Assessment of Practice of Critical Care Nurses on Open Method Endotracheal Suctioning in a Referral Hospital

NSANZIMANA Evode

College of Medicine and Health Sciences

School of Nursing and Midwifery

Master of Science in Nursing

July 2017
Assessment of Practice of Critical Care Nurses on Open Method Endotracheal Suctioning in a Referral Hospital

By

NSANZIMANA Evode

216341329

A dissertation submitted in partial fulfilment of the requirements for the degree of

MASTER of Science in Nursing

In the College of Medicine and Health Sciences

Supervisor: Professor BHENGU BUSISIWE ROSEMARY

July 2017
Declaration

I declare that this Dissertation contains my own work except where specifically acknowledged

Student Name and Number

Signed…… ..............................

Date……31/7/2017..............................
ACKNOWLEDGMENT

First of all, I praise God, the almighty for providing me with this opportunity and granting me the capability to proceed successfully. This project could not have been completed without the help of the following individuals, whose support is deserving of acknowledgement here. Special thanks goes to, Professor Busisiwe Bhengu, supervisor, for her countless hours of reflecting, reading, encouraging, and most of all patience throughout the entire process.

From the bottom of my heart I really thank you for all the support provided to me during the whole period. I would like to acknowledge and thank my school division for allowing me to conduct my research and providing any assistance requested. Special thanks go to the members of staff of musters program department of nursing for their continued support; and Kelleher, Sean, for the permission accorded to me to use the observation schedule as an adopted tool in my study.

I would like to thank the beginning teachers, mentor-teachers and administrators in our school division that assisted me with this project. Their excitement and willingness to provide feedback made the completion of this research an enjoyable experience.

Finally, my deepest gratitude goes to my family for their unflagging love and unconditional support throughout my life and my studies. God bless all of you for your support provided to me in the whole period of this study.
ABSTRACT

Introduction
Endotracheal suction (ETS) is a procedure which aims to keep airways patent by mechanically removing accumulated pulmonary secretions, especially in patients with artificial airways (Favretto et al., 2012, p.998).

Title: The assessment of practice of critical care nurses on open method endotracheal suctioning in a referral hospital is non-experimental observation quantitative study conducted in Intensive Care (ICU) and High Dependency (HDU) Units of the University Hospital Centre of Kigali (CHUK).

Purpose: The aim of this study was to evaluate the level of nursing practice in a referral hospital regards open method ETS in ICU and HDU of CHUK.

Methods: The study population was critical care nurses. Census of a population of 29 clinical nurses was observed on a practice of one event of open method ETS; while a tool of twenty four items observational schedule where used for data collection.

Data findings and conclusion: Twenty five out of twenty nine participants (86%) failed to demonstrate quality of nursing practice on different items of the observation tool as prepared for guiding action of open method ETS study. One sample T-Test was used for hypotheses testing where greater study significance was observed with a P value of less than 0.0001.

Nurses in ICU and HDU of CHUK showed poor practice on open method ETS and their practices was not evidence based.

Key-Words: Critical Care Nursing, Critical Care nurses, Endotracheal Suctioning, Open method endotracheal suctioning
KEY WORDS

Critical Care Nursing is care of patients with life-threatening illnesses and injuries and it occurs within a continuum from the scene of initial incident or onset of critical illness such as home through stabilisation, transfer/transportation, emergency and intensive care up to and including transfer to care in lower acuity levels/step down or high dependency units (South African Nursing Council, 2005, p. 1). In this study it only includes the ETS in intensive care and High Dependant units.

A critical care nurse is a registered practitioner who enhances the delivery of comprehensive patient centred care, for acutely ill patients who require complex interventions in a highly technical environment; bringing to the patient care team a unique combination of knowledge and skills. The roles of critical care nurses are essential to the multidisciplinary team who are needed to provide their expertise when caring for patients and their relatives (BACC, CC3N, 2009)

Endotracheal suctioning is defined as a component of bronchial hygiene and mechanical ventilation that involves the mechanical aspiration of pulmonary secretions from a patient’s artificial airway to prevent its obstruction. When open method is used the adaptable sterile single use suction catheter and sterile gloves are mandatory to be use during the procedure. (AARC Clinical Practice Guidelines 2010, p.750). The same meaning is adopted in this study.

Open method endotracheal suctioning is defined as suctioning the airway after the endotracheal tube has been disconnected from the ventilator (NISHAMOL, 2011).
LIST OF ACRONYMS AND ABBREVIATIONS

AARC : American Association for Respiratory Care

ACI : Agency for Clinical Innovation

CCU : Critical Care Unit

CHUK : University Teaching Hospital Centre of Kigali

EBP : Evidence Based Practice

ETT : Endotracheal Tube

ETS : Endotracheal Suctioning

ENT : Ear Nose and Throat

HDU : High Dependency Unit

ICU : Intensive Care Unit

NSI : Normal Saline Instillation

OPD : Out Patient Department

PPE : Personal Protective Equipment

RECC : Research, Ethics, and Consultancy Committee

SPSS : Statistical Package for the Social Scientists

VAP : Ventilator Associated Pneumonia

WHO : World Health organization
TABLE OF CONTENT

Declaration.........................................................................................................................i

ACKNOWLEDGMENT........................................................................................................ ii

ABSTRACT............................................................................................................................ iii

Introduction........................................................................................................................... iii

KEY WORDS........................................................................................................................... iv

LIST OF ACRONYMS AND ABBREVIATIONS ...................................................................... v

TABLE OF CONTENT ........................................................................................................... vi

CHAPTER ONE: INTRODUCTION ....................................................................................... 1

1.1. Introduction ..................................................................................................................... 1

1.2. Background ...................................................................................................................... 1

1.3. Problem Statement ........................................................................................................ 3

1.4. Aim of study .................................................................................................................... 5

1.5. Objectives ....................................................................................................................... 5

1.6 Research hypothesis ........................................................................................................ 5

1.6.1 Null hypothesis .......................................................................................................... 5

1.6.2 Alternative hypothesis ............................................................................................... 5

1.7. Significance of the study ............................................................................................... 5

1.8. Structure of the study ................................................................................................... 6

1.9. Conclusion of the chapter ............................................................................................. 6

CHAPTER TWO: LITERATURE REVIEW ........................................................................... 7

2.1. Introduction ..................................................................................................................... 7

2.2. Theoretical Literature .................................................................................................. 8

2.2.1. Practice prior ETS ................................................................................................... 8

2.2.2. Practice during ETS ............................................................................................... 9

2.2.3. Post suctioning practice ....................................................................................... 12

2.3. Empirical Literature .................................................................................................... 12
2.4. Critical Review and Research Gap identification ........................................... 13
2.5. Conceptual framework .................................................................................. 14

Process of: ............................................................................................................. 18

Data collection ....................................................................................................... 18
Data analysis .......................................................................................................... 18
Interpretations ........................................................................................................ 18
Discussion ............................................................................................................... 18
Recommendation .................................................................................................... 18

2.6. Conclusion of the chapter: ............................................................................. 19

CHAPTER 3: METHODOLOGY .............................................................................. 20

3.1. Introduction ..................................................................................................... 20
3.2. Study design .................................................................................................. 20
3.3 Study approach ................................................................................................ 20
3.4. Study setting .................................................................................................. 20
3.5. Study population ............................................................................................ 21
  3.5.1. Inclusion criteria ...................................................................................... 22
  3.5.2. Exclusion criteria ..................................................................................... 22
3.6. Population for Census determination .............................................................. 22
  3.6.1. Census size .............................................................................................. 22
3.7 Data collection .................................................................................................. 23
  3.7.1 Data collection instruments ...................................................................... 23
  3.7.2. Data collection process .......................................................................... 24
3.8. Data analysis .................................................................................................. 25
3.9. Ethical Considerations .................................................................................... 25
3.10. Data management .......................................................................................... 26
3.11. Data dissemination ....................................................................................... 26
3.12. Study limitations ........................................................................................... 26
3.13 Conclusion of chapter........................................................................................................27

CHAPTER 4: RESULTS..............................................................................................................28

4.1. INTRODUCTION...............................................................................................................28

4.2. Demographic data presentation....................................................................................28

4.2.1 The age of participants .........................................................................................29
4.2.3. The Education level of participants .................................................................30
4.2.4. Critical care nurse’s experience of ICU and HDU of CHUK .........................31
4.2.5 Relevant Training undergone by Participants ....................................................31

4.3 Observation data presentation .....................................................................................32

4.3.1. Pre-Endotracheal Suction Practices .................................................................32
4.3.3. During Endotracheal suctioning practices .......................................................37
4.3.4. Score summary of practice during endotracheal suctioning event ..............38
4.3.4.1 During endotracheal suctioning event itself hypothesis testing ..............40
4.3.5. Post Endotracheal Suctioning Practice .............................................................41
4.3.6. Score summary of practice during endotracheal suctioning event ..............42

4.5 General summary of data presentation .....................................................................45

4.5.1 Introduction .............................................................................................................45

4.6 Participants practice coefficient level ........................................................................49

4.6.2 Study participation level compared with the expected sample size ..........50

4.7 General study Hypothesis testing .............................................................................50

CHAPER FIVE: DISCUSSION OF FINDINGS, RECOMMENDATIONS, AND
CONCLUSIONS.........................................................................................................................51

5.0 INTRODUCTION.............................................................................................................51

5.1 DISCUSSION OF FINDINGS .......................................................................................51

5.2 CONCLUSION OF THE CHAPTER ..............................................................................56

5.3 RECOMMANDATION....................................................................................................57

References..........................................................................................................................58
Appendices ........................................................................................................................................... 62
Appendix I: Observation schedule tool ........................................................................................... 62
Appendix II: Data collection tool permission .................................................................................. 66
Appendix III: Data collection consent form ...................................................................................... 67
Appendix IV: signed letters ............................................................................................................. 69
LIST OF TABLES

