ASSESSMENT OF KNOWLEDGE AND PRACTICE OF INTENSIVE CARE UNIT NURSES TOWARDS OPEN ENDOTRACHEAL SUCTIONING FOR MECHANICALLY VENTILATED PATIENT IN FOUR SELECTED GOVERNMENT PUBLIC HOSPITALS IN ADDIS ABABA,ETHIOPIA.

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MSC Thesis on Assessment of knowledge and practice of Intensive care unit nurses towards open endotracheal suctioning for mechanically ventilated patient in selected four public Hospitals in Addis Ababa, Ethiopia 2017.

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APPROVED BY THE BOARD OF EXAMINERS

This is to certify that the thesis prepared by Abinet Esayas, entitled: Assessment of knowledge and practice of ICU nurses towards open endotracheal suctioning for mechanically ventilated patients in selected four public hospitals and submitted in partial fulfillment of the requirements of degree of Masters of Science in emergency medicine and critical care complies with the regulation of the university and meets the accepted standards with respect to originality and quality.

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List of Acronyms

AARC = American Association of Respiratory Care

AOR = Adjusted odds ratio

BLH = Black lion Hospital

BP = Blood Pressure

COR = Crowds odds ratio

E.C = Ethiopian Calendar

ETB = Ethiopian Birr

ETS = Endotracheal suctioning

ETT = Endotracheal Tube

HR = Heart Rate

ICP = Intra Cranial Pressure

ICU = Intensive care unit

NS = Normal Saline

RR = Respiration Rate

SPSS = Statistical product and social service

SRS = Simple Random Sampling

UK = United Kingdom

ABSTRACT

Background

Endotracheal suctioning (ETS) is considered one of the most common procedures in intensive care unit to maintain a patent airway in artificially ventilated patients. However, there are many associated risks and complications like trauma, infection, bleeding, hypoxia, dysrhythmias and, in extreme cases, cardiac arrest and death. Knowledge and practice of Intensive care unit nurses towards endotracheal suctioning is directly related to minimize the above complications, improve standard care, to promote effective/safe suctioning and to reduce length of stay in ICU. So, assessing knowledge and practice of ICU nurses towards endotracheal suctioning is baseline to improve well-being of intubated patients.

Objective

This study was conducted to assess knowledge and practice of Intensive care unit nurses towards open endotracheal suctioning for mechanically ventilated patient in four selected public hospitals Addis Ababa, Ethiopia, 2017.

Methods:

Institutional based cross sectional descriptive study was conducted. Data was collected using structured questionnaire and observational check list. Descriptive statistics included frequency, percentage, mean and standard deviation. Odds ratio was used to determine association between variables. Data analysis was done using SPSS version 20.

Result: A total of 100 participants were involved in the study with 59% female. The mean age of the participants' was between 26-30 years and the mean scores of knowledge and practice nurses were 11.14 and 16.11 respectively. Nearly half (51.0%) of nurses had poor knowledge and 41.0% of them had fair knowledge on endotracheal suctioning. and 80.0% had poor practice regarding ETS. Sex had statistically significant association with knowledge (p=.008, AOR and 95% CI 3.336, 1.364- 8.161).Training on ETS had statistically significant association with practice of nurses (p=.025, AOR & 95% of CI 3.372, 1.162-9.788).

Conclusion and Recommendation: More than half 51% of nurses had poor knowledge and almost all 80% of nurse's practice towards ETS was poor. Teaching intervention (especially for females) and training to improve nurse's knowledge and practice in the care of patients requiring ETS is indicated.

Key word: Endotracheal suctioning, knowledge and practice.

CHAPTER ONE

1 Introduction

1.1 Background

Patent air way is very important for effective gas exchanges. Airway patency is naturally maintained by action of the mucocilliary system, when normal amount of mucus is produced by local immune system and by cough reflex. When patient is critically ill this function may be compromised and lead to excessive pulmonary secretions. Airway clearance cannot be accomplished via involuntary physiological mechanism then collaborative nursing intervention is mandatory such as, endotracheal suctioning to maintain patient airway (1).

Open endotracheal suctioning refers to a single use catheter inserted in to the artificial air way either by disconnecting the ventilator or swivel connector (2).endotracheal suctioning (ETS) is one of the most essential activities performed in patients with artificial airways. It's one of the methods of bronchial hygiene therapy and mechanical ventilation which involves the mechanical aspirations of pulmonary secretions from patient's endotracheal tube to prevent its obstruction and to support breathing (3).

ETS is also a mechanism of removing secretions from patient's lung with applying negative pressure by inserting catheter through endotracheal tube. This procedure prevents accumulation of pulmonary secretions, keep airway patency and ensure optimal oxygenation and ventilation, as well as it save lifes.ETS has some life threatening complications such as hypoxia, ventilator associated pneumonia ,Bronchospasm , increased intracranial pressure ,tracheal tissue damage, atelectasis and cardiac dysrhythmias. So, all intensive care unit nurses should be aware of possible complications of patients go through when performing ETS. Therefore, assessing ETS knowledge and practices is vital in order to reduce the incidence (4).

ETS is considering one of the most essential procedures performed for patients with mechanically ventilated (4). Most patients expressed it painful and uncomfortable and it may brought choking sensation initiating involuntary cough and vomiting and also cause an unpleasant sensation when the lungs are being suctioned by catheter (5).

Despite complain, patients also told that the procedure is mandatory and help them to breathe easily. The pain and discomfort of suctioning doesn't improve during the duration of mechanical ventilation; on the opposite it become worst (6).

ETS for ventilated and intubated patients is a basic and routine nursing procedure, but practices differ among clinicians and hospitals. Sometimes, lack of research evidence doesn't necessarily mean that practice is no use. Alternatively, there may be some practice like instillation of normal saline, that continue even when actual evidence clearly indicates either no use or potential harm (7).

ETS is a sterile procedure that nurse must follow sterile technique to prevent infection. Nurse's lack of knowledge and practical skill of aseptic technique in this area leads patient to infection and cross infection .This is one of the contributing factors of long stay in hospital which results in more morbidity and mortality.

The aim of this study is to assess the knowledge and practice of ICU nurses regarding to ETS in selected governmental hospitals Addis Ababa, Ethiopia 2017.

1.2 Statement of the Problem

Mechanical ventilation is an important life support treatment given to patients admitted in ICU. Beside from requiring a specialized equipments and strategies, trained health care professionals are also needed to provide care for mechanically ventilated patients. Association of all these elements is essential for better care (8). Patients who are on the mechanical ventilator have to get a more complex, well structured and technically sophisticated level of care. Every year there are several hundreds of research papers published that help professionals to up-to-date the physiology and pathophysiology of patients and also how treatment approach should be to make different in a patient progression(9).

ETS is one of the main procedures performed in ICU (2).According to some studies that intubated patients may need ETS 3 to 24 times in each 24 hours (10). ETS have several complications and side effects if it is not applied with appropriate technique. Which may lead to infection, trachea endothelial trauma, bleeding, increased in intracranial pressure, respiratory arrest, hypoxemia and cardiac dysrhythmias and further it cause cardiac arrest and death(2). Because of the above life threatening condition ETS should follow right standards and codes to minimize its side effects (7). According to patient need, well trained nurse brings better result and minimize its risk rather than doing it routinely (11). And also revealed study show that performing suctioning according to standard protocol will minimize its complication (12).despite the fact of many studies, guidelines or manual about ETS is not found in most ICUs (13).Therefore, without guidelines practicing suctioning with in experimental way is on question(14).

Studies in intense and acute care units, confirmed that nurses poor knowledge is reflected on their practice (15). Research showed that there is big gap between nurse's knowledge and practice of ETS. According to the research their knowledge was much better than their practice and it was not reflected in their practice (14). ETS practice varies from nurse to nurse and did not follow experimental recommendations so the quality of care was lower than expected (16). Regarding the importance of performing ETS correctly in ICU, researches should take place to assess ICU nurses knowledge and practice to find the gap on ETS related knowledge and

practice because none can be said about ETS for mechanically ventilated patients in Ethiopia as there are no studies so far.

Without guidelines, a protocol and research based findings it is difficult to achieve critical patient need and see good outcome. So, assessing the knowledge and practice of ICU nurses in this topic is important to maintain patients well being.

