposed to be and it depends on his or her case, I position the patient with an assistant of nurse and the ICU doctor after their approval on the position, I position the patient and observe the patient for like 20 minutes after the positioning, and I will also be present at the shifting of the patient and reposition of the patient in the ICU."

Moreover, regarding timing of position changes for ICU patients, some participants echoed that the changing of the ICU patient's position should be every two hours to prevent complications such as bedsores, as narrated in the following quotes.

P11 A/C: "Positioning is according of the case; I need positioning for chest physiotherapy and sometime I need to reposition the patient every 2 hours to prevent bed sores."

P13 C: "Positioning is an important task in ICU to prevent the bedsores and to increase patient circulation. Every two hours the patient should change the position."

In addition, some physiotherapists stated that the positioning process is part of the nursing team's responsibilities and that the physiotherapists could guide them in this process as pointed out by the following quotes.

P5 A/C: "I do help in positioning but it is not my first role because the nursing in ICU is one to one here, so the nurses able to do positioning every two hours, if they do not know I teach them at the first time how to deal with the patient according to his case and then they are able to do it every two hours."

P14 C: "I advise the nurse staff and ask them to turn the patient every two hours to the left and to the right."

4.2.2.3.2 Role in Chest Physiotherapy

Most participants recognised their role in chest physiotherapy in the management of ICU patients and also highlighted some of the benefits of the treatment technique for the improvement in the patients' respiratory function. The following extracts can serve as evidence.

P1 A/C: "One of the important techniques also we used as a physiotherapist for the intensive care patients is chest physiotherapy, we had different techniques maintaining and managing the chest physiotherapy in order to clear the secretion inside the lungs which can result in safe breathing to the patients, we care about the cleaning of the airways for the air in and out the lungs."

P2 A/C: "The physiotherapist generally what they do for the respiratory system, they are targeting the prevention of accumulations of secretions and clearance of the airways and maintains of vital capacity as possible."

P9 A/C: "Yeah it is very important because they are bedridden for a long period of time, so the chest physiotherapy is very important in preventing of pneumonia infection, and for the other diseases which can develop."

P10 A/C: "It is the most common role in ICU to clear the airways from any secretion or restrictions."

P11 A/C: "I think the chest physiotherapy is the most important role offered by physiotherapy in the ICU. We have to clear patient secretion for better breathing."

P17 C: "Chest physiotherapy also is important for ICU patient for early weaning from the ventilator and regains their lung function and the pulmonary functions."

Some physiotherapists also noted the specific chest physiotherapy techniques used such as percussion, vibration, postural drainage, and exercise to reduce the chance of pulmonary complications that may occur as quoted below.

P6 C: "My role in intensive care chest physiotherapy I do all the techniques of chest physiotherapy depending on the case like the vibration, percussion or even postural drainage."

P13 C: "In chest physiotherapy, we position the patient and we do percussion and vibration and we try to clear the upper track and lower track to clear the secretion from the lungs."

P14 C: "I do postural daring to remove the secretion from all the loops in the lungs, and I do percussion and vibration, and I use suction to remove the secretion from the mouth and from the chest."

P15 A/C: "It is so important even the patient unconscious patient sometimes you do some vibration and exercise before suction, so in ICU we use postural drainage and respiratory exercise to clear the airways."

P16 A: "It is so important even the patient unconscious patient sometimes you do some vibration and exercise before suction, so in ICU we use postural drainage and respiratory exercise to clear the airways."

With regards to the suction technique using in chest physiotherapy, some physiotherapists mentioned that the suction technique is role of the ICU nurse. Some physiotherapists said that they only prepare the patient for the suction process as suggested in the excerpts.

P5 A/C: "We use vibration, percussion, positioning and then the nurses they do suction and we help the patient to cough."

P6 C: "I do all the techniques of chest physiotherapy depending on the case like the vibration, percussion or even postural draining, and positioning [...] the only thing I don't do is suctioning of the patient because the nurses are responsible for that."

P12 C: "The role of chest physiotherapy in intensive care patients, it is including chest percussion, and postural draining, and breathing exercises, and the suction of the secretions, and all these differ from patient to patient. Actually, I am not doing that suction so the nursing staff may help me in suction but I am preparing the patient to eliminate the secretions."

Lastly some physiotherapists referred to the use of breathing exercises to assist in the clearance of secretions and the maintenance of clear airways as part of their role in chest physiotherapy in the management of ICU patients.

P1 A/C: "I use in my experience some upper extremity exercise and breathing exercise."

P3 A: "also we have exercise we use exercise (breathing) to strengthen the muscles to prevent the lungs collapse."

P12 C: "The role of chest physiotherapy in intensive care patients, it is including chest percussion and postural draining and the breathing exercises and the suction of the secretions and all these it differs from patient to patient."

P15 A/C: "It is so important even if the patient is unconscious, you do some vibration and exercise before suction, so in ICU we use postural drainage and respiratory exercise (breathing) to clear the airways."

P16 A: "Yeah, we use a lot of chest physiotherapy techniques like percussion, like removing the secretions by suction and also you to do exercises (breathing) to improve the chest situation."

4.2.2.3.3 Role in Early Mobilisation

As far as early mobilisation for the improvement in function is concerned, it has been found that Sudanese ICU physiotherapists are involved in and are aware of some of the benefits of early mobilisation that can help patients improve circulation and physical functioning such as improving on the activities of daily living (ADLs). The following extracts illustrate the perception of the ICU physiotherapists in Sudan regarding their role in and the benefits of early mobilisation techniques for ICU patients.

P1 A/C: "the early mobilisation I start very gradually, I start with very low-intensity exercises for example, the range of motion for the upper extremities, breathing exercise in order to get him to sitting followed by standing and walking."

P10 A/C: "When I do early mobilisation I give the patient for early rehab and early movement rather than the other part of physiotherapy (respiratory care) and it is very effective for the patient."

P15 A/C: "It is so important as far as possible, when you find the patient can stand and walk, so it is very important."

P17 C: "Early mobilisation is important for the patient to reduce or prevent the deformity and the muscle wasting and the DVT (deep vein thrombosis) and also start daily life activity as soon as possible."

Some physiotherapists also stated that early mobilisation could prevent complications associated with prolonged bed rest such as in ICU patients, as indicated by the following quotes.

P4 A/C: "early mobilisation is very important for the patients. This depends on the patient situation if he/she is allowed to be mobile; the patient who stays for a very long time in the ICU might face problems like joints contraction and bedsores in the ICU."

P9 A/C: "it is very important to prevent bedsores, to prevent muscle contracture, to prevent restriction of the movement so early mobilisation is very important for the patient if he is conscious or unconscious."

P11 A/C: "We have to mobilise the patient early to prevent the stiffness, to maintain joint movement, for increasing power."

P12 C: "It is a very important thing as I said previously it is to prevent the further complications that may face the patient in the future."

P13 C: "Early mobilisation yeah it is very important to prevent the stiffness, atrophy, weakness and the other complications that follow the bedridden and immobilisation."

P16 A: "Early mobilisation can help us as physiotherapists to prevent many complications for example, joint stiffness, muscle wasting and to prevent deep vein thrombosis."

4.2.2.3.4 Use of Evidence-based Protocols and Outcome Measures

Some Sudanese ICU Physiotherapists reported having some awareness of using evidence-based protocols and reported to be using them in the management of ICU patients as per the following quotes.