TABLE 3.1: VARIABLES CATEGORIES INCLUDING DEMOGRAPHIC AND ITEMS OF OBSERVATION TOOL................................................................. 23
TABLE 2: 4.1: AGE OF PARTICIPANTS................................................................................................................... 29
TABLE 3: 4.2 EDUCATION LEVELS OF PARTICIPANTS ......................................................................................... 30
TABLE 4: 4.3 PARTICIPANTS’ EXPERIENCE OF ICU AND HDU ................................................................................. 31
TABLE 5: 4.4 PARTICIPANTS’ TRAINING DONE RELATED CRITICAL CARE.......................................................... 32
TABLE 6: 4.5: RESULTS OF PRE-ENDOTRACHEAL SUCTIONING PRACTICES ......................................................... 34
TABLE 7: 4.6 SCORE SUMMARY OF PRE-ENDOTRACHEAL SUCTIONING PRACTICES ............................................ 35
TABLE 8: 4.7: DURING ENDOTRACHEAL SUCTIONING EVENTS IT SALVES ............................................................... 38
TABLE 9: 4.8: SCORE SUMMARY PRACTICE DURING ENDOTRACHEAL SUCTIONING EVENT ............................... 39
TABLE 10: 4.9 PRESENTING THE RESULTS OF POST ENDOTRACHEAL SUCTIONING ............................................ 42
TABLE 11: 4.10 SCORE SUMMARY PRACTICE POST ENDOTRACHEAL SUCTIONING.............................................. 43
TABLE 12: 4.11 CASE PROCESSING SUMMARIES ................................................................................................. 45
TABLE 13: 4.12: DESCRIPTIVE STATISTICS OF PRACTICE OF NURSES ON OPEN METHOD ENDOTRACHEAL SUCTIONING ....................................................................................................................... 46
TABLE 14: 4.13: EXTREME VALUES OF PARTICIPANTS SCORE OF PRACTICE ON OPEN METHOD ENDOTRACHEAL SUCTIONING ....................................................................................................................... 47
TABLE 15: 4.14: TESTS OF NORMALITY OF PARTICIPANT SCORE VARIOUS ........................................................................ 48
TABLE 16: 4.15: PARTICIPANTS COEFFICIENT LEVELS ............................................................................................... 49
LIST OF FIGURES

FIGURE 2: 1: FIVE MOMENTS FOR HAND HYGIENE BY WHO ........................... ERROR! BOOKMARK NOT DEFINED.
FIGURE 2:2 THE ADAPTED MODULE OF CONCEPTUAL FRAMEWORK ......................................................... 18
FIGURE 3:4.1 GENDERS OF PARTICIPANTS .................................................................................................. 30
FIGURE 4:4.2 DISTRIBUTION OF PARTICIPANTS SCORE RELATED PRE-ENDOTRACHEAL SUCTIONING .................................................................................................................. 36
FIGURE 5:4.3 : PRESENTING THE NORMALITY OF THE DISTRIBUTION SCORE OF PRACTICE DURING ENDOTRACHEAL SUCTIONING EVENT ITSELF .................................................... 40
FIGURE 6:4.4 : PRESENTING THE SCORE DISTRIBUTION OF PRACTICE POST-ENDOTRACHEAL SUCTIONING EVENT .................................................................................................................. 44
FIGURE 7:4.5 BOX PLOT OF PARTICIPANT’S SCORES DISTRIBUTION FOR PRACTICE OF NURSES ON OPEN METHOD ENDOTRACHEAL SUCTIONING IN ICU AND HDU OF CHUK. ................. 48
CHAPTER ONE: INTRODUCTION

1.1. Introduction

The study of practice of the Endotracheal Suctioning (ETS) was conducted at University Teaching Hospital Centre of Kigali (CHUK) among nurses who work in Intensive Care Unit (ICU) and High Dependency Unit (HDU). In this study, chapter one is composed of the background of the problem, problem statement, justification for the study, aims of the study, objectives of the study, research questions, significance of the study and operational definitions.

1.2. Background

Endotracheal suction is a procedure which aims to keep airways patency by mechanically removing accumulated pulmonary secretions, particularly in patients with artificial airways (Favretto et al., 2012, p. 998). It is the most frequent nursing care practice done routinely with one principal purpose of removing secretions thereby promoting the maintenance of the patency of the airways, as well as optimizing ventilation and oxygenation (Frota et al., 2014).

The two methods of endotracheal suctioning described by American association of respiratory care (AARC) Clinical Practice Guidelines (2010, p.758); Frota et al., (2014,p.297), are the Close suction method which is a multiple use suction catheter allowing continuation of mechanical ventilation during suctioning, while the open suction method necessitates opening the respiratory circuit by disconnecting the patient from a mechanical ventilator, followed by suctioning with a single use catheter.

In recent decades, the closed suction system has been gaining popularity in developed countries where in the United States, for example, this system is used exclusively in 58% of
Intensive Care Units (ICU), while the open system is used exclusively in only 4% of the centres’ (Frota et al. 2014, p.297).

Airway management is important because the presence of an artificial airway increases the risk for ventilator associated conditions, including infections such as ventilator associated pneumonia (Mary, Sole and Bennett, 2014, p. 192).

Considering the clinical practice guideline of ETS the Agency for clinical Innovation (ACI) states the clear responsibilities of nurses to ensure safety of the patient on mechanical ventilation in three phases (prior to, during, and post) of ETS practice (ACI, 2014). In Evidence-Based Handbook for Nurses, Hughes, (2008) gave a definition of Patient safety as “the prevention of harm to patients”.

Nurses are patient advocates’, nursing care professionals reflect all measures of quality assurance, any gap in nursing practice compared to the clinical practice based on research, are a contravention and can be a source of a danger to the patients. Nursing care generally should be delivered in a condition of responding to the patient needs in a safe manner.

To succeed our golden goal which “is patient safety”, Jansson et al. (2013, p. 63) has recommended the need for greater education in nursing practices with respect to endotracheal tube suctioning generally and specifically, while Haghighat and Yazdannik, (2015, pp. 623–624) recommend the inclusion of ETS in education of critical care nurse, because of the gaps that have been observed in nursing practice on ETS compared to the best-practice recommendations in those studies.

Comparing the literature the similar practice of ETS are routinely done in ICU and HDU in CHUK, thus these stimulated the researcher to investigate the safety of patients with regard to ETS where unsafe practice can lead to the complications, such us atelectasis, infections,
respiratory compromise, movement (deep or out) of the endotracheal tube, hemodynamic changes and death (Frota et al., 2014, p. 297).

CHUK is one of the national referral and teaching hospitals in Rwanda. It accommodates a greater number of patients who require mechanical ventilation. The data retrieved from the admission book of the Intensive Care Unit of University Teaching Hospital centre of Kigali (ICU of CHUK) shows the admission number of 332 patients in 2015 with an estimated number of 28 patients’ intubated monthly requiring daily airway patency and clearance.

Concerning VAP, spectrum samples taken from ETS for suspected patients in ICU and HDU in CHUK in August and September 2016 show a number of 12 out of 56 total patients admitted, which means 21% was VAP infections. It is based on these data that the researcher decided to conduct an investigation based on observation study of ETS practice among nurses working in Intensive Care Unit and High Dependency Unit (ICU & HDU) in CHUK to identify current nursing practice related to ETS for patients in those units, and the nurses’ ETS practices level where identified.

Therefore the researcher wonders how the nurses work on prevention and promotion measures in a practice of ETS for those patients. With this study, was a good time to assess and identify how ETS is done by nurses in a manner to prevent complications and ensure safety of patients who are mechanically ventilated?

1.3. Problem Statement

Critical care nurses, as one of the important members of a multidisciplinary team, play the main role in the care where critically ill patients are highly dependent on skilled nurses throughout all aspects of their care, especially airway management and clearance (Sharma, Siren and Bala, 2014, pp. 48–49; Haghighat and Yazdannik, 2015, pp. 622–624).
During clinical practice April and May 2015, in the ICU and HDU units of CHUK, the non-scientifically observation shows that the practice of ETS as a responsibility of critical care nurses in that clinical setting area where they cared critically ill patients daily and night.

The only method used for suctioning patients in those setting units is open method endotracheal suctioning. This method requires opening the ventilator circuit before to entering the sterile suction catheter in the tracheal tube for secretion sucking on (Haghighat, 2015, p. 619).

The researcher observed the use of non-sterile suction catheter during open method ETS in ICU and HDU of CHUK as a commune routine practice done by nurses in that setting area. Again during the due procedure the researcher observed the use of clean gloves in place of sterile gloves during the catheter entering in the patient tracheal as also a commune routine of practice done by nurses in these setting units.

It has been argued by Jansson et al. (2013, p.99) that unsafe practices have been observed worldwide over the past few years where significant discrepancies were observed in practices prior to, during and post endotracheal suctioning.

In a study by Frota et al (2014, p.301) it was concluded that there are divergences between the evidence available and the practices found in the ICUs. A similar report of variations in the suctioning procedure was made by Haghighat and Yazdannik; (2015, pp. 622–624).

Therefore a similar situation of variation on practice of ETS was observed in our health setting where patients are mechanically ventilated day to day.

However, there is no research found on practice of ETS in hospital institutions in Rwanda, therefore the researcher was encouraged to conduct this clinical study for discovery the level of nurses practice on open method ETS compared the clinical practice guideline.
1.4. Aim of study
The aim of present study is to evaluate the level of nursing practice in a referral hospital regards open method ETS in ICU and HDU of CHUK.

1.5. Objectives
The objectives of the study were to:

1.5.1 Assess the nurses’ current practices of open method ETS in ICU and HDU of CHUK

1.5.2 Compare the current open method ETS practices of nurses in ICU and HDU at CHUK

With a clinical practice guideline developed and revised in 2014 by Agency for Clinical Innovation (ACI).

1.6 Research hypothesis

1.6.1 Null hypothesis
Nurse’s practice on open method ETS in ICU and HDU at CHUK referral hospital is underpinned by clinical practice standard guidelines.

1.6.2 Alternative hypothesis
Nurses practice on open method ETS in ICU and HDU at CHUK referral hospital do not follow the clinical practice standard guidelines.

1.7. Significance of the study
This study may be able to be benefiting the nursing practice in terms of providing the evidence based practice as a contribution to quality care improvement in nursing. In education, it may be a support material which will provide evidence based clinical content for the critical care nursing curriculum. On management side in nursing, the study may help in development of local policies regarding ETS, and strategies/protocol or guidelines may be developed to minimise complications in Critical Care Units (CCU) in the hospital. In terms of
research the study can be expanded to other areas in Rwanda to inform development of strategies for the whole country to prevent possible complications related ETS practice.

1.8. Structure of the study
Construction of the study project including chapter one, two and three, Ethical clearance requirements, Data collection process, Analyses and interpretation of results, Discussion and recommendation, and communication of study results; all of them are the main body’s parts of the study.

1.9. Conclusion of the chapter
The chapter has presented the background to the problem, problem statement, the aim and objectives of the study, associated research questions, the significance of the study including the operational definitions.

The following chapter is the literature review, which will be followed by the methodology. The results will be presented after data collection and finally chapter five will present the discussion and interpretation of the results, conclusions, recommendations and limitations of the study.
CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

Many areas of health care practice have been viewed through the lens of evidence-based practice (EBP), with the intent of examining current practices to ensure that patients are provided with optimal and consistent care based on high-quality evidence based care for their benefit (Leddy et al., 2015, p. 60).