1.3 Significance of the Study

To certain the highest standards of nursing care, nursing practice must be based on a strong scientific knowledge and practice. This can be achieved through adherence to the evidence based guidelines for prevention of ETS associated complication, eventually improving patients out come. Standard ETS practice will shorten patients ICU stay and hospitalization. Further, related infection like, VAP which is linked with more cost, morbidity and mortality in mechanically ventilated patients.

Considering that the critical patient in the ICU, in most cases in the state of use of endotracheal tube or artificial airway, it's important to assess nurse's knowledge and practice of ETS. By raising data on knowledge and practice of ICU nurses on ETS, demonstrating the importance of this resource in ICU, and also contribute the development of protocols which aimed at prevention of complication and to draw baseline data with the gap to the future improvement of ETS knowledge and practice so as to maintain patients well being is the reason of this study.

CHAPTER TWO

2. Literature Review

Endotracheal suctioning is used to remove pulmonary secretions, to clear respiratory tract, maintain oxygenation and avoid atelectasis. ETS is most frequent invasive procedure that performed in patients with mechanically ventilated (2,16). Unsafe ETS practice like, inadequate infection control practices and the prevention of possible aspiration of colonized Oropharyngeal secretions is the main treatment associated risk factors in the pathogenesis of ventilator associated pneumonia(VAP) by facilitating microbial colonization of the lower airways (2,17).

In previous descriptive, observational (Joanna Briggs Institute report) (18) and co relational studies, ETS practices have been evaluated in relation to recent recommendations (15,18). Even without strong evidence, unsafe practices have been notice globally over the past view years. Significant discrepancies have been observed in practice before (eg, patient assessment, and preparation, hyper oxygenation), during (eg, use of appropriate size catheter, infection control practice, the level of negative pressure) and post ETS (eg, monitoring vital sign, patient reassurance) (16). Nurses should be care full to minimize risk of adverse reaction such as, infection, hypoxemia and hemodynamic alterations, atelectasis, barotraumas and Bronchospasm and in the same time to ensure patient safety and the quality of nursing care(2).

An article reviews about ETS in adult intubated intensive patients need to provide research based recommendations. Suctioning only when necessary, using lowest suction pressure, a suction catheter occluding less than half the lumen of endotracheal tube, suctioning only for 10 to 15s, inserting the catheter no further than carina, hyperinflation and hyper oxygenation, performing continues rather than intermittent suctioning, avoiding saline lavage, providing hyper oxygenation before and after the suction procedure, always using aseptic technique, when using open suction system are the main and major recommendation of researcher (7).

A study conducted in India, to assess the knowledge and skill of critical care nurses on ETs in 8 ICU by using non probability convenience sampling technique in 50 nurses, and results revealed that 70% had an acceptable level of knowledge, 64% had least acceptable knowledge on the suction event and 54% on post suctioning period. An acceptable level of skill in performing ETS 56% of nurse, but skill in practices prior suctioning was least acceptable 86%. A significant

difference ($P < 0.001$) was obtained between the current practice observed and the best suggested practice on ETS. Auscultation of chest (2%), posts suctioning assessment (2%), wearing apron (6%), reassuring the patient before (30%) and after suctioning (18%), maintaining suction pressure (10%), time of suction applied (36%), maintaining the suction catheter's sterility (46%) and hand washing before (42%) and after suctioning (28%) were not practiced in most nurses. The conclusion, nurses had acceptable level of knowledge but practices various during ETS. Training is needed to improve nurse's practice (21).

A study conducted in India, to assess the level of knowledge on ETS among staff nurses and student nurses by using descriptive cross sectional design and convenient sampling technique was followed which included 30 samples , result shows that with regard to level of knowledge ETS among staff nurses 1(7%) had inadequate knowledge , 11(73%) had moderate knowledge , and 3(20%) had adequate knowledge . among nursing students 3(20%) had in adequate knowledge , and 12(80%) had moderate knowledge (23).

A study conducted in Trivandrum (India), sreechitratirunal institute for medical science and technology, to assess the knowledge and practice of ETS among 30 Neuron nurses by observational checklist and by using questionnaire. Outcome of the result was the knowledge score of staff nurses with less ICU experience ranged from 10 to 14 with a mean of 12.06(1.48). The knowledge of staff nurses with more ICU experience ranged from 11 to 14 with a mean of 12.08 (1.19). There was no statistically significant differences in the mean knowledge score of both group. Thirty ETS episode of 19 staff nurses both permanent and temporary were observed during all three shifts. However there was no statistically difference in the in the mean practice score of both groups. Based on the findings of the study Neuron nurses have average knowledge about ETS but in practice they are not practicing critical care elements (24).

The study conducted in IRAN by using cross sectional study of knowledge and performances of 44 nurses working in 3 ICUs in shahid beheshti hospital, kasha, Iran ,which was evaluated in prior, during and post suctioning, by using a 26 questionnaire and checklist in 2010 and the result showed that in the 8 items in question of prior suction the average score for knowledge and practice were 5.4(± 1.12) and 0.81 (± 0.71) respectively and the investigation of ten items during suction an average score of 7.7(±1.09) and 4.6(± 0.75) were gained for knowledge and practice respectively . In 8 items of post suction the average score of knowledge was 6.47 (±0.69) and that of performance was 3.86. In general, from 26 possible points, the average score of knowledge and practice were 19.59 and 8.75 respectively. The type of ICU and nurses working experience were not significantly related to their knowledge and practice. The study

revealed that regardless of acceptable knowledge, nurse's practice on ETS is poor. This shows that education without practice doesn't meet the standards (22).

A structured, non participatory, observational study conducted in institute of health sciences, university of Oulu, Finland, by using a 25-item best practice checklist to assess ICU nurse's ETS practices in medical-surgical ICU. And also used to evaluate ICU nurses ETS performance against current recommendations within different ICU experience groups. Unfortunately, observed ETS practice quality is lower than needed (p less than 0.001) infection control practice is one of the lower quality observed aria (4).

A descriptive study was done in Spain, in 34 nurses and analyzed by direct observation just looking their ETS practice, using the collection of a structured grid which contains 19 portions to measure, divided in to 6. Final conclusion of the study was, studied nurses have good scientific knowledge about ETS and it is much better than their practical skill. Different between knowledge and practice were also in evaluation, so training on the procedure must to fill the gap (14).

A study conducted in London to examine nurse's knowledge and ability when in practicing ETS in ICU and needed ward arias to search differences between practice and knowledge of 28 nurses in UK by using a structured interview and questionnaire. Poor level of knowledge was scored in many arias. This study recommended that ETS needs clinical guidelines and practice should be based on training (15).

Study conducted in UK to check ICU nurses knowledge and practice of ETS is based on recent research, to relate uses of research based teaching on nurse's knowledge and practice experimental study was a randomized, controlled, single-blinded comparison of two research based teaching programs. In 16 ICU nurses, using non participant observation and a self administer questionnaire. Result showed that most participant have poor knowledge, which affect their practice too, if suctioning was performed against many of the research recommendations. Teaching and training brings significant improvements on both knowledge and practice (13).

The study done in Italy, to assess ICU nurses knowledge about ETS guidelines of American Association of Respiratory care (AARC, 2010) in different hospitals. All of 379 nurses receive questionnaire. Only 65%of questionnaire returned complete. Nobody can get answer without

mistake 58% is maximum score to get the right answer .the total percentage of correct answers was 58%. In addition, only 2.5(n=6) of the nurses gave9/10 correct answers. Experienced ICU nurses score more correct answer. Italian ICU nurses knowledge of guidelines on endotracheal suctioning was not enough; however, experienced nurses demonstrated a better knowledge of the subject (19).

A cross sectional and non-participants structured observational design study conducted in western Turkey, to determine ICU nurses knowledge and practice levels regarding open system endotracheal suctioning and to investigate if there is a relationship between nurses demographic characteristics and their knowledge and practice on 72 nurses of 3 adult ICU teaching hospitals show that, the nurses mean score of knowledge and practice were23.79±3.83 and 12.88±2.53. Their level of knowledge was very good in 59.7%, good in 34.7%, and the level of practice was fair in 79.2% and good in18.1%. The relationship between the type of unit and the nurses knowledge scores was statistically significant (p=0.013). The correlation between the nurses score of knowledge and practice was not statistically significant(r=0.220; p=0.063). This study suggests that knowledge level of most of the nurses was good and their practice level was fair ICU nurses has responsibility to demonstrate safe practice during suctioning to give standard care for the patient and to minimize complications (20).

