Nurse's experiences of practicing endotracheal suction at intensive care units of Muhimbili Hospital, Dar Es Salam Tanzania

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NURSE'S EXPERIENCES OF PRACTICING ENDOTRACHEAL SUCTION AT INTENSIVE CARE UNITS OF MUHIMBILI HOSPITAL, DAR ES SALAM TANZANIA

By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Science in Nursing (Critical Care and Trauma) of

Muhimbili University of Health and Allied Sciences
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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Science a dissertation entitled: **"Nurse's Experiences of Practicing Endotracheal Suctioning at Intensive Care Units of Muhimbili Hospital, Dar es Salaam Tanzania",** in (partial) fulfillment of the requirements for the degree of Master of Science (Nursing Critical Care and Trauma) of Muhimbili University of Health and Allied Science.

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Dr. Dickson Mkoka, PhD

(Supervisor)

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Date

DECLARATION AND COPYRIGHT

I, **Juliana Michael Moshi**, declare that this **dissertation** is my own original work and it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature: ……..…… **Date:** …….……..

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DEDICATION

This dissertation is dedicated to my beloved parents, the late Michael Robert Kiting'ati Moshi and Immaculata Joseph Sabuni Maliwa who laid the foundation for my education which has enabled me to reach the present milestone, my beloved husband Colonel Deogratias T. Mwongi and my beloved daughter Diana Deo.

ABSTRACT

Background

Airway management in ICU includes use of oral or nasopharyngeal airway, endotracheal tube and tracheotomy. Endotracheal tube is a type of artificial airway which is inserted through the mouth or nasal cavity to the trachea to maintain clear and patent airway (Noppens, 2012). Patients with endotracheal tubes requires endotracheal suctioning (ETS), the procedure done by the ICU nurses. Endotracheal suction involves mechanical aspiration of pulmonary secretions from patient's artificial airway to prevent obstruction. When done inappropriately, ETS can lead to reduced patient comfort and safety leading to complications.

Aim of the study

The aim of this study was to explore nurse's experiences of practicing endotracheal suction at Intensive Care Units (ICUs) of Muhimbili National Hospital (MNH), Muhimbili Orthopedic Institute (MOI) and Jakaya Kikwete Cardiac Institute (JKCI) Dar es salaam, Tanzania. Two specific objectives guided the study; first was to explore nurse's experience on the practices of ETS in ICUs at Muhimbili hospital. Second was to explore nurse's perceptions on best practices of ETS in ICUs at Muhimbili hospital.

Methods and materials

An exploratory qualitative study design was used; utilizing in-depth interviews and observation check list for data collection. A total of 15 nurses from three selected hospitals in Muhimbili complex Dar es Salaam were individually interviewed using semi-structured interview guide. Twenty (20) observations were done to 20 different nurses when performing ETS from ICUs at Muhimbili hospital. Thematic analysis using deductive approach was done by using pre-determined themes derived from standard operating procedure (SOP) for ETS.

Results

Nurse's practices regarding ETS were suboptimal with minimal adherence to infection preventions as well as comfort and safety measures**.** Poor awareness of pain management during ETS procedure, use of large catheter, inappropriate position of patient during suctioning and application of high suction pressure were found to the majority of the participants. Furthermore, participants observed failure to practice hand washing before ETS, failure to do auscultation before and after ETS and prolonged suctioning. Lack of trained personnel, shortage of nurses as well as inadequate equipments needed for suction were perceived by majority of nurses as obstacles to best practice of ETS.

Conclusion

Despite the availability of few skilled nurses in ICUs, the ETS practice in ICUs in specialized hospitals in Dar es Salaam is still poor in infection prevention practices and maintenance of patient safety and comfort due to limited human resources and relevant equipments.

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ABBREVIATIONS

AARC	American Association of Respiratory Care
CCU	Critical care unit
CICU	Coronary intensive care unit
ETS	Endotracheal suctioning
ETT	Endotracheal tube
GICU	General intensive care unit
ICP	Intracranial pressure
ICT	Intensive care therapy
ICU	Intensive Care Unit
IDI	In depth interview
JKCI	Jakaya Kikwete Cardiac Institute
MNH	Muhimbili National Hospital
MOI	Muhimbili Orthopedic Institute
MUHAS	Muhimbili University of Health and Allied Science
PAP	Peak airway pressure
PIP	Peak inspiratory pressure
PPE	Personal protective equipment
SOP	Standard operating procedure
TNMC	Tanzania Nursing and Midwifery Council
URTI	Upper respiratory tract infection
VAP	Ventilator associated pneumonia

DEFINITION OF TERMS

Airway: The airway or breathing passage is the pathway through which air flows into the lungs, this starts from the nose and mouth and includes the throat, windpipe and lungs (Noppens, 2012). In this study airway was defined as essential component in intensive care unit which need appropriate care for the patient safety.

Critically ill patient: Critically ill patients are those patients with life threatening conditions which need close monitoring in a special ward with advanced equipment and machines (Poluyi *et al.*, 2016). In this study critically ill patients were defined as the patients who are unable to maintain patent airway that are assisted with artificial airway.

Endotracheal tube: Is a special catheter that is inserted into the trachea for the primary purpose of establishing and maintaining a patent airway and to ensure the adequate exchange of oxygen and carbon dioxide. It is inserted through the nose or the mouth (Fleisher, 2015). In this study endotracheal tube was defined as an artificial airway which if not taken care of can compromise patient safety.

Intensive care unit: Is a unit in a hospital that provides a continuous monitoring and treatment of seriously ill patients using special medical equipments and services.

Endotracheal suctioning: A procedure of removing tracheal secretions from the patient's artificial airway by using mechanical pressure. In this study endotracheal suctioning was defined as a life saving procedure which is done by well trained personnel. This was assessed in section B of the questionnaire.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

General care of patient in intensive care units (ICUs)

Intensive care units are specialized wards which admit patients with severe and life threatening conditions who constantly require intensive monitoring, support from specialized equipments and easy access to medications in order to maintain normal physiological functions (Poluyi *et al.*, 2016).

Determining whether the patient meets the criteria for admission to the intensive care units is a complex task that is subject to high variability depending on the training and experience of the particular physician and nurses working in the intensive care units (Kim, S.H., Chan, C.W., Olivares, M., Escobar, 2014). Critically ill patients require critical care services like respiratory support and monitoring, circulatory support, neurological support as well as renal support. These services should be provided by qualified personnel who have received special training and have acquired advanced knowledge and skills on care of patient with life threatening conditions (Canadian Association of Critical Care Nursing, 2009).

Early identification of life threatening conditions as well as prompt and appropriate management is key point during care of patients in intensive care unit. Respiratory failure is one of such conditions and remains the main reasons for intensive care unit admission. Apart from other interventions such as fluid therapy and effective analgesics, respiratory care including endotracheal tube suctioning are among common nursing care interventions for patients admitted in the intensive care unit (Barbra and Zimmerman, 2007).

Airway management in Intensive Care Unit (ICUs)

Airway management in critically ill patients involves ensuring the airway is patent to allow effective ventilation to take place. The primary purpose of airway management is to provide a continuously open airway along with continuous oxygen supply (Fleisher, 2015; Heidari and

Shahbazi, 2017). Airway management includes use of an oral or nasopharyngeal airway, endotracheal tube and tracheotomy. An endotracheal tube is a type of artificial airway which is inserted through the mouth or nasal cavity to the trachea to maintain a clear and patent airway (Lee A Fleisher, 2015; Heidari and Shahbazi, 2017). Many critically ill patients admitted in ICUs have compromised airway that keep them at risk for further deterioration. Airway management including endotracheal suctioning is therefore an important intervention and should be done with personnel who are highly skilled and quick decision makers in order to save patient life (Noppens, 2012).

Endotracheal suction (ETS)

Endotracheal suctioning (ETS) is one of the most common procedures performed in patients with artificial airways. It is a procedure whereby the tracheal secretions are aspirated from the patient's artificial airway by using mechanical pressure. This is a step by step procedure that includes three main phases. Phase one is a preparation phase which involves patient assessment whereby the need for suction is assessed together with vital signs, patient preparation in which information about the procedure is given to the patient and comfortable position is considered. The last part in phase one is preparation of equipments needed for the procedure. Phase two is a suctioning phase which involves the actual procedure of suctioning; In this phase consideration is made on appropriate use of personal protective equipments (PPE), preoxygenation, setting of suction pressure, size of catheter to use, duration of suction, placement of the catheter to the endotracheal tube (ETT), and prevention of infection. Phase three is a post suctioning phase which involves checking of vital signs after suction, assessment of the effectiveness of endotracheal suction, assessment of any adverse effects, care of used equipments and documentation of the assessment and suction procedure (AARC, 2010). Endotracheal suctioning is indicated when the patient has a raised respiratory rate, an inability to clear secretion effectively, reduced air entry on auscultation, audible or visible secretions, and a spontaneous but ineffective cough or reduced oxygen saturation levels (Chaseling, W. Bayliss, S.L., Rose, 2014).

Often, intensive care unit nurses have been responsible for conducting endotracheal suctioning to patients with endotracheal tubes whenever required. Proper knowledge about when and how to suction safely is vital. This include aseptic technique during endotracheal suction and impose of safety measure in order to minimize complications and enhance maximum patient safety (Khimani, Rattani and Awan, 2015). Infection, trauma to the trachea mucosa, hypoxia, increased intracranial pressure and lung collapse are among complications caused by improper practice of endotracheal suction.

Several studies have shown a discrepancy in nurses' knowledge and practices on endotracheal suctioning procedures when compared to guidelines and recommendations (AARC, 2010; Negro *et al.*, 2014). Other studies have demonstrated a difference between what the nurses know and what they really practices in term of safe endotracheal suction practices. Studies done in Iran, Turkey and Sudan, for example, demonstrated good knowledge of nurses regarding endotracheal suction when compared to their performance regarding endotracheal suction (Ansari *et al.*, 2012; Elbokhary, Osama and Al-khader, 2015; Bülbül Maraş *et al.*, 2016). This indicate the need to conduct more studies to conclude on the findings reported to other places (Negro *et al.*, 2014).

