

**ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, TIKUR ANBESA  
SPECIALIZED HOSPITAL**



**ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CRITICAL CARE HEALTH  
CARE WORKERS TOWARDS VENTILATOR ASSOCIATED PNEUMONIA BUNDLES  
IN TASH ADULT ICU**

**BY: G/HANS**

**ANESTHESIOLOGY AND CRITICAL CARE AND PAIN MEDICINE RESIDENT**

**DEC, 2020**

**ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, TIKUR ANBESA  
SPECIALIZED HOSPITAL**

**ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CRITICAL CARE HCWS TOWARDS  
VENTILATOR ASSOCIATED PNEUMONIA BUNDLES IN TASH ADULT ICU**

**A RESEARCH PROPOSAL TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY TIKUR ANBESA  
SPECIALIZED HOSPITAL DEPARTMENT OF ANAESTHESIOLOGY IN PARTIAL FULFILMENT  
OF SPECIALITY CERTIFICATE IN ANAESTHESIOLOGY**

**BY: GEBREHANS**

**Advisors: DR.RAHEL TILAHUN (MD, cardiothoracic anaesthesiologist)  
DR.SEMIRA ENDRIS (MD, consultant anaesthesiologists)**

**DECEMBER 2020  
ADDIS ABABA ETHIOPIA**



**APPROVED BY THE BOARD OF EXAMINATION**

The thesis here, entitled “ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CRITICAL CARE HCWS TOWARDS VENTILATOR ASSOCIATED PNEUMONIA BUNDLES IN TASH ADULT ICU” is accepted in its present form by the board of examiners as partial fulfillment of the requirement for specialty certificate in Anesthesiology Critical Care And Pain Medicine.

**Examiners:**

1. Name	signature	Date
_____	_____	_____
2. Name	signature	Date
_____	_____	_____

**Research Advisors:**

Name of primary advisor	signature	Date
DR.RAHEL TILAHUN		
(MD, cardiothoracic anaesthesiologist) _____	_____	

Name secondary Advisor	Signature	Date
DR.SEMIRA ENDRIS		
(MD, consultant anaesthesiologists) _____	_____	

**Department Head**

Name	signature	Date
Dr Ananya Abate (MD, Assistant Professor Of Anesthesiology)	_____	_____

**ADDIS ABABA UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCE SCHOOL OF  
MEDICINE DEPARTMENT OF ANESTHESIOLOGY**

---

Name Of Investigator	G/hans Kidanu (MD, Anesthesiology Resident)
Title Of Research Project	Assessment of Knowledge and practice of Critical Care HCWs towards Ventilator Associated Pneumonia Bundles in TASH adult ICU
Study Area	Tikur Anbesa Hospital
Study Type	A questionnaire-based cross-sectional study
Duration Of The Project	From 1 <sup>st</sup> April To 31 <sup>st</sup> November 2020
Study Area	TASH Adult ICUs, Addis Ababa, Ethiopia
Sample Size	160
Source Of Fund	AAU
Investigator Address	G/hans Kidanu (MD,Resident) Phone Number: 0914377418 E-Mail: <a href="mailto:kidanugebrehans@gmail.com">kidanugebrehans@gmail.com</a>
Name Of Advisor	Rahel Tlahun (MD, Cardiothoracic Anesthesiologist) Semira Endris (MD,Consultant Anesthesiologist)

---

## **Acknowledgement**

My incended gratitude and thanks goes to God for giving me health and capacity during the whole period of my work.

I am deeply indebted to express my sincere gratitude to my advisors Dr.Rahel Tlahun and Dr.Semira Endris for their committed supervision, advice, comments with justifications, and I appreciate them for their constructive criticism and encouragement starting from the time of topic selection to the completion of my thesis paper.

I would like to extend my acknowledgment to Addis Ababa University, College of Health Sciences, and School of medicine, Department of anesthesiology, critical care and pain medicine for their financial support and provision of an entail opportunity to conduct this study.

In addition, all ICUs on which study was conducted, respective department head, specialists, residents and nursing staffs who helped me to accomplish my study.

Lastly but the most; I would like to acknowledge the patience, understanding and sacrifice from my parents and friends for their enthusiastic encouragement has helped me to accomplish this thesis paper; without their holistic contribution and support this project work is meaningless and wouldn't have been possible.

## ABSTRACT

**BACKGROUND:** Ventilator-associated pneumonia (VAP) continues to be a common and potentially fatal complication of ventilator care and often encountered within intensive care units (ICUs). Ventilated and intubated patients present critical care Health care workers the unique challenge to incorporate evidence-based practices surrounding the delivery of high-quality care. This study examined the Assessment of Knowledge and practice of Critical Care HCWs towards Ventilator Associated Pneumonia Bundles in TASH adult ICU

**OBJECTIVE:** to Assess Knowledge and practice of Critical Care HCWs towards Ventilator Associated Pneumonia Bundles in TASH adult ICU

**METHODS:** Cross-sectional study was conducted from September to November 2020 among 160 HCW Addis Ababa University TASH working in adult ICU who were selected by a stratified sampling technique. a structured questionnaire was used to collect data. Data were entered and analyzed using SPSS version 26 and the results was presented by tables, bar graphs and pie chart. Variables with p-value < 0.05 were used as significantly associated with the dependent variable.