In Ireland, on March 2005, as structured observational study was conducted using a, piloted 20 item observational schedule, on two adult ICU to determine critical care nurses (N=45) endotracheal suctioning procedure in their day to day practice to establish endotracheal suctioning guidelines applied or not. All participants have different practical skill and that indicates nurses didn't use practical guidelines recommendation because of this they provide lower quality below the expectation. Considerable differences were observed in participant's respiratory assessment technique, hyper oxygenation and infection control, patient reassurance and the level of negative pressure used to clear secretions. Findings suggest that critical care nurses do not committed to apply the best practice recommendations when performing ETS. The result of this study offer an Irish/European perspective on critical care nurse's day to day suctioning practice (16).

A descriptive cross sectional hospital based study conducted in Khartoum, Sudan to assess knowledge and practice of ICU nurses regarding mechanically ventilated patients ETS, in a total of (42 nurses) results showed that the majority of nurses working in Khartoum teaching hospital

(85.7%) have poor knowledge level, (76.7%) have faire practice level. Nurses have better practice level than knowledge level (25).

CHAPTER THRE

3. Objectives

3.1. General Objective

The general objectives of this study was to assess knowledge and practice of Intensive care unit nurses towards open Endotracheal suctioning for mechanically ventilated patient in four selected public hospital in Addis Ababa, Ethiopia 2017.

3.2. Specific Objectives

1. To assess knowledge of endotracheal suctioning for mechanical ventilated patient of ICU nurse's.

2. To assess practice of endotracheal suctioning for mechanical ventilated patient of ICU nurse's

CHAPTER FOUR

4. Methods and Materials

4.1 Study Area

Addis Ababa is capital city of Ethiopia, and seat of African Union and Economic Commission for Africa is at the heartland of Ethiopia, with a population of 3.384,569 in an aria of 540 square kilometers. The city comprises 6 zones and 28 wordas. The population pyramid is broad based, typically of a developing world. People from different regions of Ethiopia populate the city; the main causes of morbidity and mortality are communicable diseases that could be prevented through interaction of primary health care activities. The city consists of a total of 79 health facilities including Hospitals; out of which 5 hospitals owned by Addis Ababa Health Bureau,4 hospitals owned by Federal Ministry of Health (central), 1 Addis Ababa University, 2 ministry of defense, 1 police force hospitals which provide different health services. In addition there are about 23 health center, 9 clinic, and 34 health posts. Among 8 public hospitals, Black Lion Specialized Hospital, St. Pawulose, Aabet, and Yekatit 12 were selected by lottery method. The study conducted in these four hospitals (ICU) from December 2017 to June 2017 Addis Ababa, Ethiopia.

4.2 Study Design and Period.

Institutional based cross sectional descriptive study was used to assess knowledge and practice of ICU nurses towards ETS for mechanically ventilated patient in four selected public hospitals of Addis Ababa from December to June 2017.

4.3 Source Population.

All nurses working in public hospitals ICU of Addis Ababa.

4.4 Study Population.

All nurses working in the four selected public hospitals ICUs during the data collection period that fulfilled the inclusion criteria.

4.5 Eligibility Criteria

4.5.1 Inclusion Criteria

- Nurses who were working in ICU for 6 months and above.
- Nurses who were available on the study time and
- Volunteer to participate in the study during the study period were included.

4.5.2 Exclusion Criteria

- Nurses who were not available during the study period.
- Nurses with less than 6 months of work experience.

4.6 Sample Size Determination

The sample size of the study was calculated by using a single proportion formula [$n_o=(Z_{\alpha/2})^2P(1-P)/d^2$]. According to Elbokhary *et al*., 2015 'P' 0.143 was taken for the study.

Z= standard normal deviation of 1.96 corresponding to 95% confidence interval

P= Prevalence rate= 0.143.

D= degree of accuracy of the result=0.05

$n_o = n_o=(Z_{\alpha/2})^2P(1-P)/d^2$

$= \frac{(1.96)^2\ 0.143(0.857)}{(0.05)^2}$

N= 176(unpublished data from the hospitals human resources data)

$n_o = 188$

Since the population is less than 10,000 the study used the correction formula

$n_f = \frac{n_o \times N}{n_o+N}$

$= \frac{188 \times 176}{188 + 176}$

$= 91$

To adjust non respondent rate 10% contingency was added and the final sample size was 100 ICU nurse.

4.7 Sampling Technique

There are thirteen (13) government hospitals of which 10 are public hospitals. Of the ten public hospitals eight (8) have ICU set up. From 8 hospitals four were selected by lottery method. These are (Black lion, Aabet, St.Paulos and Yekatit 12).

Proportional to size allocation formula = $\frac{ni \times nf}{n}$

Where: ni - number of nurse in hospital

nf - final sample of the study

n- total number of nurse in the selected hospitals

Black lion Hospital (BLH) = 37 x 100/124 = 30

Aabet hospital = 40x 100/124 = 32

St. Paul hospital = 27 x100/124 = 22

Yekatit 12 hospital= 20 x 100/124= 16

The schematic presentation of the sampling method is described in next page:

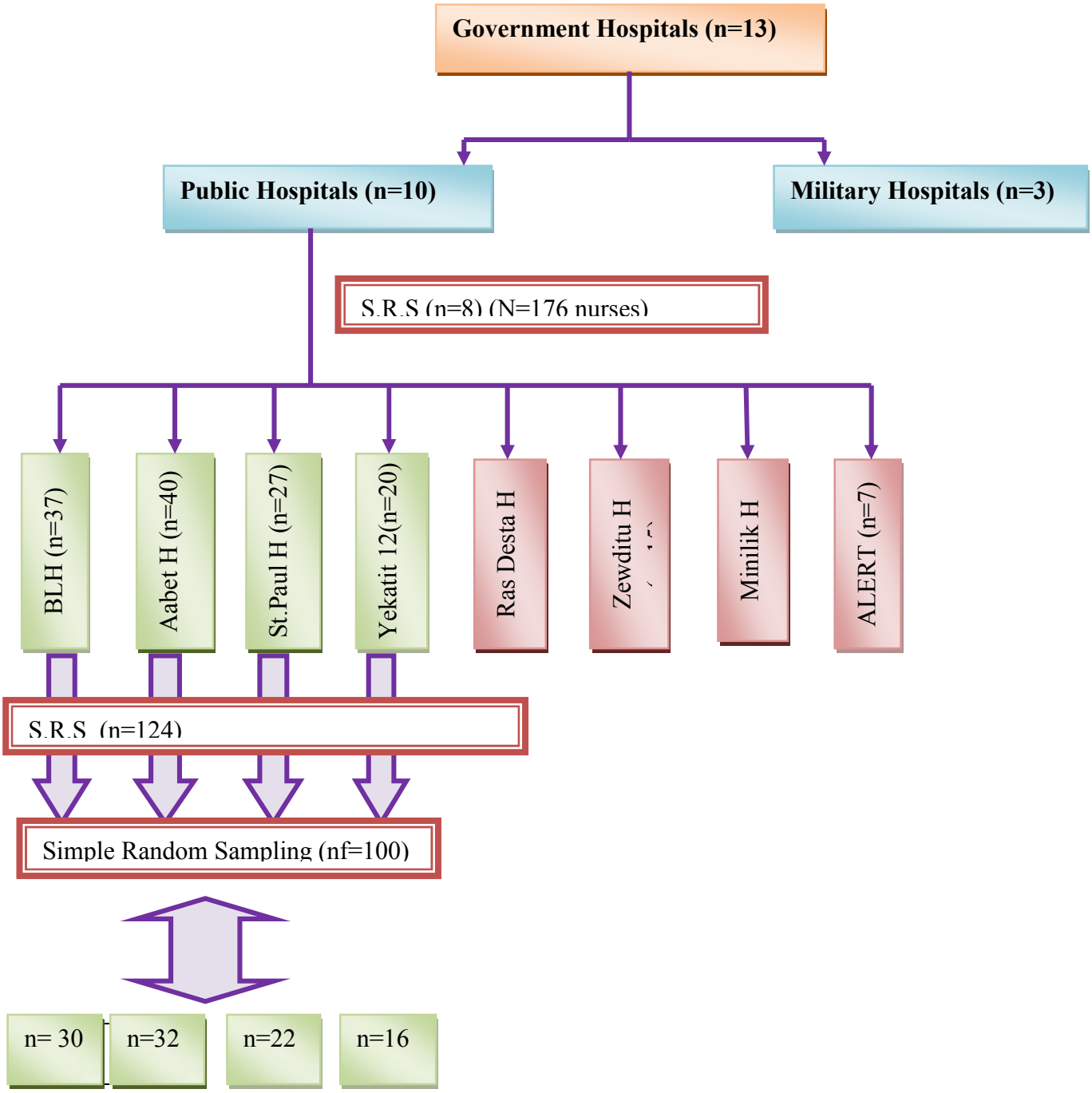


Figure 1: Shows the schematic representation of sampling procedure

4.8 Data Gathering Tool

4.8.1 Questionnaire and Checklist

A structured self administered questionnaire and observational checklists were used to assess the knowledge and practice of ICU nurses respectively. Both instruments were adopted from other research and modified according to our setup.