Nursing practice in a form of evidence based practice can be based on the six keys purposes of nursing as shown by Royal College of Nursing (2003, p. 11), those are to promote and maintain health, to care for people when their health is compromised, to assist recovery, to facilitate independence, to meet needs, and to improve/maintain well-being/quality of life.

Our position as nurse professionals should reflect our responsibilities regards managing the ill patients, preventing illness, and promoting health in all lifespan. To success those responsibilities we must understand the role of research in our day to day duties. The reason why the researcher in this study need to explore different literature theoretical and empirical review for supporting the idea of conducting a study on practice of endotracheal suctioning among critical care nurses working in ICU and HDU at CHUK.

It has been described in AARC Clinical Practice Guidelines, (2010, p.758), that ETS is a component of tracheobronchial hygiene therapy and mechanical ventilation that involves the mechanical aspiration of pulmonary secretions from a patient’s artificial airway to prevent its obstruction. As we know, those patients admitted in ICU or HDU due to a critical condition require knowledgeable and critical care nurses to assess systematically the needs and give care to them as skilled and professional persons.
Therefore the literature will focus on three steps or events of ETS which are prior, during and post ETS practices, to ensure more understanding of the suction action, and identify gaps have been observed in ETS practices by other researchers in nursing.

2.2. Theoretical Literature

2.2.1. Practice prior ETS

Clearance of airway secretions is a normal physiological process needed for the preservation of airway patency and the prevention of respiratory tract infection. Impaired clearance of airway secretions can result in atelectasis and pneumonia and may contribute to respiratory failure (Faraji et al., 2015).

Most of the critically ill patients in the intensive care units require the use of mechanical ventilation. Endotracheal suctioning is probably one of the most common invasive procedures done for patients with an artificial airway, and it is used to enhance clearance of respiratory tract secretions, improve oxygenation and prevent atelectasis (Jansson et al., 2013).

These patients are unable to spontaneously clear their airways, and ETS clears the endotracheal tree from secretions, assures adequate oxygen supply, avoids obstruction of the tube lumen, decreases patients work of breathing, and prevents atelectasis and pulmonary infection (Haghighat, 2015). Different literature has indicated the importance of ETS but they show the possible risk if not done in safe manner (Maggiore et al., 2013, p. 1588; Sharma, Sarin and Bala, 2014, p. 48; Pedersen et al., 2009, p. 21); Maggiore et al., 2013; Ansari et al., 2012, p. 71).

A patient who is intubated manifests impairment of self-pulmonary tracheobronchial care where a close patient monitoring and assessment for endotracheal secretions and suctioning is needed to keep the airway open. It is recommended to use smaller catheters whenever
possible, since suction pressure seems to have less influence on lung volume loss than
catheter size way patency (Palazzo and Soni, 2013, p. 576).

Through assessment critical care nurse evaluate if patient on ventilator support has difficulty
of breathing and decide the action of ETS or not. A clinical guideline ACI, (2014, p. 8), has
explained the procedure of assessment before ETS and shown the basis required to take a
decision for suctioning. Because of complications effect can cause the ETS, the assessment of
patient is not limited to prior suctioning but extend on the time of suctioning itself, and after
the action (Linda Bell, 2013, p. 326).

The assessment must reflect different system include respiratory, cardiovascular, and nerves
systems in order to relate the intervention with the indication of suctioning (ACI, 2014, p. 8).
For success of the procedure critical care nurses must be well prepared and organized
personally and on the side of environment and materials. That preparation includes but not
limited to: Selects, gathers, and assembles the necessary equipment; washes hands and
applies standard precautions and transmission based isolation procedures as appropriate;
identifies patient, introduces self and department; explains purpose of the procedure and
confirms patient (McKelvie, 2015, pp. 244–248).

2.2.2. Practice during ETS

Literature classifies endotracheal suctioning like one of the most common invasive
procedures performed in patients with an artificial airway. Infected biofilm in the
endotracheal tube and unsafe ETS practices (e.g., inadequate infection-control practices and
the prevention of potential aspiration of colonized oropharyngeal secretions) have been
suggested to be the main treatment related risk factors in the pathogenesis of ventilator
associated pneumonia by increasing microbial colonization of the lower airway (Jansson et
al., 2013, p. 100).
Potential harmful effects may probably be observed during ETS procedure, including hypoxemia due to interruption of the mechanical ventilation (when open method is used) and subsequently loss of lung volume, vasovagal response, arrhythmia, and hypotension, bleeding, and cross infection (Haghighat and Yazdannik, 2015, p. 619). It is important therefore that those carrying out such a procedure are aware of the potential risks and practice in a manner that ensures effectiveness and patient safety (Kelleher and Andrews, 2008, p. 6).

Appropriate management of the patient with an artificial airway can have an impact on reducing complications (such as the development of ventilator-associated pneumonia (VAP), length of ICU stay, duration of mechanical ventilation and mortality and morbidity (ACI, 2014, p. 5). As presented by Ashworth (2015, p.320) that ETS done based on suctioning indicators guideline reduced the risk of VAP by 54% in a sample of critically ill patients.

The measures of infection control like hand washing, use of sterile graves during open method ETS are likely supporting practices for patient protection against infection acquisition. The World Health Organisation (WHO) recommends five moments of hand hygiene in order to minimise the risk of infection transmission to protect both patients and health care providers. Hand hygiene must be done when a health provider manipulates the equipment or when there is a need to touch the patient itself or surroundings during caring
procedures, and should be done before and after graving process (ACI, 2014).

Figure 1:2.1: Five moments for hand Hygiene by WHO

Based on the five moments for Hand Hygiene, URL: http://www.who.int/gpsc/5may/background/5moments/en/index.html © World Health Organization 2009. All rights reserved (ACI, 2014, p.21).

The size of catheter during ETS should be a smaller size compared to the diameter of the ETT for facilitate gas exchange during suctioning time, and it should not exceed a half of diameter of Endotracheal Tube (ETT) (AARC Clinical Practice Guidelines, 2010, p. 758). In practice, 16 French suction catheters were used with artificial airways with an inner diameter 9 mm, 14 French suction catheters were used with 8.0-mm or 8.5-mm endotracheal tubes, and 12 French catheters with 7.0mm or 7.5mm endotracheal tubes (Maggiore et al., 2013, p. 1590).
ACI, (2014, p. 21) describes two formula of getting the suction catheter size which are ETT size minus one then multiplies this number with two. The second method is the ETT size divided by two then multiplied by three then getting the number. With each method we obtain the size of suction catheter adapted to the given ETT size.

Use of Normal Saline Instillation (NSI) during ETS is a common practice for different settings. However literature demonstrates the issues of use NSI with caution, and there is no strong contravention evidences. Studies are conflicting about the safety and efficacy of use or not of Normal Saline Instillation during ETS suctioning (Caparros, 2014, p. 250; Reeve, 2007, p. 119; ACI, 2014, p. 17).

2.2.3. Post suctioning practice

The next and last activities in ETS are related of monitoring and follow-up the result obtained, if there is patient satisfaction or not. The critical care nurse first restores patient to prior status, returns FiO₂ to prior settings, reorganize and maintains equipment and supplies, process infection control measures, records data, and clear communication (McKelvie, 2015, pp. 244–248).

2.3. Empirical Literature

Different studies report unwillingness for nurses to practice the duties with basis of clinical guidelines. Therefore significant treatment related discrepancies was observed in critical care nurses’ performance compared to the guidelines in their daily practice prior to and during ETS events, while the infection control practices was observed the most among them (Jansson et al., 2013, p.102).

A study done on endotracheal suction, Kelleher and Andrews, (2008a, p. 15) reported the similar result where nursing practice was unattached to the recommended guidelines.
Oxygen desaturation was a risk factor for hemodynamic alterations during endotracheal suctioning.

Frequency of suctioning as demonstrated by Maggiore et al., (2013, p. 590), should be evaluated based on oscillations on the expiratory part of the flow time curve and tracheal or bronchial respiratory sounds, ventilator alarms (increased peak airway pressure during volume controlled continuous mandatory ventilation, or decreased tidal volume during pressure-targeted ventilation modes), presence of secretions in the endotracheal tube or oxygen desaturation, after excluding other possible causes, were also considered as later indicators of the need for suctioning.

A study done by Sharma, Sarin and Bala (2014, p. 58), explored the knowledge and competence of nurses in performing tracheal suctioning and the awareness in knowledge of ETS among nurses but they showed poor nursing practices compared to clinical practice guidelines and concluded that there is no significant relationship between knowledge and practices of nursing personnel regarding endotracheal suctioning.

2.4. Critical Review and Research Gap identification

Studies have shown that nursing practice is not underpinend on the clinical practice guidelines. Compared to theoretical and empirical literature reviews, there is a gap of patient assessment for suctioning need prior and during ETS among nurses where theoretical literature supports respiratory, cardiovascular and neurological assessment for providing patient safety.

Practice has shown low adherence measures of infection control including five moment of hand washing as recommended by WHO. Personal Protective Equipment (PPE), are also not respected during ETS practices. On the use of normal saline instillation, there is no strong
evidence supporting the practice on use of it or not where the practice of normal saline instillation depends on the practitioners.

Theories in literature reviews recommend professional nurses to base their practice on evidence, while in the studies the researchers recommend training of practitioners on use of clinical guidelines during ETS.

2.5. Conceptual framework

The researcher emphasized the ETS related to nurse’s performance level because the nursing practice is a process of assessment, diagnosis, planning, intervention, and evaluation, and this (process) depends on the knowledge and the available resources of human and materials to formulate and improve the quality of care delivered to our patients. The judgment on it (nursing practice), reflect the level at which degree of quality care the nurses are performing, either lower or higher.

Contextual Issues

The issues of nurse/patient ratio in ICU or HDU are seen as a challenge in practice of nursing care related to the critically ill management. Sometimes due to shortage of nursing staff and lack of critical care bed side nurses on the field, the ration 1/1 is not respected and risks of improper patient care handling are possible and the patient is no longer safe.

The availability of basic materials such as personal protective equipment, necessary sterile materials like gloves and suction catheter, good condition of suction system, sterile packs for facilitating the process of ETS as any invasive procedure; all those should be considered during a practice of endotracheal suctioning process. Literature used in this thesis covered maximum information with regards to these contextual issues.
Contextual structure

The component structure which are knowledge, available articles and ratio of nurse/patient support the researcher in development of the study body such as background, literature and methodology. In this study of clinical practice the researcher needs to identify the level of nurse’s practice on open ETS compared to the written theories of literatures, empirical studies and the selected guideline.

