

**THE OPINIONS OF A MULTIDISCIPLINARY TEAM IN PAEDIATRIC
INTENSIVE CARE UNITS REGARDING WEANING PROTOCOLS
FOR MECHANICAL VENTILATION**

Abbie N. Njolomole

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

Johannesburg, 2015

DECLARATION

I, Abbie Ndiuzayani Njolomole, hereby declare that this research report is as a result of my own work. It is being submitted for the degree of Master of Science (Nursing) at the University of the Witwatersrand, Johannesburg. It has not been submitted anywhere else for candidature for any degree programme or examination at the University.

Signature.....

Date.....

Protocol Number M140532

DEDICATION

Special dedication goes to my husband Mac George and my children for the love and untiring support throughout my studies at the University of the Witwatersrand.

To my late father: You may not have lived to see this but you inspire me all the time.

To all family members: Thank you for everything.

ACKNOWLEDGEMENTS

In everything I thank God.

I would like to express my sincere gratitude to the following people and organisations for their contributions towards the success of this project:

- Malawi Government through the Ministry of Health for the financial support for my Master's Degree programme.
- My research supervisor, Sizakele Khoza, for the support and guidance throughout the entire period of my study.
- Special gratitude goes to Shelley Schmollgruber and Prof. Lize Maree for the encouragement and total commitment for the completion of this study. I say 'thank you.'
- Library staff for their support and direction in helping to get relevant resources for the study.
- The institution where the study was conducted and all relevant personnel who granted the permission to carry out the study.
- All registered nurses and doctors in PICU and CTICU for freely consenting to participate in the study and the valuable inputs made to the success of my study.

ABSTRACT

Background: Despite the empirical evidence of the significance of weaning protocols in Intensive Care Units, variations still exist in the adoption of weaning protocols. Multidisciplinary teams hold the responsibility for the introduction and development of weaning protocols in PICU.

Purpose: To explore and describe the opinions of multidisciplinary teams practicing in the paediatric and cardiothoracic ICU at an academic hospital in Johannesburg concerning weaning protocols from mechanical ventilation.

Design: Qualitative descriptive.

Method: Data was collected from multidisciplinary team comprising of registered nurses (n=8) and doctors (n=2) practicing in PICU and CTICU who were purposively selected using semi-structured interviews to obtain qualitative information on their opinions regarding weaning protocols. Data collected was analysed using a Braun and Clarke method of qualitative thematic analysis. Seven categories were identified in which three themes, which provided the fundamental structure of the findings for the discussion, emerged and included the following:

- Unstructured weaning – the current practice.
- Recognition of the need for weaning protocols.
- Being not in favour of weaning.

Results: The majority of the multidisciplinary team members recognise the need to develop weaning protocols in PICU for standardisation of practice. Currently there are no weaning protocols and a multidisciplinary approach was identified as an important strategy to develop the protocols. However, nurses practicing in PICU are not trained in Critical Care nursing which poses a challenge to the practice.

Conclusion

This study indicates that there is need for the development of weaning protocols in PICU. Although nurses are weaning patients in PICU, there are no standardised

weaning protocols to guide the practice. The study therefore suggests the need to develop weaning protocols through multidisciplinary approach and training of nurses in critical care nursing to improve knowledge base and skills.

Keywords: Mechanical ventilation, weaning, protocols, paediatric patients, opinions/perception and multidisciplinary team.

TABLE OF CONTENTS

	PAGE
DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
CHAPTER 1: OVERVIEW OF THE STUDY	
1.0 INTRODUCTION	1
1.1 BACKGROUND OF THE STUDY	2
1.2 PROBLEM STATEMENT	5
1.3 RESEARCH QUESTION	6
1.4 PURPOSE OF THE STUDY	6
1.5 SIGNIFICANCE TO NURSING PRACTICE	6
1.6 THEORETICAL FOUNDATION OF THE STUDY	7
1.7 DEFINITION OF TERMS	12
1.8 OVERVIEW OF THE RESEARCH METHODOLOGY	14
1.9 PLAN OF THE RESEARCH ACTION	15
1.10 SUMMARY	15
CHAPTER 2: LITERATURE REVIEW	
2.1 INTRODUCTION	16
2.2 THEORETICAL FOUNDATION OF THE STUDY	17
2.3 OVERVIEW OF MECHANICAL VENTILATION	18
2.4 DEFINITION OF WEANING	20
2.5 WEANING PROCESS	21

2.5.1	Criteria to assess readiness to wean	22
2.6	MODE OF WEANING	24
2.6.1	Spontaneous Breathing Trial	24
2.6.2	Techniques of Spontaneous breathing trials	25
2.6.2.1	Pressure Support Ventilation	25
2.6.2.2	Synchronised Intermittent Mechanical Ventilation	26
2.7	WEANING FAILURE	26
2.8	EXCUBATION	27
2.9	USE OF WEANING PROTOCOLS IN WEANING	27
2.10	ROLE OF NURSES IN WEANING	29
2.11	SUMMARY	30

CHAPTER 3: RESEARCH DESIGN AND METHODS

3.1	INTRODUCTION	31
3.2	RESEARCH DESIGN	31
3.3	RESEARCH SETTING	33
3.4	POPULATION	33
3.5	SAMPLING AND SAMPLE SIZE	33
3.6	DATA COLLECTION	35
3.6.1	Instrument	35
3.6.2	Procedure	36
3.7	PILOT STUDY	37
3.8	DATA ANALYSIS	38
3.9	MEASURES OF TRUSTWORTHINESS	41
3.10	ETHICAL CONSIDERATIONS	43
3.11	SUMMARY	45

CHAPTER 4: FINDINGS

4.1	INTRODUCTION	46
4.2	PARTICIPANT'S DEMOGRAPHY	46
4.3	EMERGENT THEMES	48
4.3.1	Unstructured weaning – the current practice	49

4.3.2	Recognising the need for weaning	53
4.3.3	Not being in favour of weaning protocols	59
4.4	SUMMARY	65

CHAPTER 5: DISCUSSION, LIMITATIONS AND RECOMMENDATIONS

5.1	INTRODUCTION	66
5.2	DISCUSSION OF FINDINGS	66
5.3	APPLICATION OF THEORY TO THE FINDINGS	73
5.4	SUMMARY OF THE STUDY	74
5.5	LIMITATIONS	75
5.6	RECOMMENDATIONS	75
5.7	CONCLUSION	77

REFERENCES	79
-------------------	-----------

APPENDICES

Appendix A:	Interview Guide	89
Appendix B:	Participant Consent Form	90
Appendix C:	Participants' Demographic Data	90
Appendix D:	Example of a Verbatim Transcript	91
Appendix E:	Example of Coded Statements, categories and theme	96
Appendix F:	Approval of Post Graduate Committee	101
Appendix G:	Ethics Clearance Certificate	102
Appendix H:	Request for permission to conduct research at the hospital	103
Appendix I:	Approval from the hospital	105
Appendix J:	Participant Information Sheet	106
Appendix K:	Language editing and proofing	107

LIST OF TABLES

Table	Page
2.1 Classification of patients in weaning process	19
4.1 Participant characteristics	44

LIST OF FIGURES

Figure		Page
1.1	Diagram of the AACN Synergy Model of Patient Care	9

LIST OF ABBREVIATIONS

AACN	American Association of Critical Care Nurse
ABG	Arterial Blood Gas
CINAHL	Cumulative Index to Nursing and Allied Literature
CPAP	Continuous Positive Airway Pressure
CTICU	Cardiothoracic Intensive Care Unit
EF	Extubation Failure
FiO ₂ ,	Fraction of Inspired Oxygen
HCO ₃	Bicarbonate
HDU	High dependency Unit
ICU	Intensive Care Unit
NICU	Neonatal Intensive Care Unit
MV	Mechanical Ventilation
PaCO ₂	Partial pressure of carbon dioxide
PaO ₂	Partial pressure of oxygen
PEEP	Positive end expiratory pressure
PICU	Paediatric Intensive Care Unit
PSV	Pressure Support Ventilation
SANC	South African Nursing Council
SBT	Spontaneous Breathing Trial
SIMV	Synchronised Intermittent Mechanical Ventilation
UK	United Kingdom

USA	United States of America
-----	--------------------------

CHAPTER ONE

OVERVIEW OF THE STUDY

1.0 INTRODUCTION

The provision of safe and error-free care in clinical practice is a priority of all health care professionals. However, there are variations in the way health professionals provide care to patients because of their different roles and responsibilities over the patient. This necessitates the need to have guidelines and protocols for clinical practice. Protocols are advocated as a method of standardising clinical practice and providing nurses with increased autonomy and accountability (Rose, Nelson, Johnston and Presneill, 2007). This supports increased implementation of weaning protocols to facilitate weaning patients from mechanical ventilation. However, despite being supported by much literature, variation still exists in the adoption of weaning protocols for mechanical ventilation in paediatric care.

This chapter provides an overview of the study which comprises the background, problem statement, purpose, research questions, objectives and significance of the study and the research paradigm. Included is also an overview of the research methods and design, trustworthiness of the study and ethical considerations.

The study sought to investigate the multidisciplinary team's opinions concerning use of weaning protocols for paediatric patients on ventilator support to improve patient outcome. The findings may lead to identifying factors which may facilitate the adoption of weaning protocols in ICUs as recommended by previous empirical evidence. Consequently the paediatric ICU patients will be provided with safe and timely nursing care thereby improving their outcome.

1.1 BACKGROUND

Mechanical ventilation is an essential medical intervention in the treatment of critically ill paediatric patients with a severely compromised airway in Intensive Care. The physiological structure of the airway in this patient population increases need for mechanical ventilatory support with minimal adverse effects to ensure full recovery and continued growth and development of the child.

Ninety percent (90%) of paediatric patients admitted into Intensive Care Units (ICUs) require invasive mechanical ventilatory support as part of their health care (Boles, Bion, Connors, Herrigde, Marsh, Melot, Pearl, Silverman, Stanchina, Vieillard-Baron and Welte, 2007). The aim of this intervention is to maintain a patent airway, ensure gaseous exchange and respiration for cell repair with minimal adverse effects. Weaning from mechanical ventilation is an essential and universal element in the care of critically ill intubated patients on ventilatory support. Crocker (2009) defines weaning from mechanical ventilation as “the gradual reduction of respiratory support to the point when the patient no longer requires assistance or has reached maximum potential and further reduction of respiratory support is neither feasible nor realistic.” Failure to wean patients off mechanical ventilation has been shown to result in poor patient outcomes such as prolonged hospitalisation, increased morbidity and mortality due to ventilator associated nosocomial infections (Monteverde, Fernandez, Poterala, Vidal, Serrate, Castelani, Albano, Podesta and Farias, 2011). Complications of prolonged ventilation specific to paediatric population include broncho pulmonary dysplasia, retinopathy of prematurity, trauma to vocal cords, subglottis stenosis, lung collapse and impaired bonding with parents (Rivera and Tibballs, 1992).

Historically, the weaning of patients from mechanical ventilation was the responsibility of the doctors based on their formal knowledge and clinical experience. However, with health care setting dynamics, nurses have increasingly been taking active part in this intervention. The recognition of the role nurses play in weaning patients off mechanical ventilation and the desire to reduce the period patients depend on ventilatory support led, to the introduction of nurse managed weaning guided by standardised protocols in Intensive Care Units (Rose et al.,

2007; Blackwood and Wilson-Barnett, 2007; Crocker, 2009). Mechanical ventilator weaning protocols define the necessary criteria for weaning and extubating patients within the ICU (Blackwood, Wilson-Barnett and Trinder, 2004). Protocols provide standardised approach of weaning which aims at reducing variation in practice, thereby improving weaning outcomes. Moreover, the implementation of protocols in healthcare is considered to be proof of the application and support of evidence based clinical practice; an effort to decrease the theory – practice gap to ensure delivery of consistent quality care. More importantly, protocols provide the means for continuous education in practice and are an important tool to orientate novice clinicians.

Weaning protocols by nurses are increasingly being used in the ICUs to facilitate weaning patients from mechanical ventilation (Rose, Blackwood, Egerod, Haugdahl, Holhuis, Isfort, Kydonaki, Schubert, Sperlinga, Spronk, Storli, McAuley and Schultz, 2011b) as opposed to doctor-led weaning. Several studies indicate that protocol-directed weaning reduces duration of mechanical ventilation, weaning time and length of stay in ICU without an increased rate of complications (Crocker, 2002; Rushforth, 2005; Taylor, 2006; Rose and Nelson, 2006; Blackwood, Junk, Lyons, McAuley and Rose, 2013). Although there is no absolute limit, weaning from mechanical ventilation is guided by the assessment of patient's readiness to wean against certain criteria based on clinical parameters (Anderson and O'Brien, 1995; Taylor, 2006). Ever present at the patient's bedside, nurses are able to assess physiological indicators of readiness, titrate ventilation and monitor responses to ventilator adjustments. As such, nurses are able to facilitate early weaning and avoid unnecessary prolonged mechanical ventilation which is associated with adverse clinical outcomes and psychological experiences for critically ill patients (Anderson & O'Brien, 1995). In a study by Hansen and Severinsson (2007), nurses also perceived protocols as useful because it represented inter-professional agreement which allowed them to practice within safe limits and provided a feeling of autonomy.

Weaning from mechanical ventilation is a complex process, with outcomes which are often due to the coordinated efforts of a skilled, multidisciplinary team (Hansen and Severinsson, 2009). Ideally, doctors and nurses collaborate actively in the

decision making and management of ventilation and weaning (Rose, Blackwood & Egerods et al., 2011b; Blackwood, Junk & Lyons et al., 2013). Expertise through inter-professional roles and responsibilities, evidence-based knowledge, planning and communication skills are important factors when aiming to achieve patient safety and decrease weaning delays (Rose, Blackwood and Egerods et al., 2011b). The respective roles played by medical and nursing staff in working with patients, points to the continued importance of close collaboration in the weaning process. White, Currey and Botti (2011) also support the use of multidisciplinary team developed and weaning protocols to reduce duration of mechanical ventilation. Consequently, a collaborative process between nurses and physicians in the development of weaning protocols and implementation of weaning process is very important as it improves patient outcome.

However, protocolled weaning by nurses has been viewed differently by some nurses and physicians. In a study of consultant physicians' perceptions of protocol directed weaning (Rose, Blackwood, Burns, Fraiser and Egerod, 2011a), physicians expressed rigidity over relinquishing their control of the weaning process to nurses due to the complexity of patients' condition and variability in nursing experience as this affects the implementation and efficacy of weaning. Hansen and Severinsson (2009) agree that nurses have a difficult role in weaning due to the mix of skills within the profession and between the professional categories. Less experienced and skilled staff are considered a threat to weaning practice and cannot be trusted with the use of protocols. It has been further argued by both nurses and physicians that the introduction and use of weaning protocols restricts clinical practice and autonomy as it limits analytical thinking and highlights failure to facilitate individualised care (Eckerblada, Erikssona, Kärnera and Edéll-Gustafssonb, 2009; Crooker, 2009). According to Lavelle and Dowling (2011), protocol rigidity may also limit nurses' role as weaning is considered to be a process requiring sound clinical judgement and a solid evidence base for decisions.

These differing views on the implementation of protocols to standardise care have extensive empirical evidence as being support which influences care. The South

African Neonatal and Paediatric Intensive Care clinical setting has its unique challenges in that evidence based practice is in its infancy. Furthermore, the collection, dissemination, application and evaluation of best practice is not well documented. In some areas of clinical practice there are no multidisciplinary written protocols or guidelines to inform practice. A professional nurse, practicing in Paediatric Intensive Care, is guided by the Scope of Practice (R2598) which broadly states that the nurse's role in maintaining oxygenation in patients is "the supervision over and maintenance of a supply of oxygen." Scribante, Muller and Lipman (1995) propose that in the Intensive Care setting this role expands to include: "in-depth knowledge of the various types of ventilators and modes of ventilation used in her specific unit and skills to use the ventilator, continuous assessment and monitoring of patient response to ventilation, the performance of physiotherapy and bronchial toilet and maintenance of cardiac output to ensure oxygen supply to tissues." The nurse is able to fulfil her legal role of weaning the patient from mechanical ventilation in collaboration with other members of the multidisciplinary team.

As a result there is need to begin the enquiry on weaning from mechanical ventilation in paediatrics by establishing the opinions of those members of the multidisciplinary team who are actively involved in paediatric care regarding protocolled weaning.

1.2 PROBLEM STATEMENT

Empirical evidence indicates that protocolled weaning is being practiced by nurses in many ICU settings in developed countries to facilitate weaning patients from mechanical ventilation. However, there are wide variations in the adoption of weaning protocols in individual Intensive Care settings (Rose, Blackwood, Burns, Frazer and Egerod, 2013). Anecdotal evidence suggests that in Neonatal and Paediatric Intensive Care Units nurses are actively weaning patients from mechanical ventilation, yet there are no standardised weaning protocols to guide the practice and controversy arises as to whether it is appropriate to develop and use these protocols. Weaning without standardised protocols in Paediatric intensive care unit (PICU) can result into inconsistent practice and compromised

quality of care in paediatric patients (Rushforth, 2005). In addition, the lack of empirical evidence describing nursing practice, with regard to weaning of patients from mechanical ventilation in this setting, alludes to a gap in knowledge (Scribante, Muller and Lipman, 1995). This study therefore proposes to find out the opinions of multidisciplinary team members, practicing in Paediatric and Cardiothoracic ICUs at an academic hospital in Johannesburg, regarding weaning protocols, as such tools are not available.

1.3 RESEARCH QUESTION

What are the opinions of multidisciplinary team members practicing in the Paediatric and Cardiothoracic ICU an academic hospital in Johannesburg regarding weaning protocols for mechanical ventilation?

1.4 PURPOSE AND OBJECTIVES

The purpose of this study was to explore and describe the opinions of multidisciplinary team members, practicing in the Paediatric and Cardiothoracic ICUs at an academic hospital in Johannesburg, regarding weaning protocols from mechanical ventilation.

The objectives were:

- To establish opinions of multidisciplinary team members on the need to develop and use weaning protocols and who can participate in developing such protocols.
- To describe the opinions of multidisciplinary team members in ICU regarding protocolled weaning by nurses.
- To identify components to be included in the weaning protocols.

1.5 SIGNIFICANCE FOR NURSING PRACTICE

Developing and using mechanical ventilator weaning protocols will help nurses to autonomously participate in this clinical intervention and be the initial step required

in establishing and maintaining safe, consistent nursing care according to quality standards. Being autonomous and guided by the weaning protocol will prompt nurses to make timely decisions in weaning the paediatric patient and thereby reducing the ventilatory period (Gelsthorpe and Crocker, 2004). This will be cost effective for the PICU as it will decrease the length of stay and improve paediatric patient care and outcome. The findings from the study would be essential in providing empirical evidence to inform development of ventilator weaning protocols in Neonatal and Paediatric Intensive Care.