P1 A/C: "I try my best in a personal effort to use the maximum evidence-based protocol going back to reading research about the …techniques for the chest and ICU patients."

P2 A/C: "Physiotherapists are pioneers in trying their best to implement the evidence-based protocols. Although in Sudan there is a single protocol to manage the patient, we are doing it hard to implement our job as we all know that when we see the patient earlier, the patient is unlikely to go for a chronic condition, it is the job and contribution of the physiotherapists in this area."

P4 A/C: "I do believe that evidence-based protocols are important in the treatment of the ICU patient and implementation of whatever is new in treating this patient in the ICU [...] this is our role."

P5 A/C: "For evidence-based usually, I use to work with the protocols I have learned for the patients according to their case."

P11 A/C: "Evidence-based protocols, it used by some physiotherapists. For me, I'm using it."

Other physiotherapists stated that applying or implementing evidence-based protocols is not easy or not possible in some cases and therefore mostly evidence-based protocols are not used. They also reported that they require someone who has the knowledge to guide them in the knowledge regarding evidence-based protocols and the implementation of these protocols which is currently a challenge to physiotherapists working in the ICU and managing ICU patients as per the quotes that follow.

P7 A/C: "we don't use the evidence, and it is available, but here in Sudan we don't use it because we miss the practices, we miss supervision we miss someone to guide."

P8 A/C: "Evidence-based protocols according to ICU patient, we have, there is a lot of recent advances that are coming on all of this evidence-based, so we have to be updated like every day there is a new thing, but applying it here, no not really."

P9 A/C: "Generally, there are restrictions in applying all these guidelines and protocols in Sudan because the facilities are very limited."

P12 C: "Yeah, in the books there are a lot of protocols but to apply it to the ICU, we may be facing some kind of problems, maybe because there is not enough equipment."

While the physiotherapists spoke to the question of the use of outcome measures, it was clear from their responses, that no ICU specific outcomes measures were used or known, as responses related only to the assessment of patients using physiological measures such as range of motion and response to treatment provided that were used to assess progress and used to further the treatments provided. The limited information gained from the physiotherapists working in the ICUs and managing ICU patients can be assumed to be lacking due to a lack of awareness on their part of ICU specific outcomes. The perception regarding outcome measures used in the ICU only included the following quotes on the topic.

P1 A/C: "I use the clinical guideline which I use in my assessment like the range of motion assessment and the general guideline subjective, objective examination, etc. I do my best using this."

P4 A/C: "You will do a kind of assessment and then wait for your patient, and while you are working with him you will see the result."

P6 C: "Each case must be treated differently according to the assessment […] we observe the patient and we do the assessment."

P8 A/C: "I will take all the measurement just like for example the PFT (Pulmonary function test) I do my treatment, and I do the outcome measures again so I see the improvement and how much patient improves."

P17 C: "I use the outcome measures in the decision of upgrading the treatment plan for the patient, I start from zero immobilised patients and I upgrade the treatment plan gradually to reach the target of standing or sitting or walking."

4.2.3 THEME 3: Training, Professional Status and Scope of Practice:

The following theme included three categories related to the training, professional status and scope of practice of the physiotherapists working in the ICUs in Khartoum, Sudan. These three categories were described as the training and competence, the awareness of physiotherapists in the ICU and the autonomy of the ICU physiotherapists in the management of ICU patients in ICUs in Sudan and how it influenced the scope of practice and reported sharing of roles in these ICUs.

4.2.3.1 Training and Competence

Some physiotherapists pointed out that there is a lack of training and workshops for physiotherapists who are working in the ICUs in Khartoum, Sudan to improve their skills as illustrated by the verbatim quotes.

> *P7 A/C: "Training is the biggest barriers to be trained in the ICU, it is the barriers."*

> *P11 A/C: "We didn't find a training now and lack of training programme for the ICU physiotherapists."*

> *P13 C: "Lack of workshops and training as physiotherapy training."*

> *P15 A/C: "I think there is a lack of training in this role (ICU), so many physiotherapists become afraid from the patients and equipment."*

> *P16 A: "when I was a student I didn't see patients in the ICU even they just divided the students to groups and for me, I'm one of the students who didn't come to Al-Shaab hospital for ICU patient."*

Other physiotherapists noted that there is a lack of physiotherapists working in the ICUs in Sudan and this was partly due to the lack of training that would affect competence in ICU patient management and affect the of amount of experience gained in this area of patient care as per the verbatim quotes illustrated.

P4 A/C: "lack of physiotherapists in the ICUs and the lack of the physiotherapists who are employ in the ICUs."

P12 C: "physiotherapy here in Sudan I don't want to be say rare, but to be known to all staff it takes time."

P13 C: "physiotherapy is a new field and the graduated is still fresh, and there are no senior physiotherapists."

P17 C: "the number of the physiotherapist around is few."

4.2.3.2 Awareness *(of the role of physiotherapists in the management of the ICU patient)*

It was clear while talking to the physiotherapists that there was a lack of awareness about the profession in Khartoum, Sudan, specifically within the ICU setting in this region. The infancy of the profession and the small numbers of trained physiotherapists may partly be due to this lack of awareness of the profession in a specialised setting such as the ICU. The Sudanese physiotherapists working in the ICU have reported little recognition among the medical staff about the role of the physiotherapist in the management of ICU patients and within the ICU team. Thus, the ICU teams' knowledge and awareness of when to refer and how to involve the physiotherapists in the referral system, discharge of patients and discussion of patient care is deemed to be difficult or challenging for the physiotherapists working in Khartoum. There is a view that other professionals in the ICU do not understand what the physiotherapists do in the ICU and what their role is in the management of ICU patients and the vital contribution they can

make to patient care and outcome. The following extracts can serve as evidence to illustrate these perceptions.

P1 A/C: "Awareness also is playing a big role; I felt the lack of awareness among my rehabilitation team "other professions in my rehabilitation team."

P2 A/C: "There is no official awareness about the role of the physiotherapist in this, this is I think is a most restrictive factor for the physiotherapist rather than the logistics which you support to get to facilitate your job inside ICU."

P3 A: "I think that the doctors or the team lack of awareness so the doctor is not aware about the role of physiotherapy."

P6 C: "Misunderstanding of intensive care physical therapy, they don't get what is physiotherapy at the first place, they don't know what the physical therapy and then they don't know the role of the physical therapist in ICU care."

P10 A/C: "There is no relation between the team. I think there is no knowledge about the role of physiotherapy and there is no sense of working as a team."

P12 C: "physiotherapy here in Sudan I don't want to be say rare, but to be known to all staff it takes time."

P14 C: "Here, there is no care about our importance or our role so we are doing what we can do."

P16 A: "Very lack of awareness of the doctor here in Sudan about the role of physiotherapy in all the disciplinary not just in ICU."

P17 C: "I am suffering from dealing with others because they haven't an idea about me and my role, the importance of my role in the ICU."

Furthermore, the physiotherapists felt that they needed to promote the profession and create awareness especially amongst the doctors of the physiotherapists' role in the management of ICU patients and their contribution to ICU patient care and outcomes. They stated that they want to be known specifically by the consultants in the ICU and suggested some ways of promoting their profession and scope of practice within the ICU as per the following quotes.

P2 A/C: "I think us as physiotherapist we should conduct a lot of tutorials sessions for doctors, for nurses about the real roles in contributions of physiotherapist in ICU."