In theory related management of critically ill patients in ICU, the nurse patient ratio must be one nurse to one patient for proper intensive care handling. Therefore, in this study the ratio of one nurse to one patient will be used as a criterion during observation and one nurse will be observed on one ETS practice event for one patient on a limited time a day.

Contextual process

Process in nursing is composed of assessment for getting information necessary, the diagnosis of the possible problem by analyzing the data collected the plan of the intervention which should be based on the priorities, the intervention which follows the priorities for problem solving and the evaluation of the results. The ETS practice is an example of nursing process and when process steps respected could minimize the VAP infection and other complications such as cardiac, respiratory, and neurological, which are possible complications related to suctioning a patient who is mechanically ventilated.
Contextual outcomes

The component outcomes were based on study objectives. The process is based on what is known as best ETS practice through literature. As cited by ACI, (2014, p. 5) that an appropriate management of a patient with an artificial airway can have an impact on reducing complications such as the development of ventilator associated pneumonia, length of ICU stay, duration of mechanical ventilation and mortality and morbidity. Therefore the outcomes of the process of ETS depend on the nurses practice adherence or not to a clinical practice guideline.

Contextual quality improvement

This study should inform the formulation of the protocol for quality improvement because it is clinical practice categorized in a group of evidence based practice where the assessment of current ETS among nurses in ICU and HDU of CHUK defined the poor level of nurses practice of open method ETS compared the ACI guideline. With that clinical practice guideline of ETS, a tool of questions was developed based on it, and the tool was used for guiding the assessment of the current nurse’s ETS practices.

Personal factors

Age, gender, professional qualification, experience, and training, all those are the elements considered in this study. They could be the factors to improve for future expected quality of care improvement. Those contextual factors are prepared in study methodology as participant’s parameters and in data collection tool as participant’s demographic variables.
In summary:

This model of ETS is a circle starting on the process based on the structures based on knowledge and articles in journals which lead to the outcomes based on the study objectives and study questions. The plan for quality improvement must be based on personal factors such as age, gender, experience, and training where the main target is a positive patient outcome and patient safety. See Figure 2.1 below for the diagrammatic presentation of the adopted conceptual framework.
Figure 2: The adapted module of conceptual framework

Performance of Nurses Related to Open Method ETS Practice in a Referral Hospital

**Structure:**
- Theoretical and empirical literatures on ETS.
- Standard guidelines (ACI; AARC). Patient/Nurse ratio. Participant

**Process of:**
- Data collection
- Data analysis
- Interpretations
- Discussion
- Recommendation

**Outcomes:**
- Expected of study results based on proposed Hypotheses/objectives

**Contextual Factors**
- Participants ages
- Sex of participants
- Education level of participants
- Experience in critical care setting area
- Participant’s trainings related critical care

**Implications**
- Development of ETS protocol or guidelines adaptation/ adoption
- Evaluation and supervision of nursing care practice for critically ill patients
- Providing evidence based practice in

Retrieved from http://www.slideshare.net/jaspreetsodhi/conceptualframework
2.6. Conclusion of the chapter:
The literature review has been presented including the identification of the gap in the area of study, a conceptual framework expected to guide the study has been presented and applied to the study. The next chapter will present and discuss the methodology guiding this study.
CHAPTER 3: METHODOLOGY

3.1. Introduction

This chapter outlines the methodology that the researcher used during the study. It describes the procedures followed in conducting the study. It includes the research design, target population, sampling techniques and procedures, and the data collection and analysis method used. The data collection instruments including its reliability and validity are also presented. Finally the ethical considerations, data management and dissemination follow.

3.2. Study design

The study was a quantitative cross sectional study of practice of the open method ETS among clinical nurses’ working in ICU and HDU in CHUK.

3.3 Study approach

A non-participant structured observational tool was adapted and used in this study to obtain briefly what is happening in practice of ETS among nurses. The nature of observational studies includes the collection of data where specific behaviours or events are selected for observation and are conducted in the participants’ natural environments (Haghighat, 2015, p. 620). Literature suggests that direct observation is initially a more important process to anyone, how a person react and act in order to perform any action in real situations and compare if there is any difference in the practices (Kelleher and Andrews, 2008, pp. 360–369).

3.4. Study setting

CHUK is a one’s of the referral hospitals in Rwanda. It was built in 1918 and is located in the centre of Kigali City, capital of Rwanda, is located in Nyarugenge district, Gitega sector. From 1928 it served the community as a health centre and later in 1965, as a hospital. Due to the history characterized in Rwanda country, from April 1994 to 1996, CHUK has served in a
triple dimension as; a health centre, a district hospital and a referral hospital. Today CHUK is placed on the second position as a public hospital after King Faisal Hospital. It serves approximately one million (1,000,000) of people from a largely differentiated area.

It is composed of different departments such as: Internal Medicine, Surgery, Paediatrics, Gyneco-Obstetrics, Emergency, Ear Nose and Throat (ENT), Stomatology, Physiotherapy, Dermatology, Out Patient Department (OPD), Ophthalmology.


CHUK receives a great number of patients who require mechanical ventilation such as spinal and head injuries, cardiovascular and respiratory injuries, chronic and acute kidney injuries, intoxication and poisoning, and prolonged or critical surgery cases. Two units ICU and HDU are positioned to receive those kinds of cases as adults. There are seven beds in ICU and four beds in HDU as a capacity of those units. Those two units are managed as two separate units under one unit manager. A total number of nurses are thirty three, and a quota sampling method which is similar to convenience was used, and sample size in this study came from this number of nurses.

3.5. Study population

The study population included all nurses working in ICU and HDU. There are 33 full time employed clinical nurses who are generally allocated one nurse to one patient, rarely as exceptionally one nurse to two patients per shift. The targeted population of interest were critical care nurses, as they predominantly practice ETS.
3.5.1. Inclusion criteria
The inclusion criteria for selection of participants were as follows: All clinical nurses who had experience of not less than one year of practice in ICU and HDU of CHUK. Signing a prepared consent form for participating in the study before data collection was a must.

3.5.2. Exclusion criteria
The following were excluded from the study: Clinical nurses who were on leave during data collection period and clinical nurses who had less than one year of experience in ICU and HDU.

3.6. Population for Census determination
All clinical nurses as a total population work in ICU and HDU was involved in this study and inclusion and exclusion criteria were considered. Census: Measurements or observations of the entire population were used as to evaluate the ETS practice among critical care nurses in ICU and HDU of CHUK where ETS event is a must.

3.6.1. Census size
29 participants where all of them nurse participated in this study. This involved clinical nurses in ICU and HDU in those settings. The census size as entire population was 29(87%) nurses which include 21 in ICU and 8 in HDU nurses out of 33 nurses as a total number of nurse staff in those units.

This size compares favourably with previous observational studies addressing ETS where in the sample sizes ranged from n=26 to n=28 observations Maggiore et al., (2013), 25 subjects in a study by (Frota et al., 2014) and 30 participants in a study done by Jansson (2014).
3.7 Data collection

3.7.1 Data collection instruments

Two type of independent variables used in data collection are demographic and twenty four items variables made a checklist of observation tool as reflected in Table 1. Demographic Variables are made by five items which are age of participant, gender identity either male or female of participants, qualification background, experience of practice in ICU or HDU, training or course including those related ETS or speciality course in Critical Care and Trauma management.

Table 3.1: Variables categories including demographic and items of observation tool

<table>
<thead>
<tr>
<th>Number</th>
<th>Variable categories</th>
<th>Items number related every part of tool</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Independent variables</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Demographic variables</td>
<td>1-5</td>
</tr>
<tr>
<td></td>
<td>OBSERVATION CHECKLIST: see appendix 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dependent Variables</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Practice prior open method endotracheal suctioning</td>
<td>1-10</td>
</tr>
<tr>
<td>3</td>
<td>Open method Endotracheal suctioning practice event itself</td>
<td>11-17</td>
</tr>
<tr>
<td>4</td>
<td>Post open method ETS practices</td>
<td>18 – 24</td>
</tr>
</tbody>
</table>
3.7.2. Data collection process

A tool of twenty four items adopted and actualized was prepared and used in a nonparticipant appraisal data collection on practice of open method ETS which was conducted among nurses of ICU&HDU of CHUK after getting an approval letter from Institution Review Board (IRB). Aim of the study where explained to participants by the researcher before signing consent. The researcher made face to face contact with the subjects for a written consent, and each subject was observed once in a period of duty time from 10.00 AM to 20.00 PM.

Data was collected using a 24 items structured observational checklist adapted from Kelleher and Andrews (2008), and actualized as a tool prepared for an observational study on the open method endotracheal suctioning practice of critical care nurses.

A researcher himself collected the data at a rate of one observer to three nurses (1/3) in ICU or HDU per day. The adapted and actualized observation tool has three main parts. Category one related prior-open method endotracheal suctioning variables concerning activities related to preparation for the procedure of ETS.

The 2nd category related variables engaging the practice of suctioning event themselves where suction catheter was inserted and suction pressure are controlled for the suctioning event. Category three is one related to the post endotracheal suctioning practice where repositioning of patient and rearrangement of devices including ventilator circuits were done and observation of suctioning outcomes were recorded.

The data was collected in a period of 30 days by a researcher himself. The researcher selected by choice one participant and asked d him/her permission to be observed on a practice of ETS to the patient he/she cared for.
The observation was guided by a tool of items related the steps of ETS. The observational schedule was piloted to identify practical or local problems that might potentially affect the research process. All items on the observational schedule were weighted with the digits 0 and 2 respectively. Kelleher and Andrews, (2008) stated that higher weighting (2) constituted adherence to best ETS practice and the weighting of (0) represented non adherence to either of the above. High observation scores represent closer adherence to recommended best practice.

3.8. Data analysis

Descriptive statistics included frequency ratings and percentages for nominal level data where proposed and used in data analysis. One-sample t-test was used to test the null hypothesis and compare participant’s current ETS practices to ideal ETS clinical practice recommendations. Analysis was performed using the Statistical Package for the Social Scientists (SPSS, version 21.0) software. The data was presented by using pie charts, tables and graphs.

3.9. Ethical Considerations

The permission to carry out the study was sought from the Institution Review Board (IRB), for ethical approval. The permission to collect data from CHUK in ICU and HDU units was sought from administration through the research comity of CHUK. Every participant was contacted face to face for information on the research process, participants’ right in the study, including giving consent, right to refuse and discontinue participation at any time in the process without sanction.

The written consent (see appendix number 3) was a must to be signed before observing a participant on 24 items of observation tool. The code was used to differentiate the participants in order to observe anonymity. All the information obtained during the study was
treated with maximum confidentiality and only the authorized persons had permission for data accessibility, such as the researcher and supervisor.