1.6 THEORETICAL FOUNDATION OF THE STUDY

A theory is “an integrated set of defined concepts and relational statements that presents a view of phenomenon and can be used to describe, explain, predict or control the phenomenon” (Burns and Grove 2011: 228). According to Polit and Beck (2012:12), assumptions are basic principles believed to be true without proof or verification. The meta-theoretical assumptions in nursing reflect interrelated central concepts of the discipline of nursing which include the person, environment, health and nursing. In this study, the meta-theoretical assumption will be guided by the following theory:

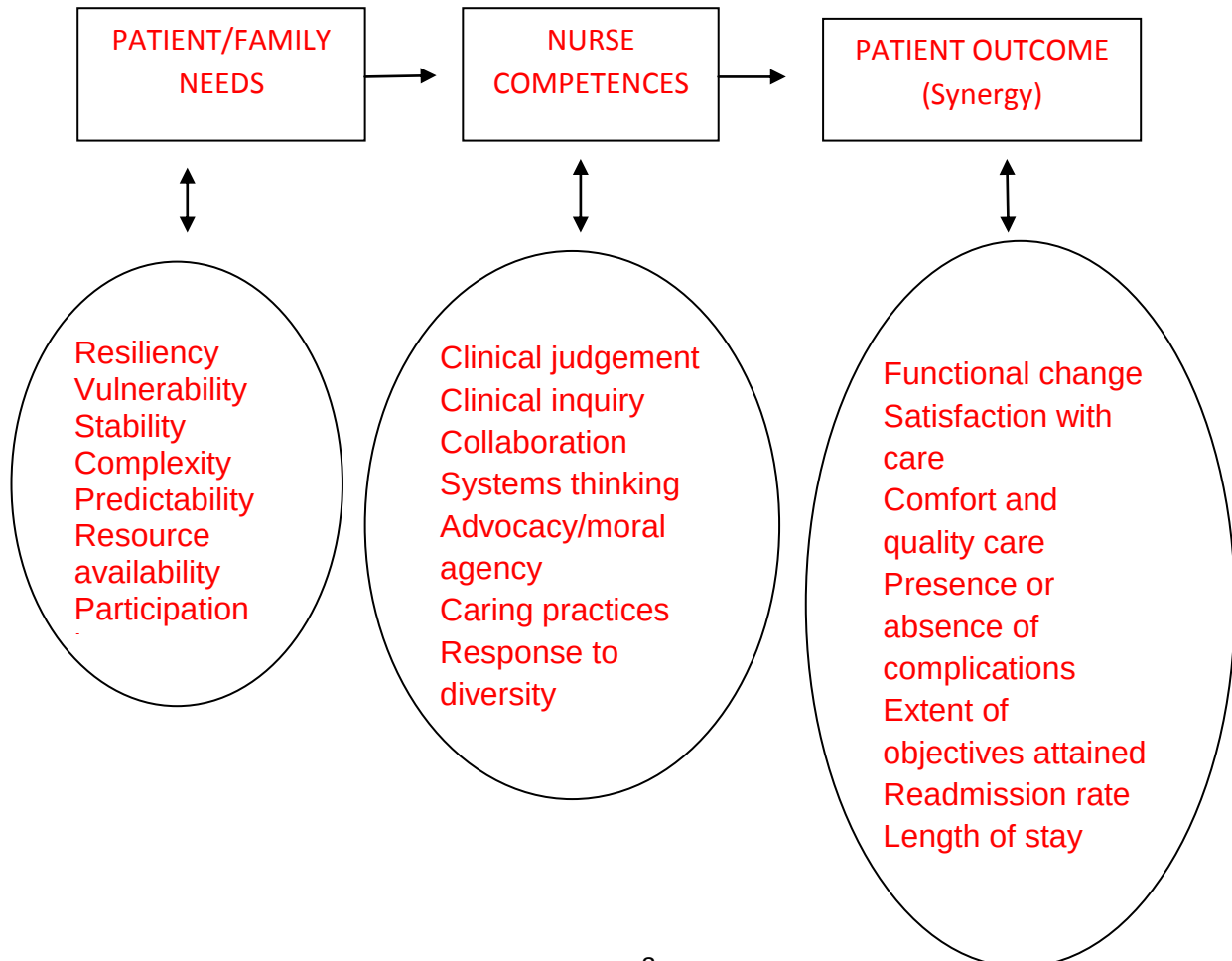
THE AMERICAN ASSOCIATION OF CRITICAL CARE NURSES (AACN) SYNERGY MODEL OF PATIENT CARE

Morton, Fontaine, Hudak and Gallo (2005:4) define synergy as “an evolving phenomenon that occurs when individuals work together in mutually enhancing ways towards a common goal.” This is a patient centred model which focuses on designing nursing practice competencies to care for critically ill patients with the goal of optimising outcomes for patients and families by matching the characteristics of the patient with the competencies of the nurse. The patient characteristics as identified by the American Association of Critical Care Nurses (AACN) synergy model are resilience, vulnerability, stability, complexity, resource availability, participation in care, participation in decision making and predictability, whilst nurse competences include clinical judgement, advocacy/moral agency, caring practices, collaboration, systems thinking, response to diversity, clinical

inquiry or innovator/evaluator and facilitator of learning (Morton et al., 2005:4). Nursing practice is based on these needs and characteristics of the patient which are of concern to the nurse and the competences of the nurses which are important to the patient. According to Swickard, Swickard, Reimer, Lindell and Winkelman (2014), synergy results when the needs and characteristics of a patient, clinical unit or system are matched with a nurse's competencies.

The model also describes three levels of outcome: optimal outcomes derived from the patient includes functional change, satisfaction, comfort and quality care; nurse derived outcomes are physiological changes, presence or absence of complications and the extent to which objectives were attained; outcomes from health care system include re-admission rate, length of stay and cost utilisation (Swickard et al; 2014). The model's main idea is matching nurses' competencies with patient's characteristics to optimise patient outcomes

Figure 1.1 Diagram of the AACN Synergy Model of Patient Care



Patient/family characteristics drive nurse competences to achieve optimal patient outcome.

The central theoretical statement of this study is that collaboration and systems thinking in a team can lead to transition from traditional professional role-based practice to a contemporary multisystem practice. Cohen, Crego, Cumin & Smyth (2002), state that systems thinking and collaboration amongst team members facilitates standardisation of policies and procedures in an organisation. The paediatric nurse, as a member of the multidisciplinary team, plays an important role in caring for the critically ill patient in the Paediatric Intensive Care Unit (PICU) and is better placed to influence patient outcome. Based on the competences inherent in the nursing profession such as knowledge, skill, experience and attitudes needed to meet the needs of patient and families (Hardin and Kaplow, 2005:6), PICU nurses should be able collaborate with other members and influence introduction of weaning protocols with better outcomes for the patient and changes across the unit. Utilisation of evidence based weaning protocols will enable PICU nurses to autonomously and timely wean the patient. This will help to prevent complications which can develop from prolonged mechanical ventilation as a result of delayed weaning by physicians on patients who otherwise would have been weaned off the ventilator, thereby ensuring safety of the patient and optimising patient outcome. The following are the meta-theoretical concepts based in this study as defined by the synergy model:

- **The person**

The person viewed as the patient is a biological, social and spiritual entity who is present at a particular developmental stage (Alspach, 2006:4). The critically ill infants and children in ICU are vulnerable as they are growing, but also sick. They are unable to communicate their needs because of their condition, age and interventions, such as mechanical ventilation, which can compromise the child's comfort, feeding and mobility (Blackwood, Murray, Chisakuta, Cardwell and O'Halloran, 2013). These children are at risk of developing long term complications as a result of prolonged exposure to mechanical ventilation due to different role responsibilities of multidisciplinary team members in ICU. It is

therefore the responsibility of the PICU nurse to collaborate with other team members and advocate for the introduction and use of the evidence based weaning protocols in PICU. Such changes will help to improve the weaning practice and optimise patient outcome.

- **Environment**

The environment comprises all the internal and external surroundings of the person and has an influence on the wellbeing of that person (Berman and Snyder, 2012:41). The nurse creates the environment for the care of the patient through her practice. With the ever changing health care system, nursing practice is also evolving with the consequent need to base nursing care on evidence rather than on tradition (Flynn and Sinclair, 2005). Evidence based practice is defined as the use of best clinical evidence from systematic research in making patient care decisions (Morton et al., 2005:4). In this case the environment is the PICU and Cardiothoracic Intensive Care Units (CTICU), where the settings and nursing practice have evolved to respond to empirical studies which advocate use of guidelines to inform practice thereby improving patient outcome. Achievement of quality care and improved patient outcome is attributed to the nurses' ability to use body of knowledge, information from experience and evidence based practice in their practice environment (Morton et al, 2005:5). As such, the Paediatric ICU nurse can manipulate the ICU setting through collaboration to provide care that is responsive and relevant to the needs of the patient using evidence based weaning protocols on mechanically ventilated patients to reduce weaning time and improve outcome.

- **Health**

Hardin and Kaplow, 2005:4, state that health is an optimal level of wellness as defined by the patient. A patient has needs and experiences which progress along the continuum from capacity for health to vulnerability to illness. At every stage of the continuum, goals needs to be set to identify and address the needs and experiences of the patient so that functional change, satisfaction and comfort is

achieved as evidence of optimal health (Morton et al, 2005:6). To ensure quality care and improved patient outcome of critically ill patients in Paediatric ICU, nurses must advocate for the use of evidence based weaning protocols for mechanical ventilation so that they can timely meet the needs of the patient and prevent complications resulting from prolonged mechanical ventilation.

- **Nursing**

The purpose of nursing is to meet the needs of patients and families and to provide safe passage through the health care system during the time of crisis (Alspach, 2006:4). To ensure the needs of the critically ill paediatric patients are met, clinical inquiry and judgement in the care provided is required. Clinical judgement includes critical thinking and nursing skills acquired from education and experience (Cohen et al; 2002). In addition to knowledge and experience, this competency occurs when assessment of the patient is focused on compliance with patient-driven protocols as evidence based guidelines. Nurses should always question and evaluate current practice to establish its relevancy to patient care and be able to practice changes through the clinical reasoning and use of evidence based guidelines to inform practice (White and Dudley-Brown, 2012). With their close proximity to patients and central position in the multidisciplinary team, PICU nurses are better positioned to develop a collaborative relationship with other team members and advocate for change and better weaning practices in unstructured environments of PICU (Swickard et al; 2014). Complications arising from prolonged use of mechanical ventilation can be avoided with the adoption of evidence based weaning protocols to reduce length of ventilation and weaning time, thereby meeting the patients' needs and optimise patient outcome.

The PICU nurses have the capacity to change the current practice and provide care that is relevant to the needs of the patient, thereby improving patient outcome. Through effort and collaboration with other multidisciplinary team members in ICU, patient outcome can improve with the use of evidence based weaning protocols. These protocols are used to assist nurses in weaning patients

from mechanical ventilation globally and in this study, South Africa can assess the feasibility of using the weaning protocols in its context.

1.7 DEFINITION OF TERMS

- **Multidisciplinary Team**

Health care team composed of members of the medical and allied professionals. In this study it comprises nurses, doctors and physiotherapists (White, Currey and Botti, 2011).

- **Professional Nurse**

In this study a professional nurse is a person registered by the South African Nurses Council (SANC) as a registered general nurse. It may also refer to a registered nurse who has undergone an accredited course in critical care nursing, neonatal nursing and paediatric nursing and registered in that capacity by SANC (Scope of practice: R2598).

- **Paediatric Intensive Care Unit**

This is a special area or department of the hospital which provides Intensive Care nursing and medical care to severely ill or injured paediatric patients (Wikipedia, the Free Encyclopedia). In this study, it includes the Paediatric and Cardiothoracic ICUs of a University affiliated public sector hospital.

- **Paediatric Patients**

Paediatric patients are infants, children and adolescents who have any type of condition which may affect normal growth and development (Kliegman, Behrman, Jenson and Stanton, 2007:1)

- **Mechanical ventilation**

A mode of assisted or controlled ventilation using mechanical devices, that cycle automatically, to generate airway pressure to deliver air to the lungs in a patient whose own ventilatory abilities are diminished or lost (The Free Dictionary by Farlex, 2012).

- **Weaning protocol**

A standard guideline used with criterion to wean patients from mechanical ventilation. It is a support tool, derived from best practices, to reduce practice variation and instill evidence-based practice into clinical care (Haas and Loik, 2012).

- **Opinions**

An opinion is a judgment or statement about matters commonly considered to be subjective. It is based on that which is less than absolutely certain as the result of emotion or interpretation of facts. In this context, it means personal beliefs or views that participants hold towards weaning protocols.

1.8 OVERVIEW OF RESEARCH METHODS

The research method refers to “the blueprint that guides the study to have control over factors that could interfere with the desired outcome” (Burns and Grove, 2009). A qualitative exploratory and descriptive design was utilised to achieve the objectives of the study. The study participants were doctors and professional nurses affiliated to PICUs and CTICUs which admit approximately 320 patients a month at a university affiliated public sector hospital in Johannesburg.

- **Ethical consideration**

Ethical clearance and permission to conduct the study was sought from the relevant University Research Committees and the hospital. Participation in the study was voluntary and participants were free to withdraw at any point in time.

After permission was granted by the hospital and ICU managers, consent was obtained from the multidisciplinary team members who agreed to participate in the study. Data was collected using a semi-structured question guide through in-depth semi-structured interviews. Qualitative thematic analysis was used to analyse the results of the study.

Concepts of credibility, reliability, dependability and confirmability were used to maintain trustworthiness of the study. Accuracy of the study was enhanced by ensuring the principal researcher was the sole collector of data, with an enquiry audit conducted by the supervisor, the sample size was achieved purposively and data was verified by participants through member checking. An audit trail was done by experienced researchers to ensure the truth of the findings.

1.9 PLAN OF THE RESEARCH ACTION

The study will be presented as follows:

Chapter 1 – Overview of the research study

Chapter 2 – Literature review

Chapter 3 – Research design and research methods

Chapter 4 – Findings

Chapter 5 – Discussion of findings, conclusion and recommendations

1.10 SUMMARY

This chapter gave an overview of the study. Firstly the background was described followed by the problem statement, the research questions, the purpose of the study, the objectives and operational definitions and a discussion of the researcher's assumptions. An overview of the methodology, measures of trustworthiness, ethical considerations and finally, the plan of the research action have been outlined.

The following chapters will include an in-depth description of the literature review in relation to the title of the study, the research design and methods, presentation of the findings described in detail and finally the summary, discussion of results, conclusion and recommendation will be outlined.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In Chapter One, an overview for the study was provided to give a background of the study. A brief orientation to the problem statement, as well as the research methods used in the study, was also provided. This chapter critically summarises the available literature from different perspectives which gave context to this research study and advised of the need to develop and use guidelines for weaning paediatric patients from ventilator and respiratory support. In order to provide an understanding and comprehension of the subject field, the researcher sought to describe the theoretical foundation underpinning the study and overview of the mechanical ventilation. A discussion on the definition of weaning, weaning process, use of ventilator weaning protocols in Paediatric Intensive Care and the role of the nurse in weaning is also presented.

Review of literature is a key step in the research process. Broadly, a literature review can be defined as “an objective, thorough summary and critical analysis of the relevant available research and non-research literature on the topic being studied” (Cronin, Ryan and Coughlan, 2008). It serves to build a logical framework for the study and set it within a tradition of enquiry and a context of related studies. De Vos, Strydom, Fouche and Depolt (2011:134) purport that a literature review helps the researcher to be familiar with the existing body of knowledge relating to the topic under study.

The University of the Witwatersrand Academic Library search engines, electronic databases of Cumulative Index to Nursing and Allied Health Literature (CINAHL), EBSCO and PubMed were used to source published articles from nursing and medical journals concerning the topic under research. Google scholar and published textbooks were also used to search for articles and information which support literature on weaning from mechanical ventilation. The literature review

began with a search of key terms related to the research topic which included mechanical ventilation, weaning, protocols, paediatric patients, opinions/perception and multidisciplinary team. Titles and abstracts of the resulting citations were then screened and full papers of those relevant to the review topic were retrieved.

2.2 THEORETICAL FOUNDATION OF THE STUDY

As explained in Chapter One, the theoretical foundation supporting this study is the AACN Synergy Model of patient care. The model was developed by the American Association of Critical Care Nurses in the early 1990s to challenge the practice where certification was awarded on the basis of hours worked in critical care setting and number and tasks performed (Hardin and Kaplow, 2005). The AACN believed certified practice is more than series of tasks and should be grounded in nursing meeting the needs of the patient and influencing optimal outcome. Thus the basis for developing this model was: to optimise patient outcome results from the synergy of nurses' competences matching the needs of the patients and their families. According to Hardin and Kaplow (2005), the AACN model draws from Virginia Henderson's definition of nursing which states: "The unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health or recovery (or to peaceful death) that would he would perform unaided if he had the necessary strength, will or knowledge."

The model was introduced as a way of linking certified practice to patient outcome. It describes the nurses' practice on the basis of patient outcome and demand of the health care system. Patients' characteristics drive the nurses' competencies, and when the characteristics of a patient and the competencies of a nurse match and synergise, patients' outcomes are optimised (Swickard et al., 2014). The patients' characteristics include resiliency, vulnerability, stability, complexity, resource availability, participation in care, participation in decision making and predictability. To meet these needs, the nurse should have competences which match the characteristics of the patient to optimise outcome. The AACN describes such competences as clinical judgement, advocacy or moral agency, caring

practices, collaboration, systems thinking, response to diversity, clinical enquiry or innovator/evaluator and facilitator of learning (Alspach, 2006:7). Each patient characteristic is critical in the competency required of the nurse. The model thus emphasises the importance of the nurse having competences relevant to the needs of the patient. Although the model was developed as a conceptual framework for specialty certification, it has evolved into a widely applicable framework for nursing practice as well as research. The synergy model has also been used to describe change from traditional professional practice to contemporary multisystem practice, with emphasis on the ability to communicate and collaborate with each other to influence the practice of nurses with better outcome for patients and the system (Cohen et al., 2002).

In this study, the AACN model was used to facilitate change through collaboration and team approach as part of systems thinking. The changes in the health care system has reshaped the traditional roles of the nurse in Critical Care Units and nurses in PICU are expected to expand their roles. The introduction of evidence based weaning protocols provides an avenue to support these roles. The nurse, as a key member of the multidisciplinary team in PICU, should communicate and collaborate with other members to influence change and optimise patient care. According to Cohen et al. (2002), collaboration, the ability to work with others to achieve a common goal, is essential for a multidisciplinary team to bring change and improvements to complex systems. Through collaboration, nurses and doctors in PICU can facilitate change and introduce weaning protocols to guide weaning practice and enhance positive outcomes for the patient. Cohen et al., (2002), state that PICU is a complex environment which requires multidisciplinary approach through systems thinking. Systems thinking through team approach and collaboration are key competencies that would enhance standardisation of weaning practices through the introduction of weaning protocols in PICU, thereby improving critically ill patient outcomes.

2.3 OVERVIEW OF MECHANICAL VENTILATION

Before weaning can be discussed it is important the process of mechanical ventilation be reviewed to provide better understanding. As mechanical ventilation

is not the primary topic of the research study, only a brief summary of the most important aspects will be covered.

Mechanical ventilation (MV) is the major life-support modality during respiratory failure (Eskandar and Apostolakos, 2007; Roh, Synn, Lim, Suh, Hon, Huh and Koh, 2012; Chao and Scheinhorn, 1998). It is most often used as a short term measure during general anaesthesia, or during a period of critical illness in the setting of the Intensive Care Unit. Mechanical ventilation is required when the respiratory drive or gaseous exchange is incapable of initiating ventilatory activity, either because of disease processes or drugs (MacIntyre, Cook, Ely, Epstein, Fink, Heffner, Hess, Hubmayer and Scheinhorn, 2001). According to Valenzuela, Araneda and Cruces (2014), the goal of mechanical ventilation is to maintain adequate alveolar ventilation and effective gas exchange in critically ill patients until the underlying cause of the respiratory failure is improved or resolved. The indications for mechanical ventilation are diverse, but it is usually a life-saving measure when a patient's spontaneous ventilation is inadequate to sustain life (Newth, Venkataraman, Meert, Harrison, Dean, Pollack, Zimmerman, Anand, Carcillo and Nicholson, 2009). In children, the most common indication for intubation and mechanical ventilator support is acute respiratory, cardiac and neurological failure (Randolph, Wypij, Venkataraman, Hanson, Gedeit, Meert, Luckeitt, Forbes, Lilley, Thomson, Chieftetz, Hibberd, Wetzel, Cox and Arnold, 2002).

Mechanical ventilation is one of the most common medical interventions used in the PICU. Valenzuela, Araneda and Cruces (2014) reported the percentage of hospitalised paediatric patients requiring mechanical ventilation varied between 30% and 64%. Although mechanical ventilation is often life-saving, it is associated with numerous well documented complications, such as ventilator-induced lung injury and nosocomial pneumonia, and increased mortality and morbidity linked to prolonged use of the treatment modality (Newth et al., 2009; Roh et al., 2012; Keogh, Courtney and Coyer, 2003). In children, endotracheal tubes also cause discomfort, increase the need for sedation, vocal cord dysfunction, epiglottitis stenosis and anxiety associated with inability to communicate (Newth et al., 2009).

It is therefore of paramount importance that the patient be weaned from mechanical ventilation as soon as physiologically possible.

2.4 DEFINITION OF WEANING

Various definitions of weaning from mechanical ventilation are found in literature. Eskandar and Apostolakos (2007) described weaning from MV as either a gradual decrease of ventilator support to allow liberation from the ventilator, or determining when the patients will have the ability to be separated from the ventilator safely. Henneman (2001) defined weaning as “the process of gradually liberating patients from artificial ventilator support and allowing resumption of spontaneous breathing.” Valenzuela, Araneda and Cruces (2014) state that weaning is “the gradual reduction in respiratory support, assigning a spontaneous breathing time to let the patient take responsibility for an acceptable gas exchange.” The intention is to decrease ventilatory support and for the patient to assume a greater proportion of the ventilatory workload (Rose and Nelson, 2006). The core aspect of these definitions is the ability of the patient to breathe spontaneously and the ability to sustain ventilation without an artificial airway. Boles, Bion, Connors, Herrigde, Marsh, Melot, Pearl, Silverman, Stanchina, Vieillard-Baron and Welte (2007) concur that weaning covers the entire process of weaning the patient from ventilatory support and from the artificial airway which is usually an endotracheal or a tracheostomy tube. Reports indicate the weaning process takes between 40% and 50% of the total period the patient is receiving mechanical ventilation (Hansen and Severinsson, 2007; Valenzuela, Araneda and Cruces, 2014).