Structured questionnaire were collected by the trained data collectors and supervisors. The structured self administered questionnaire contains socio demographic characteristics and knowledge question. An observational checklist was used to assess nurse's actual practice. Observation was conducted by principal investigator, two supervisors and two data collectors. Participant nurses were observed for 15-30minutes, the time was selected randomly. Within 15-30 minutes nurses were expected to care patients according to prepared checklists. Nurses were aware that they were being observed and principal investigator, supervisors and two data collectors judge them according to prepared checklists. Both the structured self-administered questionnaires and the check list were pre tested for its clarity in 5% of the total study population and to test what it is intended to test. Question that has problems of clarity was amended before the actual data collection period .pre-tested subject were excluded from the actual data collection.

4.9 Data Collectors and Supervisor

A total of five data collector nurses and two supervisors were used during data collection time.

4.10 Variables

4.10.1 Dependent Variable

- Knowledge of the ETS for mechanical ventilated patient among ICU nurses.
- Practice of ETS for mechanically ventilated patient among ICU nurses.

4.10.2 Independent Variable

- Age
- Sex
- Marital status

- Training on ETS.
- Professional qualification
- Work experience in ICU.
- Name of institution.

4.11 Operational Definitions

Knowledge: Information, understanding or awareness of something or someone, such as information, skill. Which is acquired though experience or education according to Merriam -Webster. Endotracheal suctioning which is measured as 3 score (25) obtained in the validated knowledge test.

- **Good knowledge:** nurses who score more than 75%.
- **Fair knowledge:** nurses who score between 50%-74%.
- **Poor knowledge:** nurses who score less than 49%.

Practice: a theoretical term for human action in society, in this study the practice of endotracheal suctioning performed by nurses is observed with the help of an observational check list and leveled in 3 categories (25).

- **Good practice:** practice level of nurses more than 75%.
- **Fair practice:** practice level of nurses between 50%-74%.
- **Poor practice:** practice level of nurses less than 49%

Intensive Care Unit: A hospital unit which is concentrated special equipments and special trained personnel for the care of seriously ill patients requiring immediate and continuous attention (medical dictionary).

Endotracheal Suctioning: a component of bronchial hygiene therapy and a mechanical ventilation and involves the mechanical aspiration of pulmonary secretions from a patient with an artificial airway in place (2).

Intensive Care Unit Nurses: use their advanced skills to care for patients who are critically ill and at high risk of life threatening health problems (medical dictionary)

4.12 Data Quality Assurance

During data collection principal investigator checked data for its completeness and missing information at each point. To ensure accuracy, Validity of the self-administer questionnaire was pre tested for the relevance of dependent and independent variables to avoid any confusion

during actual data collection period. This was helpful for the investigator to screen out unclear questions and modify some of the question item as soon as possible, Further more data were checked during entry into the computer before analysis and the incomplete data were excluded.

4.13 Data Processing and Statistical Analysis

Collected data from study participants was cleaned, coded and entered in to Statistical package for Social Sciences (SPSS). SPSS version 20 was used for analysis and descriptive methods such as frequencies, proportions, and Chi square tests used to analyze the data. Results were presented in frequency tables and graphs. Odds ratio was used to determine association between variables

4.14 Dissemination and Utilization of the Result

The result of this study will be disseminated to Addis Ababa University, College of Health Science Department of Emergency Medicine and Critical Care of Nursing. A copy of the results will be submitted to the studied respective hospital ICU Departments'. Furthermore, the manuscript will be submitted to national and international peer reviewed Journals for possible publication.

4.15 Ethical Consideration

Ethical clearance was obtained from the Departmental review committee of Addis Ababa University, College of Health Science Department of Emergency Medicine and Critical Care of Nursing Letter of permission was obtained from Medical Directors of the study settings before the actual data collection period. Permission letter provided to respective head nurses of ICU. Information was given to study participants about the purpose and procedure of study, informed consent was obtained and confidentiality and privacy was ensured.

CHAPTER5

5. RESULT

5.1. Socio demographic characteristics of the study population

A total of 100 ICU nurses were included in this study from selected public government hospitals. From them 31% were from BLH, 20% were from St.Paulos hospital, 31% were from AaBET hospital and 18% were from Yekatit 12 medical college. Most participants were females 59% and the remaining 41% were males.

The result for age categories was indicated as 33.0% (n=33) between 20-25 years, 43.0% (n=43) between 26-30 yrs, 16.0% (n=16) between 31-35yrs, 6.0% (n=6) between 36-40yrs and only 2.0% (n=2) were above 40 years old age categories.

Majority 65.0% were single and 35.0% are married. About their work experience in ICU 36.0% respondent had 6 month to 1year experience, Most of them 54% had 2-6 years work experience, 6% had 7-11 years, 3% nurse had 12-16 years work experience and only 1% participant had >16 years of experience. Regarding their educational qualification majority of them 88% were first degree owner, 9% were diploma, 1% were second degree holder, whereas 2% are health officer and emergency and critical care nurse. Out of 100 ICU nurses, half of them 60% had no training regarding ETS the remaining 40% are trained about ETS.

Table1:Socio demographic characteristics of adult ICU nurses in selected governmental hospitals in Addis Ababa, 2017 G.c

Variable	Category	NO (N)=100	Percent (%)
SEX	Male	41	41.0
	Female	59	59.0
AGE	20-25	33	33.0
	26-30	43	43.0
	31-35	16	16.0
	36-40	6	6.0
	>40	2	2.0
Name of Inst.	BLH	31	31.0
	St. Paulos	20	20.0
	Aabet	31	31.0
	Yekatit	18	18.0
Marital status	Married	35	35.0
	Single	65	65.0
Work experience in ICU	6M-1YEAR	36	36.0
	2-6 year	54	54.0
	7-11	6	6.0
	12-16	3	3.0
	>16	1	1.0
Professional Qualification	Diploma	9	9.0
	BSC	88	88.0
	MSC	1	1.0
	Other	2	2. 0
Training regarding ETS	Yes	40	40.0
	No	60	60.0

5.2. Knowledge score of adult ICU nurses on ETS for mechanically ventilated patients

There were 23 knowledge questions about ETS and level of Knowledge of nurses was calculated out of 23. According to the result, nearly half 51% of the nurses have poor knowledge and 49% nurses had fair knowledge regarding ETS. The mean score and standard deviation of knowledge of nurses working in the ICUs, about ETS was 11.14 & ± 2.68 with the minimum 3 and maximum 17 score out of 23.