During the process, the participant privacy was highly maintained. Sensitive personal information was handled with high level of confidentiality. The setting safeguarded privacy in such a way that you were not being exposed to public when giving information. The researcher was observing the obligation to protect the anonymity of participants and kept researcher data confidential. No pain or harm was inflicted to the participant during the study in any way. Duplication of researcher data was prevented by use of passwords controlled computer to control access by strangers.

3.10. Data management

The protection of data during and after study was provided by use of computer password, and Hard copies data collection was keep it as confidential until five years.

3.11. Data dissemination

End of grant approach is proposed to be used for knowledge translation where the reports of research should be made to the relevant institutions including UR, CHUK, and Rwanda Military Hospital (RMH). Peer reviewed peppers, conference presentations were also provided for data dissemination(WHO in module 5 of DISSEMINATING THE RESEARCH findings, 2014, p. 146)

3.12. Study limitations

The generalization of the study cannot extend beyond the study area because of the small sample size. Due to the small size of population, census was used where involved the entire population, therefore there is impossibility of statistical generalisation but possibility of analytical generalisation.
3.13 Conclusion of chapter

The study took place at CHUK from April 16, 2017 to May 14, 2017, quantitative close suction was used as a study design, while 24 items related ETS practice where used as a checklist tool adapted. Ethical issues were considered including clearance letter from IRB.
CHAPTER 4: RESULTS

4.1. INTRODUCTION

The study took one month in both units ICU and HDU of CHUK where 29 checklists were ticked for 29 nurses working in these units. Thirty checklists were expected to be complete but only 29 were done and one checklist was rejected based on exclusion criteria. This amounts to a response rate of 96.67% which is good response against response rates suggested in literature of 80-85% for face to face survey (retrieved on 13/06/2017 https://facultyinnovate.utexas.edu/sites/default/files/response_rates.pdf).

Both male and female participated in the study with 79.30% of females. Other baseline variables such as ages of respondents were 55.20% of respondent fell between 31 – 40 years old. Experience in ICU or HDU was predominately between 1-2 years at 37.90%. The level of education was dominated by A1 with 89.70% of participants, while the majority of participant had less than one week of training with a score of 60%.

The predominant observation data in the study emanated from the 24 checklist items that were weighed against or compared with the ACI, a clinical ETS guideline and are categorized into three sections: practice prior-suctioning, practice during suctioning event, and post-suctioning practice; while the demographic data was presented as a characteristics to describe the participants. Data presentations were done by using tables, pie charts and graphs

4.2. Demographic data presentation

Demographic characteristics included age, gender, experience, level of education and training done and are presented hereunder.
4.2.1 The age of participants

Table number 4.1 show the participant’s ages where most of respondents were in the age category between 31- 40 years old with a score of 55.2% (n=16). While a group of age 21-30 years old followed with 20.70% (n=6) of respondents; a group of 41- 50 years old with 17.20% (n=5) of participants and the group of 51- 60 years old with 6.90% (n=2) of participants. See table 4.1

<table>
<thead>
<tr>
<th>Age of participant</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 - 30 years</td>
<td>6</td>
<td>20.7%</td>
</tr>
<tr>
<td>31 - 40 years</td>
<td>16</td>
<td>55.2%</td>
</tr>
<tr>
<td>41 - 50 years</td>
<td>5</td>
<td>17.2%</td>
</tr>
<tr>
<td>51 - 60 years</td>
<td>2</td>
<td>6.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

4.2.2 The gender of participants:

Figure number 4.2 presenting the results of female as predominant with a score of 79.3% (n=23) while the score of 20.70% (n=6) represents the male participants. See figure below.
Figure 3:4.1 Genders of participants

4.2.3. The Education level of participants

Table number 4.3 below presents the results of participant’s education levels where the majority of them have A1 level of general nursing with a score of 89.70% (n=26) and the rest 10.30% (n=3) of the participants have A0 level of general nursing. See table below.

Table 3:4.2 Education levels of participants

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 of general nursing</td>
<td>26</td>
<td>89.7%</td>
</tr>
<tr>
<td>A0 of general nursing</td>
<td>3</td>
<td>10.3%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
</tr>
</tbody>
</table>
4.2.4. Critical care nurse’s experience of ICU and HDU of CHUK

Table number 4 below describing the results of experience of ICU and HDU for participants where the majority with a score of 37.90% (n=11) have 1 to 2 years of experience while 31.00% (n=9) have the experience of above 6 years, 17.20% (n=5) of participants have 5 – 6 years of experience and only 13.80%(n=4) have 3 to 4 years of experience. see table below

Table 4:4.3 Participants’ experience of ICU and HDU

<table>
<thead>
<tr>
<th>Experience of ICU and HDU</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2 years</td>
<td>11</td>
<td>37.9%</td>
</tr>
<tr>
<td>3 - 4 years</td>
<td>4</td>
<td>13.8%</td>
</tr>
<tr>
<td>5 - 6 years</td>
<td>5</td>
<td>17.2%</td>
</tr>
<tr>
<td>Above 6 years</td>
<td>9</td>
<td>31%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.2.5 Relevant Training undergone by Participants

Table number 5 below presenting the results of participants’ training done where most of them 69.00% (n=20) did a training of less than one week, while 17.20% (n=5) have a training of one week, 6.90% (n=2) have a training of six monthly; and another 6.90% (n=2) reported no training done.
Table 5:4.4 Participants’ training done related critical care

<table>
<thead>
<tr>
<th>Training done related critical care</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>no training done</td>
<td>2</td>
<td>6.9%</td>
</tr>
<tr>
<td>training of less than one week</td>
<td>20</td>
<td>69%</td>
</tr>
<tr>
<td>training of one week</td>
<td>5</td>
<td>17.2%</td>
</tr>
<tr>
<td>training of six monthly</td>
<td>2</td>
<td>6.9%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.3 Observation data presentation

Data on this party are pure based on descriptive findings of this study where relevant results are divided into three sections which are pre-endotracheal suctioning practice, during endotracheal suctioning practice, and post endotracheal suctioning practice. Data are presented according sections ascending order in tables and graphs. One sample T-test was used for rejecting or supporting the nil hypotheses which is “Nurse’s practice on open method ETS in ICU and HDU at CHUK referral hospital is underpinned by clinical practice standard guidelines”.

4.3.1. Pre-Endotracheal Suction Practices

Table number 4.6 below presenting the results of participant’s assessment for a patient level of sedation where 75.90% (n=22) assessed the patients’ level of sedation before ETS event while 24.00% (n=7) did not. Patients airway patency checking before endotracheal suctioning, 51.70% (n= 15) where have check patient airway patency before ETS event while 48.30% does not do that action of patient airway patency checking.
On the assessment of position of ventilator circuit participants presenting the results of 51.70% (n=15) where did not assess the position of circuit while 48.30% (n=14) did.

A 100% (n=29) of the participants no one auscultate chest patient before endotracheal suction event. The results of 93.10% (n=27) of the participants did not verify and record the patient’s vital signs before endotracheal suction event while only 6.90% (n=2) did it. The results of 93.10% (n=27) of the participants did not explain the procedure of ETS to the patient before doing it, while 6.90% (n=2) of participants tried to do it (n=29). Pre-suctioning hyper-oxygenation given by pressing the proper button on the ventilator where 69.00% (n=20) of participants did it while 31.00% (n=9) did not.

The study shows a total number of the participants mean a 100% (n=29) where was not using the Facial mask and goggles as known as personnel protective equipment in order to prevent infection transmission during ETS practice.

The results on use of an apron as a protection during ETS practice where 96.60% (n=28) wore the apron while 3.4% (n=1) did not. The results for hand washing prior-ETS practice shows the majority with 79.30% (n=23) of participants did not wash their hands before ETS practice while 20.70% (n=6) of participants had their hands washed before ETS practice event. See table below
Table 6:4.5: Results of pre-endotracheal suctioning practices

<table>
<thead>
<tr>
<th>Related tool/checklist item</th>
<th>N</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>level of patient sedation assessment</td>
<td>29</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>22</td>
</tr>
<tr>
<td>Airway patency checking for possible obstruction</td>
<td>29</td>
<td>No</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td>Position of Ventilator circuit Assessment</td>
<td>29</td>
<td>No</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>14</td>
</tr>
<tr>
<td>Patient Chest auscultation before Tracheal suctioning</td>
<td>29</td>
<td>No</td>
<td>29</td>
</tr>
<tr>
<td>Patient Vital Signs Verification and Recording</td>
<td>29</td>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>Procedure Explanation and communication to the patient</td>
<td>29</td>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>Pre-suctioning hyper-oxygenation giving</td>
<td>29</td>
<td>No</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>9</td>
</tr>
<tr>
<td>Goggles and Facial Mask Worn</td>
<td>29</td>
<td>No</td>
<td>29</td>
</tr>
<tr>
<td>Apron Worn</td>
<td>29</td>
<td>No</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Hand washing Prior-Tracheal Suctioning</td>
<td>29</td>
<td>No</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>6</td>
</tr>
</tbody>
</table>
4.3.2. Score summary of pre-endotracheal suctioning practices

Summary of pre-endotracheal suctioning practices is presented by using table 4.7 and a figure 4.2 below.

**Table number 4.7** below is presenting data of 10 items on observation tool where 20 points are supposed to be a maximum and 10 points a minimum score. Fifteen out of twenty (15/20) is a maximum score obtained by the participants and 10/20 is a minimum. Twelve (12) participants as majority got 12/20 points, 6 participants got 13/20 points, 5 participants got 14/20 points, 4 participants got 10/20 points, 1 participant got 15/20 points, and 1 participant got 11/20 points.