Walsh, Dodds and McArdle (2004) state that weaning is “a progressive reduction in ventilator support until a point is reached where the patient is capable of spontaneous breathing and disconnected from the ventilator and extubated.” The 2005 International Consensus Conference (MacIntyre, Epstein, Carson, Scheinhorn, Christopher and Muldoon, 2005) on weaning from mechanical ventilation redefined weaning and proposed that patients should be classified into three groups according to the difficulty and duration of the weaning process.

Table 2.1 Classification of patients according to the difficulty and duration of weaning process.

Simple weaning	Patients classified in this group account for 70% of all mechanically ventilated patients. They usually progress from initiation of mechanical ventilation to successful extubation on the first weaning attempt. Members in this group have a good prognosis with an ICU mortality rate of 5%.
Difficult weaning	This group represents 15% of mechanically ventilated patients. They require up to three spontaneous breathing trials (SBTs) or up to seven days of weaning from the first spontaneous breathing trial to achieve successful weaning. This is common in patients with chronic obstructive pulmonary disease (COPD) and acute respiratory distress syndrome (ARDS).
Prolonged weaning	Up to 15% of mechanically ventilated patients would be in the prolonged weaning group. These patients require more than three SBTs and more than seven days of weaning after the first spontaneous breathing trial.

References: (Boles *et al.*, 2007; Epstein, 2009; Haas and Loik, 2012)

According to Rose and Nelson (2006) and Boles *et al.* (2007), this classification allows for patients to be categorised into groups where ventilatory support can either be discontinued abruptly or where a gradual reduction in ventilatory support is more appropriate.

2.5 WEANING PROCESS

The process of weaning has been categorised into distinct phases. Henneman (2001) and Rose and Nelson (2006) described this weaning continuum model as

pre-weaning, weaning and outcome. In the pre-weaning stage, active weaning does not occur because the condition that prompted MV has not resolved or complications are present. Assessment of readiness to wean which includes evaluation of both respiratory and non-respiratory factors is done to determine if the patient is capable of attempting spontaneous breathing. The next stage is the weaning phase, where the patient's condition has stabilised and ventilator weaning has begun, with strategies to reduce or discontinue the support made. The last stage of weaning refers to the outcome and has many endpoints with a goal of spontaneous breathing without an artificial airway. The outcome stage may also include incomplete weaning, where the patient remains on partial ventilatory support or terminal weaning signifying death.

There is no consensus in the literature as to when weaning begins. The viewpoint of Newth et al. (2009) is that the weaning process commences with intubation at the onset of the ventilator support by using a daily screen of criteria to assess if the patient is ready to be weaned and ends when the patient's spontaneous breathing alone can provide effective gas exchange.

2.5.1 Criteria to assess weaning readiness

Evaluation of readiness to wean based on clinical judgement alone is deemed inaccurate. According to El-Khatib and Bou-Khalil (2008), the results of randomised trials on spontaneous breathing and weaning outcome of mechanically ventilated patients have shown clinicians are often overly cautious about initiating weaning. Clinicians tend to underestimate the capacity of patients to breathe independently resulting in unnecessary mechanical ventilation and increase the risk of complications (Blackwood, Alderdice, Burns, Cardwell, Lavery and O'Halloran, 2011). There is a sound rationale supporting the need to base patients' readiness to be weaned from mechanical ventilation on objective clinical parameters and facilitate clinical decision making.

Patients on mechanical ventilation should be screened daily to determine their readiness to wean. The first criterion to be met by the patient before weaning can commence is "resolution or sufficient improvement of the underlying disease

process which prompted the initiation of mechanical ventilation” (El-Khatib and Bou-Khalil, 2008; BouAkl, Bou-Khalil, Kanazi, Ayoub and El-Khatib, 2012; McConville and Kress, 2012). This is considered the most essential and basic pre-requisite which needs to be met before weaning commences. MacIntyre et al. (2001) state “The subjective clinical assessment should prompt the physician to believe weaning is possible as the acute phase of the disease process has resolved.”

According to Valenzuela, Araneda and Cruces (2014), the following criteria should be considered in weaning the paediatric patients from mechanical ventilation:

- Resolution or improvement of the cause of respiratory failure.
- Haemodynamic stability: absence or progressive decrease of vasoactive drugs.
- Adequate level of consciousness (COMFORT).
- Spontaneous respiratory effort.
- Discontinue sedatives.
- Discontinue muscle relaxants for at least 24 hours.
- No clinical signs of sepsis.
- Cough reflex present.
- Correction of significant metabolic and electrolyte imbalances.
- Adequate gas exchange with $PEEP \leq 8$ cmH₂O and $FiO_2 \leq 0.5$ L.

MacIntyre et al. (2001) stated that “both objective and subjective clinical assessments are important when deciding if a patient is ready to be weaned from mechanical ventilation.” However, O’Brien, Birnkrant, Dumas, Haley, Burke, Graham and Kharasch (2006) suggest subjective assessment in children should be obtained from reported understanding, by the family or guardian and all health care providers, of the desirability of weaning.

Although rapid weaning and extubation is a desirable goal in mechanically ventilated patients, it must be balanced with premature weaning which has its own problems. According to Newth et al. (2009) and MacIntyre (2013), premature

weaning can lead to inspiratory muscle fatigue, aspiration, dangerous gas exchange impairment, loss of airway protection and higher mortality. It is therefore important that weaning screens be performed by skilled and knowledgeable health professionals, supported with clinical judgement from the attending physician. Blackwood, Wilson-Barnett and Trinder (2004) found both empirical evidence and sound clinical judgement can be used to identify patients ready for weaning from mechanical ventilation.

In conclusion, there seems to be consensus in literature regarding the criteria to assess if a patient can begin a trial of weaning from mechanical ventilation. Resolution of the condition which prompted mechanical ventilation is very important before any weaning is done.

2.6 MODES OF WEANING

Various weaning modes are used to wean the patient from mechanical ventilation, however the weaning methods most commonly used in paediatric critical care practice are: spontaneous breathing trial (SBTs), pressure support ventilation (PSV), volume support ventilation (VSV) and synchronised intermittent mandatory ventilation (SIMV) (Newth et al., 2009; Randolph et al., 2002; Blackwood and Murray et al., 2013).

2.6.1 The Spontaneous Breathing Trial (SBT)

Following the resolution of the clinical condition requiring mechanical ventilation and objective assessment confirms patient readiness for trial of spontaneous breathing or weaning, initiation of the next phase commences. The spontaneous breathing trial is considered the most effective method of assessing a patient's capability to breathe without the mechanical ventilator (McConville and Kress, 2012). A major goal of the SBT is to allow patients to demonstrate they are ready to assume the work of breathing in preparation for removing the artificial airway (Haas and Loik, 2012). In this technique SBT is performed while the child is still intubated and cardiorespiratory tolerance is evaluated to determine if spontaneous breathing can be maintained without or with minimum respiratory support, thus

allowing the identification of patients eligible for extubation (Valenzuela, Araneda and Cruces, 2014). Humidified oxygen is provided, allowing the child to breathe spontaneously on minimal pressure support, continuous positive airway pressure (CPAP) or through a T-piece attached to the ventilatory circuit. Duration of SBT as an indicator for extubation from mechanical ventilation is controversial, however evidence supports a trial of 30 to 120 minutes (MacIntyre, 2012; BouAkl et al., 2012). McConville and Kress (2012) state a successful trial is one in which the patient does not develop respiratory distress. The SBT is considered the most useful tool to predict weaning outcome. Identifying patients ready for a spontaneous breathing trial and promptly discontinuing mechanical ventilation in patients who succeed a 2-hour breathing trial can significantly reduce time spent intubated. The nurses' role during the SBT is to monitor for signs and symptoms of weaning failure.

2.6.2 Techniques of Spontaneous breathing trials

Spontaneous breathing trials in infants and children are commonly done through gradual reduction of ventilatory support, either with a low level of pressure support volume (5-7 cm H₂O) or without positive pressure applied to the airway with a low level (5 cm H₂O) of continuous positive airway pressure (CPAP) (Newth et al., 2009). With this practice, the discontinuation of mechanical ventilatory support is implemented when the patient is able to maintain breathing with a respiratory rate within the goal range for age. In the study setting, SBTs in children are commonly done through SIMV followed by CPAP.

2.6.2.1 Pressure Support Ventilation Weaning

In pressure support ventilation mode, the level of peak inspiratory pressure is adjusted to achieve acceptable respiratory parameters followed by gradual weaning to minimal pressure support. A pressure support of 8cm H₂O is sufficient to compensate for additional work caused by endotracheal tube and demand valve (Haas and Loik, 2012). The advantage of this mode is that it reduces the inspiratory workload. Volume support is an automated mode whereby the amount of pressure support required to maintain a pre-set tidal volume is reduced

automatically as respiratory mechanics improve (Blackwood and Murray et al., 2013; Rose and Nelson, 2006).

2.6.2.2 Synchronised intermittent mandatory ventilation (SIMV)

Synchronised intermittent mandatory ventilation is a combination mode by which patients receive mandatory (set) breaths synchronised with their breathing efforts and according to a pressure- or volume-selected mode (Blackwood and Murray et al., 2013; Newth et al., 2009). Patients breathe spontaneously with pressure support between ventilator breaths; this results in patient-ventilator synchrony. The objective of this method is to give the respiratory muscle a rest during mandatory breaths and work the muscles between spontaneous efforts by the patient to maintain minute volume. Studies have shown that not all children need gradual reduction to achieve a successful weaning (Valenzuela, Araneda and Cruces, 2014).

Epstein (2009) reported, on the randomised controlled trials in which the three methods were compared, no difference in the duration of weaning, duration of ventilation, or rate of extubation on SBTs done on T-piece, PSV or CPAP. Epstein (2009) proposes that optimal SBT duration may depend upon the duration of ventilation or the underlying cause for respiratory failure.

2.7 WEANING FAILURE

Weaning failure is defined as the failure of SBT, or need for re-intubation, within 48 hours following extubation (Valenzuela, Araneda and Cruces, 2014). It is often related to cardiovascular dysfunction or inability of the respiratory pump to support the load of breathing (Boles et al., 2007). The following criteria need to be recognised for discontinuing a weaning trial in a patient who is failing: tachypnoea, tachycardia, hypertension, hypotension, hypoxaemia or acidosis, arrhythmia, agitation, depression and diaphoresis (Boles et al., 2007). According to El-Khatib and Bou-Khalil, (2008) when weaning failure is recognised, SBT should be stopped and mechanical ventilatory support re-established while evaluating the cause for the failure. Once the cause is resolved, the SBT should be

recommended. Weaning failure can be attributed to several causes such as anaemia, inadequate nutrition, electrolyte imbalances, respiratory dysfunction and pharmacological sedation (BouAki et al., 2012)

2.8 EXTUBATION

After the patient demonstrates the ability to sustain spontaneous breathing, the next decision is whether the patient can tolerate extubation. It is an important decision, as both delayed extubation and failed extubation are associated with an increase in duration of ventilation and mortality (Haas and Loik, 2012). More than 50% of ventilated children are extubated within 48 hours of admission (Newth et al., 2009) often without weaning; up to 50% of unplanned extubations are successful. Extubation failure (EF) or success can be predicted specifically by the ability of the patient to protect the airway, the management of secretions and patency of the upper respiratory tract (McConville and Kress, 2012). Extubation failure represents a set of conditions which determine the need for re-intubation and mechanical ventilation restoration within the first 24 to 72 hours after the removal of the endotracheal tube (Newth et al., 2009).

Patients with extubation failure have high mortality and morbidity rates. A study conducted by Baisch, Wheeler, Kurachek and Cornfield (2005), evaluating extubation failure in PICU incidences and outcomes amongst mechanically ventilated children, found an extubation failure rate of 4.1%. In addition, they observed longer hospital stay and no increased risk of death in children who failed extubation when compared to non-failed extubation. Though the causes of EF are diverse, studies in children have identified obstruction of upper airway, associated with the risk factor of young age and longer MV duration, as the causes of failure (Valenzuela, Araneda and Cruces, 2014).

2.9 THE USE OF PROTOCOLS IN WEANING

Despite the difference between the two terms, protocols and guidelines have been used synonymously to refer to the guiding principles health practitioners apply in

the clinical decision making process. Flynn and Sinclair (2005) defined clinical guidelines as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.” However, guidelines are defined as “a rule or principle that provides guidance to appropriate behaviour” and protocols as “the plan for a course of medical treatment or for a scientific experiment” (Chatburn and Deem, 2007). Guidelines are general statements of concepts that do not give specific instructions but allow for different decisions for the same scenario. “Protocols are explicit and contain specific rules for decision-making, based on specified criteria, by using a multidisciplinary care plan or clinical pathway; therefore there is no variability in outcome” (Morris, 2003; Chatburn and Deem, 2007). The use of guidelines and protocols limit unnecessary variation in clinical practice and standardise care, thereby reducing complications, decreasing length of stay and improving outcomes (Hammond, 2001). According to Flynn and Sinclair (2005:145), Harrison described the use of protocols and guidelines as ‘the move toward evidence based practice and stems from concerns about variations in practice.’ Evidence-based protocols elicit best-practice performance and consistent care from health care practitioners and improve patients’ outcomes. According to MacIntyre (2001), protocols should not replace clinical judgment, but enhance and complement it to guide patient care. Protocols may also be used as default management.

Weaning protocols are increasingly being used in ICUs and numerous studies have demonstrated their importance in practice and patient outcome (Rose, Blackwood and Egerods et al., 2011b). The use of weaning protocols to direct mechanical ventilation and weaning has been shown to be safe and effective. There is evidence of a reduction in the duration of mechanical ventilation, weaning and stay in the Intensive Care Unit when standardised weaning protocols are used in adults (Blackwood, Alderdice, Burns, Cardwell, Lavery and O’Halloran, 2009; Keogh, Courtney and Coyer, 2003). However, efficacy of weaning protocols in paediatrics is still controversial as this reduction is not seen in most random controlled studies. Use of weaning protocols did not reduce weaning time, child’s length of stay in the hospital, nor the number of complications associated with mechanical ventilation (Blackwood and Murray et al., 2013). According to Twite (2006), Keogh, Courtney and Coyer (2003), this could be attributed to the fact that

the majority of children are weaned from mechanical ventilation over a short period of time. Thus weaning protocols may not shorten this brief duration of weaning but may improve efficiency and collaboration between health care team members and also ensure safety of the child.

The implementation and efficacy of weaning processes can be affected by many factors other than the protocol itself. Rose and Nelson (2006) and Rose, Blackwood, Burns, Frazer and Egerod (2013) found that organisational structures, roles, responsibilities and skills of the various professional groups affect the weaning practices. Understanding the influence of these components will determine the utilisation of weaning protocols and weaning outcome within individual settings. This implies that institutions intending to standardise weaning should plan according to their existing structures and processes. Despite nurse-driven protocols being safe and easy to implement, Rose et al., (2007) and Chartbum and Deem (2003) questioned the advantages of weaning protocols in organisational settings which favour adequate numbers of skilled and experienced staff in expediting discontinuation of mechanical ventilation.

Protocols are intended to reduce practice variation by replacing subjectivity with objectivity (Blackwood, Alderdice and Burns et al., 2009). Even so, the use of a protocol should not exclude individual considerations and clinical judgement. A well designed ICU protocol should not constrain decision making, but rather focus on the common aspects of patients within a specific disease profile. However, some practitioners are concerned that weaning protocols will erode clinical judgement, suppress innovation, increase paper work and result in 'cookbook' medicine because of its rigidity as it does not allow individual care (Hammond, 2001). They prefer physician led weaning because it focuses on the individual needs of the patient.

In summary, weaning protocols can reduce variation in weaning practice. Although their use is controversial, evidence exists that allied health driven protocols reduce weaning time, particularly in adults, thereby improving patient outcome.

2.10 ROLE OF NURSES IN WEANING

Historically, the process of weaning from mechanical ventilation has been the role of physicians; nurses were involved in monitoring the patient but not directly responsible for changing the ventilator settings (Anderson and O'Brien, 1995). With the introduction of weaning protocols, nurses have taken over the responsibility of weaning patients. Since nurses are always at the bedside of the patient they are in a better position to assess the physiological changes for weaning and adjust the ventilator settings according to the patient's condition. The role of the nurse in weaning can be enhanced with collaboration through effective communication and planning between bedside nurses and physicians (Rose et al., 2011). It must be noted that inter-professional roles are influenced by differences in unit structure, staffing and skill-mix, type of patients and leadership models. Respiratory therapists also play an important role in some settings, such as in the USA. Nurses in Australia, New Zealand and Denmark are autonomous in weaning as they are sufficiently experienced and qualified in critical care nursing and also collaborate effectively with physicians (Rose & Gerdtz, 2009). In the USA, nurses are moderately autonomous as only senior nurses collaborate with physicians on weaning, whilst PICU nurses are limited to the primary role of ongoing assessment of patients and their response in treatment.

It is evident that the role of the nurse in the management of mechanical ventilation and weaning is not well defined but depends on the context processes and functions of individual institutions.

2.10 SUMMARY

This chapter presented the background of the theoretical foundation of the study and an overview of mechanical ventilation. Summaries of various approaches used to address the weaning process were presented and included definition of weaning, weaning process, modes of weaning, ventilator weaning protocols and the role of the nurses in weaning.

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

Polit and Beck (2012:12) refer to the research methods as “the techniques researchers use to structure a study, gather and analyse information relevant to the research question in a systematic way.”

This chapter gives a detailed account of the research methods and designs used in this study to achieve the research objectives. The research methods consist of the research design, study setting, target population, sample, sampling method and data collection process. The research instrument used in the data collection, the methods of data analysis, pilot study, ethical considerations and measures of trustworthiness of the study are also described. This method facilitated the emergence of themes which substantiated the opinions established in the study.

The study explored and described the opinions of multidisciplinary team members practicing in the PICU and CTICU concerning use of weaning protocols from mechanical ventilation, with the intention of advocating for utilisation of evidence based weaning protocols in guiding weaning practice.

3.2 RESEARCH DESIGN

The research design is “a blue print for the conduct of the study that maximises control over factors that could interfere with the study’s desired outcome” (Burns and Grove, 2009:47). Macnee (2004:180) states that “a research design guides the selection of population, sampling procedures and methods for data collection and analysis.” In order to examine, understand and interpret the opinions of a multidisciplinary team regarding the need to utilise weaning protocols in Intensive Care Units, this study draws on the qualitative exploratory and descriptive research design.

Qualitative research is “a systematic, subjective approach used to describe life experiences and give them meaning” (Burns and Grove, 2011:41). The qualitative approach requires an investigation of phenomena in an in-depth and holistic fashion, through the collection of rich narrative data using a flexible research design. Burns and Grove (2009) point out that the approach “focuses on subjective meanings and interpretations of participants’ feelings and thoughts as it is lived, thereby gaining insight and understanding about individual’s perception of events.” In a qualitative study, the researcher becomes a research instrument as he seeks to understand the experience and personal beliefs of participants. Qualitative design was therefore appropriate for this study as it explored the opinions of multidisciplinary team members concerning the need to develop and use weaning protocols in ICU from their perspective.

Exploratory research investigates the full nature of little understood phenomena or a situation not clearly defined. It is done to gain insight and familiarity into situation, phenomenon and people in order to identify a problem or develop a hypothesis (de Vos et al., 2011:95). Common exploratory methods in qualitative studies include focus group discussions and in-depth interviews. This approach was ideal to the study as it sought to understand the opinions of multidisciplinary team members in PICUs about the need to develop and use of weaning protocols.

According to Polit and Beck (2012), qualitative descriptive studies are naturalistic enquiries which adapt methodological techniques from other qualitative research traditions and usually are followed with interpretive descriptions. They aim at gaining more information about characteristics of phenomena within a particular field of study and provide relevant information about a situation as it naturally occurs (Burns & Grove, 2011). Methods which describe phenomena in qualitative studies include observation, semi-structured and unstructured interviews. This study was descriptive as it aimed at gaining more information on the multidisciplinary team members’ opinions regarding the use of ventilator weaning protocols in Paediatric ICUs and the findings were analysed using qualitative thematic analysis.

3.3 RESEARCH SETTING

As defined by Burns and Grove (2011), the research setting is the place in which a study is conducted. This study was carried out in PICU and CTICU at one public sector, University affiliated hospital in Johannesburg. The hospital also has five adult Intensive Care Units for critically ill patients with different disease profiles.