Table 2: Knowledge score result of nurses working in adult ICU in ETS for mechanically ventilated patient in Addis Ababa, 2017G.c

Question and right answers	Frequency	Percent %
The decision to suction ET tube must be based on? – **increased HR and BP, visible audible secretion, increased RR and increased work of breathing**	64	64.0
During suctioning suction catheter should be rotated **- 360°**	50	50.0
Best position for giving endotracheal suctioning is **- semi fowlers position**	25	25.0
Endotracheal suctioning should be done – **when required**	66	66.0
You are being asked to do endotracheal suctioning for a patient with endotracheal tube size 7mm. Appropriate size of suction catheter should be - **12F**	9	9.0
Maximum time limit for an endotracheal suctioning is? **–10-15 second**	32	32.0
Effects of pre oxygenation in endotracheal suctioning is?**- to minimize hypoxia**	92	92.0
Contraindication for endotracheal suctioning is?- **patient with increased ICP and patient with sever HTN**	31	31.0
Which of the following is true about endotracheal suctioning? – **is done by withdrawing the catheter**	23	23.0
Successful suctioning is confirmed by?**-Auscultation of the lung**	30	30.0
Recommendation of suction pressure for endotracheal suctioning in adult is?**- 80-120mmHg**	22	22.0
Suction catheter should be changed?**- after each suctioning**	32	32.0
Effect of normal saline installation during endotracheal suctioning is? – **tachycardia, dyspnea, VAP**	43	43.0
Size of endotracheal suctioning catheter should be? **-< half the internal diameter of the tracheal tube**	46	46.0
Effect of increased endotracheal suctioning frequency is? - **Atelectasis**	31	31.0
Definition of endotracheal suctioning is?**-Removal of secretions from an artificial airway**	66	66.0
The reason behind discontinuation of endotracheal suctioning is? **–high HR and low HR**	36	36.0
Adverse effect of endotracheal suctioning is? **–Reduction in lung volume**	44	44.0
Normal saline instillation during endotracheal suctioning time is?**- is not recommended**	37	37.0
Prevention of nosocomial infection **–Wash hands and maintain aseptic technique**	90	90.0
Definition of mechanical ventilator is? **–An artificial life support machine**	93	93.0
Indication for mechanical ventilator **–Respiratory failure**	82	82.0
Prevention of the risk of pneumonia in mechanically ventilated patient **–chest physiotherapy and maintain sterility during endotracheal suctioning**	70	70.0

5.2.1 Factors associated with knowledge

For knowledge outcome a binary logistic regression model reveal the following results; Correlation between professional qualification, ETS training, age of ICU nurses, working experience in ICU .No significant difference in knowledge between participants with different education level was found (p = .999), training on ETS (P=.376) as found age of nurses (p = .542) and between participants with different years of ICU working experience (p =.907). Only sex had significant association with knowledge (p=.008) and males have 32.4% more knowledge about ETS than females (AOR= 33.4 (95% CI= 13.6-81.6).

Table3. Association between socio-demographic characteristics and knowledge of nurse's working in the ICU towards ETS (N=100).

Variables	Level of knowledge Vs Socio-demographic		P value	COR (95% CI)	AOR (95% CI)
	Fair N (%)	Poor (n)			
Age					
20-33 years	39	37	.542	1.476 (.584-3.732)	1.400(.475 – 4.128)
34-45 years	10	14			
Sex					
Male	27	14	.008*	3.244 (1.409-7.466)	3.336(1.364-8.161)
Female	22	37			
Work Experience					
≤ 5 years	45	45	.907	1.500(.396-5.677)	1.094(.244-4.904)
≥ 6 years	4	6			
Professional qualification					
Diploma or Degree	46	51	.999	.000(.000-)	.000(.000)
Masters or Other	3	0			
Training					
Yes	17	23	.376	.647(.289-1.449)	.686(.298-1.580)
No	32	28			

(*)= significant at p-value <0.05 by adjusted for ICU age, yrs of Experience and Edu.Level

5.3 Practice score of adult ICU nurses in ETS for mechanically ventilated patients

There were 39 observational checklists prepared to assess level of nurses on ETS practice, which were evaluated based on observational check list. Throughout the observation period, 100 nurses were observed on ETS practice during two shifts for to15-30 minute. Observational check list is divided in three parts as practices prior suctioning, during suctioning and post suctioning. According to the result the mean score and standard deviation of nurses were 16.11 & ±4.14, most (80%) nurses had poor practice and the remaining (20%) had fair practice. 7 and 27 are the minimum & maximum score. Apply no suctioning during insertion and recommended suction pressure for adult patient is (80=120 mmHg) never practiced by nurses through time in the observation period .Maintain sterility (5.0%), use of sterile glove (3.0%) and asses' secretion clearance (4.0%) were the list practiced area during observation time. Almost all 98.0% of the nurses correctly identify indication of secretions.

Table 4: Observed practice score of adult ICU nurses in ETS for mechanically ventilated patients in number and percents

Prior Suctioning	YES	
	N	%
Monitor BP	47	47.0
Monitor HR	52	52.0
Monitor oxygen saturation	86	86.0
Identify indication for secretion	98	98.0
Prepare equipments	97	97.0
Auscultate breath sound	5	5.0
Check function of suction apparatus	75	75.0
Check suction machine with connecting tube	52	52.0
Check the availability of sterile NS	75	75.0
Prepare ambu bag with O2 supplies	43	43.0
Make sure that suction pressure at 80-120	0	0.0
Wash hands	21	21.0
Wear face mask	75	75.0
Hyper oxygenate and hyper inflate	47	47.0
During Suctioning		
Explain procedure for patients	23	23.0
Position patient in semi fowlers position	8	8.0
Place the sterile towel on the patient's chest	1	1.0
Open sterile glove	3	3.0
Put on sterile gloves, designate one hand as clean(non dominant hand)	3	3.0
Use sterile hand to remove the suction catheter	2	2.0
Detach circuit and maintain sterility	5	5.0
Attaches sterile suction catheter	34	34.0
Gently but quickly insert catheter in to artificial airway using sterile technique	4	4.0
Apply no suction when inserting		
360° rotation when inserting	0	0.0
Suction time 10-15 second	74	74.0
Discontinue if HR below or above	34	34.0

Return the patient to the ventilator	32	32.0
Rinse the catheter and connecting tube with NS	98	98.0
Assess for secretion clearance	88	88.0
Don't perform more than 4 suction per suctioning	4	4.0
Don't reinsert the suction catheter in to endotracheal tube	45	45.0
Assess patient's cardiopulmonary status	34	34.0
	44	44.0
Post Suctioning		
Hyper oxygenate after suctioning (100%)	51	51.0
Turn of suction device	96	96.0
Reassess patient V/S	51	51.0
Discarded used supplies	27	27.0
Wash hand	16	16
Documentation	54	54.0

5.3.1 Factors associated with practice

Adjusting for level of practice, binary logistic regression model reveal that, Correlation between years of working experience in ICU, level of education, professional qualification, age and sex had no significant association with their ETS practice. Training on ETS showed significant association with their practice with AOR and 95%CI (3.372, 1.162-9.788) whereas the P value (.025). There was no statistical significant between knowledge and practice of ICU nurses P=.063.

Table 5. Association between the independent variable of nurses with their practice

Variables	Level of Practice Vs Socio-demographic		P value	COR (95% CI)	AOR (95%CI)
	Fair (n)	Poor (n)			
Age					
20-30 years	14	62	.988	.677(.228-2.017)	1.010(.266-3.841)
31-45 years	6	18			
Sex					
Male	10	31	.486	1.581(.590-4.233)	1.452(.508-4.147)
Female	10	49			
Work Experience					
≤ 5 years	17	73	.597	.543(.127-2.321)	.624(.109-3.578)
≥ 6 years	3	7			
Professional qualification					
Diploma or Degree	20	77	.999	419603768.8(.000)	461705577.1(.000)
Masters or Other	3	0			
Training					
Yes	13	27	.025*	3.646(1.303-10.202)	3.372(1.162-9.788)
No	7	53			

(*)= significant at p-value <0.05 by adjusted for ICU age, yrs of Experience and Edu.Level