Given that ETS remain one of the common interventions provided by the ICU nurses, proper knowledge that guides safe practice is crucial to maintain patient comfort and safety. Hence ensuring patient safety as the patent airway of the patient is established through proper suctioning should be one of the key goals in caring critically ill patient in ICUs. Therefore, the study aims to explore nurse's experiences of practicing ETS in ICU settings.

1.2 Problem statement

Maintaining patent airway through endotracheal suctioning is one of interventions which are not properly done by nurses. Nurses are required to know properly the procedure of ETS in order to prevent complications which may arise. Ideally, all nurses working in ICUs are supposed to be competent in doing ETS, given the importance of the intervention in maintaining airway patency of ICU patients.

The ETS procedure is of high risk if not done properly (Jansson *et al.*, 2013). Normally, poor practices of ICU nurses on ETS compromises patient's safety leading to complications such as upper respiratory tract infections (URTIs), hypoxia and lung collapse among others. The complications delay recovery from ICU and increases patient's hospital stay. Studies indicate that poor knowledge and improper practices on ETS among nurses in ICU settings expose patients not only to develop complications but also to worsen their conditions to critical state(Negro *et al.*, 2014; Mohammed, 2017).

At Muhimbili Hospital in particular, there have been different efforts to improve safe practice of ETS through development of protocols /standard operating procedures (SOP) for ETS and training of nurses who are working in ICUs on general nursing care. This has been done for the purpose of updating their knowledge and improving nurses practices to enhance delivery of quality nursing care while maintaining patient safety. However, the effect of these interventions on ICU patient has not been documented. Furthermore, little is known on how nurses perceive the best practices of ETS and its use in improving patient outcome in ICUs, this study therefore explores nurse's experiences of practicing ETS for patients who are admitted in the Intensive Care Units.

1.3 Theoretical framework

The researcher uses the standard operating procedure (SOP) for ETS as theoretical framework. The standard operating procedure for ETS is a key point to ensure safety and good outcome of the patient's airway. The ETS SOP is divided into three phases describing intervention to be done prior to ETS (assessing the suction needs, preparing the patient and material and monitoring of vital signs), during ETS (appropriate use of PPE, hyper oxygenation by 100% oxygen, setting suction pressure, choosing the size of suction catheter to use, placement of suction catheter to the artificial airway, considering duration of each suction event and prevention of infection) and after ETS (connecting the patient back to the oxygen source and hyper oxygenate for one minute with 100% oxygen to prevent tissue hypoxia, checking of vital sign, auscultation of the chest to confirm clear chest, care of the equipment, hand hygiene and documentation of the assessment and the suction procedure) (Ashworth, Bennet and Sole, 2015; Tavangar *et al.*, 2016; Ghaleb, Qutub and Al-Awami, 2017).

Effective ETS is assumed as an important parameter for ensuring safety and better outcome for a patient admitted in the ICU. However, to achieve this, a nurse should follow a step by step procedure in carrying out this intervention while taking into consideration all the precaution in order to avoid complications that are likely to arise from the intervention. The researcher uses the framework as a guide into exploring the nurse's experience on practices of endotracheal suction, specifically focusing on what nurses do prior, during and after suctioning (Objective I). The researcher also uses the standard operating procedure (SOP) for ETS as theoretical framework to explore nurse's perceptions regarding best practice of ETS in ICU (objective II).

1.4 Significance of the study

Airway management remains an important priority for all critically ill patients. Failure to maintain patient safety during ETS could worsen their condition to critical state. This increase number of day's patient stays in intensive care unit and hospital in general and hence resulting to increase cost of hospitalization. The study therefore explores nurse's experiences and perceptions on best practices of ETS in ICUs at Muhimbili National Hospital, Muhimbili Orthopedic Institute and Jakaya Kikwete Cardiac Institute. The findings from this study have identified areas requiring improvement regarding nurse's practices, understanding of best practice and ways of improving best practice of ETS. Improving nursing practices on ETS will in turn reduce the ETS complications and contribute to improve outcomes for critically ill patients in ICUs. Furthermore the findings of this study will inform the hospital when updating policies and standards regarding ETS procedure, highlight areas in which to improve nursing education, identify gaps for further research and in service training in term of continuous and professional development. The study is also a partial fulfillment of Master degree of Science in Critical Care and Trauma Nursing.

1.5 Research Questions

i. What are nurse's experiences on practices of ETS in ICUs at Muhimbili hospital?
ii. What are nurse's perceptions on best practices of ETS in ICUs at Muhimbili hospital?

1.6 Objectives of the study

1.6.1 Broad Objective

The overall objective of the present study was to explore nurses' experience of practicing ETS in ICU's at Muhimbili hospital, Dar es Salaam Tanzania.

1.6.2 Specific Objectives

The specific objectives of this study were:

i. To explore nurses experience on practices of ETS in ICUs at Muhimbili hospital.

ii. To explore nurses perceptions on best practices of ETS in ICUs at Muhimbili hospital.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents reviews of relevant literatures concerning experiences and perceptions of nurses regarding ETS in ICUs in which knowledge and practices of nurses are discussed and identify gaps. The chapter has two parts; part one is a literature review on nurse's practices regarding ETS and part two include nurses' perceptions regarding best practice of ETS.

2.2 Nurse's practices regarding ETS

Endotracheal suctioning is one of the most common procedures performed by nurses in ICUs. Often, nurses working in ICUs do not take the appropriate precautions when performing ETS to prevent patients from getting complications. They usually focus on immediate care rather than long term consequences which may arise after ETS.

Infection prevention practices were revealed to be a big problem in a study done in Finland. The study indicates that poor ETS practice leads to ventilator associated pneumonia (VAP) as a complication. Furthermore, the study revealed poor nursing practice prior to ETS, for example patient assessment technique and hyper oxygenation and during suction vacuum pressure level seemed to be practiced poorly (Jansson *et al.*, 2013).

Use of evidence based practice, clinical guideline and adequate support of nurses are all needed to overcome unsafe practices and increase the quality of care provided to patients in ICUs(Negro *et al.*, 2014). An observational study conducted to assess the nurses' practices of tracheal suctioning in the cardiac intensive care unit (CICU) and the general intensive care unit (GICU) in Ireland, revealed that among the CICU nurses (n=17) only two nurses, i.e. 12% out of 34, from CICU and four nurses, i.e. 14%, from GICU performed chest auscultation to assess the need of suctioning(Batiha *et al.*, 2012).

Imparting practical knowledge and emphasis on application of the acquired knowledge into practice for nurses is vital so as to reduce the gap between knowledge and practice on ETS. A large gap between knowledge and practice was found among nurses who are working in ICUs in Iran (Ansari *et al.*, 2012).

Nurses are supposed to adhere to the recommended guideline for the benefit of both patients and themselves because unsafe practice during ETS may expose both of them into risk. They are strongly advised to use personal protective equipment (PPE) during ETS procedure in order to protect themselves and patients from acquiring infections. A study in Brazil reveal that both nurses and patients were at risk of infection; hypoxemia was revealed among patients and occupational accident among nurses due to poor practice(Frota, Loureiro and Ferreira, 2014). ETS practice among nurses in Turkey were revealed to be on fair level compared to their knowledge which was good (Bülbül Maraş *et al.*, 2016).

A prospective observational study to establish how critical care nurses perform different steps in a typical ETS practice and compare it with current best practice recommendations was conducted; the results indicated positive correlation between suctioning education period, working experience and suctioning practices. However, discrepancies were observed in patient assessment and preparation, infection control practices and use of an appropriate catheter(Haghighat and Yazdannik, 2015).

Nurses adherence to and barriers towards evidence-based guidelines for prevention of ventilator-associated pneumonia among patients with endotracheal tubes indicated that more experienced nurses have more prevention skills and they practice better than their less-experienced colleagues. The main self-reported barriers towards evidence-based guidelines were inadequate resources and disagreement with the results as well as lack of time, skills, knowledge and guidance(Jansson *et al.*, 2013).

2.3 Nurse's perceptions on best practice of ETS

Nurse's knowledge is very vital in performing ETS to patients in ICUs. American Association of Respiratory Care 2010 established guidelines for ETS procedure as a way to decrease complications that arises from ETS. Thus, nurses should apply the guideline when performing ETS procedure(AARC, 2010).

Good knowledge of nurses has a great role in promoting safety of the patients (Khimani, Rattani and Awan, 2015) . However, study in Iraq revealed that nurses have best practical level of ETS compared to their knowledge level of ETS. Areas of knowledge deficit were on suction pressure, suctioning while withdrawing, catheter size, normal saline instillation and complication of ETS(Mohammed, 2017).

Another study in Iran indicated that type of ICU and nurses' working experience were not significantly related to their knowledge and performance. Study suggested that despite acceptable knowledge, nurses' performance in endotracheal suctioning was poor(Ansari *et al.*, 2012).

Nurses' perceptions on indication, standard operating procedures and complications as well as preventive measures are the key to safe procedure of ETS. Findings from Brazil found that; nurses knowledge was poor on the following areas; preoxygenation of patient before and after ETS, instillation of normal saline, size of suction catheter, duration of suction procedure, hyperventilation and effects of ETS (Frota, Loureiro and Ferreira, 2013).

Average knowledge was found from nurses working in a tertiary hospital in Pakistan; findings thus far suggested that special seminars, courses and workshops can help to overcome the problem(Zeb *et al.*, 2017).

Lack of assessment skills on auscultation of breath sounds in ventilated patients may lead to increase accumulation of secretions and increase risk of patient to develop complications however result from a study in Khartoum indicated that, nurses knowledge related to ETS for mechanically ventilated patients was poor as compared to their practice(Elbokhary, Osama and Al-khader, 2015).

CHAPTER THREE

3.0 STUDY METHODOLOGY

The present chapter delineates the study design, study area, study population, sample size determination, sampling procedures and methods that were used for data generation.