The PICU admits paediatric patients from 0 to 12 years of age. These critically ill patients require mechanical ventilator support as a result of varied diagnoses ranging from congenital abnormalities, trauma, medical and surgical conditions. The CTICU provides quaternary services to paediatric patients with cyanotic cardiac conditions and pre- and post-surgery. On average these units provide critical Intensive Care to approximately 320 patients a month, with the nurse to patient ratio of 1:1 or 1:2 at times depending on the complexity of patients and availability of nurses. A multidisciplinary team comprising of specialist neonatal and paediatric doctors and allied health professionals collaborate to plan, implement and evaluate quality care of these patients. As an academic institution there is an expectation that the health care being delivered in this setting is evidence based to bridge the theory to practice gap.

3.4 POPULATION

Population is a total set from which the individuals or units of the study are chosen (de Vos et al., 2011:223). The target population in this study comprised of members of the multidisciplinary team practicing in PICU and CTICU, which included nurses and doctors. This is the team which is actively involved in weaning practices at the study setting.

3.5 SAMPLE AND SAMPLING

According to Burns and Grove (2011), a sample is a subset of the population which is selected for a particular study and members of the subjects or participants, whilst sampling is the process of selecting a group of people, events, behaviours, or other elements with which to conduct a study. In this study, a non-

probability purposive sampling method was used to select members of multidisciplinary team who met the inclusion criteria. Burns and Grove (2011) further defined non-probability sampling as a sampling method in which not every element of a population has an opportunity for selection. Purposive sampling aims to obtain relevant information from participants intentionally selected because of their experience and understanding on the issue (Macnee, 2004:167). Consequently, only nurses and doctors practicing in the PICU and CTICU who met the inclusion criteria were purposively considered appropriate for the study.

Inclusion criteria for the participants included:

- Registered nurses by SANC with or without an additional qualification in ICU.
- Participants with more than 1 year of clinical experience in Paediatric ICU.

Exclusion criteria:

- Enrolled nurses were not included in the study as weaning is not in their scope of practice.

This criterion was included to ensure collection of rich data from participants with experience of weaning practices in PICU. Thirteen nurses and ten doctors were approached and invited to be part of the study, but only eight nurses and two doctors agreed to participate in the study. Both nurses and doctors who declined the invitation cited busy schedules as their reasons for being unable to participate. Ten multidisciplinary team members comprising eight nurses and two doctors were eventually interviewed and allowed the generation of significant data which contributed to the development of themes in the study. Sample size of the study was not predetermined as the researcher aimed at generating adequate information until data saturation was reached. Sample size, in qualitative studies, is based on informational need (Polit and Beck, 2012). As observed by MacNee (2004) the composition and richness of the data and not the sample size determines when to stop data collection.

3.6 DATA COLLECTION

Data collection is the precise, systematic gathering of information relevant to the research purpose, specific objectives, questions or hypothesis of the study (Burns and Grove, 2011). The researcher was aware that the opinions expressed by the participants may not be similar with the researcher's own expectations. As a result, it was critical that the researcher bracketed her own opinions throughout data collection and analysis so as not to influence the participants' opinions in the interviews or the findings in data analysis. Bracketing is the suspension and laying aside what is known about the experiences being studied (Burns & Grove, 2009:545).

3.6.1 Instrument

The data collection strategy used for generating qualitative data for this study was semi-structured interviews, which required participants to answer a set of predetermined questions by the researcher. Semi-structured interviews are commonly used to gain an understanding of the participants' beliefs or perception in respect of the topic (de Vos et al., 2011). According to Maree (2012), the main purpose of the semi-structured interviews is to define the line of inquiry so that focus of the interview is maintained.

Considering the importance of qualitative research lies partly in exploring the realities and experiences of the phenomena under study, the researcher prepared open ended questions (See **Appendix A**) and used semi-structured interviews to guide the process. In this study, the role of the researcher as a child nurse is to have an understanding of what the participant is expressing about their opinions and engage the participant to give rich in-depth description. Therefore, a semi-structured interview with open-ended questions was chosen for this study allowing a greater scope of understanding participants' beliefs and perceptions of a particular topic. Using this strategy allowed flexibility for both the researcher and participants so that particular interesting issues which emerged could be pursued with the participants being able to freely express their opinions and the researcher guiding the interview (de Vos et al., 2011).

The questions were aimed at soliciting information from multidisciplinary team members regarding their opinions on use of weaning protocols. Other aspects covered in the interview guide included current weaning practices in PICU, personal involvement and experience of participants in mechanical ventilation and weaning patients, weaning patients from mechanical ventilation in the absence of protocols to inform weaning practice, impact of weaning without protocols on nursing practice and/or patient outcomes and responsible members of the multidisciplinary team for the development of weaning protocols in PICU.

3.6.2 Procedure

Upon obtaining permission to conduct the study from all the relevant authorities, unit managers were approached and informed about the research, its purpose and significance to practice, to gain access to the unit. The researcher visited the two Paediatric ICUs and observed the respective nurse unit allocation list for selection of potential participants. With assistance from the unit managers, the researcher identified and approached eligible study participants who were on duty and the purpose and objectives of the study were briefly explained. Doctors and nurses who volunteered to participate, with written consent, were enrolled in the study.

Appointments were made with each participant and ten in-depth semi-structured interviews were conducted with eight nurses and two doctors. The researcher conducted all the interviews personally, which assisted in maintaining focus of the interview and understanding of the experiences of the participants. Except for two participants, who declined to be audio-taped, data was collected using a voice tracer in which participants were aware of the recording device. All interviews were conducted during working hours at the participants' place of work where they were easily accessible and later traceable for truth value. De Vos et al., (2011) advise that interviews should be conducted in a private and non-threatening environment, where participants are comfortable and easily accessible, including the professional environment. However, the interviews were conducted during each participant's break time as agreed upon to ensure work schedule was not disturbed. Nurses, interviews were conducted in the nurse managers' offices, whilst doctor's interviews were conducted in their offices for privacy. The interview

process, which lasted for a period of five weeks from 30th July, 2014 to 4th September, 2014, took approximately 30 minutes for each study participant, with a range of 15 to 45 minutes.

In setting the scene of the interview, objectives and purpose of the research was repeated to all participants and each participant was asked to sign a consent form (See **Appendix B**) and fill in the socio-demographic data form (See **Appendix C**). The interviews usually began by seeking participants' opinion on the need to develop and use ventilator weaning protocols in PICU; thereafter the proceedings depended on the participants responses guided by the interview questions ensuring focus of enquiry was maintained. During the interview the researcher only spoke to ask questions, seek clarifications of participants' thoughts or use prompts to assist the participant to provide as much valuable information as possible. Examples of prompts used were: "What are you implying when you say that?" and "Can you describe what actually happens."

The researcher transcribed each interview within 48 hours of the interview process. Data from earlier transcripts were analysed concurrently with ongoing data collection to ensure emerging themes relating to the topic under study could be further pursued in later interviews. Data collection continued until the researcher believed saturation was achieved, which was evident when new information no longer emerged and data became repetitive. Data was then taken back to the participants to confirm if what was transcribed was a true reflection of what was said.

3.7 PILOT STUDY

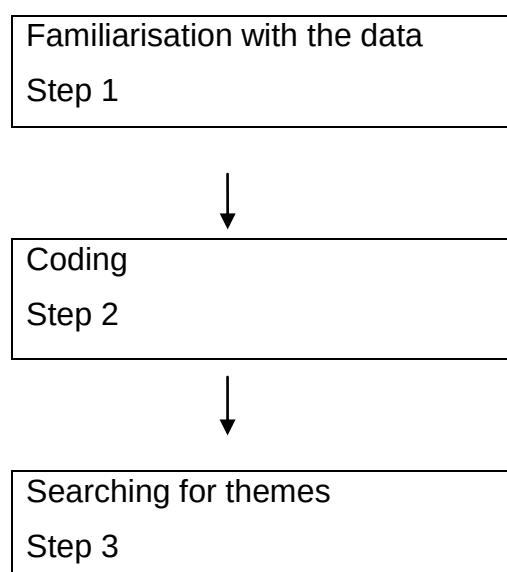
As a prerequisite for the successful execution and completion of any research, a pilot study should be conducted before commencement of the main study. A pilot study is referred to as a small scale version of the proposed study, conducted to develop and refine the methodology to be used in the larger study (Burns and Grove, 2011). In addition to helping familiarise the researcher with the research techniques and clarify questions, a pilot study also assesses feasibility of the study (de Vos, 2006).

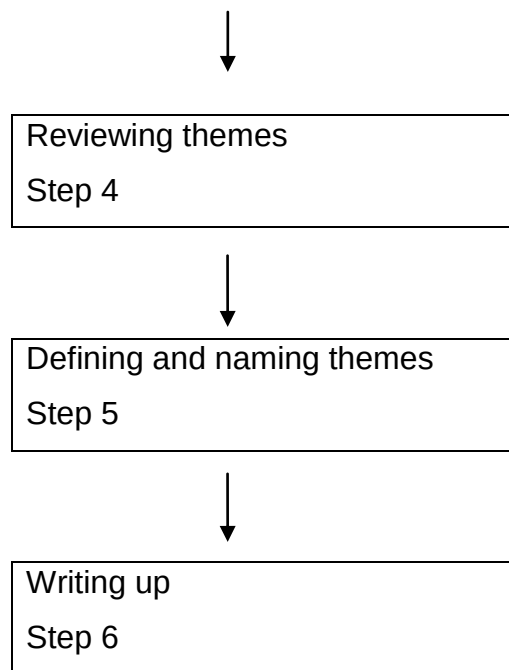
In this study, the first interview pre-tested the interview guide to help the researcher make modifications so as to ensure quality interviewing and determine whether relevant data can be obtained from participants (de Vos et al., 2011). The participants were asked to comment on the language, clarity and relevance of questions. No problems were experienced and the participant understood the questions, therefore the information was included in the main study.

3.8 DATA ANALYSIS

Analysis of collected data aids the researcher to draw conclusions and obtain answers pertaining to the research question. Polit and Beck (2012:556) state that data analysis reduces, organises and gives meaning to data. A qualitative thematic analysis method, as described by Braun and Clarke (2006), was utilised and deemed most fitting for this study in analysing data. Thematic analysis identifies, analyses and reports patterns (themes) within data, helping to organise and provide a rich description of data set. An inductive approach was employed where the identified themes were strongly linked to the data itself and not preconceived codes by the researcher.

Consequently the researcher analysed each transcribed interview guided by the six-phase process of Braun and Clarke's (2006) method of thematic analysis consisting of:





Step 1: Familiarisation with the data

After each interview was conducted, the audio-digital recording was personally transcribed into verbatim accounts by the researcher (See **Appendix D**). As recommended by Henning (2009), own transcription helps a novice researcher to understand the data and gain competence in identifying meaningful units. Transcripts were then re-read several times and recorded interviews listened repeatedly to become familiar with the data and also gain more understanding of the whole phenomenon (Burns & Grove, 2009:557). A critical problem with transcribing data is the potential for transcription error. As a result, comparison was made between written and audio-taped versions of each interview in order to correct transcription errors and ensure the transcription accurately reflected the recordings.

Step 2: Coding

Coding the data began once all the data was fully transcribed. Each transcript was summarised to get an impression of the content of what each participant was communicating. Through horizontal analysis of transcripts, the researcher identified common and meaningful statements held by participants which were recurrent and became repetitive. Distinct differences of participants' ideas which

were relevant to the study were also identified. These statements were underlined and coded in words that were semantically related at the end of the margin (See **Appendix E**). All significant statements were reviewed by the researcher to ensure extracted statements reflected the objectives of the study.

Step 3: Searching for themes

The researcher further organised the related codes into manageable categories and broader themes which were elaborated by moving back and forth between codes and the emerging themes. Coding and organisation of data into manageable categories helped the researcher to develop a storyline relevant to the study which represented the feelings and thoughts of participants (Henning, 2009). As such, emerging data was organised into concepts the study was communicating. Throughout the analysis process the transcripts, extracted statements, coding, formulated categories and themes were reviewed by the research supervisor to ensure a rigorous and auditable process was adhered to thus leading to agreement and subsequent confirmation of formulated themes of the study. *(This is the part that indicates the co-coder and audit trailing).*

Step 4: Reviewing themes

The emergent findings and transcripts were re-read to understand its meaning and categories were reviewed for possible rearrangement or combination to establish rich description of coherent themes for the phenomenon. Themes were refined until the data became specific to the research question but broad enough to incorporate a set of related ideas meaningful to the phenomena under study. The researcher was satisfied that the emergent themes represented the objectives of the study and used them for argument in the discussion.

Step 5: Defining and naming themes

The researcher defined informative names which depicted the focus and storyline of the study for each theme.

Step 6: Writing up

The findings comprising of data extracts with analytic narrative were written.

3.9 MEASURES OF TRUSTWORTHINESS

Numerous steps were taken to ensure that findings were accurate and faithful to the participants' description and interpretations and also that the research process could be rigorous. The aim of rigor is to ensure trustworthiness of the research. Lincoln and Guba (1985), as highlighted in Polit and Beck (2012), Krefting (1991) and Graneheim and Lundman (2004), suggested the trustworthiness of the qualitative research entails four aspects: credibility, dependability, confirmability and transferability. These strategies were used to maintain rigor in this study.

- Credibility

As related to validity, credibility refers to the confidence in the truth of data and its interpretation. According to Shenton (2004), credibility is done through the process of reflecting, exploring and judging the relevance and meaning of data and ultimately developing themes and essences which accurately depict the experience. Polit and Beck (2012) point out that the conduct of the study, as demonstrated by the researcher in the research report, reflects the credibility of the study. To ensure this, the study was conducted in a familiar setting to participants so that they can be traced for the truth value. Purposeful sampling in this case increased in-depth understanding by selecting information rich experiences from participants who have experience (Graneheim and Lundman, 2004) in weaning patients from mechanical ventilation. There was prolonged engagement with each participant to gather enough and accurate data and this data was checked by experienced researchers. Member checking was also done by returning transcripts to the participants for review and verification (Loh, 2013). Each participant had agree with his or her transcript which they did to determine the accuracy of the data.

- Dependability

Dependability refers to the consistency and reliability of data over time and conditions (Polit and Beck, 2012). To ensure dependability in this study, the

researcher relied on consultation with the supervisor. The researcher and the supervisor conducted an enquiry audit in all aspects of the study to ensure consensus was reached so that findings and their interpretations were credible. As observed by Graneheim and Lundman (2004), comprehensive and systematic description of methods has been provided in this research report to ensure the research is dependable.

- Confirmability

Refers to objectivity or neutrality of the research where the researcher demonstrates findings which emerged from the data and not their own presuppositions. Graneheim and Lundman (2004), point out that confirmability involves linking the data to their sources and rules out researcher bias in the study findings. The researcher transcribed the interviews and verbatim quotes have been presented in the report to confirm the source of the finding. Data documented as field notes, transcript and audiotapes were kept to serve as an audit trail (see Appendices D & E) and all documents used in data analysis were kept to validate the results of the study (Morrow, 2005).

- Transferability

Similar to external validity in quantitative studies, transferability refers to applicability of the research findings to other settings of similar nature (Shenton, 2004). In this study, proper documentation and thick descriptive data of the research content have been provided in the report. This allows readers the opportunity to decide whether or not the results are transferable to other circumstances (Graneheim and Lundman, 2004).

3.10 ETHICAL CONSIDERATIONS

Ethical considerations are an important aspect of any research involving human participants in order to protect their rights. Burns and Grove (2011) described such rights as the right to self-determination, privacy, anonymity and confidentiality, fair

treatment and protection from discomfort and harm. In this context, the following ethical requirements were taken into consideration prior to and during the study.

The research proposal was peer reviewed and sanctioned by the Department of Nursing Education at the University of Witwatersrand. The University Postgraduate Committee granted the permission to conduct the study (See **Appendix F**), whilst formal ethics approval was obtained from the committee for Research on Human Subjects (Medical) of the University of the Witwatersrand (See **Appendix G**). Recruitment of participants and subsequent data collection commenced only after permission to conduct study in the hospital and research setting was sought (See **Appendix H**) and obtained from the Nursing Services Manager, Chief Executive Officer of the hospital and Head of Department of Paediatrics and Child Health (See **Appendix I**).

During the recruitment process, prospective participants were given information sheets (**See Appendix J**) explaining the purpose and objectives of the study and a detailed explanation of the benefits, risks and procedures involved in the study to solicit participation. The informational sheet further informed prospective participants that their identity would not be identifiable in the study as codes, instead of names, would be used during data collection and reporting. A clear explanation was given that participation in the study was voluntary and participants could withdraw at any time without penalty. It was also made clear that participants may not directly benefit from taking part in the study, but that the findings would assist them in the clinical practice. Reassurance was given that participation in the study carried no risk of physical or psychological harm. Name and contact details of the researcher were provided in the event further information was required.

In order to maintain privacy and confidentiality, participants were informed that the researcher would be the only person who could link the name of the participants with the interviews and the digital recordings would be deleted after transcription to maintain anonymity. It was explained to the participants that transcription of the interviews, field notes and demographic data would be kept safely in a locked room and on a computer with a protected password and only the researcher and

the supervisor would have access to this raw data. All data from the interview would be destroyed within six years of completion and two years after research publication, as per University of Witwatersrand guidelines.

After prospective participants had read the information sheets, which were also clarified verbally, each participant was asked for willingness to participate in the study. Out of the twenty three participants approached, ten participants agreed to be involved in the study, with knowledge of the nature and aims of the study clearly explained to them. Each participant was required to sign a consent form, prior to commencement of the interview, which explained their rights to accept or refuse to participate in the study. Permission was also sought to digitally audio-record the interviews (See **Appendix D**) and participants were informed that the recordings and research data would only be used for the purpose of the study.

During the course of the research, participants' identifiable information was coded and stored in a separate file to ensure anonymity and deleted on completion of the research. All data generated in the form of transcriptions and consent forms were kept in a securely locked drawer in the researcher's room in order to deny access to the confidential data to anyone other than the researcher. Direct quotes from participants' interviews are incorporated into this research and the researcher has ensured that participants names and other potentially identifiable information would not be contained in this document.

3.11 SUMMARY

This chapter described the research methods, which included the research design, setting, target population, sample and sampling, data collection method, data collection instrument, ethical considerations and trustworthiness of the study. The following chapters present the findings and discussion of the findings.

CHAPTER FOUR

FINDINGS

4.1 INTRODUCTION

The study was intended to explore and describe the opinions of multidisciplinary team members regarding weaning protocols in PICU and CTICU at a public sector, university affiliated hospital in Johannesburg. The exploration involved enquiring about multidisciplinary team's experiences and involvement in weaning practice and their views on the need to develop and use weaning protocols. In order to do this, the main objectives guiding conduct of the study were establishing opinions of multidisciplinary team members on the need to develop and use weaning protocols and identifying members to be included when developing such protocols, describing these opinions and identifying areas to be included in the weaning protocols for nurses in PICU and CTICU of an academic hospital in Johannesburg.

In Chapter Three, the research design and methods were provided. This chapter begins with the presentation of the demographic profile of the study participants. The themes which emerged from participants' expressions of their opinions on the need for weaning protocols are then presented with participants quoted words for clarification purposes. The summary of the findings is finally presented, which provides the fundamental structure of multidisciplinary teams' opinions of the need to develop and use weaning protocols in PICU and CTICU.

4.2 PARTICIPANT'S DEMOGRAPHY

The multidisciplinary team's characteristics comprised of profession category, gender, qualification, years of experience in the designated unit and specialty training (See **Appendix C**). Ten (n=10) multidisciplinary team members comprising eight nurses and two doctors from PICU and CTICU participated in the study.

Table 4.1 below summarises the characteristics of ten (n=10) participants for discussion of data.

ITEM	DEMOGRAPHIC CHARACTERISTICS	FREQUENCY (n)	PERCENTAGE (%)
1	Profession: Nurses	8	80
	Doctors	2	20
2	Gender: Male	1	10
	Female	9	90
3	Qualifications:		
	Diploma	4	40
	Bachelor's degree	4	40
	Medical and Doctorate degree	2	20
4	Specialty Training:		
	Critical Care nursing	3	30
	Paediatric and Neonatal Nursing	1	10
	Neonatologist	1	10
	Paediatrician and Neonatologist	1	10
	None	4	40
5	Years of Experience:		
	1-5 years	5	50
	6-10 years	2	20
	11-15 years	0	0
	15-20 years	3	30

Females formed the majority (n=9; 90%) of the study participants. The nursing profession was well represented by eight (n=8) participants and proportionally, two (n=2) doctors contributed the medical opinion. Four (n=4; 40%) participants held a diploma in nursing, another four (4; 40%); held a Bachelors' degree in nursing, whilst two (20%) had medical and doctoral degrees. The majority (n=6; 60%) of participants held post-basic qualifications: three (n=3; 3%) nurses were qualified

Critical Care nurses and one (n=1; 10%) a Neonatologist. Two participants (n=2; 20%) received post basic education in two specialties, one in paediatric and neonatal nursing while the other was both a Paediatrician and Neonatologist. Four nurses (n=4; 40%) were general nurse professionals with Paediatric Intensive Care experience. Work experience in PICU care ranged between less than 5 years (50%) and a maximum of 20 years (30%).