5.4. Comparison of knowledge and practice:

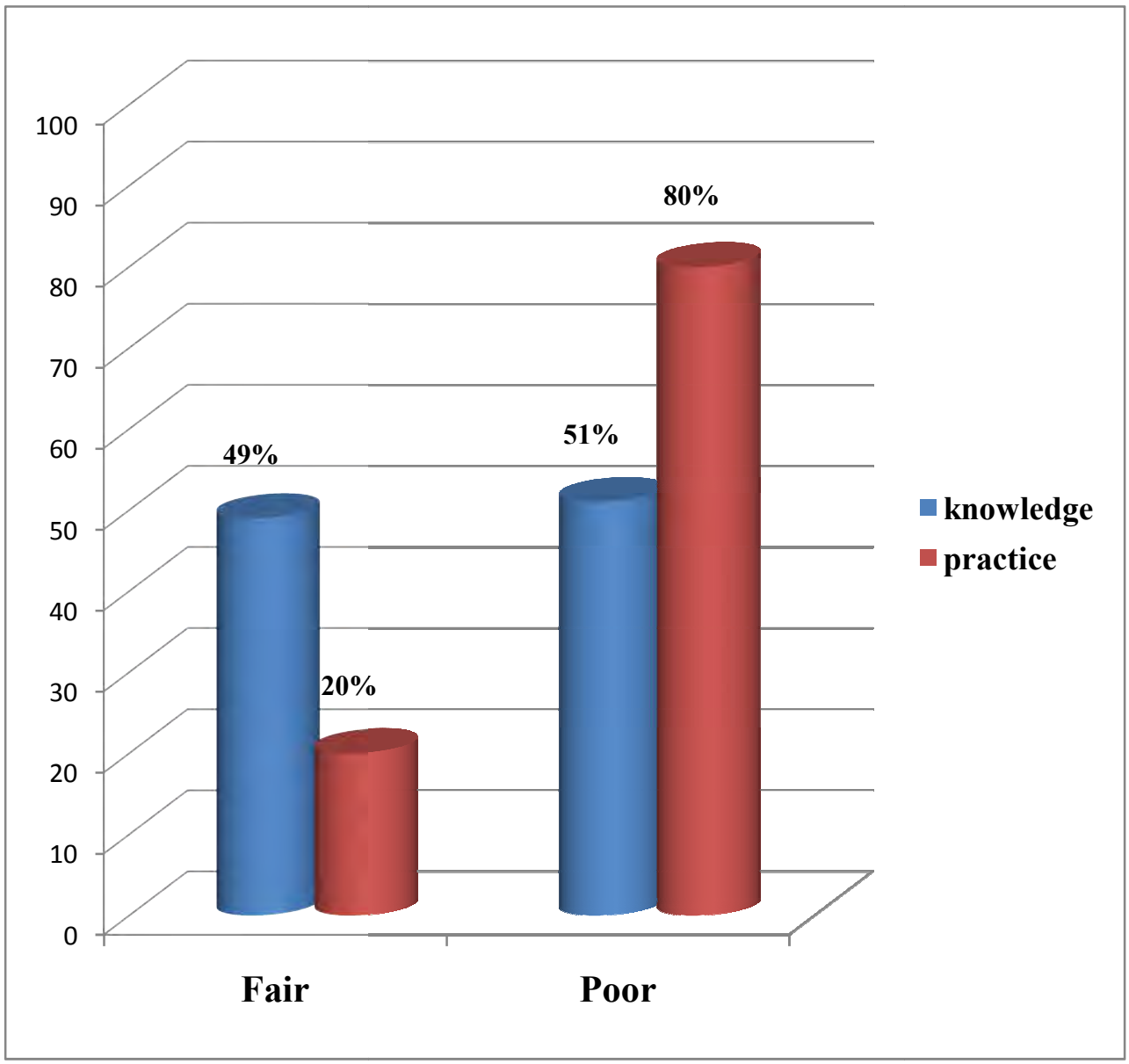
5.4.1. Prior suctioning: 30.0% of nurses had knowledge about Successful suctioning that it is confirmed by auscultation of the lung, whereas only 5.0% auscultate before suctioning.

5.4.2. During suctioning: 23.0% of nurses knew, ETS is done by withdrawing the catheter where as no one was observed when applying suctioning during only withdrawing time. About Recommendation of suction Pressure for endotracheal suctioning in adult patient 22.0% of nurses answered right answer but it was found that none of the nurses apply this during practice time. Most (92.0%) of the nurses knew that effects of pre oxygenation in ETS will minimize hypoxia; however, only 47.0% administered it 100% O2 before suctioning.

5.4.3. Post suctioning: when asked about the means of Prevention of nosocomial infection, 90% of ICU nurses answered it correctly as to wash hands and maintain aseptic technique but on

observation period only 21.0% of nurses were seen practicing it prior suctioning and 16.0% wash hands after suctioning.

FIG. 2 Comparison of knowledge and practice of ICU nurses.



CHAPTE SIX

6. DISSCUTION

The purpose of this study is to assess knowledge and practice of ICU nurses towards ETS for mechanically ventilated patients in four (4) selected public hospitals. It was found that mean score and standard deviation of nurses for knowledge was (11.14 &± 2.68 respectively which showed that almost half of the nurses have poor knowledge and (51%). However, the mean score and standard deviation of practice was 16.11 &± 4.14, respectively. Most 80% of participants have poor practice and only 20% of nurses score fair for practice. Good score was not observed in both knowledge and practice part.

Knowledge of adult ICU nurses

In this study, knowledge of ICU nurses was found to be poor in half 51.0% of the cause and 49.0% had fair knowledge. Similar to our study, Study conducted in Sudan(N=45) in 2014 also determined the level of most of ICU nurses to be poor 85.7% ,fair 9.5% and good 4.85% knowledge (25).Comparing the records of this study with the current one records of fair knowledge was very low. This may be due to the difference in the study methods used. Findings in India (N=30) also showed that few of the nurses 7% had inadequate knowledge and many 73% had moderate knowledge. This study also indicates the percentage of nurses to have adequate knowledge is unsatisfactory 20% (23). In Turkey (N=72) similar study was conducted in 2016, that knowledge is at very good level (59.7%) and at good level (34.7%). The difference level of knowledge exhibited between these and the current study may arise from sample size used, study aria where there might be better access to training in Turkey.

Association of knowledge with Independent Variables

This study found that, age, work experience, educational qualification and training on ETS had no statistical significant association with knowledge. Similar studies show that age gender, work experience and educational qualification also were not statistically significant (23). Similar records were reported elsewhere (20). In this study sex is statistically significant association (P=008) with knowledge and being male makes more knowledgeable than females.

Nurses knowledge about endotracheal suctioning**:** Overall, more than half of our participants 66.0% define ETS is a method of removal of secretions from an artificial airway correctly, However only 23.0% know that it was done by withdrawing the catheter rather than inserting the

catheter. Related study in Sudan also show 47.6% of nurses said ETS is a method of removal of secretions from an artificial (25).Similar study in India show that 100% of nurse had knowledge on ETS was done by withdrawing the catheter (24). Different might be because of scoring technique, additional qualification and sample size.

Nurse's knowledge towards endotracheal suctioning catheter Size**:** According to this study finding, worriedly most ICU nurses had poor knowledge in this aria and it was list score knowledge question. Only 9% answer correctly about size of catheter and 46 % of them know that it should be < half the internal diameter of the tracheal tube. Study done in Turkey, also revealed that less than half of nurse (47.2%) got right answer about size of catheter (20). In London 64.3% nurses exactly know accurate size of catheter (15). In India 73.33% of ICU nurses had knowledge on appropriate size of catheter (24). Differences appear might be cause of work experience, training, sample size, and study aria. Even if the differences were there, when comparing our results to others nurses had a big knowledge gap.

Nurse's knowledge towards recommended suction pressure in adult: Findings of recent study revealed that nurse's knowledge on recommendation of suction pressure for endotracheal suctioning in adult was only 22.0%**.** Study conducted in Sudan also show 45.2 % of ICU nurses correctly answer about recommendation of suction pressure in adult (25).Some study conducted in Turkey, most of the nurses70.8% knew that the recommended suction pressure for adult(20). Also study conducted in Trivandrum, India, 99.6% of participants had knowledge about recommended suction pressure in adult (24).Failure to know the recommended suction pressure in adult was affect ETS procedure directly. Recognized knowledge differences observed from the others might be inadequate training, special qualification, study aria and period.

Nurses' knowledge towards infection prevention and maintaining aseptic technique**:** Evidence from the present study revealed that nurse's knowledge on Prevention of noso comial infection 90.0 % and Prevention of the risk of pneumonia in mechanically ventilated patient was 70.0%. Similar study shows that 47.6% of ICU nurses knew about prevention of nosocomial infection (25). Findings show that participants had good knowledge in this area.