3.1 Study design

The study uses a qualitative exploratory design. In this study, nurse's experience and perceptions regarding best practice of endotracheal suctioning in ICUs at Muhimbili hospital was explored. The study design was chosen due to its nature which focuses more on live experience. Furthermore, little is known about the problem thus; the study is aiming to find out how nurses perceive best practice of ETS and what there their experiences on the practices of ETS are. Exploratory research design is conducted when the problem has not been clearly defined(Polit and Beck, 2003). The exploratory research design was used to undertake this study as pointed earlier that very little was known on nurses' experiences on ETS practices and their perceptions regarding best practice of ETS in ICUs at Muhimbili hospital.

3.2 Study area

The study was done in ICUs at the Muhimbili hospital campus which is a home to three hospitals; Muhimbili National Hospital, Muhimbili Orthopedic Institute and Jakaya Kikwete Cardiac Institute. The Muhimbili hospital campus is located in Ilala District, Dar es Salam. These hospitals have been selected based on the fact that; all of the patients admitted in the ICUs are very sick, and some are intubated with a need of ventilator support and endotracheal suctioning.

3.2.1 Muhimbili National Hospital

Muhimbili national hospital (MNH) is the national referral hospital, research center and university teaching hospital. It has 1,500 bed capacities, attending 1,000 to 1,200 out patients per day and admitting 1,000 to 1,200 inpatients per week. MNH has 3000 employees, of which 300 are doctors and specialists, 900 are registered and enrolled nurses while the rest are

operational support employees. MNH is organized into eight directorates which are Medical Services, Clinical Services, Nursing Services and Quality, Clinical Support Services, Human Resources, Finance and Planning, Technical Services, and Information and Communications Technology. This is the biggest hospital in the country of Tanzania and it has 29 departments and 107 units. Muhimbili National Hospital has an ICU bed capacity of 32, which are distributed between medical and surgical ICUs. Intensive Care Units are under the directorate of Medical Services, department of anesthesia.

The health care team who are working in ICUs at Muhimbili national hospital includes the following; physicians, surgeons, anesthesiologists, nurse anesthetists and physiotherapist. Unlike the nurses, they are not fully based in ICU. They only come when there is a need. Nurses work 24 hours in ICU giving care to patient. There are 5 specialized registered critical care nurses with a master degree 2 in medical ICU and 3 in surgical ICU, 17 registered nurses with bachelor's degree 12 in medical and 5 in surgical ICU, 34 nurses with diploma in nursing 14 in medical and 20 in surgical ICU, and 5 enrolled nurses with certificates in nursing 1 in medical and 4 in surgical ICU.

There are policies and standards for ETS which were adapted from American Association of Critical Care and other approved research articles and books.

3.2.2 Jakaya Kikwete Cardiac Institute (JKCI)

JKCI is a government owned hospital which provides specialized cardiovascular care for patients who are referred from across the county. JKCI also serves as a national specialized and university teaching hospital, offering cardiovascular care, training and research services. The Institute has bed capacity of 103 attend to an average of 700 outpatients and 100 inpatients per week. The Institute has 203 employees organized into five directorates which are Cardiology services, Surgical Services, Nursing Services, Clinical Support Services and Corporate Services. These directorates are sub-divided into 16 departments. JKCI has an ICU bed capacity of 16 beds, and the ICU is under the department of Cardiac Services.

The health care team who are working in ICU at JKCI includes the following; physicians, surgeons, nurse anesthetists and physiotherapist. They only come to attend patients on daily bases and wherever there is a need. The anesthesiologists' are also part of health care team at JKCI ICU; one anesthesiologist is allocated each day to attend patients in ICU. Nurses work 24 hours in ICU giving care to patient. There are 2 specialized registered critical care nurses with a master's degree, 3 registered nurses with bachelor's degree in nursing, and 11 nurses with diploma in nursing.

The standard operating procedure for ETS is available to enhance safe practice.

3.2.3 Muhimbili Orthopedic Institute

The Muhimbili Orthopedic Institute (MOI) is an autonomous institute established under ACT. No 7 of 1996 with the main objective of providing primary, secondary and tertiary care of preventive and curative health services in the field of Orthopedics, Traumatology and Neurosurgery. The Institute also involves in human resources development for the nation and also carries out research in these fields with a view of developing cheaper ways of treatment of patients and reducing invalidity to members of the community.

The management of the Institute is based on a new Public/Private Mix concept geared towards performance, improvement and self-sustainability. MOI's total bed capacity is 380 while there are 8 beds reserved for patients requiring Intensive Care Therapy (ICT).

Nurses are the solely professionals engaged in provision of care to patients admitted in ICU for 24 hours. Nevertheless, physicians, neurosurgeons, orthopedic surgeons, anesthesiologists, physiotherapist and nurse anesthetist are part and parcel of the ICU team though they occasionally required attending patients as needs arises.

Currently; there are 18 registered nurses working in ICU. Only 8 nurses are qualified to have postgraduate diploma in critical care, 3 graduate nurses with bachelor degree in nursing and 6 nurses with diploma in nursing. The ICU Nurses are using the SOP on ETS procedures adapted in year 2010as approved ETS guidelines.

3.3 Study population

The study involved registered nurses working in ICUs at Muhimbili National Hospital, Muhimbili Orthopedic Institute and Jakaya Kikwete Cardiac Institute. Registered nurses are those nurses with diploma, bachelor and master degree in nursing who have licensed to practice by Tanzania Nursing and Midwifery Council (TNMC).

ICU nurses are the target group of this study because, endotracheal suctioning is done for most patients admitted in ICUs and nurses are the ones who mostly perform this procedure. Also, some nurses working in ICUs have attended special training about how to provide ICU care, both within and outside the country. Most of the patients admitted in ICUs are intubated with endotracheal tubes and they need suctioning to maintain a patent airway.

3.4 Sample size

Sample size was determined by data saturation. The saturation point determined the sample size of the study after the participants provide almost the same information. According to Polit and Beck 2006; data saturation is where any added information does not provide new insight about the problem explored (Polit and Beck, 2003). The researcher interviewed fifteen volunteered study participant (4 males and 11 females) reaching to the saturation point. Being qualitative in nature, it was difficult to determine the sample size prior to the actual study. Thus, the sample size of this study was determined by information generated in the field.

3.5 Sampling procedure

The study used convenience and purposive sampling method to get study participants. The researcher selected the study participants by targeting the most resourceful participants who can provide the detailed, valid and reliable information concerning the topic under the study. Nurses who have been working in ICU for more than 3 years were selected. Maximum variation sampling was used to make sure that nurses with different background are included to the study.

3.6 Inclusion criteria

i. Registered nurses working in ICU's for more than 3 years in the selected hospitals.

3.7 Exclusion criteria

i. Nurses who are on internship.
ii. ICU nurses who are involved with administration issues.

3.8 Data collection method and tools

Semi structured interview guide was used as the main method of data collection. The interview guide captured information about nurse's practices and perceptions regarding best practice of ETS. The interview guide contains three sections, section one was about social demographic information of the participants; section two was questions on ETS practices prior, during and after ETS. The participants were asked to describe how they perform the actual procedure of ETS. In section three, there were questions on nurses' perceptions on best practices of ETS.

Data was collected by the researcher. Audiotape was used to record the participants' responses during interviews. Participants were informed that the interview were to be audio taped and notes taken for further analysis. The whole process was conducted in English language for one reason that, to make the interaction with the study participant easy as through their learning process in nursing schools they were taught in English. Data obtained was transcribed by the researcher from verbatim to written notes.

Non participatory observation was performed using check list developed by adopting from SOP of the selected hospitals as an additional method to explore nurses' practice regarding ETS in ICUs. The checklist was made by picking the common practice found in both SOP of the respective hospital. Data was collected under pre-determined themes which were practices before, during and after endotracheal suctioning and infection prevention practices. The observation targeted the actual procedure of ETS.

3.9 Data analysis

Qualitative thematic analysis approach was used to analyze data. Thematic analysis provides opportunity to analyze information about experience of an individual(Alhojailan and Ibrahim, 2012). Thematic analysis was used for the reason that this is semi structured interview which gathered primary data. Furthermore, thematic analysis gave the researcher insights to answer the research questions.

To approach the thematic analysis the researcher use a deductive way; this is a way of guiding analysis whereby the predetermined themes or questions are used to analyze the data(Alhojailan and Ibrahim, 2012). The collected data from all participants was transcribed by the principal investigator. The transcribed data was read and re-read by a researcher and audio taped was listened several times to ensure the accuracy of the transcription. Similar codes were identified from the field notes and grouped together to form categories. Again similar categories identified and grouped together to form the pre determine themes. The analysis of data was conducted by using written transcript and audiotape of which were shared to one critical care nurse (a research assistant) to ensure accuracy of the data. The initial findings was reviewed and shared by supervisor and further refinement was conducted until data saturation achieved.

3.10 Ethical issues and ethical consideration

The researcher obtained ethical clearance from Muhimbili Health and Allied Sciences (MUHAS) at the Directorate of Research and Publications prior to the commencement of the study. Permission to conduct the study at MNH, MOI and JKCI was obtained from Executive Directors of both three hospitals. Furthermore, a written consent was obtained from the participant before engaging to the study.

Researching ETS in ICUs at Muhimbili hospital is essential. The results obtained will lead to reduction in complications arises from ETS. The potential risk was lack of privacy to patients in case of observation part. The researcher evaluated this risk and come up with the answer that benefits outweigh the risk that; researcher asked permission from the patients and guardians before the procedure to respect their right to privacy.

Written consent was obtained from the participant before engaging to the study. Confidentiality was assured by use of code numbers instead of names. Participants were informed that they have the right to withdraw from the study at any time and this will not involve penalty or losing their benefits like entitlements, promotions and workshops. Furthermore, the data will be kept in a secured area or system with no access to an authorized person.

2.11 Dissemination of the findings

The findings of the study will be presented to the member of staffs working in ICUs at Muhimbili National Hospital, Muhimbili Orthopedic Institute, Jakaya Kikwete Cardiac Institute and the hospitals management, School of Nursing and Director of Postgraduate MUHAS. Brief report will be sent to the professional Regulatory Authority; Tanzania Nursing and Midwifery Council (TNMC).Furthermore the findings will be presented in local and international conferences and publication in peer reviewed journal.