P3 A: "I think we need also increase the awareness in the staff especially the doctors because some of the doctors lack awareness about the physiotherapy role."

P6 C: "I wish that there is a school for doctors or at least a mini textbook for them to teach them what physiotherapy is."

P12 C: "We want the physiotherapy to be known."

P14 C: "I hope all the consultant of the ICU know our role."

4.2.3.3 Autonomy

Most of the physiotherapists working in the ICU felt that their practice was not autonomous in the management of ICU patients. They reported that ICU doctors or physicians control the patient's management with regards to referral and discharge decisions, some stating that the lack of awareness is part of the challenge in this regard. The following extracts can serve as evidence to illustrate the lack of decision making and thus lack of physiotherapy autonomy regarding ICU patient referral and discharge due to what seems to be a hierarchal system where the doctor is mainly responsible for the patient. The lack of autonomy with regards to decision making regarding referral and discharge of ICU patients and a view that there is a lack of awareness of the physiotherapists role in the ICU setting in Sudan may affect the scope of practice of these physiotherapists and also affect their professional status within the ICU.

P3 A: "we have not a lot of referral patients from the doctor because he is responsible for that [...] we are not responsible for discharging the patient unless the doctor says that."

P5 A/C: "Here we do not have the system of referral and discharging the patient from the ICU to the ward [...]. The system here in the hospital usually the patient under the consultant who enter him and under the intensive care specialist, so the two of them have the role to discharge the patient or to refer him."

P7 A/C: "No, I cannot discharge the patient, here it is a protocol, here it is like evidence, the doctor only one have the right to discharge the patient but I think as a physiotherapist and what I learned about physiotherapy is one of the multidisciplinary team I should be involved in this decision."

The same participant also stated:

P7 A/C: "I am going to talk about Sudan, here is very difficult to take this decision to refer the patient, use my own decision to refer the patient … is very difficult here, you cannot do something like this because the ICU is missing the part of being manage by a physiotherapist it is already managed by a doctor and the doctors they don't consider physiotherapist has a main role in the ICU that is why the only decision to refer the patient comes from the doctor."

P9 A/C: "I can't say that this patient we can discharge him now or not, this like for the team there is doctors there, the nurse the team in the round they decide that but me as physiotherapist I cannot decide this here in Sudan."

P11 A/C: "In Sudan we cannot discharge the patient [...] the doctor can discharge him."

P12 C: "Here, they mainly to discharge the patient? It is directed by physicians [...] I am not involving in referral and discharge system."

The same participant also said:

> *P12 C: "In Sudan, we cannot apply it (self-referral/ blanket assessment) because the knowledge about the role of physiotherapy is not known from other clinicians or other physicians [...] I'm not involving in [...] Referral system."*

> *P17 C: "Honestly, it is my role but here it is not applicable because the knowledge and awareness of the medical staff it is not involving me in this decision."*

4.3 Conclusion

In summary, the most important results regarding the profile of the physiotherapist working in the ICUs in Khartoum, Sudan, the three major themes and their specific categories and subcategories were highlighted and supported by verbatim quotes in this chapter. A critical analysis and in-depth and integrated interpretation of the study findings or results in relation to the current available evidence in other contexts is provided in the discussion in chapter 5.

CHAPTER FIVE: DISCUSSION

This chapter discusses the results of the study and compares it with the current related literature on the role of physiotherapy in the management of intensive care patients. The aim and objectives of the study are answered in line with the research findings. The researcher attempts to critically analyse the findings and integrate them with available evidence regarding the role of the physiotherapist in managing ICU patients and to highlight findings that are novel and not documented in previous literature in the current context of ICU physiotherapy in Sudan. The strengths and limitations of the study and recommendations for future studies and suggested improvements for the profession based on the findings of the study are also highlighted.

5.1 Overview of the Study Findings

To the best of the researcher's knowledge, this study is the first to evaluate the perceptions of the physiotherapists' role in the management of ICU patients in Khartoum, Sudan. The study achieved its aim to explore and describe the perceptions of physiotherapists on their role in the management of ICU patients. The study provided information on the profile of the physiotherapists who have worked in these ICUs and also train and supervise in this area. The latter has not been reported elsewhere and thus adds valuable knowledge to the body of evidence of allied healthcare in Sudan, in particular physiotherapy in the intensive care setting.

In this study there were more female physiotherapy participants compared to male physiotherapy participants who were identified to work in the ICUs in Khartoum. The participants varied in age but the majority were young, especially the females. Most participants were working in both academic and clinical sectors. The males who were older thus reported more years of general physiotherapy clinical and/or academic experience than females but the females reported more

years of clinical and/or academic experience in ICU patient care and management. The majority of the physiotherapists who worked in the ICUs identified and participated in this study had bachelor's in science degrees and more males had master's in science degrees in Physiotherapy but none in the area of ICU physiotherapy per se. The profile of these Sudanese physiotherapists working in the ICUs in Khartoum are similar to physiotherapists in South Africa who are also young and have basic minimum qualifications with a few master degree graduates but the South African ICU physiotherapists have more experience in ICU training and clinical work due to the availability of more ICU related continuous professional development courses and having fulltime work in these units as they are permanently employed in physiotherapy posts that include ICU patient management as part of their job description (Peerbhay, Hanekom, Karachi, 2020; Karachi et al., 2018; Lottering & Van Aswegan, 2016) that is lacking in Sudan. While the Sudanese physiotherapists working in the ICUs are on par other African countries in terms of the age of the physiotherapists, their years of ICU clinical experience and therefore expertise is lacking (Peerbhay, Hanekom, Karachi, 2020; Karachi et al., 2018; Lottering & Van Aswegan, 2016). The Sudanese physiotherapists could be considered young not only in age but in years of ICU clinical experience which was on average less than 10 years. In terms of degrees and qualifications, physiotherapists working in the ICUs in Sudan are fairly on par with those in South Africa, Sri Lanka and also some developed countries (Lottering & Van Aswegan, 2016; Sigera et al., 2016; Malone et al., 2015; Denehy & Berney, 2006) even though the profession is still in its infancy (Rhodes 1989). Price and Richert (2017) stated that younger healthcare professionals must have sufficient training and education for transition in a workplace. They also state that younger healthcare professionals require more continuous professional development (CPD) and education for career pathing and for improving life-long learning skills as they improve their competency and skill (Price and Richert, 2017). Training and CPD seems to be

lacking in Sudan with regards to improving ICU skills and competency as stated by the Sudanese physiotherapists.

Based on the physiotherapists' perceptions of their role in the management of ICU patients, data analysed revealed three themes with related categories and subcategories that related to the role of the physiotherapist in the management of ICU patients in Sudan. These themes and their specific categories and subcategories were the i) ICU Environment or Setting (referring to the structure and organisation; resources; referral patterns; multidisciplinary ICU teamwork including ICU team communication and the discharge procedures), 2) Role of the ICU physiotherapist (referring to the perceived importance of physiotherapists in the ICU and their role in ICU patient management including their perceived role in treatment activities; use of evidence based practices and outcome measures) and 3) Training, Professional Status and Scope of Practice (including their perception on ICU training and competence, awareness of physiotherapy in the ICU and autonomy of the ICU physiotherapist in ICUs in Khartoum Sudan). These themes and how they relate to the role of the physiotherapists in the management of ICU patients in Khartoum, Sudan are discussed in a critical manner and integrated into an in-depth discussion in comparison to available evidence on the topic. The themes and their related categories and subcategories are discussed and evaluated against how the perceptions of the physiotherapist working in the ICUs in Khartoum, Sudan may affect or influence their role in patient management in the ICU.