**Table 7:4.6 Score summary of pre-endotracheal suctioning practices**

<table>
<thead>
<tr>
<th>Score summary of pre-endotracheal Suctioning practices</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/20 points</td>
<td>4</td>
<td>13.8%</td>
</tr>
<tr>
<td>11/20 points</td>
<td>1</td>
<td>3.4%</td>
</tr>
<tr>
<td>12/20 points</td>
<td>12</td>
<td>41.4%</td>
</tr>
<tr>
<td>13/20 points</td>
<td>6</td>
<td>20.7%</td>
</tr>
<tr>
<td>14/20 points</td>
<td>5</td>
<td>17.25%</td>
</tr>
<tr>
<td>15/20 points</td>
<td>1</td>
<td>3.4%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure number 4.2** is presenting the normal distribution of data where the score are grouped in a central tendency compared to the mean which is 12.34 evidenced by the graphic cave. With this normality distribution of data, the parametrical test must be based for guiding the study significance where one sample T-test is selected. See figure 4.2 below.
Figure 4.2 Distribution of participants score related pre-endotracheal suctioning

4.3.2.1 Pre endotracheal suctioning event hypothesis testing

The significance of study in this section of pre--endotracheal suctioning practice is calculated from a mean tool of 10 items \((2 \times 10 \times 29)/29 = 20\) related event effect for safety of open method pre-endotracheal suctioning Compared with the mean of participants which is 12.34. One sample T-test shows a study significance where \(P\)-various is less than 0.0001, therefore the practices of nurses on open method ETS in ICU and HDU of CHUK doesn’t following the guidelines with one example of ACI guideline. With the above evidence where a \(P\)-various less than 0.0001, there is no safe practice related pre-endotracheal suctioning event in ICU and HDU of CHUK.
4.3.3. During Endotracheal suctioning practices

The table below presenting The results of items related practice of endotracheal suctioning event itself complied seven items related the insertion catheter event in the tracheal including use of sterile gloves and sterile suction catheter, adequate size of suction catheter, suction pressure uptake in time of length, level and time of application pressure.

A 100% of participants all of them use a non sterile suction catheter during endotracheal suctioning as that procedure is invasive which require to be performed with sterile materials.

The concerning size of catheter used for ETS where 58.60% (n=17) of participants used a catheter > of a half of the inner diameter of tracheal tube, while 41.40% (n=12) of participants used a suction catheter of < or = of a half of inner diameter of tracheal tube.

The results of the number suction catheter passing during ETS event where 69% (n=20) of participants suctioning pass is between 1 and 2 times while 31% (n=9) of participants’ suctioning pass was > to 2 times.

The study shows the length/time of suctioning pressure applied by participants where 51.70% (n=15) applied active pressure in 10 to 15 seconds of suctioning while 48.30% (n=14) of participants applied active pressure more than 15 seconds.

Suction pressure length/level applied where 69.00% (n=20) of participants applied a pressure length of 80mmHg to 150mmHg while 31% (n=9) of participants applied a pressure length less than 80mmHg or more than 150mmHg.

The starting time for pressure for suctioning application by participants where 51.70% (n=15) started application of pressure during suction catheter withdrawal, while 48.30% (n=14) started application of pressure during the insertion of the suction catheter. See related table 4.8 below.
Table 8.7: During endotracheal suctioning events it salves

<table>
<thead>
<tr>
<th>Related tool/checklist item</th>
<th>N</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterile Gloves Use during ETS</td>
<td>29</td>
<td>29</td>
<td>100%</td>
</tr>
<tr>
<td>Sterile Suction Catheter Use during ETS</td>
<td>29</td>
<td>29</td>
<td>100%</td>
</tr>
<tr>
<td>Adequate use of Suction Catheter size during ETS event</td>
<td>29</td>
<td>No 17</td>
<td>58.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes 12</td>
<td>41.4%</td>
</tr>
<tr>
<td>Proper Number of Suctioning Passing during ETS event</td>
<td>29</td>
<td>No 9</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes 20</td>
<td>69%</td>
</tr>
<tr>
<td>Respect of 10 – 15 seconds time/ Length of Suctioning Pressure Application</td>
<td>29</td>
<td>No 14</td>
<td>51.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes 15</td>
<td>48.3%</td>
</tr>
<tr>
<td>Respect of 80 – 150 mmHg length/ level of Suctioning Pressure application</td>
<td>29</td>
<td>No 9</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes 20</td>
<td>69%</td>
</tr>
<tr>
<td>Respect of time for Suctioning Pressure Application</td>
<td>29</td>
<td>No 14</td>
<td>48.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes 15</td>
<td>51.7%</td>
</tr>
</tbody>
</table>

4.3.4. Score summary of practice during endotracheal suctioning event

Summary of practice during endotracheal suctioning event it selves is presented by using table 4.9 and figure 4.3 below.

Table number 4.9 presenting data of seven (7) items of open method endotracheal suction event itself using observation checklist. Fourteen out of fourteen (14/14) points are considered to be the maximum of a higher score, while 7/14 are considered to be a minimum of the score. Seven participants got 8/14 points, four participants got 9/14 points, eight participants got 10/14 points, nine participants got 11/14 points, and one participant got 12/14 points. See related table below.
Table 9.4.8: Score summary practice during endotracheal suctioning event

<table>
<thead>
<tr>
<th>Score of practice during endotracheal suctioning event</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/14 points</td>
<td>7</td>
<td>24.1%</td>
</tr>
<tr>
<td>9/14 points</td>
<td>4</td>
<td>13.8%</td>
</tr>
<tr>
<td>10/14 points</td>
<td>8</td>
<td>27.6%</td>
</tr>
<tr>
<td>11/14 points</td>
<td>9</td>
<td>31%</td>
</tr>
<tr>
<td>12/14 points</td>
<td>1</td>
<td>3.4%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure number 4.3 below show the normal distribution curve of the scores grouped in central without tapering toward the extremities. From this data distribution the test guidance of study significance is based on parametrical statistical with that a selection of one sample T-Test was done. See related figure below.
Figure 5.4.3: presenting the normality of the distribution score of practice during endotracheal suctioning event itself

4.3.4.1 During endotracheal suctioning event itself hypothesis testing

The significance of study engaging the section of during endotracheal suctioning practice is calculated with aid of two means. Participants score mean and the mean tool of the seven items which are those involving the introduction in and poor-off the suction catheter in the tracheal tube for secretion removal. Mean tool of 7 items is \((2 \times 7 \times 29) / 29 = 14\) compared with the mean of participants which is 9.76; through one sample T-test the result show a study significance where P-various is less than 0.0001.

Therefore the ETS practices of nurses in ICU and HDU of CHUK do not following the guidelines with one example of ACI guideline. With the above evidence where a P-various of less than 0.0001, there is unsafe nurse’s practice related event of introducing in and off of the suction catheter in tracheal tube for secretion removal for patients in ICU and HDU of CHUK.
4.3.5. Post Endotracheal Suctioning Practice

The third and last section of study tool with which the results of seven items are presented here in a table including events of managing the patient, immediate after passing the suction catheter in and poor out of endotracheal tube. At these points practitioner assess the different aspects of patient and patient surrounding in order to ensure and providing the safety of both patient and practitioner(s).

The time taken by the participants to reconnect a patient on a ventilator where 79.30% (n=23) of participants reconnected the patients to the ventilator within 10 seconds post tracheal suctioning, while 20.70% (n=6) of participants took more than 10 seconds to reconnect the patients to the ventilator.

Post suctioning hyper-oxygenation given by pressing the appropriate button on the ventilator machine where the most of participants 93.10% (n=27) failed to give oxygen while 6.90% (n=6.9) of the participants gave patients oxygen post ETS event.

Post-endotracheal suctioning patient chest auscultation, a 100% (n=29) of participant no one tried to do it. Post suctioning vital signs assessment where 65.50% (n=19) of the participants did not assess patients’ vital signs after suctioning them while 34.50% (n=19) of participants verified and recorded patients vital signs after suctioning them.

The results for patient reassuring after ETS event where the majority of participants 82.80% (n=24) failed to reassure the patients after ETS event, while 17.20% (n=5) of the participants reassured their patients after ETS event.

Proper west management including the used catheter and gloves where none of participants 100% (n=29) discarded the used suction catheter but kept that catheter to be reusable, and where gloves remained worn and touching objects surrounding the patient. The results for hand washing after ETS event where 62.10% (n=18) of participants failed to wash their hands while 37.90% (n=11) washed their hands after ETS event. See related table below
Table 10:4.9 presenting the results of post endotracheal suctioning

<table>
<thead>
<tr>
<th>Related tool/checklist item</th>
<th>N</th>
<th>Frequency</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Reconnected to the ventilator within a time</td>
<td>29</td>
<td>No</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>23</td>
</tr>
<tr>
<td>Post suctioning Hyper-oxygenation Drivelling</td>
<td>29</td>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>Post suctioning Vital signs Assessment</td>
<td>29</td>
<td>No</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>10</td>
</tr>
<tr>
<td>Post suctioning patient Chest auscultation</td>
<td>29</td>
<td>No</td>
<td>29</td>
</tr>
<tr>
<td>Patient Reassuring after ETS Procedure</td>
<td>29</td>
<td>No</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Used catheter and gloves are disposed of in a manner that prevents contamination from secretions</td>
<td>29</td>
<td>No</td>
<td>29</td>
</tr>
<tr>
<td>Hand Washing After ETS procedure</td>
<td>29</td>
<td>No</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>11</td>
</tr>
</tbody>
</table>

4.3.6. Score summary of practice during endotracheal suctioning event

Table N° 4.11 below presenting data of seven items of open method post endotracheal suctioning practice where 14/14 is considered a maximum score and 7/14 as a minimum score. Most of the participants (n=12) got 8/14 points; six participants got 9/14 points, five participants got 10/14 points, three participants got 11/14 points, and other three participants got 7/14 points. See related table below.
Table 11:4.10 Score summary of safety practice post endotracheal suctioning

<table>
<thead>
<tr>
<th>Score summary of Post Endotracheal Suctioning practices</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/14 points</td>
<td>3</td>
<td>10.3%</td>
</tr>
<tr>
<td>8/14 points</td>
<td>12</td>
<td>41.4%</td>
</tr>
<tr>
<td>9/14 points</td>
<td>6</td>
<td>20.7%</td>
</tr>
<tr>
<td>10/14 points</td>
<td>5</td>
<td>17.2%</td>
</tr>
<tr>
<td>11/14 points</td>
<td>3</td>
<td>10.3%</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure number 4.4** below show a normality of data distribution post endotracheal suctioning with a mean of 8.76. With this normality data distribution allow the use of parametrical statistical test where one sample T-Test is chosen for study significance guidance. See related figure below
4.3.6.1 Post-endotracheal suctioning event hypothesis testing

The significance of study of this section of post-endotracheal suctioning practice is calculated from a mean tool of 7 items \( ((2 \times 7 \times 29)/29 = 14) \) related event effect for safety of open method post-endotracheal suctioning compared with the mean of participants which is 8.76. One sample T-Test show a study significance where P-various is less than 0.0001, therefore the practices of nurses on open method ETS in ICU and HDU of CHUK do not following the guidelines with one example of ACI guideline. With the above evidence where a P-various less than .0001, there is no safe practice related post endotracheal suctioning event in ICU and HDU of CHUK.

Figure 6.4.4: presenting the score distribution of practice post-endotracheal suctioning event
4.5 General summary of data presentation

4.5.1 Introduction

In this part the data are presented in four tables and three figures which were obtained by using SPSS analysis using descriptive statistic explore in order to have general participants score data over view and to test the normality distribution of participants score values.