CHAPTER FOUR

4.0 RESULTS

This section includes description of results starting with analysis of participants demographic data. This is followed by analysis of qualitative data regarding nurses' experiences on ETS practices and analysis of qualitative data on nurse's perceptions of the best practice on ETS. The last part of this section describes the findings from observations.

Finding from In-depth interview

In this study, fifteen participants were interviewed; among them males were four (4) and females were eleven (11). Majority of participants were between 40 to 44 years old while few of them were 34 to 39 and above 45 years old. Most of participants were diploma holders in nursing while few of them were holder of Bachelor of Nursing and Post Graduate Diploma in critical care. Majority of participants had 5 to 10 years of working experience in ICU while the remaining participants had more than 10 years of working experience in ICU. Majority of participants attended short courses and workshops on emergency care, neurotrauma care course and mechanical ventilator course. Table number 1 below summarizes the demographic characteristics of the study participants.

Table 1: Demographic characteristics of the study participants

Characteristics	**Frequency**
Gender	
Male	4
Female	11
Age (in years)	
34-39	4
40-44	8
>45	3
Level of education	
Diploma in Nursing	6
Postgraduate diploma in Critical care	5
Bachelor in Nursing	4
Work experience	
5-10yrs	13
>10yrs	2
Place of work	
MNH	6
MOI	6
JKCI	3

During analysis of the interviews, three categories describing ICU nurses experiences on ETS practices and three categories describing ICU nurses' perception on best practices of ETS emerged. Table number 2 below presents emerged categories and related codes.

Table 2: Emerging categories and related codes from in depth interviews

Themes	**Category describing latent meaning of the text**	**Codes describing manifest meaning of the text**
ICU nurses experience on practices of ETS	Triggers for doing ETS	1. Visible and audible secretions are reasons for suction 2. Suction is done when patient present dyspnea 3. Patients with difficulty in breathing needs suction 4. Sweating is an indication for suction 5. Suction is done when there is decreased saturation of oxygen 6. Suction is done whenever necessary
	Safety and Comfort related practices of ETS	1. Giving drugs to relieve pain 2. Proper positioning improving patient's comfortability 3. During suction the smallest catheter is used for children and large catheter for adults 4. Deep suction is avoided 5. Few seconds is used per one attempt of suction 6. During suction high vacuum pressure is used
	Infection prevention related practices	1. Hand washing is performed before and after the procedure of ETS 2. Suction catheter is rinsed by clean water after suction 3. During suction the catheter is used once 4. During suction PPEs are used 5. Suction is done to the ETT first then to the mouth 6. Suction catheter is re used

ICU nurses perceptions on best practices of ETS	Perceived meaning of best practice of ETS	1. Use of current evidence based research during ETS 2. During ETS high quality care is provided 3. Providing safe practice to patients and nurses 4. Is when the procedure of ETS is performed per protocols 5. Use of knowledge and skills to perform ETS 6. The one which save patients' life
	Barriers for implementing best practice of ETS	1. Limited equipments 2. Shortage of staff 3. Lack of knowledge 4. Lack of motivation 5. Nurses reluctance to change
	Strategies for improving best practice of ETS	1. Training of ICU staff on ETS 2. Supplying enough and relevant equipments for ETS 3. Hiring enough staff to work in ICUs 4. Use of SOP when performing ETS 5. Improving working environment in ICUs 6. Change of attitudes for nurses who are working in ICUs

ICU nurses' experience on practices of Endo Tracheal Suction (ETS)

The participants shared their experience regarding the practice of ETS. About eighteen different codes were extracted from the texts and similar codes were grouped into three categories reflecting ICU nurses' experience on practicing ETS. "Triggers for doing ETS" refers ICU nurses experience on the reasons for performing ETS while Safety and comfort related practices describing nursing interventions that ensure patient's safety and comfort during ETS. "Infection prevention related practices" points out nurse's experience of practices during ETS that targeting preventing spread of infection.

Triggers for doing ETS

Several reasons for doing ETS emerged during in depth interviews (IDIs). Visible and audible secretions were reported of being physical reasons that can lead a nurse into a decision of doing ETS to patients in ICUs. Participants also mentioned shortness of breathing (dyspnea) or difficulty in breathing as a sign that indicate need for suction. Majority of participants mentioned that seeing patients sweating is also used as an indicator for ETS. Furthermore, observed physiological parameters such as decreased saturation of oxygen of a patient were mentioned by participants to be another indicator that make nurses to initiate ETS. Together with the above reasons, some participants also added that suction should be done whenever necessary and that physiological, physical and behavioral indicators can all be taken into consideration when deciding for ETS as narrated by one participant below.

"When I observe the patient having decreased respiration rate, sweating, alarm from the ventilator machines, dyspnea and decreased heart rate I usually think of suction" (Respondent 1)

Safety and Comfort related practices of ETS

Some participants mentioned that one of the adverse effects of ETS is pain of which it should be alleviated by giving pain relieving drugs. Participants mentioned that, proper positioning during ETS improves patients' comfortability and therefore ensuring that patient is properly positioning is necessary in maintaining patient safety and comfort during ETS. However, participants were of different view regarding exact position during ETS. Some mentioned that, the patient should be kept on 90 degree sitting up position while others mention 45 degree sitting up position as the right position during ETS. Some participants were aware that a formula to calculate ideal catheter size exists. However, some did not know the formula and some mentioned that the catheters size should be twice the size of endotracheal tube. Most of the participants were aware of the different size of catheter that can be used for children and adult. Additionally, most participants mentioned that during ETS, one should avoid deep suction, though some reported to insert the entire catheter into the endotracheal tube.

Many participants were not sure of the recommended pressure used for suction. Some participants mentioned that pressure for suction should be as low as possible while some participant's recommended medium pressure and others mentioned that high pressure is used for suction.

"I set the pressure at the machine but how much for adult or children I don't know, I just set low pressure" (Respondent 11)

Infection prevention related practices

Infection prevention practices during ETS that emerged from the IDIs were hand washing before and after the procedure, rinsing of the suction catheter with clean water during suction and using suction catheter only once during suction. The majority of the participants were aware of the importance of washing hands before and after the procedure to prevent spread of infection. Few participants reported the use of clean water to rinse the suction catheter during the process of suction. Most of the participants were aware of using sterile water to rinse the catheter. Single use of suction catheter was mentioned by many to be the right practice.

ICU nurses perceptions on best practices of ETS

Three categories emerged from the interviews of ICU nurses describing their perceptions on best practice of ETS. "Perceived meaning of best practice of ETS" refers participants understanding of the meaning of the ETS best practices. "Barriers for implementing best practice of ETS" and "Strategies for improving best practice of ETS" are categories that provide participants insight of obstacles for implementing best practices and interventions that can improve the use of best practice for ETS in ICUs.

Perceived meaning of best practice of ETS

Participants shared their views of what they understand about best practice for ETS. Participants reported several recurring themes including use of current evidence based research during ETS, providing high quality care during ETS, providing safe practice to patients and nurses, performing ETS procedure per protocols, use of knowledge and skills to perform ETS and lastly best practice of ETS is the one which save the patients' life. Most

participants recognized research evidence as a pillar of best practice. Some mentioned that, new evidence arising from research is the key factor for changes in nursing practice patterns.

"Best practice is when a health care provider practice safe and perfect when giving care to patients by use of guidelines to guide what he/she is doing" (Respondent 4)

"It is a practice which you use current research findings to give quality care to patients" (Respondent 11)

Barriers for implementing best practice of ETS

The most perceived barriers for implementing best practice of ETS were; limited equipments, shortage of staff and lack of knowledge. The least perceived barriers were lack of motivation to nurses and nurse's reluctance to change.

Shortage of equipments and supplies was the main barrier in performing suction to patients in ICU. Equipments and supplies such as suction machines, suction catheters, bottles and silicon tubes are usually in short supply leading to limited practice of ETS to patients who need it as reported by participants below.

"We usually re use the suction catheter against the recommendation in which it is supposed to be used once because if you use once after a short period you have nothing to use" (Respondent 3)

"Some time you are using the suction machine, at the same time another nurse need it you find yourself stranded or you do the suction quickly without following the SOP and give it to another nurse so she can help the other patient" (Respondent 11)

Limited number of nurses working in ICUs was the second most cited challenge the nurses face. As a result of limited number of nurses, one nurse has to take care of two or more patients at the same time. This makes it impossible to carry out ETS as per patients' need and required standards.

"*When the patient need suction while you are in between attending another patient and the other staff are busy also with for example resuscitation no one is free to assist you, you get stressed and confused because you cannot attend two patients at the same time, for sure we are so troubled" (Respondent 5)*

Lack of the nurses specially trained in ICU was reported by most of the participants to be a barrier for best practice of ETS. The participants thought that nurses working in ICUs should be equipped with special academic training in ICU in addition to their general diploma and degree in nursing. They further narrated that nurses are everything in ICUs because they have to know what is going on to a patient every single minute; the changes of body mechanisms, recovery or deterioration. According to them, nurses in ICUs should be the one who has special training concerning ICU care.

"*The very big challenge is to have trained nurses, to care seriously ill patient need special training of which it is not applied here most of time they take nurses with general knowledge which is difficult, keeping in mind that the ICU care and equipments are very advanced " (Respondent 12)*

Other participants mentioned lack of motivation as barrier to best practice of ETS. They further explained that nurses working in ICUs need special allowance due to uncomfortable and busy environment in ICUs and as the patient is suffering from their illness they usually suffer too and end up with stress related illnesses.

"*They should give us special allowance in order to motivate us because ICU nurses are special as they give care to special patients. The patient is lying on the bed unconscious, a nurse has to know if he has fever, pain, hungry, increased heart rate, full bladder and so many others"(Respondent 3)*

Some participants reported that some nurses are reluctance to change and that majority of ICU nurses fail to adopt or acquire new knowledge that is imparted to them by their colleagues' whom undergone training or are coming from school. They continue practicing routine work instead of EBP.

"Some of the nurses they don't want to change even though you come with new update they are still reluctant to shift from routine to EBP" (Respondent 9)

Strategies for improving best practice of ETS

Participants gave their views about how best practice of ETS can be improved. They mentioned several strategies including; training of ICU staff on ETS, supplying enough and relevant equipments for ETS, hiring enough staff to work in ICU, use of SOP when performing ETS, improving working environment in ICU and changing of attitudes for nurses.