Practice of ICU nurses regarding ETS

The current research finding about practice of ICU nurses regarding ETS were According to the result the mean score of nurses were 16.11 , (80%) nurses had poor practice and the remaining (20%) had fair practice. Similarly a cross sectional hospital based study in Sudan, 2014 also confirmed that level of practice of ICU nurses 76.67% was fair and 23.33 % poor. Practice level was greater than us 76.67% with fair score (25), similarly no good practice was score and observed our result differ may cause of our sample size difference. Related study, most nurses' practice was at a fair level in 79.2% and good in18.1%. The differences may be due to most nurses have ICU training (75%) and scoring technique (20). Study in kashan, Iran (2010) by using cross-sectional method, (N=44), the mean practice was 8.75 out of 26 the maximum score. 95.4% of nurses practice was undesirable (<50%), only 4.6% nurses was score moderate (51-75%) similar to our study there was no desirable (good) practice score (>75%) (22). By using convenient sampling technique similar study was done in Sree Chitra Tirunal Institute for Medical Sciences and Technology ,Trivandrum, 2011(N=30). And result had shown that, the total practice score achieved was 21. Out of the 21 correct practice the observed correct practice ranged from12 (57.14%) to 17 (81%) The average correct practice observed was 15.07. (71.7%). Compare to our result they had better practical skill this may be due to sample size differences and nurses special qualification (neuro-nurse)(24).

Association of practice with Independent Variables

This study found that, training was statistically significant with nurses practice P value (.025). Most of participant had no training on ETS and it affects their performance and significant association shows that ICU nurses need more training and updated education regarding ETS. On the other hand sex, Age, work experience, educational qualification, had no statistical significant association with their practice. Some in London, work experience, sex and age had no statistical significant association with their practice (15). Also in Iran, work experience of nurses, age and sex had no statistically significant with nurse's performance (22).

This research found that, almost all nurses perform ETS during insertion time and it is controversial with the current recommendation. Some study also shows 60.0% of nurses apply no suctioning during inserting the catheter (25). Some study conducted in India, when we saw practice part 63.33% applies no suction while inserting the catheter (24). When we compare our

results with them there practices were much better than us there was a big difference this might be, because of additional qualification, sample size and study aria.

Findings of this result also revealed about auscultation of the lung. When performing respiratory assessment auscultation of patient lung is best way to verify the need of ETS according to best practice recommendation (11,15).This study results show that 95% of participant failed to do this. Almost the same findings reported (15) in a study of acute and high-dependency ward nurses. some study in Turkey, show that none of the nurses performed lung auscultation (20).Although another study shows 98% of nurses failed to auscultate the lung (21).Other correlation observational study also show that (N=40) 5.3% of nurses prior suctioning and 0% post suctioning performed auscultation(4) . Considering that most of nurses failed to auscultate before suctioning might they used indication of ETS like visible audible secretion in the ETT clinically, didn't perform auscultation might be they done it routinely or based on their own experiences(16).

Findings of recent study revealed that nurse's practice on recommendation of suction pressure for endotracheal suctioning in adult was almost 0%. The result of study conducted in Ireland also found that 100% used suction pressure out of recommendation (16). Also study conducted in Trivandrum, India, none of the participant check suction pressure before the procedure (24).According study done in Turkey, nurses performed the suctioning pressure incorrectly at over the limit (mean = 390.97; minimum 200mmHg and maximum 600 mmHg (20). Study conducted in London also revealed some result that most of the nurses didn't used recommended suction pressure during suctioning. Almost 98% of participant used high suction pressure than recommendation .Five nurses observed in different time, and they used260-300mmHg which is twofold the recommendation pressure (15). According to studies using high negative pressure is one of the reasons of mucosal trauma, which predisposes for bronchial tree to infection (6). Similarity might be because of gap of overall ICU training and education.

Other concern aria of this study was maintaining aseptic technique and prevention of nosocomial infection. According to our observation the following practical aria had minimum score related to others, Place the sterile towel on the patient's chest1.0%, Open sterile glove 3.0%, Put on sterile gloves and designate one hand as clean (non dominant hand) Use sterile hand to remove the suction catheter3.0%, Detach circuit and maintain sterility 5.0%, Gently but quickly insert

catheter in to artificial airway using sterile technique 4.0%, Assess for secretion clearance 4.0%, wear face mask75%, hand washing before procedure 21.0% and after procedure 16.0%. Some study conducted in Ireland, 2008 (N=45) An observational study on the open-system ETS. Different in practice was observed, hand washing prior to the procedure and maintaining the sterility of the suction catheter until its insertion into the airway. From general ICU 31% participants washed their hands prior performing ETS whereas 65% from central ICU. 29% from general ICU and 59% from central ICU nurses failed to maintain sterility of suction catheter before insertion to ETT (16). Study conducted in India also showed that, only 42% nurses Washed hands prior and 28% nurses post suctioning, 88% wore face mask, 46% participants maintained sterility of the suction catheter until inserted into the airway and researcher identified that in most cause suction catheter touches the patient linen and non sterile glove touches the catheter. However, ETS clearly stated on guideline of AARC it was a sterile procedure (21). Institutional polices, study aria, work related training, method that was used might brought the differences on result.

It was found in the present study that nurses had large gap between their knowledge and practice similar to this in basic areas knowledge of recommended standards were not applied in practical period (16).A study conducted in London also shows that many nurses failed to demonstrate satisfactory level of competence for knowledge and practice. Most are unaware of current recommended practice even some of them show unsafe practice (15).In general results of this study advice that using recommended standard of ETS is more effective. However the positive effects of using the integrated methods in the standard ETS procedure are well-known by many nurses, but they do not apply it frequently. The reason of this can be conclude as follows, lack of awarance of nurses about positive effects of using standard ETS procedure, absence of standard guidelines or checklist in use of nursing interventions; training of nurses on applying ETS shortage of nurses in ICU and lack of continues supervision (12).

7. STRENGTH AND LIMITATION OF THE STUDY

7.1 Strength of the study

- ✓ This study is the first in its kind in Addis Ababa, Ethiopia.
- ✓ Withstand a lots of challenges (such as: repetitive appointment, plead and disregard as well as difficulty in contacting all organizational hierarchy, Identifying those hospital those had well-equipped ICU and those do not..etc)
- ✓ Having standardized structured questionnaire and observational checklist.
- ✓ In an attempt to keep the validity and reliability; a pre- testing was done.
- ✓ Data collators were health professionals.
- ✓ Higher response rate.

7.2 Weakness or limitations of the study

- ✓ Time constraint
- ✓ Misreporting by respondents cannot be ruled out
- ✓ The main limitation of this study was the relatively it includes only four hospitals.
- ✓ Methodological limitation since we used observational checklists.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Generally, this study found that:

■ More than half of 51% had poor knowledge and almost all (80%) practice regarding endotracheal suctioning was poor.

■ Nurses' requires support, education (especially females) and training relating to endotracheal suctioning.

■ Knowledge on endotracheal suctioning was found to be statistically significant association with sex.

■ Practice on endotracheal suctioning was found to be statistically significant association with training.

■ This study revealed that ICU nurses' had good knowledge on the aria of infection prevention and maintaining sterility but knowledge did not reflect in their practice. Hand washing, maintaining sterility of ETS catheter, to detach circuit and maintain sterility and using sterile glove was observed to be poor.

8.2 Recommendations

I would like to recommend:

- Institutional based polices and guidelines, which are based on current best practice recommendations, need to be developed.

- Teaching interventions (especially for females) to improve nurses knowledge and practice in the care of patients requiring endotracheal suctioning is indicated particularly with regard to auscultation skills, suction catheter size, suctioning pressure and infection control measures.

- Another study to assess attitude of ICU nurses towards ETS is vital. Since there is the gap between knowledge and practice.

- **Similar study is recommended** to include large sample size, in other hospitals which provide care for critically ill patients, further research on factors affecting implementation of ETS strategies is recommended.

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ANNEXES

Annex I

Information sheet

Name of the investigator: ABINET ESAYAS (BSC, MSC candidate)

Research Title: Assessment of knowledge and practice of ICU nurses towards open Endotracheal Suctioning for mechanically ventilated patients in selected government hospitals Addis Ababa, Ethiopia.