5.2 ICU Environment and Setting

The physiotherapists working in the ICUs perceived that the structure and organisation of the ICU including the resources was somewhat lacking as there was a perceived lack of a

multidisciplinary team (MDT) with lack of specialist allied healthcare professionals such as occupational and speech therapists that may affect holistic rehabilitation of the ICU patient. Similarly, Nelson et al. (2012) also noted the difficulty in collaboration and sharing of information between the nurses and physiotherapists within the ICU team that may be one of the obstacles impeding sufficient rehabilitation service in the ICU. In this study the physiotherapists also reported some difficulty in with working as a team with the ICU nurse and communicating with the ICU nurse. Even though a few said that they would do positioning of the ICU patient but deemed it the work of the nurse and would advise the nurse on positioning of the patient the general perception amongst the physiotherapists was a lack of team work that included the nurse in the ICU MDT. The physiotherapists considered the lack of monitoring equipment, electrically operated beds or lifting equipment as well as suction units as negatively affecting patient care and possibly outcome. They also stated that they only worked in the ICU and managed ICU patients when called by the doctor and thus there was a lack of physiotherapy staff in the ICU or in the MDT that may influence holistic patient care and functional outcomes normally addressed by early physiotherapy intervention. In a trial by Hanekom, Louw and Coetzee (2012) it was reported that a 24-hour dedicated ICU physiotherapist was beneficial in reducing ICU-related complications including readmission and reduced ICU and hospital length of stay with improved function and quality of life. Hanekom et al. (2012), also noted that the lack of equipment such as chairs for early mobilisation out of bed were essential in order to allow each patient ventilated or not to sit out and function optimally. These results from Hanekom et al. (2012) support the need for improved resources such as physiotherapy staff and physiotherapy related equipment needed to effectively manage ICU patients.

The Sudanese physiotherapists also reported that patients with different conditions were admitted to the ICUs and thus they had to manage ICU patients with different conditions in any particular ICU that implies the need to be clinically competent in the field of intensive care. The physiotherapists also observed that the doctor was the main person in charge of the ICU patients and that everything in the ICU was managed and run or organised by and through the ICU doctor, including patient referral, leaving little room for teamwork. In other local and international ICUs while the doctor was also more involved in the referral and decision making of the ICU patients care needs, the physiotherapists had input into the referral criteria and system with some doing "blanket" referral [assessing all patients for treatment in a unit] and also set patient goals and was involved to some extent in the decision making regarding ICU patient management together with the doctor (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Sigero et al., 2016; Makalla et al., 2015; Malone et al., 2015; Denehy & Berney, 2006) more so that the Sudanese physiotherapists reported. With regards to resources, although there was a shortage of certain equipment and staff, this aspect of the ICU environment and setting needs further and deeper analysis. It is well known that ICU services and care are expensive and required hi-tech advanced equipment as well as a sufficient qualified and expertly trained staff. While the shortage of ICU resources in terms of staffing and equipment are reported globally, the extent of this challenge in the ICUs in Khartoum needs further exploration and analysis as Alfadil (2017) also reported a lack of equipment in the ICUs in Sudan. As previously stated efficient physiotherapy staff and physiotherapy related equipment for the efficient management of ICU patients is important for improved ICU patient outcomes (Hanekom, et al., 2012, Hanekom et al., 2013). However, the availability of physiotherapy related in physiotherapy equipment required for the management of ICU patients, needs investigation and exploration to assess its impact on quality of care and ICU patient outcomes.

In this study, there is ambivalence about the physiotherapists' role in the referral system specifically in terms of receiving ICU patient referrals and advocating for referrals for ICU physiotherapy management. While many of them said they received referrals from the doctors via a note or through the nurse for physiotherapy management of the ICU patients, others said they received minimal referrals that they felt was due to the lack of knowledge and awareness of the role of physiotherapy in the management of ICU patients on the part of the doctors. Since the doctor is perceived to be in charge of the ICU and its patients it is perceived that only the doctors are involved in making decisions about the referral of ICU patients to the physiotherapists with the physiotherapists seemingly feeling that they are not involved in the structure or organisation of the referral system. Some physiotherapists do however report that they refer ICU patients back to the doctor if they have concluded their assessment and treatment and noted that further medical management is required for example for patients who are haemodynamically unstable. The lack of a structured referral system that allows the physiotherapists who need to manage the ICU patient to be involved in decision making regarding which ICU patients should be referred and can benefit from physiotherapy care, may be due to inadequate knowledge or lack of awareness about the ICU's physiotherapists' role in ICU patient management and the benefits of such treatment. The latter can be addressed in ICUs and training institutions in Khartoum, Sudan by involving a more interdisciplinary approach to teaching and learning in the academic and clinical setting. While other ICU settings locally and internationally also report that ICU doctors refer ICU patients, there is more input and decision making with regards to referral criteria and the structure of when and how patients are referred with some even reporting blanket assessment (assessment and treatment of all ICU patients) as reported in the earlier part of the discussion (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Sigero et al., 2016; Makalla et al., 2015;

Malone et al., 2015; Denehy & Berney, 2006). In contrast, in Sudan the physiotherapists only manage ICU patients or work in the ICU if they receive a referral and are called out specifically, thus they do not regularly or exclusively work in the ICUs as reported in other ICU contexts (Karachi et al., 2018; Lottering & Van Aswegan, 2016; Sigero et al., 2016; Malone et al., 2015; Kumar et al., 2007; Denehy & Berney, 2006). This lack of referral and presence of physiotherapists in the ICU setting in Khartoum may affect the role of the physiotherapist and limit their actual scope of practice as they are deemed first line autonomous practitioners by their professional board namely the National Medical and Allied Health Professions Association in Sudan. Similarly, Yeole et al. (2015) stated that the physicians always direct the referral system in ICUs, and there is an established set of criteria for physiotherapists practice in the Indian ICUs. The variation in the referral system's in ICU depends on the understanding, interest, and knowledge of different professionals' roles that make-up the ICU (Yeole, Chand, Nandi, Gawali, & Adkitte, 2015). Baidya et al. (2016) reported that 68% of the hospitals in Nepal, provide physiotherapy intervention for ICU patients, followed by a physicians' consultation. Their investigations emphasised the importance of collaborative treatment and adherence to standard referral systems on patient management and good hospital practice including ICU.