Most participants perceive training to be the most important aspect in improving best practice of ETS in ICUs. Methods of training which were proposed by participants include short and long ICU courses, giving ICU training to students, new nurses and all nurses who are working in ICUs, seminars and workshops as well as on job training.

"On job training should be the priority for nurses as things are changing day to day" (Respondent 6)

Supplying enough and relevant equipments was mentioned by majority of participants as another key strategy that ensures availability of resources needed for ETS procedure. Participants narrated that provision of enough and relevant equipment will help nurses to perform well ETS procedure rather than providing equipments which are not relevant to the needs. Furthermore, some participants recommended that supply department should cooperate with users to understand their need as some of equipments procured are not useful or complicated and are more of technical.

"*The hospital leader should make sure they supply enough equipments for suction like face mask, gloves, suction catheters, suction machines, distilled water and many others to help nurses to do their work smoothly"(Respondent 4)*

Hiring enough staff to work in ICUs was reported by some participants, as another strategy to improve best practice of ETS. Participants perceived that giving care to patients in ICUs needs enough man power. They further perceive that patients are at great risk when one nurse cares more than one patient.

"The employer should make sure there is enough staff that one patient one nurse as it is recommended worldwide" (Respondent 8)

Participants commented on the use of standard operating procedures for ETS in order to improve best practice of ETS. Nurses working in ICU should be encouraged to follow SOPs and do critical assessment of research evidence to inform their practice.

Most participants perceive that working environment is a key point to the performance of the health care provider. The participants suggested that, the management should make sure ICU environment is clearly maintained especially from the construction process whereby all needed resources like machines, oxygen source and many others are fixed to the appropriate place for the safety of patients and nurses.

Nurses are advised to change their attitudes whenever necessary; when new updates or EBP are available they should accept for the purpose of saving patients' life.

"We nurses we have to change, we have to do as we learned and avoid routine work. We have to do according to SOP and be committed to our work" (Respondent 11)

Findings from observations on nurses practicing ETS

Twenty observations were conducted in which researcher observed nurses performing ETS in the selected ICUs as follows; eight observations from MNH ICU, seven observations from MOI ICU and five observations from JKCI ICU. A check list of 33 observable items which were divided into four parts was used. Part one included ETS practices prior to suction, part two focused on practices to be done during the actual procedure of ETS while part three involve practices after the ETS procedure. Last part of the observation was on infection prevention practices from time of starting the ETS to the end of ETS. Twelve critical items were chosen from thirty three items and analyzed. The (12) critical items were chosen due to its important to patients outcome that; if they are not practiced properly they can compromise patient safety. Table number 3 below shows the performance of ETS using critical items chosen from thirty three items.

Table 3: Observational checklist of nurse's practice on ETS

S/NO		Done	Not done
	Practices before suctioning		
1	Assessment of the need for suction	14	6
2	Auscultation before the procedure	7	13
	Practices during suctioning		
3	Hyper oxygenation with 100% oxygen	13	7
4	Choosing the correct diameter of suction catheter	11	9
5	Adjusting the correct suction pressure	6	14
6	The correct suction time (≤1-15 s) per one attempt	5	15
	Post suctioning practices		
7	Auscultation of patient chest	5	15
8	Taking of vital signs	15	5
9	Recording the procedure and patient response to ETS	15	5
	Infection prevention measures practices		
10	Hand washing before the procedure	1	19
11	Wearing sterile gloves before the procedure	18	2
12	Use sterile catheter	15	5

From table number 3 above, majority of nurses observed assessed the patients for the need for suction prior to suction. Few nurses perform ETS without assessing the patient. Auscultation before suction was performed by few nurses while the remaining more than half of the nurses skipped auscultation. Almost all nurses observed did not wash hands as infection control measure before performing ETS. However, majority of nurses observed to use sterile gloves before washing their hands when performing ETS. During suction it was observed that, majority of nurses give high flow of oxygen to patients prior to commencement of ETS to prevent hypoxia. Hyperventilation of the patients was also observed among the majority of participants while few of the participants performed ETS without hyperventilating the patient.

The correct size of catheter were used by majority of nurses; while few nurses observed (9/20) picked suction catheter without considering the size of the catheter and used force when introducing the catheter into the ETT. Few nurses would set the suction pressure on the suction machine although some of the machines manometers were not working properly, majority of nurses set the highest suction pressure. Adherence to the time for suction was observed in few nurses; majority of nurses take more than fifteen seconds per one attempt of suction. Furthermore, few nurses performed chest auscultation as a means of assessing the effectiveness of the suction. Despite the importance of chest auscultation, yet the majority of nurses omitted the intervention. Lastly vital signs assessment after ETS was performed by the majority of the nurses which include saturation of oxygen, heart rate and respiration rate. Majority of nurses observed documented the procedure and findings on the patient observational chart.

CHAPTER FIVE

5.0 DISCUSSION

This chapter begins with a discussion of study findings on nurse's experiences on practice of Endo Tracheal Suctioning (ETS) and nurses perceptions of the best practices for ETS. Lastly, methodological consideration, as well as implication of this study for nursing practice, training and recommendation for further research is outlined.

5.1 ICU nurses experience on practices of ETS

Safety and comfort considerations

This study reveals that, nurses have been performing endotracheal suctioning care to patients with Endo Tracheal Tube (ETT) in ICU. Suction is an important nursing intervention and a nurse is required to be conversant when he/she should conduct ETS, how to conduct as well as how to prevent complications from ETS (Noppens, 2012). This study revealed several reasons that used by nurses as indicators for performing suctioning including visible and audible secretions, difficulty in breathing (dyspnea), sweating and decreased saturation of oxygen (<95%). According to Ashworth and his colleague (2015) and Nicolar (2016) other indicators for suction are increased peak inspiratory rate and restless (Ashworth, Bennet and Sole, 2015; Nicolar, 2016). While these indicators remains as the guiding rules for deciding suction, the study found that, suction can be conducted whenever a need arise, indicating the importance of close nursing observation of ICU patients by nurses as indicated in several other studies (AARC, 2010; Chaseling, W. Bayliss, S.L., Rose, 2014).

Despite of conducting suction, the study reveals that nurses lack awareness on the measures for patient safety and comfort when conducting suction. Nurses in this study were not aware of giving medication to relieve pain during suction a situation that could interfere the patient comfort (Sönmez Düzkaya and Kuğuoğlu, 2015; Ruan *et al.*, 2017). Use of large catheter, high suction pressure and taking long time during suction had an impact of pain to patients in ICUs. To optimize patients comfort and safety, nurses are advised to utilize measures to relieve pain during the procedure of suction (Paymard, A. ; Bargrizan, 2017).

This study has also revealed contradicting perceptions about the comfortable positioning of patients during ETS. Some of the nurses believe 90 degree is the right position while others believes that 45 degree position is the right position during suction. According to (AARC, 2010) the patient should be positioned at 30 to 45 degree head up to prevent aspiration and maintain patient comfort during suction. This findings illuminate areas for improvement in suction and that there should be a written protocol that clearly stipulate safety and comfort measures to be considered during suction including proper position during suctioning.

According to Evidence Based Practice, a nurse should choose appropriate size of the catheter for suction. The recommended size of the catheter is 50% of the inner diameter of the endotracheal tube (Russian, Gonzales and Henry, 2014).Nurses conducting ETS should be aware on this to ensure comfortability during procedures as well as preventing injuries from using an inappropriate catheter size. However this study found lack of awareness on the formula on how to get the exactly size of catheter to use during suction. Though; nurses in this study were aware of catheter used for patient with different age group and from observation, it was noted that majority of nurses were competent in inserting suction catheter into the ETT. The proper insertion of catheter is emphasized for prevention of trauma to the patient's lower airway(AARC, 2010). However, the study found considerable number of nurses who apply suction pressure at high rate, an action that could cause trauma to the patient's mucus membrane and cause lung collapse. According to best practice the recommended suction pressure for adult is 100 - 150mmHg, for children is 80-100mmHg and infant is 60-80mmHg (Pedersen and Rosendahl-Nielsen, 2009; Arbon, 2011). Appropriate suction pressure should be maintained when doing suction in order to minimize adverse effect like increased ICP, pain and bleeding (AARC, 2010).

Nurses practices prior, during and after ETS

Prior to endotracheal suction nurses are required to assess for the suctioning need of the patients, monitoring the vital signs and perform chest auscultation. This is supported by this study, whereby nurses assessed the patients for the need of suction; although the assessment by auscultation technique was poorly practiced. This findings is similar to a previous studies

by (Ashworth, Bennet and Sole, 2015; Nicolar, 2016) in context whereby most nurses assessed for visible secretions, decreased saturation of oxygen and difficulty in breathing prior to ETS.

According to (AARC, 2010) guideline, several interventions are recommended prior to ETS. These include hyper oxygenating the patients by 100% oxygen for one to two minutes before suctioning to minimize suction induced hypoxemia(Tavangar *et al.*, 2016).Selection of appropriate size of suction catheters (Russian, Gonzales and Henry, 2014), setting the right suction pressure(Arbon, 2011)then conducting ETS for 10-15 seconds in adults and less than 10 seconds in pediatric and infants(AARC, 2010).Through participant's observations, this study has revealed that these procedures are rarely adhered to by nurses during ETS. For example, selection of appropriate size of suction catheter was practiced among few nurses, the suction time exceeded more than 15 seconds among adult patients. The non-adherence to SOPs during ETS may cause hypoxia and pain to the patients undergoing ETS. However, a study done in Iran by (Haghighat and Yazdannik, 2015) revealed that nurses are not following best practice of ETS.

After ETS, auscultation of the chest is recommended to confirm clear chest. Checking of vital signs together with observation for any adverse effect to make sure patient is safe and stable (Arbon, 2011; Nicolar, 2016). This study found that vital signs assessments were practiced by the majority of the nurses. The vital signs were documented by either writing notes on the patient's observation charts or ticking what has been done. On the other hand, chest auscultation after the procedure of ETS was poorly practiced.