4.3 EMERGENT THEMES

This section focuses on findings which surfaced from participants' expressions of their opinions regarding the need to develop and use weaning protocols. The prevailing main issues included current weaning practices, decision making in weaning patients from mechanical ventilation, team members responsible for weaning patients from mechanical ventilation, significance of using weaning protocols, individualised weaning, importance of knowledge, competence and experience in weaning practice and need for training nurses in Critical Care nursing. These seven (7) categories generated three (3) emergent themes which provide the fundamental structure of the findings of the study and included:

- Unstructured weaning – the current practice.
- Recognition of the need for weaning protocols.
- Being not in favour of weaning protocols.

Each of these themes will be presented and discussed in detail substantiated by verbatim quotations from interview transcripts in the context they were expressed to support observations or conclusions drawn by the researcher and give them meaning. Following standard procedures for reporting interview data, typical statements made by participants are presented in italics.

4.3.1 Theme 1: Unstructured weaning – The current practice

Participants in this study observed that despite having mechanical ventilator protocols in PICU and CTICU, there were no weaning protocols to guide weaning resulting in the current practice of unstructured weaning.

"We have protocols on how to start ventilation, how to monitor but we have never like developed a weaning protocol. I have heard that in some units they have a weaning protocol but I don't have like a personal experience in using a protocol".

Participant 10

Another participant added:

"Truly speaking we don't have protocols on weaning patients... the procedures that is done is only weaning a patient according to the progress of the baby".

Participant 3

One participant described specifically the current weaning practice as trial and error:

"I still have not seen like in black and white eee protocols as to what to follow because it varies according to the professor who is on call in that unit for weaning the patient...pause... it's not standardised but more or less they are all following the same but it's not really like... you know... one plus one is two. The other one is like let's try this or may be based on the history or the other patients so it's trial and error most of the times".

Participant 6

Some participants alluded to the fact that weaning patients is usually guided by the doctor's daily ventilator weaning plan instructing nurses on what to do for that particular patient and day. This depends on the individual doctor, just as this participant had to say:

"If the unit is working properly the doctors are supposed to write a weaning plan on each individual patient chart giving the nurses various parameters for weaning and the nurse normally does blood gases and the weaning".

Participant 9

Another participant added:

“Currently our weaning practices like we are six ICU doctors working in ICU and I think everyone has their own protocol, not protocol as such but there is a way in which they wean patients it’s not standard so you find out that this week am on I say this is.... “

Participant 10

It was also noted that nurses wean patients from mechanical ventilation using discretion based on their knowledge and experience as pointed by this participant:

“The nurses do wean the patients but they also just wean them from their experience so it depends on who taught them it’s not written down that ...what we may be just give them because we are mainly in neonatal ICU so we tell them that everyday there is a ventilator plan so you write.... saturations are above this level.... you can wean FiO₂ but you never say by how much so they also use their discretion”.

Participant 10

All participants based their decision to wean on the same weaning parameters. The parameters included patient’s history of illness and clinical presentation in terms of oxygen saturations, arterial blood gases (ABG) which includes PaCO₂, PaO₂, pH and HCO₃ and ventilator settings of FiO₂, pressures and rates.

This participant said:

“If you notice that your baby clinically is nice and pink and is maintaining good sets.... Its good then that you start to wean that FiO₂ drasticallyunless otherwise presented and then we stand to start as well with the ventilator of 30, you start with the peak pressures of 24/5, but as am saying clinically how the patient will be presenting it tells you like with your next move.”

Participant 1

Another participant added:

“The process is started basing on the condition of the baby in terms of oxygen concentration, pressures as well as BG results.’

Participant 5

Participants in the study indicated that the process of weaning patients from mechanical ventilation depended on the patient's response to ventilation and mode of ventilation. However, they all pointed that the weaning process starts with oxygen followed by pressures and rates.

One participant said:

"Weaning babies from ventilation usually starts with oxygen first then you continue with the other parameters. If the baby is able to maintain the oxygen saturations above 90% with the FiO₂ below 30% and pCO₂ with pressures of 12 and PEEP of 5 then that baby is ready to wean so we wean that baby from oxygen. The pressures determine the weaning of oxygen."

Participant 5

Another participant agreed:

".....on mechanical ventilation we will generally try to wean the oxygen down to 60% first and then we would wean the pressure and rates until we are on extubation settings for the new-born or infant."

Participant 9

However, participants in this study had different views regarding who has responsibility over weaning patients from mechanical ventilation. Participants, especially those who were new to PICU, regarded weaning patients off ventilation as the responsibility of the doctors as expressed by this participant:

".... professionally it is the duty of the doctor to do that (to wean). And not everyone who works here is neonatal or paediatric trained so that is where the problem is."

Participant 2

Another participant further stated:

"....like I said from us from nurses' view we mostly follow orders from the doctors.."

Participant 6

Experienced and ICU trained participants believed they were obliged to wean patients by their specialty training as evidenced in these statements:

One participant said:

“Yes it is your responsibility because we learn that in training (ICU)”.

Participant 4

Another participant supported the idea:

“As a trained ICU nurse I know what to do and what is important is to know your blood”.

Participant 1

Whilst acknowledging the professional obligation of doctors over weaning, some participants felt nurses proximity to patients gave them the responsibility to wean as doctors are short staffed and not always around.

As expressed by this participant:

“So I cannot just stay waiting for the doctor to come I am with the patient all the time so I need to make a decision we don’t want to overly saturate the baby so we will wean the baby from oxygen.”

Participant 2

This was also supported by another participant:

“.....so as you know that like in terms of our doctors as well you will find that the doctors covering this side is also covering eeehh the premature side and that is 177 and also 278 so you yourself as well you need to be the doctors eye and be able to take appropriate actions in terms of those blood gases.”

Participant 1

Just as this participant lamented over shortage of doctors to carry out the weaning:

“The problem is also that we don’t have sufficient doctors especially at night and after hours we have got only one registrar on the floor to look at 15 ventilator patients so it’s not always possible for the doctors to do eh hh you know all the weaning as they should.”

Participant 9

One participant observed that the scope of nursing practice gives nurses the mandate to advocate for needs of patients, hence nurses have the professional responsibility to wean patients from mechanical ventilation as part of fulfilling the needs of the patient.

This participant had this to say:

“But again I also work according to our scope of nursing the SANC R2598 it gives the nursing responsibilities. So much as we are using the protocols we are also guided by the scope of nursing. Is it not the same scope of nursing that tells us to advocate for the needs of the patient, observe and provide care according to needs? To me I know as nurse you have the responsibility to observe the patient, assess, plan and provide the needs of the patient. So I just do that. I do not think you can be penalised because you weaned a patient. We don’t need to hyper ventilate the patient because not weaning will just make matters worse.”

Participant 2

4.3.2 Theme 2: Recognising the need for weaning protocols

Most of the participants in this study agreed on the need to develop and use ventilator weaning protocols in PICU and CTICU. They described various reasons to support the need, such as guiding weaning especially for nurses new to PICU, standardising practice and for safety and autonomy in nursing practice.

Using weaning protocols as a guideline for weaning practice in PICU emerged as a consistent theme amongst the participants.

“With the protocol you have something guiding you on how to go about weaning the patient so I think it will be good if the protocol is in place.”

Participant 5

Another participant added:

“Protocols also clarify things, they explain what to do and give steps to follow and this makes things a bit easier.”

Participant 2

All participants who supported the use of weaning protocols indicated that weaning protocols are needed as a guideline, especially for nurses new in ICU as they lack confidence as a result of having little knowledge and experience in weaning patients from mechanical ventilation.

“...I think we need the protocols to be a guidance I mean.... because me I have a long years working in ICU set up but what about those newly qualified nurses they have to follow the protocols they can't follow what I have been doing so I think protocols should be there.”

Participant 4

Another participant expressed her experience when she was new in the unit:

“I started in this unit fresh from school. It was a little bit challenging, trying to understand what is going on, why I am doing this what's happening but even the new ones is still a challenge you find that you wean you do not know the reason why you do what you are doing but for now am okay I have learnt a lot and am fine I do understand why should I wean”.

Participant 3

Most participants highlighted the fact that not all nurses practicing in PICU are trained in Critical Care nursing, hence underscored the need for protocols in ICU.

“Some of the nursing staff are not as well qualified and experienced as in the past and that’s why I think we need the protocols even more important aaa you know it’s really important to have written guidelines so that the nurse can carry out the instructions as put in the protocol.”

Participant 9

Not only will weaning protocols guide new nurses but also new registrars as they also have problems in weaning patients as observed by one experienced participant:

“Without protocols, sometimes people get confused they do not know what to do. This is very important for nurses who are new. But it is not for nurses only , even registrars especially when they are new, most of them do not know how to wean they usually ask consultants. “They say I have done this and the baby’s condition is like this and consultants advise them”. So you see if we had protocols in place things would have been easy for them.”

Participant 5

One participant offered a different perspective that weaning protocols as guidelines are only needed when one is new but once experience is gained they are used less often.

“You know with time and experience you know what to do. You become to know the Vents, the blood gases. You are able to interpret them; you are able to change the pressures according to patient’s condition. So the experience and the knowledge that you gain with time help you to work without always referring to the protocols.”

Participant 2

The need to have weaning protocols in PICU was further supported to standardise weaning practice in PICU. Some participants expressed a concern that there is no uniformity or standard of weaning of patients from ventilators as weaning varies according to individuals involved:

“Because what is happening is that everybody is just weaning of course basing on blood gases and SATs but there is nothing like a standard, so sometimes it is confusing and people become stressed up. So protocols are also there for uniformity just for control so that we do the same thing all of us okay. They like set the criteria to ensure that everybody can do the same thing.”

Participant 7

Another participant also agreed with the observation:

“Of course if there are no guidelines everyone does her own things so there is need for each unit to have its own protocol that suits the environment.”

Participant 2

Participants observed that weaning without protocols compromises patient safety and safety in nursing practice. Some participants stated that weaning without protocols can either prolong or shorten ventilation with unfavourable patient outcome.

One participant said:

“It’s just that you will not be able to measure it but I think without a protocol then probably you will have a prolonged stay in ICU especially for those people that wean slowly but also for people that wean faster they might just ...may be underestimate the illness of the patient and wean quicker and then the patient fails extubation so there is repercussions on both sides.”

Participant 10

Another participant also added:

“Very difficult because anything that you do you have to wait for the doctor. This delays the weaning you know some patients have been extubated late, they become restless and you sedate them unnecessarily because they are kept longer on ventilations...you understand me ...so with long ventilation you end up having complications like infections so to prevent

and minimise those problems you better wean the patient quickly and extubate. Though not too quickly because sometimes the patients are weaned prematurely which is not good either as they fail to cope up.”

Participant 7

“.....When the baby is hyperventilated for a long time you know there are complications like the retinopathy of prematurity.”

Participant 5

Responding to the same question another participant added:

“Yaa and sometimes (weaned) too abrupt and then, when now you wean the child and you see the child is not coping and may be they put the child on CPAP andnow it's another setback because the child will go back to the vents.. you see.. and they go back on a high settings so just wean slowly on the vents and also because we have different levels between registrars, sometimes.....some of the registrars they don't know exactly like the rate that can wean to extubate the child that's why the child doesn't cope because was weaned on high settings.. maybe the pressure was still high and the rates as well.”

Participant 6

Some participants expressed lack of trust of nurses who are not trained nor experienced in ICU, as they tend to make mistakes in the absence of weaning protocols.

“I think it's really important that the parameters are set and if the nurses are going to take over the weaning and the management of the ventilator which is practical for our situation where we don't have enough medical staff I think that without a protocol especially when that nurse is not ICU trained then they can do funny things on the ventilator.”

Participant 9

“I think there is (impact) I mean because there are certain things that sometimes you see for example as I have said not all sisters are trained and experienced in ICU and one of the common mistakes that people make is just to look at the carbon dioxide level and the blood gas without considering the pH and acid-base status and sometimes if the saturation is high they will take out the ventilation meantime the child has confrontation to meet the blood gas.”

Participant 9

In terms of nursing practice, some participants' emphasised the need to have a weaning protocol as a professional document to defend nursing role in weaning, thus ensuring safe weaning practice.

“You are backed by those protocols, I know when I use the protocols and something goes wrong with the baby I can defend myself even at SANC to say I did this because it is written in the protocols or in that way you are safe.”

Participant 2

Another participant agreed to the notion:

“If you don't have a protocol for example if I did a mistake following through the process for example a patient died what's going to guide me at SANC that I did because of this. You understand me, you don't have a governor, you don't have a proof showing that I have been following this, you were just weaning.”

Participant 3

Another reason suggested by participants, which necessitates the need to have weaning protocols in ICU, is autonomy. Participants implied that protocols will help them to independently wean patients from ventilators without necessarily always waiting for doctor's instructions on what to do.

“I mean if I have to wean this patient what am I going to use? With the protocol, I must be able to wean the patient on my own so it will lead to

quicker extubation unlike where the patient is waiting for the doctor....now wean the oxygen , now wean the rate, now wean this what...you understand."

Participant 3

Another participant also supported this view:

"As a nurse working here, a protocol gives an allowance to practice on your own and make decisions."

Participant 2

One participant acknowledged the use of weaning protocols as evidence based practice, as weaning protocols are well researched therefore ought to be used.

"Protocols are they not research based? Because I know people have conducted research studies to come up with those protocols. They are often reviewed to make changes that suit the situation so they are reliable."

Participant 2

Having recognised the need for weaning protocols in PICU and CTICU, all participants agreed that development of weaning protocols requires team approach particularly involving experienced members in PICU.

One participant said:

"Doctors and nurses because they are the ones who often work here and they work together and have experience in ventilation."

Participant 2

"All ICU work is a team approach and one thing it doesn't work to have some single person in charge to saying this is how it shall be so I think these protocols have to be developed between the doctors and nurses looking after the patients and the nurses who are going to do the weaning should understand and be part of the process."

Participant 9

4.3.3 Theme 3: Being not in favour of weaning protocols

Despite recognising the need for weaning protocols in PICU and CTICU some participants in this study were not in favour of the protocols, as weaning protocols were considered restrictive and not recognising patient uniqueness. This was evident in the following statements:

“You have to use your discretion basing on your knowledge and experience and also the patient’s illness. Using protocols is like you are using a rule over the patient care so in ICU you cannot have a rule to dictate you on what to do. So I do not think that can work.”

Participant 8

Another participant added:

“The only problem I have working in the neonatal ICU is when people just follow protocols and yet the patients are different so it’s going to be very difficult to just aahh you know like we experience that when you say ‘the protocols says’ even when the patient doesn’t fit the criteria.”

Participants 10

“People insist that they follow the protocol. Yes you need to have protocols in place but use them as a guide not like as they are cast in stone because you need to adjust your ventilation based on the type of patient and the type of illness.”

Participant 10

Participants emphasised the need for individualised weaning, as weaning protocols generalise care and fail to recognise patient uniqueness.

“We are dealing with the Intensive Care Units each and every patient needs to be treated individually (pause) what is best is for the sister who is looking after that child is to have the insight in terms of ventilation to be able to analyse a blood gas (pause) and then after analysing and then eeee do what is proper for that patient at that moment in time.”

Participant 1

Another participant supported the view:

“I can say in terms of our ventilation weaning protocols it basically depends on each and every patient’s needs. I cannot just generalise that there is this for specifically for such type of patients because we admit different type of patients with different needs and reasons why there is need to be ventilated.”

Participant 1

One participant emphasised the need to individualise weaning on the basis of age of the patient:

“They have got to be individualised, I mean you can’t have black and white protocol especially in a unit like ours where you can have anything from an 800g neonate all the way through to 18 year old male so you can’t have a blackened protocol so they have got to be individualised.”

Participant 9

The importance of having knowledge, experience and competence when using weaning protocols to wean the patients from mechanical ventilation featured highly among ICU trained and experienced nurses.

“What I believe is that the person who looks after that child must have the insight.... You must have the insight, you must have knowledge, understand why am I ventilating this patient, know what are the functions, what is the rate doing to this patient, what does the pressure do to this patient, what does FiO₂ do to this patient. For me those are very very much important because I can still have all those weaning protocols but if I still don’t understand what I am dealing with, what am I looking at in that ventilator, what is the function of the FiO₂ and the pressure you know. So in that way you will do more harm than good.”

Participant 1

The same nurse reaffirmed her belief of having insight of the practice

“Yes it will be a guideline like at least for people like students but now as a nurse specialist I fully believe you must have the insight you must have ehhhh know what you are doing.”

Participant 1

Experienced nurses also regarded autonomy as an important aspect in weaning practice:

“I can wean the patient from oxygen and the sets and that is what we normally do here for example am looking after that baby I have to monitor the blood gases and basing on the results and oxygen saturation I will wean the oxygen and the pressures and rates. So I don't need someone to tell me that or wait for the doctors you know but extubation is decided by the doctor even if we know that the patient is due for extubation.”

Participant 8

Confidence was also evident in experienced and ICU trained nurses as expressed by this participant:

“As trained ICU nurse you know how to wean the patient, when to wean the patient and the dangers associated with prolonged ventilation..... So it's good as nurse professionals and nurse specialist to be knowledgeable.”

Participant 1

“I will say am an expert because am neonatal care, am also paed's trained I can analyse a gas I can do a gas ...pause.....and I have more insight in terms of my experience and exposure to different types of diagnosis”.

Participant 1

Participants expressed their wish for training in ICU to have knowledge base in mechanical ventilation and weaning and hence prepare nurses for ICU practice. They suggested that nurses not trained in ICU but practicing in PICU should go for such training, as illustrated by this participant:

“There is need to send staff here to go to school for training so that everyone is trained in ICU. Of course those who are new are oriented, supported and educated on job.”

Participant 2

Need for in-service training in Critical Care nursing for nurses new to ICU was suggested to impart prior knowledge and enhance understanding on weaning thereby make their practice easy.

This was expressed as:

“Before they bring nurses or a new nurse in ICU at least to be trained it is not that as you think because by passing day you wish like I cannot work in there it’s not that good but when they do a basic or given a basic as you are trained you will be understanding what’s going there but when you are new fresh you even don’t know what’s happening.”

Participant 3

One participant suggested inclusion of weaning in the curriculum for new nurses training as a way of increasing nurses with such knowledge.

This participant said:

“ICU trained sisters are becoming such a scarce commodity and I think it’s really important especially with the increasing numbers of ICU beds and I think that it (weaning) is incorporated in the training of the future nurses.”

Participant 9

Experience was considered vital when weaning patients from mechanical ventilations as pointed out by this participant:

“...the more experience the more nurses know how to wean without our intervention (doctors) but the newer nurses you basically... they are scared so they are slower than the experienced people.”

Participant 10

Some participants lamented over the current shortage of trained and experienced nurses in ICU and attributed it to inadequate training programmes of nurses in Critical Care nursing.

“Of late unfortunately as you know in ICU trained sisters in ICU are becoming a scarce commodity and some of the nursing staff are not as well qualified and experienced as in the past.”

Participant 9

“I think that’s not quite the same now because I don’t think all the sisters are comfortable with it so I think that doctors are taking more responsibilities for that but it worked very well with the nursing staff provided they were experienced and trained and you know... take the management of the ventilation.”

Participant 9

To address the educational gap, nurses new to PICU are trained on the job by experienced and ICU qualified nurses and this was regarded as the responsibility of experienced professional nurses by some participants:

“When new nurses come here they are taught how to wean by experienced nurses basing on their experience not using the protocols.”

Participant 4

Another participant agreed:

“For a sister it is part and parcel of what is expected of you to be able to teach others, those who do not have the insight. You cannot say all of us we are at par others are still new others are experienced.”

Participant 1

In view of the findings, it is evident that most of the participants (who are nurses and doctors) recognise the need for use of weaning protocols in Critical Care settings for various reasons. Such reasons included guiding practice, standardising practice and for safety and autonomy in nursing practice. However, individualised weaning, importance of education, competence and experience and weaning protocols being restrictive were amongst the reasons some participants described for not supporting weaning protocols. This section has provided the fundamental features which gave an insight of the opinions of multidisciplinary team members regarding weaning protocols. The main expressions are linked to unstructured weaning practice currently prevailing in ICU as a result of the absence of weaning protocols and lack of training for nurses in Critical Care nursing which affects weaning practice. Controversies arose amongst participants over the role of the nurse in weaning, with some nurses accepting responsibility, whilst others felt not obliged. Team approach was expressed as a key strategy for the development of multidisciplinary weaning protocols. Trained and experienced participants expressed their role in teaching the nurses new to PICU to wean patients from mechanical ventilation until the latter were fully capable.