Again, similar to the referral system and criteria, the majority of the ICU physiotherapists in Sudan believed that their involvement in the discharge decision making process and procedure is limited and is mainly subject to the discretion of the ICU doctors or physicians. However, some of them believed that they should and could be involved in the discharge decision making process and procedure of ICU patients as they have the appropriate skills and knowledge in this regard. The perceived lack of awareness of the role of the physiotherapist in the ICU and their lack of autonomy within the ICU setting and thus involvement in the discharge goals of the ICU

patient may be affected and in turn affect patient outcome. Physiotherapists in Sudan should advocate their role within the ICU multidisciplinary team and promote their profession and scope of practice in the ICU setting in Khartoum, Sudan. A few physiotherapists stated that they participated with the ICU doctors or physicians in the discharge procedure through their recommendations and suggestions and this could assist in promoting their involvement and interaction with the ICU team with regards to discharge decisions regarding ICU patients. The role of physiotherapists in the management of the ICU patient cannot possibly be complete if it does not encompass this final step of deciding when the patient is ready to be moved to the ward. Matmari, Uyeno and Heck (2014), are in absolute agreement that the discharge decisions of patients should be done collaboratively among the public health practitioners and state that proper discharge recommendations is one of the crucial roles that the physiotherapists play in a multidisciplinary team in the ICUs. A study done by Shepherd (2018) in the United Kingdom described the discharge process as a multidisciplinary decision that assesses patient physiology, health status, level of dependency, and treatment plan to discharge the ICU patients. The discharge process requires an interprofessional team opinion to be successful (Shepherd, 2018). Physiotherapists have more knowledge regarding the functional status and respiratory and cardiac capacity of patients as rehabilitation experts (Hanekom, 2016) and thus are integral to the decision making regarding ICU discharge that will prevent complications due to premature ICU discharge and an increase in ICU readmissions (Hanekom et al., 2012; Hanekom, Louw & Coetzee, 2013).

It is clear from evidence that multidisciplinary ICU team work is highlighted as a requirement since referral and discharge decisions may all be affected by the lack of this interaction that may in turn affect ICU patient outcome in this setting (Shepherd, 2018; Matmari et al., 2014). Also,

the limited availability of other specialists and allied healthcare professionals in the ICUs in Khartoum, Sudan may affect the extent of an appropriate multidisciplinary team and level of teamwork as was reported. The physiotherapists had mixed feelings about their involvement in a multidisciplinary team in the ICU as some felt they were not part of a team, while others felt partially integrated in the ICU team or felt that their involvement in the team varied from team to team. A study conducted by Atwal and Caldwell (2005) showed that the multidisciplinary team collaboration is a fundamental part of the practice; the rules of collaboration and teamwork are usually challenged in applying it. As previously mentioned by Çakmak et al. (2019), physiotherapy is an integral part of the multidisciplinary team in managing ICU patients. Thus, there seems to be room for improvement in teamwork in the ICU through increased allied health staff employment and the inclusion of the physiotherapist in the ICU team for improved ICU patient care. The lack of integration of the physiotherapists in the ICU team in Sudan may affect their role in the management of ICU patients and the lack of their integration in these teams seems to stem from the overarching perception of a lack of awareness of the role of the physiotherapists in the ICU and in the management of ICU patients in Sudan. In a South African based study (unpublished thesis) by Ponto et al. (2019) the lack of awareness and knowledge of doctors and nurses on the physiotherapist's role in the management of the neonatal ICU patient is reported by physiotherapists working in these units in Cape Town, South Africa. This impacts on the referral of neonatal patients to physiotherapists and affects the scope of practice of the physiotherapists in general as they have minimal input into the management of the neonatal ICU patient. The findings of this study are therefore similar to that of Ponto et al. (2019) in terms of the perceived lack of awareness and knowledge of the role of the physiotherapist in the management of ICU patients, and in this case adult intensive care patients. In addition, the lack of presence and integration of the physiotherapists in the ICU team results in the poor

communication between the physiotherapists and the doctors and nurses or multidisciplinary team as a whole (Ponto et al, 2019; Gupte & Swaminathan, 2016) and thus physiotherapists who are working on an adhoc basis in ICUs in Khartoum, Sudan have reported poor MDT communication. Gupte and Swaminathan (2016) highlighted that ICU nurses perceived the physiotherapist to play a vital role in the ICU MDT and should be part of the team in ICU patient management thus physiotherapists in Sudan need to improve the awareness of their role and increase their presence in these settings as effective involvement and communication with the multidisciplinary team is important for effective decision making regarding patient management and outcomes in the intensive care.

5.3 Role of the ICU Physiotherapists

The physiotherapists in this study highlighted the importance of their role in the management of ICU patients. They considered themselves to have a role in positioning, chest physiotherapy and early mobilisation techniques to improve patient function and outcome. It is widely published that physiotherapists play a critical and essential role in the management of ICU patients (Marshall et al., 2017; Denehy & Berney, 2006). The physiotherapists in Sudan who work in the ICUs in Khartoum were of the opinion that they are important and play an essential role in the ICU and in the management of ICU patients. However, they reported that this role is not well known to ICU doctors and may affect the physiotherapy related referral and discharge practices in these ICUs and thus patient outcomes. This lack of knowledge and awareness of the critical role and benefits of physiotherapy care in the ICU also leaves room for a limited scope of practice and limited job posts in this area for physiotherapists in Sudan. Physiotherapists in Sudan therefore need to promote their role and efficacy within the ICU through providing the relevant evidence to the relevant stakeholders.

The Sudanese physiotherapists also discussed specific treatment techniques used in the management of ICU patients. In this study, most physiotherapists recognised that chest physiotherapy, early mobilisation, and positioning are the significant interventions utilised within ICUs. Similarly, Lottering and Van Aswegen (2016) conducted a study to describe physiotherapists' current practice in ICUs and concluded that chest physiotherapy and mobilisation were the most used techniques by ICU physiotherapists in South Africa. Physiotherapists in Sudan have described vibration, percussion, postural drainage, suction, and breathing and respiratory muscle exercises as chest physiotherapy techniques used in the ICUs. According to Newstead et al. (2017) traditionally chest physiotherapy techniques used in treating the respiratory system dysfunction for ICU patients have included percussion, vibrations, deep breathing exercises, and postural drainage and thus concur with the findings of this study. Moreover, concerning patient position changing time, some physiotherapists maintained that changing the ICU patient's position should be every two hours to avoid complications. In contrast, a review study about positioning ICU patients in different settings for nurses done by Griffiths and Gallimore (2005), reported that the medical condition of the patient is the final consideration in the planning of ICU patient positioning, for example, when positioning a patient with burns patients it is recommended to be two to three turns hourly. However, it is not clear what type of conditions the ICU physiotherapists managed and deeper exploration of their criteria for positioning may highlight differences in timing of positioning of ICU patients' dependent on the condition. While the ICU physiotherapists in Sudan felt that they had a critical role to play in positioning, they also stated that positioning was part of the nurses' role in the ICU and that they could guide nurses in this role by educating on how positioning can be done effectively to optimise the ICU patients respiratory and physical functions. This finding is in line

with Karachi et al. (2018) that observed that ICU physiotherapists in South African ICUs share the role of positioning with nurses but that ultimately the technique was reported to be the role of the ICU nurse. With regards to chest physiotherapy, the Sudanese physiotherapists stated that they used manual chest techniques such as percussions and vibrations, breathing exercises as well as postural drainage and suctioning in order to loosen and remove secretions accumulated in the lungs due to prolong bedrest. Other studies have also reported the use of chest physiotherapy techniques in the management of ICU patients but included breathing exercises with and without equipment (Karachi et al., 2018; Lottering & Van Aswegan, 2016, Norrenberg & Vincent, 2000) not discussed by the physiotherapists in Sudan. It can only be assumed breathing exercises with equipment such as intermittent positive pressure breathing (IPPB) exercises is due to a lack of physiotherapy related respiratory equipment although not explicitly stated as while they reported a lack of equipment in the ICU, the Sudanese physiotherapists did not specifically state which, physiotherapy related respiratory equipment are available or lacking and needs further analysis. In a descriptive study by Alfadil (2017) in ICUs in Khartoum, there was a reported lack of certain practices or techniques such as manual hyperinflation (MH) that was not used by physiotherapists in the ICU and that some equipment such as suction equipment, spirometers and nebulizers was used by physiotherapists in the ICU; while hyperinflation bags, chest support and neuromuscular electrical stimulation (NES), were not used by them but the reasons for these were not explored. Abdo et al. (2013) states that physiotherapists have not been well trained in the area of cardiopulmonary rehabilitation techniques in Sudan and thus these physiotherapists may have a limited number of practical skills in their repertoire for the management of respiratory conditions and could explain the lack of use of certain respiratory or chest physiotherapy techniques.