Infection prevention control practices

Prevention of infection is an important aspect during ETS procedure and nurses are required to adhere to infection prevention protocols to minimize risk of infection. Use of personal protective equipment (PPE) including mask, goggles, gloves and aprons; and hand washing are compulsory during the procedure of ETS. Furthermore, aseptic technique should be maintained throughout the procedure(Jansson *et al.*, 2013; Negro *et al.*, 2014).This study has found that nurses do adhere to infection prevention measures on wearing sterile gloves and using sterile catheters during suction. However, hand washing as a way of preventing infection is still a challenge; as most nurses did not wash their hands prior to ETS; a situation that could

interfere with patient's safety or making patients at risk of developing ventilator associated infection (VAP) (Jansson, 2014; Haghighat and Yazdannik, 2015).Despite the poor hand washing, nurses in this hospitals use sterile water for rinsing the suction catheter during suction and use catheters once as a means of reducing the risk of transmitting infections to patients. This practice is similar to study done by(Vanessa Wagner *et al.*, 2015) that showed adequate knowledge on preventive interventions with ventilator associated infection (VAP).

5.2 ICU nurses perceptions on best practices of ETS

Apart from exploring experiences of nurses on practicing ETS, the study also explored their perception on ETS best practices. Participants in this study were of different views of what does the best practice for ETS mean, however, the study found that, most of them perceived the use of evidence from research as a key to best practices for ETS in order to improve quality of care. ICU nurses are expected to use research findings in their day to day practice in order to give quality care to patients in ICUs (Aburuz *et al.*, 2017). Adherence to the best practice is the key point to the patient safety; though several studies revealed that nurses are not following best practice of ETS in their daily practice (Haghighat and Yazdannik, 2015).

Barriers for implementing best practice

The provision of best practice of ETS in ICUs does not only depend on skilled personnel, but also on the availability of enough and relevant equipments. The current study found that the availability of enough and relevant equipments for ETS is a challenge, a situation that could compromise the provision of best practice.

Critically ill patients demand increased nurse staffing resources and nurses who have specialized knowledge and skills. This study found inadequate number of nurses in ICUs and this was perceived by majority of nurses as a barrier for implementation of best practice of ETS. Having few nurses in ICUs contribute to increase risk of complications to patients (Mudihanselage, H.S.S.S. and Chamaru, 2015; Pastores and Kvetan, 2015).

Furthermore, lack of skilled personnel in ICUs was perceived as another challenge in implementing best practice of ETS. Incorrect airway management in ICUs can be life threatening for patients and lack of skilled personnel in ICU contributes to poor quality of care and poor ETS practice in ICUs. Incorrect knowledge generates inappropriate practice which could compromise patient safety during ETS (Frota, Loureiro and Ferreira, 2013; Elbokhary, Osama and Al-khader, 2015).

ICU nurses reluctance regarding the use of best practice on ETS was found to be among the challenge in this study. Nurses were perceived to be difficulty to change in their attitude on ETS practice despite of being exposed to new inputs from research evidence. This is supported by one study which revealed that, nurses continue to practice normal saline instillation despite of evidence based practice guideline suggesting that the practice may cause harm to patients (Leddy and Wilkinson, 2015).

Lack of motivation for ICU nurses is an obstacle to the best practice of ETS. Nurses in this study perceived that good motivation could results to good best practice of ETS. Health care professional tends to be motivated by intrinsic factors; however, when there is extrinsic motivation nurses performance could increase and this could improve patient's outcome in ICUs (Lambrou, Kontodimopoulos and Niakas, 2010).

Strategies for improving best practice of ETS

In improving best practice of ETS; multiple approaches are needed like training of nurses on critical care specialty as recommended in this study. Nurses are encouraged to learn more about patient care in ICUs using different materials like journals, seminars, short and long training in order to improve their practice on ETS (Lin *et al.*, 2011; Heidari and Shahbazi, 2017).

Best practice of ETS requires adherence to standard operating procedure (SOP) guideline thus, development and monitoring of nurses adherence to SOP is very important to improve quality of care and ensure patient safety (Özden and Görgülü, 2012). The current study indicated that, use of SOP and available research evidence could help in improving best practice of ETS.

Furthermore, the managements are encouraged to initiate SOP and policies for ETS and perform frequent review to update it whenever necessary.

The current study suggested that the availability of enough and relevant equipments for ETS should be a priority to the management and users should be involved during ordering to ensure relevance of the equipments.

Other strategy for improving best practice of ETS as mentioned in this study is hiring enough nurses to work in ICUs. Internationally, ICU nurses patient ratio is 1:1, nurses in this study perceived that this is not practiced in ICUs. Appropriate nurse staffing in critical care units may improve the quality of care of critically ill patients and enhance quick recovery (Aragon Penoyer, 2010).

Wiskow and his colleague defined supportive work environments as the one that provide conditions that enable health workers to perform their duty effectively, making best use of their knowledge, skills and competences and the available resources in order to provide high quality nursing services ((Wiskow, Albreht and Pietro, 2010). Improving ICU environment was mentioned in the current study as another strategy for improving best practice of ETS. This could be addressed by building standard ICUs with all important equipments and machines to enhance nurses to perform their duty. Example; putting enough space between bed to bed and ensure availability of running water for hand hygiene among others (Valentin and Ferdinande, 2011).

Change of attitude for nurses in ICUs as a way of improving best practice of ETS was also suggested in the current study. Nurses are advised to change their attitude of being reluctance to the attitude of learning and accepting new ideas and research evidenced from authorized sources in order to create a world of science in nursing practice. Education about research through nursing education or continuous education is of great important to raise awareness for ICU nurses on best practice of ETS (Ez elarab *et al.*, 2012).

CHAPTER SIX

6.0 CONCLUSION

Endotracheal suction is commonly practiced intervention by nurses caring for critically ill patients in specialized hospitals in Dar es Salaam. Nurses use their experience to recognize physiological, physical and behavioral manifestations that indicates patients need for suctioning in ICU. However, their practices of ETS are suboptimal with minimal adherence to infection preventions as well as comfort and safety measures. Failure to practice hand washing whenever the ETS is done, inappropriate position of patient during suctioning, use of large catheter and prolonged suctioning both could compromise comfort, safety as well as exposing patient to acquisition of infection leading to increase severity, prolonged ICU stay and deaths. Lack of trained personnel, shortage of nurses in ICU as well as inadequate equipment needed for suction was found to contribute to substandard practices for ETS. While the use of research findings was found to be key in providing best practices for ETS, there is need to initiate in-service training for nurses currently working in ICUs on the use of SOP for ETS. However, these initiatives should go parallel with the improvement of ICU staffing with qualified, trained nurses as well as equipping the units with necessary equipment needed for ETS and other interventions.

6.1 Methodological considerations and study limitations

This study highlights some areas with regard to nurses' practices and perception of ETS that need improvement in order to ensure safe and best practice. The study used qualitative approach whereby four criteria that is credibility, transferability, dependability and Confirmability were assessed to ensure trustworthiness.

To achieve credibility, the researcher collected the data herself and selected participants who have enough experience in ICUs to obtain rich information. The researcher spent almost one month collecting data in selected ICUS. Data interpreted and analyzed by the researcher and shared to supervisor who has an extensive knowledge in critical care services. Furthermore the researcher uses two methods of collecting data which were in-depth interview and observation

to enhance the credibility of data. In addition to this, peer debriefing was done to ensure the data obtained is accurate and represent participants views and not of the researcher. Dependability was achieved by systematic documentation of information gathered during data collection and analysis to enhance the follow up of the data whenever there is a need. The findings were evaluated to make sure they reflect participants view. The researcher avoided use of pre- existing ideas about the problem under the study and based on collected data for analysis. This was assured by coding of collected data and quotes that support the presented findings. In spite of the fact that, this findings cannot be transferred directly into other settings; they can represent what is practiced in other hospitals. In considering this, description of research settings and process was given so as to permit decision of the reader about transferability.

The study provided understanding of the current practice of ETS among nurses in ICUs. But, there were some limitations that were observed. The study noted that to ensure best practice of ETS; multiple professionals are involved like procurement and supply department of which there views were not explored. However, the researcher wanted to focus on nursing professional perspectives of the problem. The current study was conducted at specialized hospitals which are at the national level. The findings may not be representative of the general population of nurses in other settings; therefore another study is required to include regional level hospitals. Small sample size limits generalization of the findings, however the purpose of the study was not statistical generalization rather it was the theoretical generalization. Recall bias from participants was observed during interview of which the researcher minimizes it by probing questions in between to facilitate good flow of information and organize a quiet and comfortable place for data collection. Another limitation is the Hawthorn effect, whereby participants were aware of being observed which could change their behaviors. However, literatures suggest that the change of behavior is only temporary that it takes short time for the observed to return back to their normal practice (Polit and Beck, 2003). In this situation, the study findings may not be affected by Hawthorn effect.

6.2 Implication for the nursing practice

This study has helped to identify the current practices of ETS among nurses in ICUs at specialized hospitals in Dar es Salaam. This research suggested interventions to be done by the hospitals in order to minimize the problems. The study has identified the areas where nurses had gaps on the practice and knowledge of ETS. These challenges need to be addressed by hospital managements and nurses together with training institution of nursing professionals.

It is believed that, provision of enough and relevant resources will improve nurse's practice on ETS which will result to improvements in patient safety and comfort.

6.3 Recommendations

The current study raised important issues regarding practices of ETS among nurses in ICUs at MNH, JKCI and MOI. The recommendations include training of nurses and ensuring availability of resources.

Recommendation to ICU nurses:

1. Registered nurses are recommended to be ready to update their knowledge in order to improve their practice on ETS by attending formal training specific to ICU.

Recommendation to nursing management:

1. Nursing management is recommended to develop a policy that will help to build competence to critical care nurses during care of critically ill patients in ICUs. This can be done through development of SOP for all nursing interventions performed in ICUs including ETS.

2. Nursing management is recommended to supervise nurses to ensure there is best practice in ICUs.

Recommendation to the hospital management:

1. The hospital management is recommended to address the factors within their level that contribute to poor best practice of ETS like employing enough skilled nurses to work in ICUs.