4.4 SUMMARY

This chapter presented the findings of the study. Three (3) major themes emerged from the findings. These emergent themes were presented and validated with extracts of participants exact expressions for clarity purposes and a summary of the findings, which formed the fundamental structure of the opinions of multidisciplinary team members practicing in PICU and CTICU, regarding the need for weaning protocols as captured from the study findings were presented.

In the next chapter, the findings will be discussed in relation to relevant literature including the study limitations, recommendations for nursing practice, education, management and future research and conclusion of the study.

CHAPTER FIVE

DISCUSSION OF FINDINGS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter provides a discussion of the findings of the study. The study's justifications are also presented together with limitations. The chapter concludes with recommendations for nursing practice, education, management and future research and a final conclusion for the study.

5.2 DISCUSSION OF THE FINDINGS

The study provides evidence that not all the participants were in favour of weaning protocols. There was mixed reaction towards the need to develop and use weaning protocols in PICU, with some supporting while others not. According to Blackwood and Wilson-Barret (2007), the use of weaning protocols is a controversial issue because of the contentious status of the research evidence and doctors' perception that protocol rigidity will restrict professional freedom and autonomous practice. It is also suggested that nurses and allied professionals tend to adhere to protocols more readily as a result of their different trainings and professional cultures (Blackwood, Alderdice and Burns et al., 2011).

The findings show that participants recognise the need for weaning protocols in PICU as they guide and standardise weaning practice, as well as ensure patient safety thereby improving patient outcome. Furthermore, weaning protocols make nurses feel safe to practice and ensure autonomous decisions. Consistent with this finding are the number of studies which have investigated the perceptions of doctors and nurses regarding weaning protocols, where it was found that weaning protocols were perceived as useful and well accepted (Blackwood, Wilson-Barnett and Trinder, 2004; Hansen and Severissson, 2007; Hansen and Severissson,

2009; Danckers, Grosu, Jean, Cruz, Fidellaga, Han, Awerbuch, Jadhav, Keith and Khouli, 2013). These studies conducted in Norway, UK and USA respectively, revealed that nurses perceived weaning protocols as useful because they fostered inter-professional agreement which allowed them nursing autonomy, provided focused weaning, saved time, easy to use, efficient and lead to a feeling of safety and continuity in the weaning. According to Anderson & O'Brien (1995) and Blackwood, Alderdice, Burns et al., (2011) protocols define necessary criteria for weaning and extubating patients within ICU. Weaning protocols also provide guidelines to enable the nurse to exercise clinical judgement based on experience and knowledge, when taking decisions to wean and extubate. Keogh, Courtney and Coyer, (2003) in a study of examining the impact of guidelines for weaning children from mechanical ventilation on patient outcome found collaborative guidelines could be used safely and effectively to guide the weaning process for the Paediatric population in Intensive Care. The current study also demonstrated the need for weaning protocols for guidance as a result of shortage of doctors and ICU qualified nurses in the unit. According to Roh, Synn, Lim, Suh, Hon, Huh, Koh (2012) and Blackwood and Wilson-Barnett (2007), protocols may have merit in institutions where organisational structures and the environments, such as lack of availability of medical staff and Critical Care nurses educated at postgraduate level, negatively affect the duration of ventilation and progress of weaning. Guidelines and protocols based on best practice and research are developed to reduce undesirable variations and improve the quality of care (Blackwood, Alderdice, Burns et al., 2011). However, the concept of using weaning protocols as evidence based practice was not well pronounced in the study except for one participant who acknowledged it. Despite evidence in literature, only one participant related weaning protocols to reducing weaning time. This may be attributed to non-availability of the weaning protocols in PICU.

Controversially, some participants in the current study described individualised weaning, importance of knowledge, competence and experience in weaning patients as opposed to use of weaning protocols and restrictions being placed on their clinical judgement as reasons for not being in favour of the utilisation of weaning protocols in PICU. This correlates with findings in other studies of consultant physicians, doctors and nurses' perceptions and barriers to undertaking

weaning protocols (Blackwood, Wilson-Barret and Tinder, 2004; Blackwood & Wilson-Barnet, 2007; Tume, Scally and Carter, 2013) that protocols were viewed as unnecessary and their introduction and use as a restriction on clinical discretion and autonomous practice which may lead to repression of analytic thought, critical thinking, clinical innovation and failure to facilitate individualised care in both medical and nursing practice. Participants in the current study preferred individualised patient care as it recognises patient uniqueness and specific needs regarding the nature of illness and age. To support this notion, Crocker (2009:185) noted that weaning a patient is not merely discontinuation of mechanical ventilation, but “continuity of care, knowing the patient and the development of patient centred, individualised weaning plans” which suggests the importance of nurse involvement in the process.

It was demonstrated in the current study that participants emphasised the importance of experience and clinical competence in weaning patients from mechanical ventilation. Weaning was considered too complex and a high risk procedure to be left to inexperienced nurses in ICU, who could not be trusted with the practice as they tended to make mistakes. Clinical competence is a combination of skills, behaviours and knowledge demonstrated by performance within a practice situation and specific to the context in which it is demonstrated (Elliott, Aitken and Chaboyer, 2012). This concurs with Gelsthorpe and Crocker’s (2004) findings in the UK, which explored factors which influence the decision to commence nurse-led weaning and that experience and professional judgement were key factors in decision making for nurses in weaning patients. Nurses believed individual judgement based on knowledge, skill and experience can override protocol use and that commencing protocols may only help junior staff manage the weaning process. Crocker and Scholes (2009) underlined the importance of skill and experience having a positive impact upon decision making and the need for a sufficient amount of experienced practitioners to fully undertake a procedure. This corresponds with nurses achieving competence through experience, from which skill is an inherent element. Contrary to this, Morris (2003) argued that using experience, which is often prejudiced, to base decisions upon may have undesirable consequences with regard to weaning patients and suggests that a systematic approach to weaning improves patient outcome as

opposed to individual judgement. Flynn and Sinclair (2005), in an Irish ICU, explored the relationship between nursing protocols and nursing practice in ICU and found that nurses feared losing their clinical judgement over protocols and adapted clinical protocols as they saw fit, thus demonstrating the importance they place on their own professional judgement and autonomy.

As evidenced by their profile and expressions, the findings in the current study suggest lack of formal training for half of the participants which related to feelings of inadequacy with regard to knowledge and skills for weaning practices. There was evidence that nurses new in PICU and non-qualified ICU nurses do pass through some levels of difficulty before becoming used to the complex nature of weaning patients in PICU. This conforms with the findings of Aari, Tarja and Helena's (2008) report, on Cochrane review of studies, regarding clinical and professional competence in Critical Care nursing and Guilhermino, Inder, Sundin and Kuzmiuk's (2014) study determining how Intensive Care Unit nurses perceived current education provided on mechanical ventilation. These studies found that registered nurses and graduating nurse students are commencing their ICU experience with limited knowledge of invasive MV and lack skills in practicing. They put weaning a patient on low priority out of fear. According to de Beer, Brysiewicz and Bhengu (2011), the environment of an Intensive Care Unit (ICU) is highly technological, requiring the nurses to have a broad knowledge base and a high level of decision-making skills as they care for patients and their families who are in vulnerable circumstances. In the current study, participants aspired for Intensive Care training as one educational opportunity that would empower them on the job, as well as prior to allocation in PICU. Elliott, Aitken and Chaboyer (2012) noted that formal education in conjunction with experiential learning, continuing professional development and training and reflective clinical practice, is required to develop competence in Critical Care nursing. It can be acknowledged that in every clinical setting, adequate knowledge, skills and positive attitudes towards a subject matter of interest are critical to successful service provision. It is therefore important that the education provided within the ICU workplace becomes fundamental to safe and effective practice.

This study provided evidence that nearly half of the participants were not formally trained. Lack of formal training causes a shortage of Critical Care nurses in PICU, as established in this study. The Critical Care nurse is responsible for caring for the critically ill patients in hospitals and the acute shortage of nurses contributes to the intensity and pressure of the environment (Pretorius and Klopper, 2011). According to the National Audit of Nursing Profiles in South African ICUs and HCUs, only 25.6% of nurses working in ICU were ICU trained, the majority were registered nurses (49.2%), whilst 21.4% were semi-professional nurses (Scribante and Bhagwanjee, 2007). This demonstrates that Intensive Care nursing in South Africa faces the challenge of acute shortages of trained and experienced nurses in Critical Care nursing. This implies that patient safety is compromised as errors are more likely to occur in weaning as a result of inadequate knowledge combined with inexperience, shortage of staff, high activity level and inadequate supervision. Scribante and Bhagwanjee (2007) reported that nursing care without expertise may be a potentially harmful intrusion for the patient and directly affect outcomes such as morbidity and mortality.

What is of concern, is the finding that participants were divided about the nurses' role with regards to weaning patients from mechanical ventilation. While some participants believed nurses can wean patients from ventilators because of their proximity to patients and specialty training in Critical Care nursing, others felt they were not professionally accountable. The argument is based on the fact that weaning is regarded as the medical domain (Lavelle and Dowling, 2011), therefore extension of such responsibility to nursing practice requires authentication from regulatory authorities. In the context of nursing, an extended role is one which is not covered in basic training for the register. With the current scope of nursing practice (SANC Regulation 2598) for the registered nurse in South Africa, participants in this study felt unsafe to wean patients as the scope of practice does not stipulate the role of the registered nurse in weaning, it only states '*The supervision over and maintenance of a supply of oxygen.*' This statement is broad and difficult to understand. According to Scribante, Muller and Lipman (1995), in their interpretation of the scope of practice of South African Critical Care Nurse (SANC Regulation 2598), the ethico-legal and professional responsibilities of the registered nurse, as stated in the scope of practice, are not specialisation specific

and not well understood by the practicing nurse. However it includes assessment, planning, implementation and evaluation as continued and interlocking actions ensuring crucial decision making as required in the nursing process. Scribante, Muller and Lipman (1995) noted that anything which is left out automatically falls outside the scope of practice. In addition to this, although Intensive Care nursing is registered by SANC as an additional post registration and postgraduate qualification of the critical nurse specialist, there is limitation of the specific scope of practice (de Beer, Brysiewicz and Bhengu, 2011). The current study shows that the role of the nurse in mechanical ventilation and weaning in the study setting is not well defined. Rose, et al., (2013) noted that management of mechanical ventilation and weaning is not seen as part of nurses' scope of practice in many institutions resulting in a separation of care. This underscores the need for weaning protocols to make the nurses feel safe to practice. According to Rose, Blackwood and Egerods et al. (2011b), the role of nurses, relative to ventilator adjustment and weaning, varies by institution according to availability of respiratory therapists and the presence of policies and protocols which empower nurses to manage different aspects of ventilator management. A study in the UK to determine the professional group and seniority of clinicians responsible for key decision making regarding ventilation and weaning by Blackwood, Junk, Lyons, et al., (2013) found that key decision making occurred via inter-professional collaboration mainly between senior physicians and senior nurses. However, independent PICU nurses' role in mechanical ventilation and weaning was limited to adjusting the oxygen in addition to their primary role of the on-going assessment of patients and their response to treatment.

Participants in the current study acknowledged that departmental guidelines for weaning were not available, resulting in variation in the approach to weaning. They described common current practices as doctor-led weaning with the use of individual weaning plans, trial and error approach and relying on ICU qualified nurses to wean patients based on their experience and knowledge. Taylor (2006) examined the way doctors and nurses make decisions in weaning patients from mechanical ventilations. The study found similar results in that approaches to weaning were based on decision making analysis to come up with an individual weaning plan, tuition-based on past experience and trial and error approach, in

which ventilator settings are reduced and patient's response observed. In the absence of protocols or where protocols are not often used, there is variation in the approach to weaning which delays weaning and compromises patient safety. As documented in literature, participants in the current study described impact of weaning without protocols in children as prolonged or shortened mechanical ventilation which results in complications such as retinopathy of prematurity, infections, dysplasia, lung damage due to hyperventilation (Newth, et al., 2009; Rose and Nelson, 2006) and need for re-intubation due to extubation failure resulting from premature or rapid weaning rapid (Keogh, Courtney and Coyer, 2003).

It was demonstrated in the study that participants based their decisions to wean on patient's history of illness and clinical presentation which included changes in oxygen saturations, arterial blood gases (ABG) which include PaCO_2 , PaO_2 , pH and HCO_3 and ventilator settings of FiO_2 , pressures and rates. In a study conducted by Lavelle and Dowling (2011), on describing factors which influence nurses when weaning patients from mechanical ventilation, findings showed that participants based their decision on physiological influence as a result of assessments of arterial blood gases and ventilator settings. The medical history of the patient was also considered, as certain conditions can slow weaning or make it more complex. This shows the importance of clinical assessment of the patient before deciding to wean and during weaning.

The findings in the study have demonstrated that team approach is a key strategy to developing weaning protocols. Participants asserted that experienced nurses and doctors in ICU need to be involved in the development of weaning protocols. White, Currey and Botti's (2011) study, in determining if ventilation-weaning protocols developed and implemented by multidisciplinary teams reduced the duration of mechanical ventilation, found that involvement of key stakeholder clinicians from many disciplines through all stages of protocol development, dissemination, implementation and evaluation generates ownership and an interest at a clinical level, resulting in improved adherence and patient outcomes. ICU has a high activity level consisting of inter-professional roles and responsibilities by diverse health care providers requiring collaboration through

team approach. Teamwork allows input from the perspectives of both nursing and medicine resulting in shared planning, responsibility, and decision making which maximises the potential effectiveness of the team (Salipante, 2002). According to Blackwood, Wilson-Barnett and Trinder (2004), a team approach, involving nurses, physicians and relevant others, should be deployed to develop the protocols and plan the implementation process. This would ensure protocolled weaning addressed unit-specific issues and those involved in protocol development would need to 'champion' its implementation. Rose and Nelson (2006), in a study to raise questions on the effect of skill mix and organisational structure on weaning from mechanical ventilation, reported that recent pre- and post-interventional studies support and advocate for a multidisciplinary approach to implement all protocols or guidelines developed for weaning from mechanical ventilation. A multidisciplinary approach to protocol development, implementation and review is essential to ensure success.

5.3 APPLICATION OF THEORY TO THE FINDINGS

When applying the AACN Synergy Model of patient care to the findings, team work was identified as the key competence for the development of weaning protocols in PICU. Despite the different views regarding the protocols it was evident that participants realised the need to work as a team in ICU and also to develop the evidence based weaning protocols to reduce variability in weaning practice which currently exist in PICU due to absence of weaning protocols. Participants observed that the absence of weaning protocols either delays or quickens weaning which negatively affects the patient outcome. Recognition of the need for weaning protocols in PICU and team approach will facilitate transition of practice from traditional professional roles to multisystem roles. Teamwork within a systems thinking and multidisciplinary approach will help participants to collaborate and develop weaning protocols which would standardise weaning practice in PICU and improve patient outcome.

5.4 SUMMARY OF THE STUDY

The purpose of the study was to explore and describe the opinions of multidisciplinary team practicing in the Paediatric and Cardiothoracic ICU at a university affiliated public sector hospital in Johannesburg concerning weaning protocols from mechanical ventilation. Prior to commencing the study, ethical clearance was granted by the Human Research Ethics committee (Medical) of the University of Witwatersrand and approval from the Faculty of Health Sciences Post Graduate Committee and the Nursing Services Manager at the hospital.

Paediatric and Cardiothoracic Intensive Care Units at a university affiliated public sector hospital were used to conduct the study. Multidisciplinary team members comprising of doctors and nurses were purposively selected to participate in the study. A semi-structured interview guide was developed by the researcher and pre-tested with the first participant prior to collecting data to clarify questions.

To achieve the study objectives, a qualitative and descriptive research design was used. Data was collected from ten (10) participants over a period of five weeks. Findings were discussed using Braun and Clarke's qualitative thematic analysis approach.

This study demonstrates that the need to develop and use weaning protocols in PICU is recognised to standardise the weaning practice and ensure patient safety and nursing autonomy. To ensure successful development of these protocols, team approach was therefore emphasised as a key strategy. Through collaboration nurses and doctors can plan the development of weaning protocols and implement them to improve patient outcome. It also emerged that half of participants are not trained in Critical Care nursing and this study suggests nurses should be trained in Critical Care nursing to improve their knowledge base and skills in weaning. Furthermore, there was no consensus on the professional obligation or role of nurses in weaning practices and this requires further exploration.

The opinions of multidisciplinary team members practicing in Paediatric and Cardiothoracic ICU concerning weaning protocols were identified and have been presented. It can therefore be stated that this study is justified in that the purpose has been achieved.

5.5 LIMITATIONS

- This study was conducted at a single public institution and therefore results cannot be generalised to other private and public hospitals, only to the specific PICU where the study was conducted.
- Study sample was not balanced as there were more nurses (n=8) than doctors (n=2) and thus findings cannot be generalised as doctors or nurses opinions.
- This was a qualitative study and no such study reflects the only true meaning as there could be more than one interpretation of the narratives. Qualitative studies do not present the only truth.

5.6 RECOMMENDATIONS

The findings of the study provide an insight of the opinions of multidisciplinary team members practicing in PICU with regard to weaning protocols. These findings have significant implications for weaning practice regarding nursing practice, education, management and further nursing research.

- **Nursing Practice**

The findings of the study indicate there are no weaning protocols to inform weaning practice in PICU, resulting in variation in weaning practice. The current weaning practice is doctor-led weaning which depends on the knowledge and experience of the individual doctor. These findings therefore serve as empirical evidence to inform development of ventilator weaning protocols in Paediatric Intensive Care. The multidisciplinary team should develop weaning protocols specific for the unit through a multidisciplinary approach. The protocols will serve

as a decision making tool for allied health professionals to standardise the weaning practice, as well as enable nurses to practice safely and autonomously. Once developed, the weaning protocol needs to be evaluated for its efficacy and function every six months.

- **Nursing Management**

Participants in the study expressed the need for educational opportunities especially for nurses not trained in Critical Care nursing but practicing in PICU. It is therefore imperative that consideration be given to policy development outlining prerequisites for allocation of nurses to PICU. Furthermore, continuous professional development programmes on mechanical ventilation and weaning should be instituted to empower nurses on the job.

- **Nursing Education**

It is acknowledged there is shortage of Critical Care nurses in South Africa. From these findings, half the participants are not trained in Critical Care nursing and considering the complex nature of weaning practice, having knowledge base in mechanical ventilation and weaning is vital. The nursing education should therefore consider revisiting the nursing curriculum for generic nurses to incorporate basic information on mechanical ventilation as well as scaling up the training of nurses in Critical Care nursing. This would help to prepare nurses for the weaning practice in PICU and make their practice easy and safe.

- **Future Nursing Research**

Although research has been done on the role of the nurse in weaning practice, findings in the current study established that the role is not well defined. There is a need to further explore the role of the nurse in mechanical ventilation and weaning practice. The current study can also be replicated in other PICU settings within the region to obtain diverse opinions of multidisciplinary team members regarding weaning protocols.

5.7 CONCLUSION

The study is based on the AACN Synergy Model of Patient Care. According to this model, nurses must have competences relevant to the patient's needs to optimise outcome. Paediatric patients in PICU are at risk of developing complications as a result of exposure to MV. Nurses practising in PICU are challenged with their role in weaning the patients from MV, underscoring the need to have weaning protocols to guide weaning. This requires the multidisciplinary team members to communicate and collaborate with each other to influence the introduction of the weaning protocols in PICU. These protocols will guide and standardise the weaning practice thereby improving patient outcome. The purpose of the study was to explore the opinions of the multidisciplinary team members in PICU regarding weaning protocols, of which systems thinking and collaboration through team work has emerged as the competences required for developing such protocols. This will help to facilitate the change in weaning practice.

The findings of this study provide an insight of multidisciplinary team member's opinions regarding the need to have weaning protocols in PICU. Despite the differences regarding weaning protocols, the opinions suggest there is need to develop and use protocols to inform and standardise practice through a multidisciplinary team approach as weaning protocols are not available. Findings in the study also showed that some nurses practicing in PICU are not trained in Critical Care nursing, thus underscoring the need for weaning protocols. As such, the study suggests that nurses should be formally trained in Critical Care nursing to improve knowledge base and skill which would optimise patient outcome.