Christakou et al. (2018) states that physiotherapists play an essential role in preventing and treating complications associated with the respiratory and neuromuscular system. The majority of ICU physiotherapists in Sudan reported on the benefits of their treatments to prevent complications in ICU patients. They noted that their role in the management of ICU patients through the use of positioning, chest physiotherapy techniques and early mobilisation prevent complications such as muscle weakness joints contractures, bed sores, the need for prolonged mechanical ventilation and improved activities of daily living such as bed function and walking. This is in line with evidence that states that early physiotherapy in ICU patient prevents complications due to prolonged bedrest and promotes function and ultimately an improved health related quality of life (Gupte & Swaminathan, 2016; Hanekom et al., 2013, Hanekom et al., 2012; Denehy & Berney 2006).

Physiotherapists in this study were also considered to have a role in early mobilisation and showed awareness of the importance of the benefits of early mobilisation in the prevention of complications in ICU patients. They perceived early mobilisation such as low intensity exercises and walking to be important in improving function and preventing complications of prolonged bedrest. However, since the referral structures and systems in place do not allow for physiotherapists to independently assess and treat ICU patients in ICUs in Khartoum and are reliant on referrals from the doctor, there may be a delay in the first physiotherapy contact post ICU admission. Karachi et al. (2018) states that the time to first physiotherapy contact post ICU admission is dependent on factors such as the availability of physiotherapy services in the ICU over a 24-hour period, the referral system and awareness of early mobilisation protocols. These factors may affect the early mobilisation of ICU patients admitted to ICUs in Khartoum as well and should be further explored in this setting.

Regarding the use of evidence-based protocols, some Sudanese physiotherapists reported having some awareness of using evidence-based protocols in the ICU, while others stated that applying evidence-based protocols is neither easy nor possible in some cases and therefore mostly not used. This variation in practice may be due to the ICU physiotherapists' lack of awareness of evidence-based protocols that exist and knowledge and experience of how to implement these protocols in ICU clinical practice in the real life setting. It has been reported that the implementation of, use and sustainability of evidence-based protocols in practice in the ICU is dependent on the manner (how, where, when and by whom) in which evidence-based protocols are implemented in the ICU setting (Maritz, et al., 2017). The findings of this study therefore indicate a gap in the ICU physiotherapists understanding and implementation of evidence-based protocols in Sudan. A study in Saudi Arabia by Alshehri, Alalawi, Alhasan, and Stokes, (2017) to investigate physiotherapists' behaviour, attitudes, awareness and knowledge about evidence-based protocols, along with barriers that curb the implementation of evidence-based protocols, concluded that the awareness and knowledge among physiotherapists about the use of evidence-based protocols in Saudi Arabia were low and thus support the findings of this study. In Sudan, the lack of use of evidence-based protocols could affect the outcome of ICU patients.

Lastly, another aspect related to the physiotherapists' management of ICU patients in Sudan, is the knowledge and use of ICU-related outcome measures. In this study, the physiotherapists were not aware of appropriate outcome measures that can be used to assess the outcome of their treatments and the patients progress in the ICU. There was a perceived and reported need to improve the knowledge of relevant ICU-related outcome measures in the management of ICU patients from trained experts in ICU physiotherapy. In order for physiotherapists to support their

role in the ICU setting it has been argued that physiotherapists need to provide evidence of their efficacy in ICU patient management and outcomes (Karachi et al., 2018, Hanekom, Faure & Coetzee, 2007). In order to provide such evidence, outcomes besides physiological outcomes are required to show the benefits of physiotherapy care through reduced ICU complications and readmissions due to respiratory and physical related complications.

In conclusion, while Sudanese physiotherapists working in the ICUs are using similar treatment techniques reported in the studies but lack the application of evidence based practices in terms of ICU physiotherapy protocol and guideline implementation together with a lack of use of outcomes to provide evidence of efficacy. In that being said however, the lack of a structured referral system reported by the Sudan physiotherapists may affect how early post-admission the ICU patients receive evidence based care resulting in ICU-related complications that could have been prevented by early physiotherapy intervention that has shown to be effective in the prevention of these complications. Thus, not only evidence-based practices but the importance of the physiotherapist in the care of the ICU patient from the time of admission needs promotion in ICUs in Sudan in order to assist in increasing their much needed presence in these units.

5.4 Training, Professional Status and Scope of Practice

Aspects relating to the training and competence, awareness and autonomy of the profession were seen to affect the professional status and scope of practice of the physiotherapists working in ICUs in Khartoum, Sudan. Most physiotherapists stated that there is a lack of training and workshops for physiotherapists working in the ICUs to improve their skills. Moreover, most of the participants who participated in this study had only bachelor's degrees. Similarly, Alfadil (2017) reported a lack of postgraduate ICU physiotherapists in a survey study done in Sudan. In

South Africa, Lottering and Van Aswegen, (2016) also reported a scarcity of postgraduate physiotherapy training in ICUs. In India and Sri Lanka, most of the physiotherapists had a postgraduate degree in particular master's degrees in Physiotherapy (Sigero et al., 2016; Kumar & Shergill, 2013; Kumar et al., 2007). This indicates a lack of training at all physiotherapy profession levels and a lack of awareness and skills. Therefore, special training programmes are required to improve physiotherapists' skills and knowledge. This programme's training can benefit ICU patients' outcomes and improve the quality of physiotherapist services provided. Training and education may be critical for implementing an evidence-based practice that could improve practitioners' knowledge and skills (Snöljung, 2018; Hanekom, van Aswegen, Plani, & Patman, 2014). Training and education are linked with ICU culture; therefore, it may promote ICU patients' physiotherapy routine role (Fuest & Schaller, 2018). Continuous Professional Development and Training in ICU physiotherapy was also seemingly lacking in Sudan and similarly to South Africa (Lottering & Van Aswegan, 2016) physiotherapy-related ICU training and CPD are needed to improve competence and skills in this area of patient care.

A common thread that was seen through the study was the lack of awareness about the role of the physiotherapists in the management of ICU patients in Khartoum Sudan and how this lack of awareness affected the referral and discharge practices, the availability of physiotherapy services in the ICU as well as their presence and integration in the multidisciplinary team in the ICU setting. The limited referrals for physiotherapy management of ICU patients in Sudan may limit the scope of practice of these physiotherapists thereby limiting job opportunities in this area of healthcare. Similarly, the dependence on the referral of patients from the doctors who already are seemingly minimally aware of the profession and its benefits in effective patient management and outcome also affects the autonomy and thus the professional status of the physiotherapists in

ICUs in Khartoum, Sudan. There is a perceived view that other ICU professionals do not even understand what physiotherapists do in the ICU. Similarly, in South Africa, a study conducted by Ponto et al. (2019) aimed to explore and describe the perception of doctors, nurses, and physiotherapists of the role of the physiotherapist in neonatal intensive care units. The result showed a lack of awareness among medical staff about the physiotherapists' role, lack of formal referral to physiotherapists, and lack of being involved in discharge planning. Also, it showed that the referral system is driven and directed by the ICU doctors. The ICU physiotherapists in Sudan need to establish their identity and promote their skills within the ICU team in order to increase ICU team awareness about their role in the ICU and the benefits in improving patient outcomes and reduced ICU and hospital costs.