2. The hospital management is recommended to support ICU nurses to attend training in order to have skilled and knowledgeable personnel in ICUs, this could ensure patient safety.

3. The hospital management is recommended to ensure availability of equipments for ETS and ICU in general which require financial investment and priority.

4. The hospital management is recommended to integrate the best practice competencies for practicing ETS and other procedures into job description of nurses to ensure that it is well practiced.

Recommendation to the training institutions

1. All nursing institutions are recommended to equip nurses with the appropriate knowledge to demonstrate the best practice of ETS.

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APPENDICES

Appendix I: Informed Consent – English Version

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)

DIRECTORATE OF RESEARCH AND PUBLICATIONS

MUHAS INFORMED CONSENT FORM

ID NO: HD/MUH/T.263/2016

Consent to participate in a study: ENTITLED: "**Nurses experiences of practicing endotracheal suctioning at intensive care units of Muhimbili hospital Dar es salaam, Tanzania".**

Name: Juliana Michael Moshi

Purpose of the Study

Of the study is to explore nurses' practices and perceptions regarding ETS in ICU's at Muhimbili hospital.

What Participation Involves

If you agree to join the study, you will be interviewed in order to answer a series of questions in the interview guide prepared for the study.

Confidentiality

The information from the study will be kept in a safe place with access to authorized personnel only and will be used for research purposes only. No names will be used instead identification number will be used to represent the participants.

Risks

For this study we do not expect any risk while participating in this study.

Rights to Withdraw and Alternatives

Taking part in this study is completely your choice. You are free to choose either to participate in this study or not. You can decide to stop participating in this study at any time you wish even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits

If you agree to take part in this study there are no direct benefits that you will get from this study but we believe the information you will provide will help in improving nurse's practice and perception on ETS procedure in ICUs at Muhimbili National Hospital, Muhimbili Orthopaedic Institute and Jakaya Kikwete Cardiac Institute, Dar es Salaam.

Compensation

There will be no compensation of any kind for participating in this study.

Whom to contact:

In case of any questions about this study, don't hesitate to contact the principal investigator **Juliana M. Moshi** Muhimbili University of Health and Allied Sciences School of Nursing P.O. Box. 65004 Dar es Salaam, through **Mobile +255 754 291696** or research supervisor **Dr. Dickson Mkoka,** Muhimbili University of Health and Allied Sciences School of Nursing P.O. Box 65004 Dar es Salaam, **Mobile Number +255 718 694 495/ 628 139 150.**

If you ever have questions about your rights as a participant, you may contact the Director of Research and Publications Committee **Dr Bruno Sunguya,** Muhimbili University of Health and Allied Sciences P.O. Box 65001 Dar es Salaam **Tel + 255 2150302 - 6 /2152489.**

Do you agree?

Participant agrees…… Participant does not agree…….

I……. have read the content in this form. My questions have been answered. I agree to participate in this study.

Signature of participant ……

Signature of principal investigator ……..

Date of signed consent…….

Appendix II: Consent Form – Swahili Version

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

KURUGENZI YA TAFITI NA UCHAPISHAJI

FOMU YA RIDHAA

Nambari ya usajili: HD/MUH/T.263/2016

Naitwa **Juliana Michael Moshi,** mimi ni mwanafunzi wa mwaka wa pili katika shahada ya uzamili ya huduma kwa wagonjwa mahututi na majeruhi katika chuo kikuu cha afya na sayansi shirikishi Muhimbili. Ninafanya utafiti kuhusu **"Mtazamo na ufanyaji kazi wa wauguzi katika kufyonza makohozi kwa wagonjwa mahututi wenye njia ya hewa bandia katika vitengo maalum vya wagonjwa mahututi hospitali ya Muhimbili Dar es Salam Tanzania".** Utafiti huu unawahusu wauguzi wanaofanya kazi katika vitengo maalumu vya wagonjwa mahututi (wasiojiweza) katika Hospitali Taifa Muhimbili, Taasisi ya Tiba ya Mifupa na Mishipa ya Fahamu Muhimbili na Taasisi ya Moyo ya Jakaya Kiwete Dar es Salaam, Tanzania.

Umuhimu wa utafiti huu

Utafiti huu unalenga kuangalia mtazamo na ufanyajikazi wa wauguzi katika kufyonza makohozi kwa wagonjwa mahututi wenye njia ya hewa bandia katika vitengo maalum vya wagonjwa mahututi Hospital ya Taifa Muhimbili, Taasisi ya Tiba ya Mifupa ya Muhimbili na Taasisi ya Moyo ya Jakaya Kikwete Muhimbili.

Jinsi ya kushiriki

Ukikubali kushiriki katika utafiti huu, utasailiwa ili kuweza kujibu maswali kutoka kwenye dodoso lililoandaliwa kwa ajili ya utafiti huu ambapo utaulizwa na mtafiti nae ataandika maelezo yako.

Usiri

Majibu yote yatakusanywa kutoka katika eneo la utafiti na yatahifadhiwa sehemu maalum ambapo wahusika tuu ndio wataruhusiwa kuzipata taarifa hizo. Pia majina hayatatumika badala yake tutatumia nambari ya utambulisho tu. Hakuna jina la mshiriki litakalochapishwa.

Madhara

Hatutegemei madhara yeyote kukutokea kwa kushiriki kwako katika utafiti huu.

Haki ya kutoshiriki au kusitisha kushiriki na mbadala

Kushiriki katika utafiti huu ni chaguo lako, na una uhuru wa kukubali au kukataa kushiriki katika utafiti huu. Pia unaweza kusitisha kushiriki katika utafiti huu muda wowote utakapojisikia hivyo hatakama umeshakubali kushiriki.Kukataa kushiriki au kusitisha kushiriki katika utafiti huu hakutakufanya upoteze haki zako za msingi au kupata adhabu yoyote.

Faida

Ukikubali kushiriki katika utafiti huu hakuna faida ya moja kwa moja utakayopata lakini tunaamini maelezo utakayoyatoa yatasaidia kupendekeza njia zinazofaa kuboresha huduma ya wagonjwa na namna iliyo sahihi katika kufyonza makohozi katika njia ya hewa bandia kwa mgonjwa mahututi katika Hospitali ya Taifa Muhimbili, Taasisi ya Tiba ya Mifupa Muhimbili na Taasisi ya Moyo ya Jakaya Kikwete Muhimbili, Dar es Salaam.

Fidia

Hakuna fidia yoyote itakayotolewa katika utafiti huu, uko huru kushiriki au kutoshiriki katika utafiti huu.Pia unaweza kujitoa /kujiengua wakati wowote**.**

Mawasiliano

Kama utakuwa na swali lolote kuhusu utafiti huu unaweza kuwasiliana na mkuu wa utafiti huu **Juliana Michael Moshi,** Shule ya Uuguzi ya Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P. 65004, Dar es Salaam, namba ya simu **+255 754 291696** au unaweza kuwasiliana na msimamizi wa utafiti huu **Dr Dickson Mkoka,** Shule ya Uuguzi Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P. 65004, Dar es Salaam**namba ya simu +255 718 694 495/ 628 139 150.**

Na ukiwa na swali lolote kuhusu haki zako kama mshiriki, unaweza kuwasiliana na Mkurugenzi wa Utafiti wa Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili**, Dr Bruno Sunguya,** S.L.P**. 65001, Dar es Salaam Tel +255 222150302 -6/ 2152489.**

Je unakubali?

Mshiriki kakubali……Mshiriki hajakubali…….

Mimi …….. nimesoma na nimeelewa maelezo ya fomu hii. Maswali yangu yote yamejibiwa na nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki ……

Sahihi ya mtafiti……

Tarehe ……

Appendix III: Investigation tools

Semi structured interview guide on nurses' experiences of practicing endotracheal suction in Intensive Care Units at Muhimbili Hospital, Dar es Salaam.

Date……. / …… / ……

Participant identification number …….

Section A: Background information

1. Can you tell me about yourself?*(Probes: age, level of education, where did you acquire it, current employment position, working experience in ICU, any training/course attained apart from those mentioned above? - where, about what, how long, any certificate awarded, the content).*

Section B: Practices regarding ETS

1. What is your experience in the care of patient in ICU? *(Probes: routine care, your roles as a nurse).*

2. How do you care patients with mechanical ventilation in ICU? *(Any idea about essential care of ventilated patient?)*

3. How do you do endotracheal suction? (step by step)
   a) Before, during and after ETS
   b) Any guide/SOP used
   a) Any idea about when and why should we do ETS
   b) What intervention do you follow to promote safe practice of ETS?
   c) Any nursing consideration during ETS procedure
   d) Can a patient get problems from ETS, what are they?
   e) Is there any ways you can use to prevent or minimize these problems from ETS?

4. What challenges do you face during care of patient in ICU?
   a) Any challenge specifically to ETS?

Section C: Nurses perception on best practice of ETS

1. Have you ever heard about best practice? Any idea of what is it
2. What is your opinion on suctioning patient with endotracheal tube?
3. What do you think about provision of ETS service by nurses in your working place? Is it well practiced? Why do you think so?
4. How do you think this can be done properly?
5. In your views who is responsible to improve the best practice of ETS in ICU?
6. Do you think nurses are to be blamed when best practices is not practiced in ICU? Why do you think so?
7. If you are asked to recommend on best practices in relation to ETS in ICU, what will be your recommendations to improve the practices?

Is there anything more you would like to share?

Thank you much for your time

Appendix IV: Questionnaire – Swahili Version

“Kuangalia mtazamo na ufanyaji kazi WA wauguzi katika kufyonza makohozi Kwa wagonjwa mahututi wenye njia ya hewa bandia katika vitengo vya wagonjwa mahututi Hospitali ya Taifa Muhimbili, Taasisi ya Tiba ya Mifupa na Mishipa ya fahamu Muhimbili na Taasisi ya Magonjwa ya Moyo ya Jakaya Kikwete Dar es Salaam”.

Tarehe……. / …… / ……

Nambari ya utambulisho ya mshiriki ……

MAELEKEZO

- Taarifa utakazotoa zitahifadhiwa kwa usiri mkubwa.
- Jibu maswali yote kwa uzoefu ,maoni na uaminifu.