LIST OF REFERENCES

- Aari, R., Tarja, S. and Helena, L. 2008. Competence in intensive and critical care nursing: A literature review. *Intensive and Critical Care Nursing*: Vol. 24, pp 78-80.
- Alspach, J.G. 2006. *Core Curriculum for Critical Care Nursing*. 6th ed. St Louis: Saunders Elsevier.
- Anderson, J. and O'Brien, M. 1995. Challenges for the future: the nurse's role in weaning patients from mechanical ventilation. *Intensive and Critical Care Nursing*: Vol. 11, No. 1, pp 1-6.
- Baisch, S., Wheeler, B., Kurachek, S. and Cornfield, D. 2005. Extubation failure in pediatric intensive care incidence and outcomes. *Pediatric Critical Care Medicine*: Vol. 6, No. 3, pp 312-318.
- Berman, A. and Snyder, S. 2012. *Kozier and Erb's Fundamentals of Nursing – Concepts, Processes and Practice*. 9th ed. New Jersey: Pearson Education Inc.
- Blackwood, B., Alderdice, F., Burns, K., Cardwell, C., Lavery, G. and O'Halloran, P. 2009. Protocolized vs. non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients. *Journal of Advanced Nursing*: Vol. 65, No. 5, pp 957-964.
- Blackwood, B., Alderdice, F., Burns, K., Cardwell, C., Lavery, G. and O'Halloran, P. 2011. Use of weaning protocols for reducing duration of mechanical ventilation in critically ill adult patients: Cochrane systematic review and meta-analysis. *British Medical Journal*: Vol. 342, pp 1-14.
- Blackwood, B., Junk, C., Lyons, J., McAuley, D. and Rose, L. 2013. Role responsibilities in mechanical ventilation and weaning in Paediatric Intensive Care Units: A National Survey. *American Journal of Critical Care*: Vol. 22, No. 3, pp 189-197.

Blackwood, B., Murray, M., Chisakuta, A., Cardwell, C.R. and O'Halloran, P. 2013. Protocolized versus non-protocolized weaning for reducing the duration of invasive mechanical ventilation in critically ill paediatric patients (Review). Cochrane Database of Systematic Reviews: Vol. 1, No. 7, pp1-26.

Blackwood, B., Wilson-Barnett, J. and Trinder, J. 2004. Protocolized weaning from mechanical ventilation: ICU physicians' views. Journal of Advanced Nursing: Vol. 48, No. 1, pp 26-34.

Blackwood, B. and Wilson-Barnett, J. 2007. The impact of nurse-directed protocolised-weaning from mechanical ventilation on nursing practice: A quasi-experimental study. International Journal of Nursing Studies: Vol. 44, pp 209 – 226.

Boles, J.M., Bion, J., Connors, A., Herrigde, M., Marsh, B., Melot, C., Pearl, R., Silverman, H., Stanchina, M., Vieillard-Baron, A. and Welte, T. 2007. Weaning from mechanical ventilation. European Respiratory Journal: Vol. 29, No. 5, pp 1033-1056.

BouAkl, I., Bou-Khalil, P., Kanazi, G., Ayoub, C. and El-Khatib, M. 2012. Weaning from mechanical ventilation. Current Opinion in Anesthesiol: Vol. 25, No. 1, pp 42-47.

Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. Qualitative Research in Psychology: Vol. 3, No. 2, pp 77-101.

Burns, N. and Grove, S.K. 2009. *The Practice of Nursing Research – Appraisal, Synthesis and Generation of Evidence*. 6th ed. St. Louis: Saunders Elsevier.

Burns, N. and Grove, S.K. 2011. *Understanding Nursing Research: Building an Evidence Based Practice*. 5th ed. St. Louis: Saunders Elsevier.

Chao, D. and Scheinhorn, D. 1998. Weaning from Mechanical Ventilation. Critical Care Clinics: Vol. 14, No. 4, pp 798-810.

Chatburn, R. and Deem, S. 2007. Should Weaning Protocols Be Used With All Patients Who Receive Mechanical Ventilation? *Respiratory Care*: Vol. 52, No. 5, pp 609-621.

Cohen, S., Crego, N., Cuming, R. and Smyth, M. 2002. The Synergy Model and the Role of Clinical Nurse Specialists in a Multihospital System. *American Journal of Critical Care*: Vol. 11, No. 5, pp 436-445.

Cronin, P., Ryan, F. and Coughlan, M. 2008. Undertaking a literature review: a step-by-step approach. *British Journal of Nursing*: Vol. 17, No. 1, pp 38-43.

Crocker, C. 2002. Nurse led weaning from ventilatory and respiratory support. *Intensive and Critical Care Nursing*: Vol. 18, No. 5, pp 272-279.

Crooker, C. 2009. Weaning from ventilation – Current state of the science and art. *British Association of Critical Care Nurses, Nursing in Critical Care*: Vol. 14, No. 4, pp 185-190.

Crocker, C. and Scholes, J. 2009. The importance of knowing the patient in weaning from mechanical ventilation. *British Association of Critical Care Nurses, Nursing in Critical Care*: Vol. 4, No. 6, pp 289-296.

Danckers, M., Grosu, H., Jean, R., Cruz, R., Fidellaga, A., Han, Q., Awerbuch, E., Jadhav, N., Rose, K. and Khouli, H. 2013. Nurse-driven, protocol-directed weaning from mechanical ventilation improves clinical outcomes and is well accepted by intensive care unit physicians. *Journal of Critical Care*: Vol. 28, pp 433-441.

de Beer, J., Brysiewicz, P. and Bhengu, B. R. 2011. Intensive Care nursing in South Africa. *South African Journal of Critical Care*: Vol. 27, No. 1, pp 6-10.

de Vos, A.S., Strydom, H., Fouche, C.B. and Depolt, C.L.S. 2011. *Research at Grass roots for the social sciences and Human Service professions*. 4th ed. Pretoria: Van Schaik Publishers.

Eckerblada, J., Erikssona, H., Kärnera, A. and Edéll-Gustafssonb, U. 2009. Nurses' conceptions of facilitative strategies of weaning patients from mechanical ventilation - A phenomenographic study. *Intensive and Critical Care Nursing*: Vol. 25, No. 5, pp 225-232.

El-Khatib, M. and Bou-Khalil, P. 2008. Clinical review: Liberation from mechanical ventilation. *Critical Care*: Vol. 12, No. 4, pp 1-11.

Elliot, D., Aitken, L. and Chaboyer, W. 2012. *The ACCCN'S Critical Care Nursing*. 2nd ed. Chatswood: Mosby Elsevier.

Epstein, S. 2009. Weaning from ventilatory support. *Current Opinion in Critical Care*: Vol.15, No. 1, pp 36-43.

Eskandar, N. and Apostolakos, M. J. 2007. Weaning from Mechanical Ventilation *Critical Care Clinics*: Vol. 23, pp 263–274.

Flynn, A. and Sinclair, M. 2005. Exploring the relationship between nursing protocols and nursing practice in an Irish Intensive Care Unit. *International Journal of Nursing Practice*: Vol. 11, pp142-149.

Frutos-vivar, F. and Esteban, A. 2003. When to wean from a ventilator: An evidence-based strategy. *Cleveland Clinic Journal of Medicine*: Vol. 70, No. 5, pp 389-400.

Gelsthorpe, T. and Crocker, C. 2004. A study exploring factors which influence the decision to commence nurse-led weaning. *British Association of Critical Care Nurses, Nursing in Critical Care*: Vol. 9, No. 5, pp 213-231.

Graneheim, U. and Lundman, B. 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*: Vol. 24, pp 105–112.

Guilhermino, M., Inder, K., Sundin, D. and Kuzmiuk, L. 2014. Education of ICU nurses regarding invasive mechanical ventilation: Findings from across-sectional survey. *Australian Critical Care*: Vol. 27, pp 126-132.

Haas, C. and Loik, P. 2012. Ventilator Discontinuation Protocols. *Respiratory Care*: Vol. 57, No. 10, pp 1649-1662.

Hammond, J. 2001. Protocols and guidelines in critical care: development and implementation. *Current Opinion in Critical Care*: Vol. 7, pp 464-468.

Hansen, B. and Severinsson, E. 2007. Intensive Care nurses' perceptions of protocol-directed weaning - A qualitative study. *Intensive and Critical Care Nursing*: Vol. 23, pp 196-205.

Hansen, B.S. and Severinsson, E. 2009. Physicians' perceptions of protocol-directed weaning in an Intensive Care Unit in Norway. *Nursing and Health Sciences*: Vol. 11, No. 1, pp 71-76.

Hardin, S.R. and Kaplow, R. 2005. *Synergy for Clinical Excellence – The AACN Synergy Model for Patient Care*. Mississauga: Jones & Barlett Publishers.

Henneman, E. 2001. Liberating patients from mechanical ventilation: A team approach. *Critical Care Nurse*: Vol. 21, 3, pp 25-33.

Henning, E., Smit, B. and van Rensburg, W. 2009. *Finding your way in qualitative research*. 6th ed. Pretoria: Van Schaik Publishers,

Keogh, S., Courtney, M. and Coyer, F. 2003. Weaning from ventilation in paediatric intensive care: an intervention study. *Intensive and Critical Care Nursing*: Vol. 19, pp 186-197.

Kliegman, R., Behrman, R., Jenson, H. and Stanton, B. 2007. *Nelson textbook of Paediatrics*. 18th ed. Philadelphia: Saunders Elsevier.

Krefting, L. 1991. Rigor in Qualitative Research: The Assessment of Trustworthiness. *The American Journal of Occupational Therapy*: Vol. 45, No. 3, pp 214-222.

Lavelle, C. and Dowling, M. 2011. The factors which influence nurses when weaning patients from mechanical ventilation: Findings from a qualitative study. *Intensive and Critical Care Nursing*: Vol. 27, pp 244-252.

Loh, J. 2013. Inquiry into Issues of Trustworthiness and Quality in Narrative Studies: A Perspective. *The Qualitative Report*: Vol. 18, No. 65, pp 1-15

MacIntyre, N., Cook, D., Ely, E., Epstein, S., Fink, J., Heffner, J., Hess, D., Hubmayer, R. and Scheinhorn, D. 2001. Evidence Based Guidelines for Weaning and Discontinuing Ventilatory Support. *CHEST*: Vol. 120, No. 6, pp 375S-395S.

MacIntyre, N., Epstein, S.K., Carson, S., Scheinhorn, D., Christopher, K. and Muldoon, S. 2005. Consensus Statement: Management of Patients Requiring Prolonged Mechanical Ventilation - Report of a NAMDRS Consensus Conference *CHEST*: Vol. 128, No. 6, pp 3937–3954.

MacIntyre, N. 2013. The Ventilator Discontinuation Process: An Expanding Evidence Base. *Respiratory Care*: Vol. 58, No. 6, pp 1074-1086.

Macnee, C.L. 2004. *Understanding Nursing Research – Reading and Using Research Practice*. Philadelphia: Lippincott Williams & Wilkins.

Maree, K. 2007. *First Steps in Research*. 12th ed. Pretoria: Van Schaik Publishers.

McConville, J.F and Kress, J.P. 2012. Weaning Patients from the Ventilator. *The New England journal of medicine*: Vol. 367, pp 2233-2239.

Monteverde, E., Fernandez, A., Poterala, R., Vidal, N., Serrate, A.S., Castalani, P., Albano, L., Podesta, F. and Farias, J.A. 2011. Characterization of pediatric

patients receiving prolonged mechanical ventilation. *Paediatric Critical Care Medicine*: Vol. 12, No. 6,

Morris, A. 2003. Treatment algorithms and protocolized care. *Current Opinion in Critical Care*: Vol. 9, No. 3, pp 236-240.

Morrow, S.L. 2005. Quality and Trustworthiness in Qualitative Research in Counseling Psychology. *Journal of Counseling Psychology*: The American Psychological Association: Vol. 52, No. 2, pp 250–260.

Morton, P.G., Fontaine, D.K., Hudak, C.M. and Gallo, B.M. 2005. *Critical Care Nursing – A Holistic Approach*. 8th ed. Philadelphia: Lippincott Williams and Wilkins.

Newth, C., Venkataraman, S., Willson, D., Meert, K., Harrison, R., Dean, M., Pollack, M., Zimmerman, J., Anand, K., Carcillo, J. and Nicholson, C. 2009. Weaning and extubation readiness in pediatric patients. *Pediatric Critical Care Medicine*: Vol. 10, No. 1, pp 1-11.

O'Brien, J., Birnkrant, D., Dumas, H., Haley, S., Burke, S., Graham, R. and Kharasch, V. 2006. Weaning children from mechanical ventilation in a post-acute care setting. *Pediatric Rehabilitation*: Vol. 9, No. 4, pp 365-372.

Polit, D.F. & Beck, C.T. 2012. *Nursing Research - Generating and Assessing Evidence for Nursing Practice*. 9th ed. Philadelphia: Lippincott Williams & Wilkins.

Pretorius, R. and Klopper, H.C. 2012. Positive practice environments in Critical Care Units in South Africa. *International Nursing Review*: Vol. 9, pp 66-72.

Randolph, A., Wypij, D., Venkataraman, S., Hanson, J., Gedeit, R., Meert, K., Luckeitt, P., Forbes, P., Lilley, M., Thomson, J., Chiefetz, I., Hibberd, P., Wetzel, R., Cox, P. and Arnold, J. 2002. Effect of Mechanical Ventilator Weaning Protocols on Respiratory Outcomes in infants and Children – A Randomized Controlled trial. *American Medical association*: Vol. 288, No. 20, pp 2561-2568.

Rivera, R. and Tibballs, J. 1992. Complications of endotracheal intubation and mechanical ventilation in infants and children. *Critical Care Medicine*: Vol. 20, No. 2, pp 195- 208.

Roh, J.H., Synn, A., Lim, C., Suh, H.J., Hong, S., Huh, J.W. and Koh, Y. 2012. A weaning protocol administered by critical care nurses for the weaning of patients from mechanical ventilation. *Journal of Critical Care*: Vol. 27, pp 549–555

Rose, L., Blackwood, B., Burns, S., Fraiser, S.K. and Egerod, I. 2011a. International Perspectives on the Influence of Structure and Process of Weaning From Mechanical Ventilation. *American Association of Critical-Care Nurses*: Vol. 20, pp e10-e18.

Rose, L., Blackwood, B., Egerod, I., Haugdahl, H.S., Holhuis, J., Isfort, M., Kydonaki, K., Schubert, M., Sperlinga, R., Spronk, P., Storli, S., McAuley, D.F. and Schultz, M.J. 2011b. Decisional responsibility for mechanical ventilation and weaning: an international survey. *Critical Care*: Vol. 15, pp 1-8.

Rose, L. and Gerdtz, M. 2009. Mechanical ventilation in Australian emergency departments: Survey of workforce profile, nursing role responsibility, and education. *Australasian Emergency Nursing Journal*: Vol. 12, pp 38-43.

Rose, L. & Nelson, S. 2006. Issues in weaning from mechanical ventilation: literature review. *Journal of Advanced Nursing*: Vol. 54, No. 1, pp 73-85.

Rose, L., Nelson, S., Johnston, L. and Presneill, J.J. 2007. Decisions made by Critical Care Nurses during Mechanical Ventilation and Weaning in an Australian Intensive Care Unit. *American Journal of Critical Care*: Vol. 16, No. 5, pp 434-443.

Rushforth, K. 2005. A randomised controlled trial of weaning from mechanical ventilation in Paediatric Intensive Care (PIC) Methodological and practical issues. *Intensive and Critical Care Nursing*: Vol. 21, No. 2, pp 76-86.

Salipante, D. 2002. Developing a Multidisciplinary Weaning Unit Through Collaboration. *Critical Care Nurse*: Vol. 22, No. 4, pp 30-39.

Scribante, J. and Bhagwanjee, S. 2007. ICU nurse allocation in a cardiothoracic ICU: How many hands do we need? *South African Journal of Critical Care*: Vol. 23, No. 2, pp 66-69.

Scribante, J. and Bhagwanjee, S. 2007. National audit of Critical Care resources in South Africa – nursing profile. *South African Medical Journal*: Vol. 97, No. 12, pp 1315-1318.

Scribante, J., Muller, M.E. and Lipman, J. 1995. Interpretation of the scope of practice of the South African Critical Care nurse. *South African Journal of Medicine*: Vol. 85, No. 5, pp 437-441.

Shenton, A.K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*: Vol. 22, pp 63–75.

South African Nursing Council. 1984. *Government notice regulation 2598 as amended*. Regulation related to the scope of practice of person registered or enrolled under the Nursing Act, 2005.

Swickard, S., Swickard, W., Reimer, A., Lindell, D. and Winkelman, C. 2014. Adaptation of the AACN Synergy Model for Patient Care to Critical Care Transport. *Critical Care Nurse*: Vol. 34, No. 1, pp16-28

Taylor, F. 2006. A comparative study examining the decision-making processes of medical and nursing staff in weaning patients from mechanical ventilation. *Intensive and Critical Care Nursing*: Vol. 22, pp 253-263.

The Free Dictionary by Farlex, 2012.

<http://medical-dictionary.thefreedictionary.com/mechanical+ventilation>

Tume, L., Scally, A. and Carter, B. 2013. Paediatric Intensive Care nurses' and doctors' perceptions on nurse-led protocol-directed ventilation weaning and extubation. British Association of Critical Care Nurses: Vol. 19, No. 6, pp 292-302.

Twite, M.D. 2006. Is there a "right" way to wean my patient from the ventilator? A critical appraisal of Randolph et al: Effect of mechanical ventilator weaning protocols on respiratory outcomes in infants and children: A randomized controlled trial. Pediatric Critical Care Medicine: Vol. 7, No. 6, pp 571-574.

Valenzuela, J., Araneda, P. and Cruces, P. 2014. Weaning From Mechanical Ventilation in Paediatrics.State of the Art. Arch Bronconeumol: Vol. 50, No. 3, pp 105-112.

Walsh, T., Dodds, S. and McArdle, F. 2004. Evaluation of simple criteria to predict successful weaning from mechanical ventilation in Intensive Care patients. British Journal of Anaesthesia: Vol. 92, No. 6, pp 793-796.

White, K.M. and Dudley-Brown, S. 2012. Translation of Evidence into Nursing and Health Care Practice. New York: Sprinder Publishing Company

White, V., Currey, J. and Botti, M. 2011. Multidisciplinary Team Developed and Implemented Protocols to Assist Mechanical Ventilation Weaning: A Systematic Review of Literature. Worldviews on Evidence-Based Nursing: Vol. 8, No. 1, pp 51-59.

Wikipedia, the free encyclopedia -

https://en.wikipedia.org/wiki/Pediatric_intensive_care_unit

APPENDIX A

SEMI-STRUCTURED INTERVIEW GUIDE

Thank you for your willingness to participate in this research study. The topic for this study is *“The opinions of multidisciplinary team members in Paediatric Intensive Care Units regarding weaning protocols for mechanical ventilation.”* Controversies arise about this topic. It is my request that you participate actively, feel free and be honest as much as possible in expressing your opinions.

RESEARCH QUESTION

- What are your opinions regarding the need to develop and use weaning protocols in Neonatal and Cardiothoracic ICUs?

PROBES

- Can you describe the current weaning practices in NICU/CTICU?
- What is your personal involvement and experience in mechanical ventilation and weaning patients in NICU/CTICU?
- What are your opinions regarding protocolled weaning in NICU/CTICU settings?
- In the absence of protocols to inform weaning from mechanical ventilation, discuss how weaning is implemented?
- What is the impact of weaning without protocols on nursing practice and/or patient outcomes?
- Which members of the multidisciplinary team should be the responsible for the development of weaning protocols? Explain.
- What would you recommend regarding weaning practices in NICU/CTICU?
- Is there anything you would like to add?

Thank You.

APPENDIX B

The opinions of multidisciplinary team members in Paediatric Intensive Care units regarding weaning protocols for mechanical ventilation

PARTICIPANT CONSENT FORM

I _____ (Nurse/Doctor's name)
hereby give permission to be included in the study. I have read and understood the content of the information sheet and I have been given the opportunity to ask any questions I might have regarding the procedure and my consent to my being included in the study.

Participant Signature.....

Witness.....

Date.....

CONSENT FOR THE AUDIO-TAPING OF THE INTERVIEW

I..... (Nurse/Doctor's name),
hereby give consent willingly to audio-taping of the interview. I have understood the content in the information letter. The researcher clarified verbally the purpose of audio-taping the interview and the freedom to reject the taping.

Participant signature.....

Witness.....

Date.....

APPENDIX C

PARTICIPANT CODE.....

DATE.....