Research Objective: to assess knowledge and practice of ICU nurses towards Endotracheal suctioning for mechanically ventilated patient in selected government hospitals Addis Ababa**,** Ethiopia 2017**.**

Study Procedure: to carry out the designed Objective of this study, socio demographic data, level of knowledge and practices of ICU nurses were taken from structured questionnaire and checklist**.**

Confidentiality: the collected information were kept confidential and used only for research purpose. No one except the members of the research team was access to the information gathered. The personal information of the nurses was notified**.**

Person to Contact: if the data collectors or other hospital administrative staffs have any question regarding the study they are free to Contact me in person or by the following address:

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Annex II

Hospital Consent Form

This study will be conducted in selected four public hospitals, which have organized and well equipped ICUs. The main objective of this study is to assess knowledge and practice of ICU nurses towards open endotracheal suctioning for mechanically ventilated patient. Such assessment is useful for intensive care unit nurses on proper management of mechanically ventilated patients and to know its related complication.

In this study data will be collected from ICU nurses. Information regarding any specific personal identifiers will be collected and information generated will be disclosed totally. In addition confidentiality of any personal information was maintained throughout the study process and no an authorized access to the information is allowed.

Finally, the nurses have full right to refuse to participate in this study at any time, have full right to jump any question. There is no harm on your job by participating in this study .The benefit of this study is for both participant (indirectely) and patients, for participant by updating your knowledge with evidence based current researches data's to give quality care for patients and minimize patient harm and for patients to minimize length of stay in hospital and related complication. If you have any questions or need further information regarding the planned study you are free to get clarification from the principal investigator from the institution or through the following address.

Abinet Esayas, telephone +251-977080131 (the principal investigator). Therefore, if you would like to participate in this study, would you please confirm it by singing space provide below Thank you.

Participant……

Principal investigator ……

Annex III

Data collection sheet

I. Socio Demographic Data

Name of the institution ……..

Sex

A) Male.

B) Female.

Age

A) 20-25.

B) 26-30

C) 31-35

D) 36-40

E) >40

Marital status

A) Married

B) Single

C) Widow

D) Divorced

E) Separated

Work experience in ICU

A) 6 months-1 year

B) 2- 6 years

C) 7- 11 years.

D) 12-16 years

E) >16years

Professional qualification

A) Diploma.

B) BSC.

C) MSC.

D) Other……

Do you have any training regarding Endotracheal suctioning?

A) Yes B) No

II. Knowledge assessing questions (modified from Suctioning an Adult ICU Patient with an Artificial Airway: A Clinical Practice Guide line)

1**.** The decision to suction an endotracheal tube must be based on

A) Increased HR and BP. .

B) Visible, audible secretions.

C) Increased RR and increased work of breathing

D) All.

E) Other……..

2. During suctioning the suction catheter should be rotated?

A) 360 .

B) 180 .

C) 120 .

D) 90 .

E) I don't know.

3. Best position for giving endotracheal suctioning is?

A) Supine position.

B) Semi fowler's position (semi sitting position).

C) Right lateral position.

D) Left lateral position

E) Other……..

4. Endotracheal suctioning should be done

A) Every1 hour.

B) Every 2 hours.

C) When required.

D) I don't know.

E) Other……..

5. You are being asked to do endotracheal suctioning for a patient with Endotracheal Tube size 7mm.Appropriate size of suction catheter for this patient should be?

A) 12F

B) 14F

C) 16F

D) I don't know

E) Other…….

6. Maximum time limit for an endotracheal suctioning is?

A) 20-30 second.

B) 10-15 second.

C) 5-10 second.

D) I don't know.

E) Other……

7. Effects of pre oxygenation in endotracheal suctioning are?

A) To prevent hypotension

B) To minimize hypoxia.

C) To minimize RR.

D) I don't know

E) Other……

8. Contraindication for endotracheal suctioning is?

A) Patient with increased ICP

B) Patient with sever HTN

C) A and B.

D) I don't know.

E) Other……

9. Which of the following is true about endotracheal suctioning?

A) Is done by withdrawing the catheter.

B) Is done by inserting the catheter.

C) I don't know

D) Other……

10. Successful suctioning is confirmed by

A) Improvement in SPO2 LEVEL

B) No visible secretion in the ET tube

C) Auscultation of the lung

D) By looking the patient

E) Other……

11. Recommendation of suction pressure for endotracheal suctioning in adult is?

A) -60 to -70.

B) -80 to -120.

C)-120 to -180

D) I don't know

E) Other……

12. Suction catheter should be changed

A) After 6 hour

B) After 12 hour.

C) After 24 hour.

D) After each suctioning

E. Other……

13. Effect of normal saline instillation during endotracheal suctioning is?

A) Tachycardia

B) Dyspnea

C) Ventilator associated pneumonia.

D) All

E. Other……..

14. Size of Endotracheal suctioning catheter should be

A) > half the internal diameter of the tracheal tube.

B) < half the internal diameter of the tracheal tube.

C) I don't know

D) Other……

15. Effect of increased endotracheal suctioning frequency is?

A) Atelectasis.

B) Hypotension.

C) A and B.

D) I don't know

E. Other…… .

16**.** Definition of endotracheal suctioning is?

A) Method of helping patient to breath.

B) Removal of secretion from the mouth.

C) Removal of secretions from an artificial airway.

D) I don’t know.

E) Other……

17. The reason behind discontinuation of endotracheal suctioning is?

A) High HR.

B) Low HR.

C) Cough.

D) A and B.

E) Other……

18. Adverse effects of endotracheal suctioning is?

A) Reduction in lung volume.

B) Reduction in RR

C) Increased in lung volume.

D) I don’t know

E) Other……

19**.** Normal Saline instillation during endotracheal suctioning time

A) Is recommended.

B) Is not recommended.

C) I don’t know.

20. Prevention of nosocomial infection

A) Wash hand.

B) Maintain aseptic technique.

C) A and B

D) Other……..

21. Definition of mechanical ventilator is?

A) An artificial life support machine.

B) An artificial heart support machine.

C) I don’t know.

D) Other…….

22. Indication for mechanical ventilator

A) Critically ill patient

B) Patient with cardiac problem.

C) Respiratory Failure.

D) I don't know.

E) Other……

23. Prevention of the risk of pneumonia in mechanically ventilated patient?

A) Chest Physiotherapy.

B) Maintain sterility during endotracheal suctioning

C) A and B.

D) I don't know

E) Other…..

II. Observational check list to assess practice of ICU nurse's towards ETS for mechanically ventilated patients(modified from Suctioning an Adult ICU Patient with an Artificial Airway: A Clinical Practice Guide line)

Table 6. Observational check list to assess practice of ICU nurse's towards ETS for mechanically ventilated patients

NO	**PRACTICE of NURSES**	**YES**	**NO**
	Prior Suctioning		
1	Monitor BP		
2	Monitor HR		
3	Monitor oxygen saturation		
4	Identify indication for suctioning		
5	Prepare equipments		
6	Auscultate breath sound		
7	Check function of suction apparatus		
8	Check suction machine with connecting tube		
9	Check the availability of sterile NS		
10	Prepare ambu bag with O2 supplies		
11	Make sure that suction pressure at 80-120mmHg		
12	Wash hands		
13	Wear face mask		
14	Hyper oxygenate and hyper inflate		
	During suctioning		
1	Explain procedure for patients		
2	Position patient in semi fowlers position		
3	Place the sterile towel on the patient's chest		
4	Open sterile glove		
5	Put on sterile gloves ,designate one hand as clean(non dominant hand)		

6	Use sterile hand to remove the suction catheter		
7	Detach circuit and maintain sterility		
8	Attaches sterile suction catheter		
9	Gently but quickly insert catheter into artificial airway using sterile technique		
10	Apply no suction when inserting		
11	360 rotation when withdrawing the catheter		
12	Suction time 10-15 second		
13	Discontinue if HR below or above		
14	Return the patient to the ventilator		
15	Rinse the catheter and connecting tube with NS		
16	Assess for secretion clearance		
17	Don't perform more than 4 suction per suctioning		
18	Don't reinsert the suction catheter in to endotracheal tube		
19	Assess patient's cardiopulmonary status.		
	Post suctioning		
1	Hyper oxygenate after suctioning (100% O2)		
2	Turn of suction device		
3	Reassess pt v/s		
4	Discarded used supplies		
5	Wash hand		
6	Documentation		