Sehemu A: Taarifa binafsi za mshiriki

1. Naomba taarifa zako binafsi (jinsia yako, umri wako, mahali pako pa kazi, cheo chako, ngazi ya elimu kitaaluma, muda uliofanya kazi chumba cha wagonjwa mahututi, mafunzo yoyote uliyoyapata kuhusu utaratibu wa kufyonza makohozi kwa mgonjwa mwenye njia bandia ya kupitishia hewa).

Sehemu B: Kufyonza makohozi kwa mgonjwamahututi mwenye njia bandia ya kupitisha hewa

1. Elezea uzoefu wako wa kumhudumia mgonjwa katika chumba cha wagonjwa mahututi.
2. Elezea jinsi unavyomhudumia mgonjwa anayepumua kwa kusaidiwa na mashine maalumu ya kupumulia.
3. Elezea unafyonzaje makohozi kwa mgonjwa mwenye njia bandia ya kupitisha hewa katika chumba cha wagonjwa mahututi (*kuanzia mwanzo mpaka mwisho kwa kufuata utaratibu uliowekwa, ni wakati gani wa kufyonza makohozi na kwa nini unafyonza makohozi kutoka kwa mgonjwa?, kuna muongozo wowote unaotumia wakati wa kufyonza makohozi kwa mgonjwa?, utafanya nini ili kufyonza makohozi kwa usalama*

kutoka kwa mgonjwa mwenye njia bandia ya kupitisha hewa, ni vitu gani muuguzi anapaswa kuzingatia wakati anafyonza makohozi kwa mgonjwa mwenye njia bandia ya kupitisha hewa?, mgonjwa anaweza kupata madhara yoyote kutokana na kitendo cha kufyonzwa makohozi kwenye njia bandia ya hewa? Kuna njia zozote za kupunguza hayo madhara?).

4. Elezea vikwazo unavyokutana navyo wakati wa kumhudumia mgonjwa katika chumba maalumu cha wagonjwa mahututi. (je kuna kikwazo chochote kinacholenga wakati wa kufyonza makohozi?).

SEHEMU C: Mtazamo wa wauguzi kuhusu ufyonzaji bora wa makohozi kwa mgonjwa mwenye njia bandia ya kupitisha hewa.

1. Je umewahi kusikia utendaji bora? Elezea mawazo yako
2. Nini ushauri wako kuhusu kufyonza makohozi kwa mgonjwa mwenye njia bandia ya kupisha hewa?
3. Una mtazamo gani kuhusu huduma ya ufyonzaji makohozi kwa mgojwa mwenye njia ya bandia ya kupisha hewa kati eneo lako la kazi? Inafanyika vizuri? Kwanini unafikiri hivyo?
4. Unafikiri hii huduma inaweza kufanyikaje vizuri?
5. Kwa mtazamo wako nani anawajibika kuboresha utendaji bora wa kufyonza makohohi katika chumba cha wagonjwa mahututi?
6. Kwa mtazamo wako unafikiri wauguzi walaumiwe kwa utendaji bora kutofanyika vizuri?
7. Kama ukipewa nafasi ya kutoa mapendekezo yako kuhusu kuboresha utendaji bora wa kufyonza makohozi utasemaje?

Appendix V: Observational Checklist (Nurses Practices on ETS procedure)

S/NO		Done	Not done
	Practices before suctioning		
1	Assessment of the suction need		
2	Checking vital signs		
3	Auscultation before the procedure		
4	Preparation of materials		
5	Informing the patient		
6	Protection of privacy		
7	Putting the patient in a suitable position (semi-fowlers)		
8	Hyperventilation/hyper oxygenation		
	Infection prevention measures		
9	Hand washing before the procedure		
10	Wearing sterile gloves before the procedure		
11	Use sterile catheter		
12	Wearing apron before the procedure		
13	Wearing masks before the procedure		
14	Wearing goggles before the procedure		
15	Hand washing after the procedure		
	During suctioning		
16	Choosing the correct diameter of aspiration catheter		
17	Adjusting the correct aspirator pressure		
18	Gently advancing the catheter while entering the airway		
19	Moving the catheter back and forth in the airway		
20	Removal of the catheter with intermittent suctioning		
21	The correct aspiration time (≤1-15 s)		
22	Performing the aspiration for a maximum of 3 times consecutively		

23	Hyperventilation at the end of the procedure and at interim if the procedure is going to be repeated		
24	Minimize use of deep suction		
25	Resting of the patient for 30—60 s in between consecutive aspirations		
26	Monitoring cardiac rhythm during aspiration		
	Post suctioning		
27	Hyper oxygenate with 100% oxygen		
28	Patient chest auscultation		
29	Check vital signs		
30	Giving oral care		
31	Recording the procedure and the patient's responses to ETS		
32	Assessment of any adverse effect and manage it		
33	Report any abnormal findings		

Appendix VI: Letter for Ethical Clearance from - MUHAS

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES

P.O. Box 65001
DAR ES SALAAM
TANZANIA
Web: www.muhas.ac.tz

Tel G/Line: +255-22-2150302/6 Ext. 1015
Direct Line: +255-22-2151378
Telefax: +255-22-2150465
E-mail: dpgs@muhas.ac.tz

Ref. No. DA.287/298/01A/ 17th April, 2018

Ms. Juliana Michael Moshi
MSc. Critical Care and Trauma Nursing
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED: "NURSES PERCEPTION ON BEST PRACTICES OF ENDOTRACHEAL SUCTIONING AT INTENSIVE CARE UNITS OF MUHIMBILI HOSPITAL DAR ES SALAAM, TANZANIA"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from 13th April, 2018 to 12th April, 2019. In case you do not complete data analysis and dissertation report writing by 12th April, 2019, you will have to apply for renewal of ethical clearance prior to the expiry date.

Dr. Emmanuel Balandya
ACTING: DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publications
cc: Dean, School of Nursing

Appendix VII: Permission letter from Muhimbili National Hospital

MUHIMBILI NATIONAL HOSPITAL

Cables: "MUHIMBILI"
Telephones: +255-22-2151367-9
FAX: +255-22-2150534
Web: www.mnh.or.tz

Postal Address:
P.O. Box 65000
DAR ES SALAAM
Tanzania

In reply please quote: MNH/TRC/Permission /2018/309 23th April, 2018

Block Manager,
ICU
Muhimbili National Hospital.

RE: PERMISSION TO COLLECT DATA AT MNH

Name of Student	Juliana Michael Moshi
Title	"NURSES PERCEPTION ON BEST PRACTICES OF ENDOTRACHEAL SUCTIONING AT INTENSIVE CARE UNITS OF MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM TANZANIA"
Institution	Muhimbili University of Health and Allied Sciences
Supervisor	Dr. Dickson Mkoka
Period	24/4/2018 – 30/10/2018 (6 months)

Permission has been granted to Juliana Michael Moshi to collect data for the above title. Please ensure that the researcher abide to the ethical principle and other conditions.

Sincerely,

Dr. Faraja Chiwanga
Head of Teaching, Research and Consultancy Coordination Unit

c.c. DNS
c.c. Juliana Michael Moshi

All Correspondences to be addressed to the Executive Director

Appendix VIII: Permission letter from Muhimbili Orthopedic Institute

MUHIMBILI ORTHOPAEDIC INSTITUTE

P.O. Box 65474; DAR ES SALAAM, TANZANIA, MUHIMBILI COMPLEX
Executive Director: +255-022-2153359
General lines: +255-022-2151298/2152937/2152938
FAX: +255-022-2151744
E-Mail: info@moi.ac.tz
Website: www.moi.ac.tz
OFFERING SERVICES IN ORTHOPAEDICS, NEUROSURGERY AND TRAUMATOLOGY

AB.145/292/0IB/82 30th April 2018

Juliana Michael Moshi
MUHAS,
P.O. Box 65001,
Dar es Salaam

RE: RESEARCH APPROVAL

Reference is made to your letter dated 20th April 2018 with the above mentioned heading.

On behalf of the management of the institute (MOI), I would like to officially inform you that permission has been granted to conduct the study tittled "***Nurses perception on Best practices of Endotracheal suctioning at Intensive care units of Muhimbili Hospital Dar es salaam Tanzania''*** " at Muhimbili Orthopedics Institute. Therefore you can start the research as requested.

It's my hope that you will provide enough cooperation regarding this matter.

Regards
Robert
Mary Robert
For: Executive Director.

Cc: Medical Director-MOI

Appendix IX: Permission letter from Jakaya Kikwete Cardiac Institute

JAKAYA KIKWETE CARDIAC INSTITUTE

Cables: "Muhimbili"
Telephone: +255-22-2151379
FAX: +255-22-2150534
Email: info@jkci.or.tz

JAKAYA KIKWETE
CARDIAC INSTITUTE

Postal Address:
P.O. Box 65141
DAR ES SALAAM

In reply please quote;

Ref: JKCI/RESEARCH/11/18 **Date:** 11/05/2018

To JKCI Community

RE: PERMISSION LETTER FOR JULIANA M MOSHI TO CONDUCT HER DISSERTATION AT JKCI

Reference is made to the above heading. Juliana Moshi is a student at MUHAS pursuing MSc Critical Care and Trauma Nursing. As a partial fulfillment for completion of her studies she is required to conduct a research. Her research is titled "**NURSES PERCEPTION ON BEST PRACTICES OF ENDOTRACHEAL SUCTIONING AT INTENSIVE CARE UNITS OF MUHIMBILI HOSPITAL**".

She has been granted ethical clearance from University. With this letter, I am pleased to inform you that the Chairman of the JKCI Ethical committee has granted permission for the research of the above named student. Kindly provide her the necessary assistance to facilitate the conduct of her study.

Thanking you sincerely,

Pédrö Pallangyo M.D., M.P.H., M.Med
Chairman, Ethical Committee
Head, Research, Training & Consultancy

C.C

Director of Cardiology – JKCI
Director of Nursing - JKCI
Director of Surgery - JKCI.
Director of Clinical Support Services - JKCI