The lack of autonomy in the identification of ICU patients for physiotherapeutic care and management contradicts the first-line practitioner status of physiotherapists stated by the National Medical and Allied Health Professions Association for physiotherapy. Awareness and autonomy of ICU physiotherapists seem to be a challenge in many ICUs around the world as the ICU the doctors and ICU nurses are perceived to be mainly in charge of the ICU patients and their care. Therefore, most of the physiotherapists in this study felt that their practice was not autonomous in the management of ICU patients and their professional status low. Similarly, in a study conducted by Karachi et al. (2018) in South Africa, a lack of autonomy of physiotherapists within the ICU team was found. Most of the ICU physiotherapists reported that the ICU physician or doctor mainly directs the patient referral and discharge decisions (Karachi et al., 2018). This lack of practice autonomy may affect the physiotherapists scope of practice especially their role in the management of ICU patients in ICUs in Khartoum, Sudan. Physiotherapists need to find ways to improve the awareness of the profession in the ICUs in

Sudan and thus support their professional status and scope of practice in this area of healthcare and to maintain autonomous practice in the ICU setting.

In summary, this chapter highlights the profile of the physiotherapists working in ICUs in Sudan from both the clinical and academic sector. While the perceptions of physiotherapists working in ICUs in Khartoum, Sudan of their role in ICU patient management are somewhat variable there seems to be a common sense that lack of awareness of the profession in the care of ICU patients impacts their role in ICU patient management and limits their scope of practice and professional status in the ICU. The ICU setting in Sudan and its organisation and structure with regards to the doctor overseeing patient management including allied healthcare requirements, the referral and discharge system and resources available affects the role of the physiotherapist in the management of ICU patients. While some aspects of the role of the physiotherapist in management of the ICU patient in Khartoum, Sudan, are on par with other local settings in Africa and internationally, there are more aspects of their role lacking such as involvement in referral and discharge criteria, multidisciplinary team involvement, use of evidence-based protocols, outcome measures and treatment techniques such as the use of intermittent positive pressure breathing, PEP bottles, cycle ergometry, manual hyperinflation and involvement in weaning and ventilation such as CPAP that was minimally reported on during the interviews and may need additional investigation and exploration.

5.5 Strengths and Limitations

To the researcher's knowledge this is the first study of its kind in Khartoum, Sudan. The new and novel information provided by this study has added valuable information to the limited body of evidence on the physiotherapists who provide care to patients in ICUs in Khartoum Sudan, and

their perceived role in the management of ICU patients. The latter is a major strength of the study. The ability of the researcher to identify the ICUs in Khartoum and the academic and clinical physiotherapists that work in these ICUs and provide this information, which is currently lacking in the literature, is another strength of the study. However, a slight limitation was that the researcher had difficulties in knowing and counting all the ICUs in the public and private hospitals due to a dearth of information regarding the exact number of ICUs in Khartoum, Sudan, and since physiotherapists work on a rotation or on call basis in the ICUs determining the exact number of ICU physiotherapists presented a limitation. The study only included five hospitals (three government/ two private hospitals) in Khartoum that had ICUs and physiotherapists employed in ICU care or service as other hospitals with ICUs did not have physiotherapy services readily available. Some of the physiotherapists that participated in the study worked in both the academic and clinical setting which may be a reason for some differences in the perceived role of the physiotherapists in the management of ICU patients. However, the latter could not be seen as a limitation as the qualitative nature of the study adds to the strength of the findings as the sample size is in line with the methodological evidence for appropriate sample sizes and provides understanding of the ICU physiotherapists roles in the management if ICU patients in Sudan not provided elsewhere. The clear and detailed description of the method and analysis and well as the report on the results allow for reproducibility of the study that may provide similar findings and can be considered a strength of this study. Finally, another limitation is that whether these ICU physiotherapists completed clinical or research masters' degrees was not explored.

5.6 Recommendations

To manage and treat ICU patients, it is crucial that all healthcare professionals, including physiotherapists, have sufficient knowledge and awareness about the role of the management of

critically ill patients. Since physiotherapy is an essential part of the multidisciplinary team managing ICU patients, effective practice is crucial in preventing complications and improving health-related quality of life of ICU survivors. Therefore, based on these findings, the recommendations related to the study are as follows. There is a need for further research regarding the physiotherapists' role in the management of the critically ill patients in ICUs in Sudan. Future research would be useful to support this study and to contribute to the baseline findings of this study. This research should focus on aspects of treatments used, frequency of treatments, factors affecting quality physiotherapy treatment for example equipment, staff resources and competence and training as well as factors influencing the implementation of evidence based practice and outcomes for quality care in these ICUs. The Sudanese physiotherapists' society needs to promote and improve physiotherapy awareness about their role in the management of ICU patients to improve to the globally recommended standards of ICU physiotherapy patient care. ICU medical staff and physiotherapists should strengthen their communication, collaboration, and interaction for improved service delivery and care to ICU patients. The physiotherapists need to work on a framework for ICU patients' referral and discharge criteria in the ICU and increase their presence in the ICU and ICU MDT through advocating for dedicated physiotherapy posts in this setting. The study findings further showed a lack of physiotherapy training programmes regarding physiotherapy management of ICU patients as well as a lack of continuous professional development for evidence based practice in this setting. Therefore, regular and continuous training programmes are recommended to improve the physiotherapists' skills and practice in the ICUs in Sudan. Information on whether the physiotherapists working in the ICU have done clinical or research masters would also be useful and advocating more masters and PhD level research in ICU would also be beneficial for the profession in Sudan. Through the Ministry of Health, the government should establish an

independent physiotherapy department in all government and public hospitals to facilitate the patients' accessibility of physiotherapy services. The Ministry of Education should through the University improve the training resources for Physiotherapy Departments and provide support in the form of funding for the employment of physiotherapists with ICU and cardiopulmonary/respiratory physiotherapy expertise in order to improve competence in this field of medicine and physiotherapy.

CHAPTER SIX: CONCLUSION

Chapter Six presents the conclusion of the research findings. This chapter presents the reader with the way forward and ways in which the findings can be utilised for future research and for future improvements that can be made by the various stakeholders in the higher education and health sector regarding physiotherapy in intensive care units in Sudan.

6.1 Study Conclusion

The aim to explore and describe the physiotherapists' perception of their role in the management of intensive care patients in Khartoum, Sudan, was successfully achieved. The new and novel body of evidence provided can be used by trained and qualified academic and clinical physiotherapists in the country and by the National Medical and Allied Health Professions Association to find ways to promote the profession and improve its professional status in the ICU healthcare setting in Sudan.

The information allows the physiotherapy community in Sudan to benchmark their practices within the ICU setting against other ICU settings locally in Africa and internationally and also against developed and other developing countries. Based on the findings of this study with regard to the challenges with the referral system, decision making in patient discharge, limited equipment and lack of a multidisciplinary team or team communications can be improved through promotion of the physiotherapy profession in the ICU setting and by advocating for improvement in resource availability for assisting effective physiotherapy care.