Table N°4.12 is presenting the total number of participants (29) that is 100%, while there is no missing presented. See related table below.

Table 12:4.11 Case processing summaries

<table>
<thead>
<tr>
<th>Case Processing Summary</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>29</td>
</tr>
</tbody>
</table>

Table number 4.13 below presenting the variety of descriptive statistic summarising the score of participants where 30.8621 is presented as original mean, while 30.8467 as a 5% trimmed mean where both are very close and do not’ show an important difference between them. Therefore the extreme distribution score of participants does not have a strong influence on the mean. The minimum score observed is 27/48 points while the maximum score observed is 35/48 points. See related table below.
Table 13.4.12: Descriptive Statistics of practice of nurses on open method endotracheal suctioning

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>30.8621</td>
<td>.42323</td>
</tr>
<tr>
<td>95% Confidence Interval for Mean</td>
<td>Lower Bound</td>
<td>29.9951</td>
</tr>
<tr>
<td></td>
<td>Upper Bound</td>
<td>31.7290</td>
</tr>
<tr>
<td>5% Trimmed Mean</td>
<td>30.8467</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>31.0000</td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>5.195</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>2.27916</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>27.00</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>35.00</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>8.00</td>
<td></td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>0.124</td>
<td>0.434</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-0.486</td>
<td>0.845</td>
</tr>
</tbody>
</table>

Table number 4.14 below shows the most extreme cases and their score values where in highest division, participants recorded as number 7, 9 and 28 gets a score of 35/48 points, participant recorded number 12 got 34/48 points and number 27 got 33/48. while in a lowest division the participants recorded number 16 and 5 gets score of 27/48 points, participants recorded as number 18, 22 and 26 gets points. See related table below.
Table 14:4.13: Extreme Values of participants score of practice on open method endotracheal Suctioning

<table>
<thead>
<tr>
<th>Extreme Values of participants score of practice on open method endotracheal Suctioning</th>
<th>Case Number</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>35.00</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>35.00</td>
</tr>
<tr>
<td>3</td>
<td>28</td>
<td>35.00</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>34.00</td>
</tr>
<tr>
<td>5</td>
<td>27</td>
<td>33.00</td>
</tr>
<tr>
<td><strong>Lowest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16</td>
<td>27.00</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>27.00</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
<td>28.00</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>28.00</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>28.00^a</td>
</tr>
</tbody>
</table>

Table number 4.15 below shows the normal distribution of participants score where 0.145 is a statistic score test with significant score values of 0.124, While the significance value of kolmogorov-Smirnov^a is 0.05 and when participant’s statistic score more than 0.05, there is no significance which means normality of score distribution in this study. See related table below. See related table below.
Table 15:4.14: Tests of Normality of participant score various

<table>
<thead>
<tr>
<th>Tests of Normality of participant score various</th>
<th>Kolmogorov-Smirnov(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
</tr>
<tr>
<td>Test various of score participants practices on open method endotracheal suctioning</td>
<td>0.145</td>
</tr>
</tbody>
</table>

Figure N\(^o\) 4.5 below shows the normality of distribution of participants’ score value in which the box plot has a rectangle view located in middle of the figure and represent 50% of the participants score values. While the whiskers going out to the highest and smallest values. No sign for outliers found.

![Box plot of participant’s scores distribution for practice of nurses on open method endotracheal suctioning in ICU and HDU of CHUK.](image)

**Figure 7:4.5** Box plot of participant’s scores distribution for practice of nurses on open method endotracheal suctioning in ICU and HDU of CHUK.
4.6 Participants practice coefficient level

The open method ETS observation tool has 24 items as a checklist where 2 points were marked for each item if the participants’ practiced with respect of standard approaches guideline, while 00 point was marked for each item if open method ETS were not correctly performed. But SPSS does not accept 0 as a value, the reason why value 1 was used to replace value 0 in SPSS data view sheet.

The maximum score values is 48/48points which gave a 100% while the minimum score value was 24/48 points which is gave 00%. Consider revising: maximum for each item was 2 points and minimum was 1 point, it means if the participant got 1 point x 24 items (all items) that means 50% which are considered as zero (0 point). A researcher was deciding on which coefficient level participants are classified as very good, good and poor practice.

Table 4.16 is presenting the assumptions on the intervals possible to classifying current nurses practice on open method ETS in ICU and HDU of CHUK as a referral hospital. In these three classes interval which are very good practice, good practice and poor practice as presented in the table below, only 4/29(14%) participants showed good practice, 25/29(86%) of participants showed poor practice while no one in the participants showed very good practice.

**Table 16: 4.15 : Participants coefficient levels**

<table>
<thead>
<tr>
<th>Participant Coefficients level interval</th>
<th>Assumption Score values classifications interval</th>
<th>Assumption of the % classification interval</th>
<th>Participants current classification interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good practice</td>
<td>39 – 48 points</td>
<td>81 – 100%</td>
<td>00/29 participants</td>
</tr>
<tr>
<td>Good practice</td>
<td>34 – 38 points</td>
<td>71 – 80%</td>
<td>04/29 participants</td>
</tr>
<tr>
<td>Poor practice</td>
<td>24 – 33Points</td>
<td>50 – 70%</td>
<td>25/29 participants</td>
</tr>
</tbody>
</table>
4.6.2 Study participation level compared with the expected sample size

The proposed sample size was 30 participants who were nurses working in ICU and HDU at CHUK. During data collection one was excluded due to exclusion criteria. All (29) participants were observed after signing consents. Therefore \(\frac{29 \times 100}{30} = 97\%\) is a level of participant participation.

4.7 General study Hypothesis testing

One sample T-Test was used to support or to reject the null study hypotheses which are “nurse’s practice on open method ETS in ICU and HDU at CHUK referral hospital is underpinned by clinical practice standard guidelines”.

Different statistical exploration shown the normality of data distribution including histogram, Normal Q-Q plot, Box plot, and Kolmogorov-Smirnov\(^a\) tests were used in SPSS to explore, where all of them showed the normality of the distribution of participants’ score values. Therefore due to the above normality tests which guided the researcher to the parametric data and the suitable hypothesis test decision made with a choice of one sample T-Test.

From the study the score mean of participant practice is 30.86, while the mean of observation tool is calculated as \(\frac{2 \times 24 \times 29}{29} = 48\). The SPSS one sample T-Test gave a strong significant difference between nurses current practice and the observation tool of open method ETS where significance is less than 0.0001. The result of the due one sample T-Test shows unsafe nurses ETS practices in the three parts of observation schedule tool which are pre, during and post-endotracheal suctioning.
Chapter Five: Discussion of Findings, Recommendations, and Conclusions

5.0 Introduction

This chapter presents the discussion of findings in the context of the existing literature in the area from which the conclusions were extrapolated or deduced about the practice of the ICU nurses in the selected study area; recommendations were made to the various areas of nursing.

5.1 Discussion of Findings

The expected outcomes in this study were categorized in three main levels of data which are very good practice, good practice, poor practice, for adherence to open method ETS for Nurses working in ICU and HDU at CHUK.

Twenty four (24) items were used for guiding the observation, none of the participants tried her/his practice of open method endotracheal suctioning with very good adherence on the standard ETS guidelines including the ACI guideline, meaning 0\% of participants are in high level of adherence category of ETS practice.

In a good practice category 4 participants it means that 13.79\% of 29 participants tried to follow the standards of practice of open method ETS. Twenty five [25(86\%)] participants who are the majority showed poor practice on the open method ETS procedure compared to the clinical ETS guidelines.

Considering the nature of ETS procedure, the professional’s nurses should remain sensitive on possible complications and hazards, and take all necessary precautions to ensure patient safety as illustrated in a guideline of AARC (2010, p.760), but the scores of the study participants achieved in the study setting are not in keeping with patient safety.
Findings of the study outcomes put the current nurse’s practice on open method ETS in ICU and HDU of CHUK in high alert of patient safety. Professional critical care nurses must demonstrate competencies by assessing the need for endotracheal suctioning before taking that action in process (AARC Clinical Practice Guidelines, 2010, p. 760). Studies have shown low quality of practice of ETS among nurses working in critical care units where they do differently compared to the clinical practice guidelines. This study compared the current nurse’s practice on open method endotracheal suctioning with the best clinical practice recommendations. As stated by Australian clinical Innovation (ACI) assessment of varieties indications for suction need is the first step to consider for all professionals when they are caring for the critically ill patients. The study findings on patient assessment pre-endotracheal suctioning showed that 27 (97.1%) of participants did not verify and record patient vital signs as written recommendation number 2 by ACI 2014 (ACI, 2014, p. 7).

Patient chest auscultation can be a guidance for decision taking on the suction need which is evidenced by different studies, and the findings made the impressions on it with 0.00% of participants as a score of patient chest auscultation pre-ETS (S. Kelleher and Andrews, 2008; Haghighat, 2015, p. 622; Frota et al., 2014, p. 298).

Communication with a patient whatever the condition presenting especially those are in critical condition, was supported in literatures as an issue with greater importance for minimizing more complications related endotracheal suctioning as an invasive procedure. Only 2/29 nurses performed this aspect of the procedure while 27/29 meaning 93.10% manipulated patients without preparation related to ETS process. Poor practice as observed generally in this part of ten items of observation tool, showed high risk of infection transmission on both side, patients and nurses practitioners.
Lower adherence to the item hand washing was observed, where 27/29 (93.10) of participants did not wash their hands as recommended by five moment of hand washing by WHO. Other measures of infection control such as wearing goggles facial mask and; apron, showed absolute poor practice where the scores were 0.00% on goggles and facia mask won with 28/29 participants (96.6%) who did not put on aprons, goggles and nor facial masks before the suctioning process as recommended in the guideline(ACI, 2014, p. 21).

These are different compared with the findings in study done by Frota et al., (2014, p.293) where practitioners showed adherence on a recommendation of use of PPE during patient suctioning process. Literatures emphasises the importance of PPE when suction is undertaken. Frota et al., (2014, p. 299) in a study discusses the decision of using eye protection, facial mask and apron during the suctioning process that it may be associated with the personnel's high sense of security, in addition to those investigated being experienced professionals with many years of experience in the role and in intensive care.

With the same discussion the security in the work affords a series of benefits for the process of health promotion, when exaggerated it can becomes dangerous, as it leads to the banalization of the risks which exist. This can contribute to the increase in the professionals’ exposure to the risks (Frota et al., 2014, p. 299).