DEMOGRAPHIC DATA FOR PARTICIPANTS

1. Gender

1	Male		2	Female	
---	------	--	---	--------	--

2. Profession

Nurse	
Doctor	

3. Highest level of Qualification

1	Diploma in Nursing	
2	Bachelor's Degree	
3	Post-basic clinical course	
4	Advanced Diploma	
5	Master's Degree	
6	Doctoral Degree	
7	Other	

3. Years of experience

1	PICU		2	NICU	
3	CTICU				

APPENDIX D

An extract from an interview with the participant

Q: indicates question from researcher **A:** indicates answer from participant

Participant 9

Thank you for your willingness to participate in this research study. The topic for this study is *“The opinions of multidisciplinary team members in Paediatric Intensive Care Units regarding weaning protocols for mechanical ventilation.”* Controversies arise from this topic, but I request that you participate actively, feel free and be honest, as much as possible, in expressing your opinions.

Q So the main question in this study is about opinions but before I go to the opinions, can you please describe the current weaning practices in Paediatric ICU?

A Well it will depend on the type of patients as we just said that it's a combined unit we actually have neonates as well as paediatric patients in the unit so if it's a neonate understand that on mechanical ventilation we will generally try to wean the oxygen down to 60% first and then we would wean the pressure and rates until we are on extubation settings for the new-born or infant. The infants are pretty much the same, it will be less than 30% oxygen, a pressure of 18 and a 5 and rate of 8 that's an argument (eeh) obviously if it's an older child, it will depend on the mode of ventilation and it will be in a similar fashion where we will try to wean everything proportionally. I think we don't want to have a child on 100% oxygen and a rate of 6 because you can't extubate a child on that. Most of our children are uuhh infants, the bigger children are usually post-operative patients and usually don't stay on a ventilator very long.

Q Okay, so the weaning protocols I am talking about will be mainly for nurses so I don't know what the practice is for nurses, are they allowed weaning patients from ventilators?

A In our units the nurses have traditionally always take in charge of the ventilation management of the patients and if the unit is working properly the doctors are supposed to write a weaning plan on each individual patient chart giving the nurses various parameters for weaning and the nurse normally does blood gases and the weaning. However, of late unfortunately as you know ICUs..... sisters in ICU, trained sisters are becoming a scarce commodity and some of the nursing staff are not as well qualified and experienced as in the past and that's why I think we need the protocols even more important aahh you know it's really important to have written guidelines so that the nurse can carry out the instructions as put in the protocol. The problem is also that we don't have sufficient doctors especially at night and after hours we have got only one registrar on the floor to look at 15 ventilator patients so it's not always possible for the doctors to do eee you know all the weaning as they should. We do have a respiratory therapist available in the week eeee office hours so she will often do the gases and the weaning during the week but it's after the hours that's really the problem

Q So from your explanation you are saying there is a need to have the protocols

A I think so yes absolutely....pause.... they have got to be individualised I mean you can't have black and white protocol especially in a unit like ours where you can have anything from an 800g neonate all the way through to 18 year old male so you can't have a blackened protocol butso they have got to be individualised but I think it's important especially if nurses are being given the responsibility of managing the ventilation that they are guidelines or protocols written

Q So do you think there is any problem in weaning without protocols as it is happening now? Is there any impact on, uuhh, patient outcome?

A I think there is I mean because there are certain things that sometimes you see for example as I have said not all sisters are trained and experienced in ICU and one of the common mistakes that people make is just to look at the carbon dioxide level and the blood gas without considering the pH and acid-base status and sometimes if the saturation is high they will take out the ventilation meantime the child has confrontation to meet the blood gas or..... and that's the reason for the high saturation so ee you know I think it's really important that the parameters are

set and if the nurses are going to take over the weaning and the management of the ventilator which is practical for our situation where we don't have enough medical staff I think that without a protocol especially when that nurse is not ICU trained then they can do funny things on the ventilator and sometimes unnecessarily prolong the ventilation, the ventilation will cause lung damage. Because the other thing that you see is that people just wean down the ...(pause)...they will leave the oxygen on 100% and just wean down the pressure and rate and so the child will be as I have said on a 100% oxygen and a rate of 8 and you can't move forward so what you have got to do is to take the ventilation back and wean oxygen down so I think weaning protocols provided they can be tailored to the individual patients aaa it's essential

Q Okay so who could be responsible for the development of these protocols if there is this need?

A All ICU work is a team approach and one thing it doesn't work to have some single person in charge to saying this is how it shall be so I think these protocols have to be developed between the doctors and nurses looking after the patients and the nurses who are going to do the weaning should understand and be part of the process

Q Okay, so let me say maybe if we are to develop these protocols what areas should be included in these protocols

A In our unit it will be medical doctors, respiratory therapist and nursing staff. The physios are not really hands on involved ... I mean we consult them occasionally when we have like collapsed lungs or something so it's not like they are in the unit on a daily basis and they don't take over the management of the ventilation or anything like that. The management of the ventilation is medical and nursing and respiratory therapist and ...

Q Okay, so what I was trying to find out is what parameters or what areas should be included in these weaning protocols?

A Do you mean in terms of the ventilators or in terms of the staff involved in the

Q No I mean in terms of the ventilator

A in the ventilator ... obviously it will be your oxygen levels, ventilator setting so depending on the mode of ventilator you are using so you want your pressures, rates uuuhh tidal volumes that you are measuring them if you are on high frequency you want your mean airway pressure, your frequency so it will depend on your parameter you know so you would obviously have different weaning protocols with different ages of patients on different mode of ventilation and then your blood gases and sets so yaa.

Q Okay, so I just went ahead with questions but I did not find out about your personal involvement and experiences in mechanical ventilation and weaning practices, what's your personal experience and involvement?

A Look I have been..maybe we have been spoiled.. I mean....(laughs) for many years that I have been in ICU, the nursing staff have been... I was the registrar so the nurses do the weaning and the respiratory therapist essentially; the doctors would write the weaning parameters at that time but we never had to do the blood gases and physically do all the weaning and I think that's not quite the same now because I don't think all the sisters are comfortable with it so I think that doctors are taking more responsibilities for that but it worked very well with the nursing staff provided they were experienced and trained and you know, take the management of the ventilation

Q Aaa I don't know, why are physiotherapists not necessarily involved in ventilation and weaning practices

A That's just how we are in our unit, the physios I think in our circumstances everybody is short staffed. I don't know but for example not that I have been there, in States they have respiratory therapist who actually do the ventilation so it's a completely different category of pattern. We just don't have a full time physio in the unit so we are able to consult eeee if we need them here so we can get them to come and do physio, there is nobody full time in the unit but we do have a respiratory therapist.

Q So based on the current practice, what is your recommendation regarding the weaning practice in Paediatric ICU

A As I have said, we should have a weaning protocol in the unit that everybody understands and knows how to apply.

Q Okay, that is what I wanted to find out. So basically you have described the weaning practice, shared your personal experience and identified members who should participate in the development of the weaning protocol, is there anything you would like to add?

A Just that it's very unfortunate that uuuhh you know ICU trained sisters are becoming such a scarce commodity and I think it's really important especially with the increasing numbers of ICU beds and I think that it is incorporated in the training of the future nurses you know.

Closing - okay thank you very much that is the end of the interview and I thank you for your time and participation.

A - You are welcome.

APPENDIX E

Examples of significant statements, codes, categories and themes

No	Meaningful Statements	Codes
1	With the protocol you have <u>something guiding you on how to go about weaning</u> the patient, so I think it will be <u>good if the protocol</u> is in place. Participant 5	Guiding practice
2	Protocols also <u>clarify things</u> , they explain what to do and give steps to follow and this <u>makes things a bit easier</u> . Participant 2	Clarify steps Easy practice
3	I think <u>we need the protocols to be a guidance</u> I mean.... because I have a long years working in ICU set up but what about those <u>newly qualified nurses</u> they have to follow the protocols, they can't follow what I have been doing so I think protocols should be there. Participant 4	Guide for new nurses
4	I started in this unit fresh from school. It was <u>a little bit challenging</u> , trying to understand what is going on, why I am doing this what's happening, but even the new ones is still a challenge, you find that you wean you <u>do not know the reason why you do what you are doing</u> . Participant 3	Confusion as a new nurse Lacking knowledge
5	Some of the nursing staff are <u>not as well qualified and experienced</u> as in the past and that's why I think we need the protocols even more important, aaa you know it's really <u>important to have written guidelines</u> so that the nurse can carry out the instructions as put in the protocol. Participant 9	Guide for unqualified and inexperience nurses
6	Without protocols sometimes <u>people get confused</u> , they do not know what to do. This is very important for nurses who are new. But it is not for nurses only, even registrars especially when they are new, <u>most of them do not know how to wean</u> they usually ask consultants. So you see if we had protocols in place things would have been easy for	Confusion for new practitioners Lacking knowledge

	them. Participant 5	
7	Because what is happening is that everybody is just weaning of course basing on blood gases and SATs but <u>there is nothing like a standard</u> , so sometimes it is confusing and people become stressed up. So protocols are also there <u>for uniformity just for control</u> so that we do the same thing all of us okay. They like set the criteria to ensure that everybody can do the same thing. Participant 7	Inconsistent weaning Confusion Uniformity and control
8	Of course if there are no guidelines, <u>everyone does her own thing</u> so there is need for each unit to have its own protocol that suits the environment. Participant 2	Inconsistent weaning
9	It's just that you will not be able to measure it but I think <u>without a protocol then probably you will have a prolonged stay</u> in ICU, especially for those people that wean slowly but also for people that wean faster they might just ...may be underestimate the illness of the patient and <u>wean quicker and then the patient fails extubation</u> so there is repercussions on both sides. Participant 10	No protocols Compromised patient safety
10	Very difficult because <u>anything that you do you have to wait for the doctor</u> . This <u>delays the weaning</u> you know some patients have been extubated late, they become restless and you sedate them unnecessarily because they are kept longer on ventilations...you understand me ...so with long ventilation you end up having <u>complications like infections</u> so to prevent and minimise those problems you better wean the patient quickly and extubate. Though not too quickly because sometimes the patients are <u>weaned prematurely</u> which is not good either as they fail to cope up. Participant 7	Not autonomous Compromised patient safety
11	I think it's really important that the parameters are set and if the nurses are going to take over the weaning and the management of the ventilator, which is practical for our situation where <u>we don't have enough medical staff</u> , I think	Guide for nurses not ICU trained

	<u>that without a protocol especially when that nurse is not ICU trained then they can do funny things on the ventilator.</u> Participant 9	Make mistakes
12	I think there is (impact) I mean because <u>there are certain things that sometimes you see</u> for example as I have said <u>not all sisters are trained and experienced in ICU</u> and one of the common mistakes that people make is just to look at the carbon dioxide level and the blood gas without considering the pH and acid-base status and sometimes if the saturation is high they will take out the ventilation meantime the child has confrontation to meet the blood gas. Participant 9	Doubting the practice Make mistakes Lacking knowledge
13	You are <u>backed by those protocols</u>, I know when I use the protocols and something goes wrong with the baby <u>I can defend myself even at SANC</u> to say I did this because it is written in the protocols or in that way you are safe. Participant 2	Confidence Feeling safe
14	<u>If you don't have a protocol for example if I did a mistake</u> following through the process for example a patient died what's going to guide me at SANC that I did because of this. You understand me, <u>you don't have a governor, you don't have a proof showing that I have been following this</u>, you were just weaning. Participant 3	Feeling unsafe in absence of protocol
15	<u>I mean if I have to wean this patient what am I going to use?</u> <u>With the protocol, I must be able to wean the patient on my own so it will lead to quicker extubation unlike where the patient is waiting for the doctor....now wean the oxygen, now wean the rate, now wean this what...you understand.</u> Participant 3	Recognising limitation in professional practice
16	As a nurse working here, a protocol gives an allowance to practice on your own and make decisions. Participant 2	Independent practice
17	<u>Protocols are they not research based?</u> Because I know people have conducted research studies to come up with	Research based

	those protocols. They are often reviewed to make changes that suit the situation so they are reliable. Participant 2	practice
18	<u>Doctors and nurses because they are the ones who often work here and they work together</u> and <u>have experience in ventilation.</u> Participant 2	Working together Experience
19	All <u>ICU work is a team approach</u> and one thing it <u>doesn't work to have some single person in charge</u> to saying this is how it shall be so I think these protocols have to be developed between the doctors and nurses looking after the patients and the nurses who are going to do the weaning should understand and be part of the process Participant 9	Team approach

Codes	Category	Theme
Guiding inexperienced and unqualified nurses Easy practice Clarify steps Lacking knowledge Make mistakes Confusion of new nurses New nurses not trusted	Guide weaning practice	Recognising the need for weaning protocols
Inconsistent weaning practice Uniformity and control	Standardising weaning practice	
Research based	Evidence based practice	
Independent practice Recognising limitation in professional practice	Autonomous practice	
Confidence Feeling safe with protocols	Safe practice and patient safety	

Feeling unsafe in absence of protocol Compromised patient safety – delayed or premature weaning with complications		
Team approach Working together Experience	Protocol development is a collaborative process	

APPENDIX F

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG



Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Ms Thokozile Nhlapo
E-mail: thokozile.nhlapo@wits.ac.za

Mrs AN Njolomole
Machinga District
Hospital P O Box 44
Liwonde
Malawi
0000
Malawi

09 January 2015
Person No: 722545
PAG

Dear Mrs Njolomole

Master of Science in Nursing: Approval of Title

We have pleasure in advising that your proposal entitled *The opinions of multidisciplinary team in paediatric intensive care units regarding weaning protocols for mechanical ventilation* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

A handwritten signature in cursive script, appearing to read 'Sandra Benn'.

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX G

M140532



HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M140532

NAME: Mrs Abbie N Njolomole
(Principal Investigator)

DEPARTMENT: Department of Nursing Education
CM Johannesburg Academic Hospital

PROJECT TITLE: The Opinions of Multidisciplinary Team in
Paediatric Intensive Care Unit Regarding
Weaning Protocol for Mechanical Ventilation

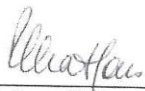
DATE CONSIDERED: 30/05/2014

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Sizakele Khoza

APPROVED BY:


Professor PE Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 30/05/2014

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.**

Principal Investigator Signature _____

M140532 Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX H



Sizakele Khoza
Department of Nursing Education
Faculty of Health Sciences
7 York Road
Parktown
Johannesburg 2193

08 July 2014

Nursing Services Manager
[REDACTED] Hospital
Private Bag X39
Johannesburg
2004

Dear Ms Pule

Re: REQUEST TO CONDUCT RESEARCH AT JOHANNESBURG ACADEMIC HOSPITAL

I am student currently registered for a Masters in Nursing Science (Child Nursing) at the University of the Witwatersrand, Faculty of Health Sciences. I am required as part of my course to conduct clinical research under supervision. The title of my research is "*The opinions of multidisciplinary team in paediatric intensive care units regarding weaning protocols for mechanical ventilation*".

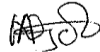
Weaning protocols are increasingly being used in many intensive care units (ICU) to facilitate weaning patients from mechanical ventilation. They define the necessary criteria for weaning and extubating patients within ICUs. Furthermore protocols provide a standardized approach to weaning of mechanical ventilation aimed at reducing variation in practice and helps nurses to practice weaning autonomously within their safe professional limits. A preliminary background search revealed that the weaning protocols used in paediatric care in this institution are developed by the

medical staff even though the interventions recommended are implemented by the nursing staff. Literature supports that protocol development, implementation and evaluation requires the involvement of a multidisciplinary team. It is therefore important to explore the opinions of nurses and doctors in multidisciplinary team in ICU about weaning protocols as they are actively involved in weaning practices for mechanical ventilation.

An information letter will be sent inviting selected staff to participate in individual interviews to collect data for the study. Staff willing to participate will be asked to provide written consent for interviews and audio taping prior to inclusion in the study. Participation is voluntary and request to discontinue carries no penalty. Interviews will be held during the participants off duty time and will not interfere with the staff obligations. The anonymity and confidentiality of the participants will be maintained through coding of data collected and safekeeping of the consent forms. The name of the institution will not be mentioned directly in the research report and publications this study. A copy of the report will made available to you if so requested.

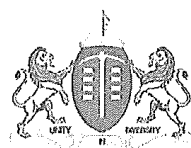
I hereby ask for permission to undertake the research at [REDACTED] Hospital, Paediatric and Cardiothoracic Intensive Care Units. Attached is my research proposal as well as the clearance certificate from Human Research Ethics Committee (Medical) of the University of the Witwatersrand. I am available to address queries concerning this study on the following contacts: **0794071149 or 0844005601 abinjolo@gmail.com**

Yours sincerely,



Abbie Njolomole (MSc Nursing Student)

APPENDIX I



GAUTENG PROVINCE
REPUBLIC OF SOUTH AFRICA

HOSPITAL

Enquiries:
Ms. G. Ngwenya
Office of the Nursing Director
Toll: (011) 488-4558
Fax: (011) 488-3786
14 July 2014

Mrs. Abbie Njolomole
Department of Nursing Education
Faculty of Health Sciences
University of Witwatersrand

Dear, Mrs. Abbie Njolomole

RE: "The opinion of multidisciplinary team in paediatric intensive care units regarding weaning protocols for mechanical ventilation"

Permission is granted for you to conduct the above recruitment activities as described in your request provided:

1. [REDACTED] hospital will not in anyway incur or inherit costs as a result of the said study.
2. Your study shall not disrupt services at the study sites.
3. Strict confidentiality shall be observed at all times.
4. Informed consent shall be solicited from patients participating in your study.
- 5.

Please liaise with the Head of Department and Unit Manager or Sister in Charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the results of your study on completion of the research.

Supported / not supported

[Signature]
Ms. M.M Pule
Nursing Director
Date: 14/07/2014

Approved / not approved

[Signature]
Ms. G. Bogoshi
Chief Executive Officer
14/07/2014

APPENDIX J

The opinions of multidisciplinary team members in Paediatric Intensive Care Units regarding weaning protocols for mechanical ventilation.

PARTICIPANT INFORMATION SHEET

Dear Colleagues,

My name is Abbie Njolomole and I am child nursing student, currently registered for an MSc (Nursing) at the University of the Witwatersrand, Department of Nursing Education. As part of my course requirement I am expected to conduct a research project under supervision. I intend to explore the opinions of nurses, doctors and physiotherapists practicing in Neonatal and Paediatric Intensive Care Units regarding weaning protocols for mechanical ventilation with an intention to advocate for the development and use of weaning protocols in ICUs. I would like to invite you to participate in this study, as I would be interested in your opinions, as a health professional who is involved in weaning practices, which will include your views and recommendations.

Participation in the study is entirely voluntary. You may choose not to participate or withdraw from the study at any time without any penalty. Anonymity and confidentiality are guaranteed as research codes will be used instead of names. The interviews will be conducted in a quiet and private room and will take approximately one hour. The information from the study will be used for the intended purpose only. The research carries no risk of harm.

Should you agree to participate, I will invite you to an interview which will be scheduled at a date and time convenient to you. I will be using an audio-tape recorder during the interviews to capture all the data. You are free to reject the tape recording if you wish so. During data collection and analysis, access to this information will be made available to the research supervisor only.

Confidentiality of the taped recordings and transcribed data will be ensured. All data from the interview will be managed, stored and destroyed as per University of

Witwatersrand guidelines. The information will be kept in a secure area under lock and key. All audio-tapes and recordings will be destroyed within six years of completion and two years after research publication.

I appreciate you will get no direct benefits from participating, however, I hope the study findings will assist health professional managers to consider devising strategies for standardised weaning practices in Paediatric Intensive Care Units which will enable nurses to work autonomously within their professional safe limits.

The Human Research and Ethics Committee and Postgraduate Committee of the University of the Witwatersrand, Gauteng and this institution, Charlotte Maxeke Johannesburg Academic Hospital, have approved the study and its procedures.

Thank you for reading this information letter. Should you require any more information you are welcome to contact me at the telephone numbers listed below.

Yours sincerely,

Abbie Njolomole (MSc Nursing Student).

Cell Numbers: 0794071149 or 0844005601.

APPENDIX K

Gill Smithies

Proofreading & Language Editing Services

59, Lewis Drive, Amanzimtoti, 4126, Kwazulu Natal

Cell: 071 352 5410 E-mail: moramist@vodamail.co.za

To	Dr S Schmollgruber
Address	Wits Dept of Nursing Education
Date	30/7/2015
Subject	Abbie Njolomole
Ref	SS/gs/005

I, Gill Smithies, certify that I have proofed and language edited:

Thesis: THE OPINIONS OF A MULTIDISCIPLINARY TEAM IN PAEDIATRIC
INTENSIVE CARE UNITS REGARDING WEANING PROTOCOLS FOR
MECHANICAL VENTILATION

to the standard as required by Wits Dept. of Nursing Education.

Gill Smithies

30/7/2015