Academic physiotherapists who train and supervise in the area of intensive care physiotherapy can use the information regarding evidence-based protocols and outcome measures and their implementation to improve on the curriculum regarding these aspects of ICU physiotherapy patient management by providing expert training in these areas of physiotherapy teaching and learning. There is also a need for increased post-graduate training and workshops in the area of intensive care physiotherapy and this need should be addressed. By increasing awareness of the profession in the ICU setting in Sudan, the professional status in ICU including autonomy and scope of practice could improve and benefit physiotherapists who qualify and want to work in this area of healthcare.

Furthermore, in order to provide more detail with regards to aspects covered in this study the researcher recommends more in-depth enquiry into aspects such as treatment techniques and skills or competencies in the ICU setting, evidence-based practice and outcome measures related to ICU patient assessment and lastly finding solutions to improve the referral and discharge procedures as well as the presence and integration of physiotherapists in the multidisciplinary ICU team in ICUs in Sudan. Lastly, the National Medical and Allied Health Professions Association through the Ministry of Health in Sudan should attempt to create posts within the ICUs for physiotherapists as evidence shows that a 24 hour dedicated ICU physiotherapist and early physiotherapy management of the ICU patient improves outcomes and prevents complications and readmissions. This may improve the quality of life of ICU survivors in Sudan.

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ADDENDUM 1: ETHICS APPROVAL

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22 August 2016

Mr A Khalil
Physiotherapy
Faculty of Community and Health Sciences

Ethics Reference Number HS/16/5/35

Project Title: Perceptions of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan.

Approval Period: 29 July 2016 – 29 July 2017

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval. Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

PROVISIONAL REC NUMBER - 130416-049

ADDENDUM 2: INFORMATION SHEET

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Revised: December 2015

INFORMATION SHEET

Project Title: Perceptions of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan.

This is a research project being conducted by Ashraf Khalil Abduni Khalil at the University of the Western Cape. We are inviting you to participate in this research project because you are a physiotherapist working in Khartoum, Sudan. The purpose of this research project is to explore the physiotherapist's perception on their role in the management of intensive care patients in Khartoum, Sudan.

You will be asked to participate in the study by attending an individual face to face interview that will be conducted by the researcher. The place at which the interview will be conducted will be decided upon according to the comfort and ease of accessibility for the you and will be quiet and private. Anonymity will be ensured to all participants throughout the study by using codes or pseudonyms. If we write a report or publish an article on this research project, no names would be mentioned and your identity will be protected.

This research is not designed to help you personally, but the results may help the researcher learn more about the physiotherapist's perception on their role in the management of intensive care patients in Khartoum, Sudan. We hope that, in the future, other people might benefit from this study through improved understanding of the physiotherapist's perception on their role in the management of intensive care patients in Khartoum, Sudan and the improvements made based on the recommendations made based on the findings of this study.

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

This research is being conducted by Ashraf Khalil Abduni Khalil at the University of the Western Cape. If you have any questions about the research study itself, please contact:

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email: ashrafkhalil1984@gmail.com

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

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ADDENDUM 3: CONSENT FORM

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E-mail: mwarner@uwc.ac.za

CONSENT FORM

Title of Research Project: Perceptions of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan.

The study has been described to me in language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

Participant's name……

Participant's signature……

Date……

ADDENDUM 4: INTERVIEW SCHEDULE

Semi-structured Interview Guide

Project Title: Perceptions of physiotherapists on their role in the management of intensive care patients in Khartoum, Sudan.

Section 1: Demographic Questionnaire to complete before interview:

1. Code (in place of name): _____ [the researcher has an electronic list of names with these codes for his own access which is password protected and will be destroyed following completion of the study].

2. Age:_____

3. Gender: _____

4. Workplace:_____

5. Qualification (BSc, MSc, PhD Physiotherapy):_____

6. Occupation (Physiotherapy Clinician or Academic or both)

   _____

7. Area of expertise: _____

8. Years of working experience:

   As clinician:_____

   As Academic:_____

9. Years of experience specifically in:

   ICU teaching/supervision:_____

   ICU clinical work:_____

Section 2: Qualitative Interview

1. What do you think is your role as a physiotherapist in the management of ICU patients?

Probes: your role in the following:

- Involvement in patient management and specifically:
- Positioning of intensive care patients.
- Use of chest physiotherapy for intensive care patients
- Early mobilization of intensive care patients
- Involvement in referral and discharge system of intensive care patients
- Use of outcome measures and evidence based protocols or clinical guidelines in ICU patient care
- Involvement with the rest of the ICU team (doctors, nurses, dietician, etc)

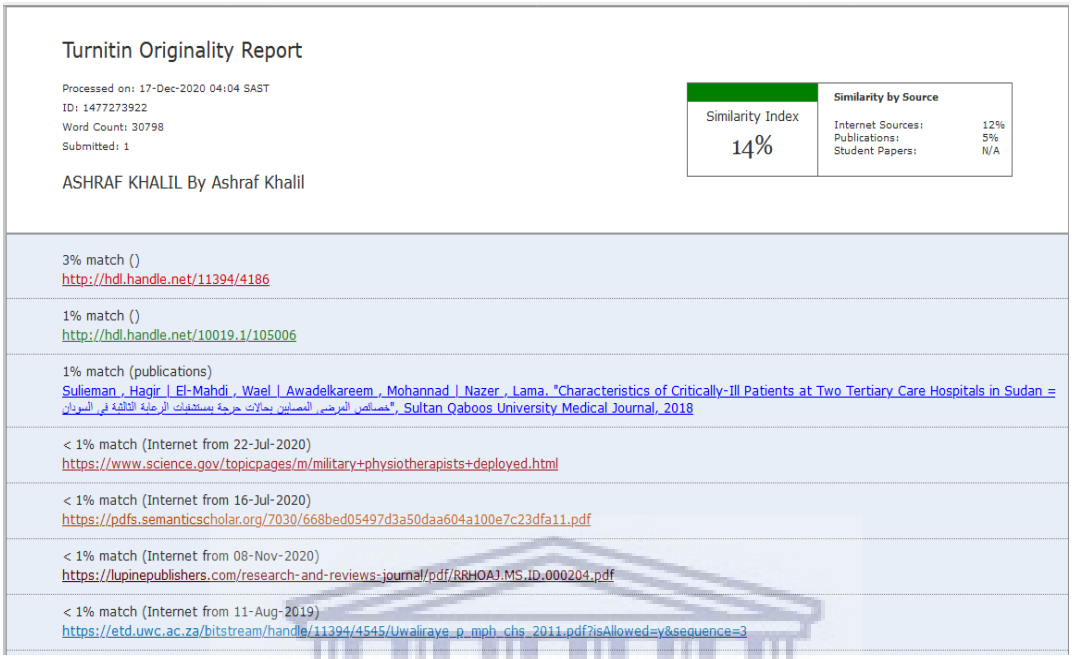
2. What in your perception are the challenges (barriers) and positive factors (facilitators) facing the physiotherapists in their role in the management of patients in the ICU?

Probes:

- Reasons for specific challenges (barriers)
- Reasons for specific positive factors (facilitators)

3. Any other further comments the physiotherapist may want to make in relation to their role in the management of intensive care patients.

ADDENDUM 5: TURNITIN REPORT



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