Patients on mechanical ventilation need more oxygen when the suctioning practice is in process, and literature strongly supports the action of increasing Fio₂ for minimizing the risk of hypoxia. Frota et al., (2014, p. 300) state that, it is known that during ETS hypoxemia can occur, with consequent hemodynamic changes, cardiac arrhythmias, cardiac and/or
respiratory arrest and even death. As a preventive measure against these adverse events, it is widely recommended by literature, and emphasized in recent guidelines, that adult and paediatric patients should be offered oxygen at 100% for 30 to 60 seconds prior to the suctioning (Frota et al., 2014; ACI, 2014, Restrepo, 2010, p. 761).

The ACI and AARC guidelines strongly recommend the use of sterile gloves and sterile suction catheter when action of suctioning is undertaken by the practitioner. In relation to the findings of the current study a total opposite was found where clean gloves were used in place of sterile gloves.

The suction catheter in place of a single use, that catheter was used multiple times. The result of 0.00% of participants on use of either sterile gloves or sterile suction catheter could be a subject for further research for more understanding the reason behind it. The dangers of development of VAP infection is high with this kind of unsafe practice on open method ETS.

We would ask if the decision of use none sterile catheter or none sterile gloves in ETS open system, is a person decision or an institutional decision. Whatever the nature of that decision, the safety measure must be applied when an invasive procedure is being performed to optimise the patient outcomes. On the items 14, 15, 16 and 17 which are related to ETS event (the number of suctioning passing, length of suctioning pressure application, suctioning pressure level, and time of suction pressure application), in all of them, the study revealed low quality of ETS practice.

Post endotracheal suctioning event starting on patient reconnection to the ventilator machine and taking the following steps after patient reconnection on ventilator, hyper-oxygenation
delivered more for optimising saturation, vital signs are to be taken, post suctioning chest auscultation should be done, patient reassuring, used catheter and PPE discarded, and hand wash post ETS. In this part of practice the study still showed poor practice and no adherence to ETS standard guidelines specifically on the items post suctioning patient chest auscultation, and used catheter and PPE discarding where the participants score was 0.00%; For patient reassurance post suctioning, the participants score of not reassuring was 82.8% meaning that 24/29 of participants did not perform patient reassurance.

Only 2/29 of the participants tried to give oxygen to the patients, while 27/29 (93.10%) did not give patients oxygen as recommended in guidelines (ACI, 2014, p. 16). On hand hygiene as part of infection control, post endotracheal suctioning, the participant’s demonstrated low adherence where only 11(37.90%) participants washed their hands after endotracheal suctioning, while 18/29(63.1%) participants did not wash their hands as recommended by Frota et al., (2014, p. 300).

The low adherence to hand washing is not always directly related to the level of theoretical knowledge or to the situation in which it is indicated, but rather to the incorporation of this knowledge into the professionals' routine practice (Frota et al., 2014, p. 300). The lack of motivation, the failure to understand the risk of spreading pathogens, the excess of activities and lack of materials, and/or inadequacy of the physical structure of the institution stand out among the principal factors responsible for the non-incorporation of this practice.

The study investigated three over view parts, namely; pre-endotracheal suctioning, during Endotracheal suctioning itself, and post endotracheal suctioning, and in all of these, participants showed poor practice evidenced by low level of adherence on steps of practice of open method ETS where 25/29 participants (86%) were categorised in poor practice.
Therefore there is a greater significance of exploring current practice on open method endotracheal suctioning for nurses working in ICU and HDU in CHUK referral hospital evidenced by P-value less than 0.001 as a study finding.

5.2 CONCLUSION OF THE CHAPTER

Nursing practice is underpinned in nursing professional values of respect for human dignity. Patients on mechanical ventilation need advanced nursing practice to be done with commitment for overcoming possible challenges and complications that could interfere with the expected results which are patient full recovery "as my belief". The observation study took place in ICU and HDU of CHUK on the date of February 16, 2017 to March 14, 2017.

The observation of open suction study based on descriptive statistics demonstrated poor practice of nurse’s work in ICU and HDU of CHUK, evidenced by P-value of less than 0.001. The present study observed the gap between what is considered clinical practice guideline and the current practice of critical care nurses on open method of ETS in ICU and HDU of CHUK, and different studies observed a similar issue (Leddy et al., 2015, p. 63; Kelleher, Seán J.; Andrews, 2008b, p. 19; Haghighat, 2015, p. 624; Frota et al., 2014, p. 301). Further more research is needed for better future benefits of both patient outcomes and nursing profession.
5.3 RECOMMANDATION

1. Study showed majority of 20 (69%) of participants have less than one of training related critical care. The study suggests that all nursing staff must be trained 6 monthly at a minimum.

2. More research is needed to investigate the reason of unsterile practice on open method ETS in ICU and HDU of CHUK; and the investigation on relationship of unsafe practice to patient outcomes.

3. Institutional policies and guidelines should be clear and available to facilitate to standardise nursing practice and guide the implementation Supervision and policy monitoring must also be considered by management.

4. Support from high level of hospital management is highly recommended to identify and analyse the institutional issues cited in order to provide common solutions.

5. Nurses practitioners must develop a culture of scientific reporting “research” to make aware different disciplines and bring them for sharing in finding of health solutions.

5.4 CONCLUSIONS OF THE STUDY

The researcher has engaged deeply in an exploration of practice of ETS and in detail discussion and conclusion of the study findings which informed the recommendation made based on the study significance where discrepancy practices of ETS among nurses was observed in ICU and HDU of CHUK.
References


Appendices

Appendix I: Observation schedule tool

Demographic variables

1. Age of participant
   21 – 30 years
   31 – 40 years
   41 – 50 years
   51- 60 years
   Above 60 years

2. Gender of participant
   Male
   Female

3. Level of Education
   A2 of General nursing
   A1 of General Nursing
   Bachelor of General Nursing
   Master of Science in Nursing

4. Experience of ICU of HDU (years)
   1- 2 year(s)
   3 – 4 years
   5 – 6 years
   Above 6 years

5. Training done related critical care
   No training done
   Training less than one week
   Training of one week
   Training of two weeks
   Training of one monthly
   Training of three monthly
   Training of six monthly
   Training above six monthly
6. Prevalence of VAP during study period in ICU/HDU

Observational checklist Schedule

1. Practice prior-suctioning

1. Assessment of level of patient sedation
   0 = No
   2 = Yes

2. Airway patency checking by observing the possible obstruction of tubes
   0 = No
   2 = Yes

3. Assessment of position of ventilator circuits
   0 = No
   2 = Yes

4. Chest auscultation before ETS
   0. = No
   2 = Yes

5. Verify and record patient’s vital signs
   0 = No
   2 = Yes

6. Procedure explained to the patient before ETS
   0. = No
   2. = Yes

7. Pre suctioning hyper oxygenation/ hyperinflation
   0. = Not given
   2 = Given by pressing to the place suction on the ventilator machine

8. Goggles / face mask worn
   0 = No
   2 = Yes

9. Apron worn
   0 = No
   2 = Yes

10. Hands washing prior to suctioning
    0 = No
    2 = Yes

11. Sterile gloves used
II. Suctioning events

12. Sterility of suction catheter maintained until inserted into airway
0 = No
2 = Yes

13. Size of suction catheter ................................ Size of ETT ........................................
0 = > Half of the internal diameter of ETT
2 = < Half of the internal diameter of ETT

14: Number of suction passes.........................
0 = > 2
2 = 1 to 2

15: Length of time/suction applied to airway
0 = More than 15 seconds
2 = 10 - 15 seconds

16: Pressure/Level of suction pressure
0 = 80 mmHg - 150 mmHg
2 = >150 mmHg

17. Position of catheter when suction applied
   Suction applied during:
0 = Insertion
2 = Withdrawal

III. Post Suctioning Practices

18. Patient reconnected to Oxygen
0 = >10 seconds post suctioning
2 = within 10 seconds post suctioning

19. Post suctioning hyper-oxygenation/ hyperinflation
0 = Not given
2 = Given by means of manual resuscitation bag/ventilator

20. Assessment of patient for vital signs after suction event
0 = No
2 = Yes

21. Chest auscultation post suctioning
0 = No
2 = Yes

22. **Patient reassured**
0 = No
2 = Yes

23. **Used catheter and gloves are disposed of in a manner that prevents Contamination from secretions**
0 = No
2 = Yes

24. **Hands washed post suctioning**
0 = No
2 = Yes
Appendix II: Data collection tool permission

Kelleher, Sean <S.Kelleher@ucc.ie>
À Nsanzimana Evode
Aujourd’hui à 22h40
Dear Nsanzimana,

Thank you for your interest in using my observational tool. I am happy for you to use it once it and the associated supporting literature is referenced accordingly.

Kind regards,
Sean

Original message
--------
From: Nsanzimana Evode <evodens3@yahoo.fr>
Date: 25/09/2016 9:30 AM (GMT+00:00)
To: "Kelleher, Sean" <S.Kelleher@ucc.ie>
Subject: permission request

Afficher le message d’origine
Appendix III: Data collection consent form

Dear Sir/Ms/Mrs

I, Nsanzimana Evode, a Rwandan student of Critical care and Trauma in University of Rwanda and I am carrying out a study of“ assessment of practice for critical care nurses on endotracheal suctioning ,open method in a Referral hospital ICU and HDU at CHUK” as part of my course requirement. The study findings will be used to make recommendations on ways of improving the safety of patient being cared in ICU and HDU. The study will involve the observation method of ETS practice among nurses in ICU and HDU at CHUK.

During the process, your privacy will be highly maintained. Sensitive personal information will be handled with high level of confidentiality. The setting will safeguard privacy in such a way that you will not be exposed to public when giving information. I will observe the obligation to protect your anonymity and keep researcher data confidential. Your identity will be from the data by use of instrument codes. No pain or harm will be inflicted to you by participating in the study in any way. Duplication of researcher data will be prevented by use of passwords to control access by strangers.

I will be under obligation to keep the information confidential and avoid revealing participants’ information to third parties without your consent in case the disclosure will be necessary for the benefit to you, but the patients will benefit from the improved cares.

The findings of this study will help the authorities in development and implementing the local policies regarding practice of ETS in the unities ICU and HDU in order to improve quality of care in nursing practice. You have the liberty to withdraw from this study without any victimization or consequences.

If you have any questions regarding this study please contact me on mobile number 0783412904 or on my e-mail evodens3@yahoo.fr or CMHS IRB secretariat on this email address: researchcenter@ur.ac.rw
Responder statement

I have been explained the purpose of the study and the benefits likely to accrue from the study. I therefore, agree voluntarily to take part in this study

Signed by:

Respondent’s (signature)………………………………Date…………………………………

Researcher(signature)………………………………Date…………………………………

68
Appendix IV: signed letters