**RESULTS:** Most (67.5%) of the study participants were male and 70.6 % were ages 25-30 years. Most of the respondents were residents (69.4%) and had a work experience below 5 years (73.1%). The total mean knowledge score of the participants was 12.4312 out of 16 (Range 5-16, SD= 2.10606). 51.9 % of the participants had scores above the mean (i.e. good knowledge score) while the rest had below the mean score with only 155 (96.9%) of the study participants scoring above 8 out of 16. The mean practice score of the respondents was 14.9625 out of 25 (Range 7-23, SD = 3.48562). Fifty three point one percent (53.1 %) of the respondents had a mean practice score above the mean (good practice) while the rest had poor practice. 25 (15.6 %) respondents had total practice score below 12 out of 24 (i.e. below 50%).

**CONCLUSION:** In this study, around half of HCWs have good knowledge (i.e. 51.9%) and around half of HCWs have good practice (i.e.53.1%). The percentage of HCWs who score good practice is higher than who score good knowledge. No significant association between age, gender, working department, years of working experience and knowledge. It was profession (job title) that had statistically significant impact on having good knowledge score. Practice of ICU HCWs on VAP prevention bundles was not statistically associated with age, gender, working department, years of working experience and profesion.but nurses had higher odds of having good practice. There was no correlation between knowledge and practice score.

## Contents

<b>Acknowledgement</b> .....	iv
<b>ABSTRACT</b> .....	v
<b>LIST OF TABLES</b> .....	viii
<b>LIST OF FIGURES</b> .....	ix
<b>LIST OF ACRONYMS AND ABBREVIATIONS</b> .....	x
<b>1. INTRODUCTION</b> .....	1
1.1. BACKGROUND .....	1
1.2. STATEMENT OF THE PROBLEM .....	2
1.3. Significance of the study .....	3
<b>2. LITERATURE REVIEW</b> .....	4
<b>3. OBJECTIVES</b> .....	8
3.1. General objective .....	8
3.2. Specific objectives .....	8
<b>4. Methods and Materials</b> .....	9
4.1. Study Setting .....	9
4.2. Study Design and Study Period .....	9
4.3. Population .....	10
4.3.1 Source population .....	10
4.3.2. Study population .....	10
4.4. Eligibility Criteria .....	10
4.4.1. Inclusion criteria .....	10
4.4.2. Exclusion criteria .....	10
4.5. Sample Size Determination and Sampling Technique .....	10
4.5.1. Sample size determination .....	10
4.5.2. Sampling procedure and Technique .....	12
4.6. Study variables .....	13
4.6.1. Dependent variables .....	13
4.6.2. Independent variables .....	13
4.7. Data Collection Procedure and Technique .....	13
4.7.1. Data Collection Tool .....	13

4.7.2. Data Collection and Quality Control.....	13
4.8. Data Entry, Process and Data Analysis .....	14
4.9. Operational definition .....	14
4.10. Ethical Consideration .....	15
4.11. Dissemination and Utilization of Results.....	15
<b>5. RESULTS .....</b>	<b>16</b>
<b>6. DISCUSSION.....</b>	<b>25</b>
<b>STRENGTH AND LIMITATION OF THE STUDY .....</b>	<b>26</b>
<b>7. CONCLUSION AND RECCOMENDATION .....</b>	<b>27</b>
7.1. CONCLUSION .....	27
7.2. RECOMMENDATIONS.....	27
<b>Reference.....</b>	<b>28</b>
<b>ANNEX .....</b>	<b>31</b>
<b>ANNEX I: Questionnaire (English version) .....</b>	<b>31</b>

**LIST OF TABLES**

**Page**

Table 5.1 Socio-demographic characteristics HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....16

Table 5.2 Mean knowledge score, proportion of good knowledge, proportion of poor knowledge, odds ratio and P value according to sociodemographic variables on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....18

Table 5.3 Mean practice score, proportion of good practice, proportion of poor practice, odds ratio and P value according to sociodemographic variables on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....20

**LIST OF FIGURES**

**Page**

Fig 5.1 percentage of good knowledge score and poor knowledge score on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....17

Fig 5.2 Percentage of good and poor knowledge score according to profession (job title)on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....19

Fig 5.3 Percentage of good and poor practice according to profession (job title)on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....22

Fig 5.4 Percentage of good and poor practice according to age category on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....23

Fig 5.5 Percentage of good and poor practice according to years of work experience on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C.....24

## **LIST OF ACRONYMS AND ABBREVIATIONS**

AAU-- Addis Ababa University

DVT—Deep venous thrombosis

ETT—Endotracheal tube

FMOH---Federal ministry of health

GI--Gastrointestinal

HCW – health care workers

HIV- human immunodeficiency virus

ICU – Intensive care unit

MD—Medical Doctor

MV—Mechanical ventilator

TASH – Tikur Anbesa specialized hospital

SPSS - Statistical Package for the Social Sciences

WHO- World health organization

VAP—Ventilator associated pneumonia

# 1. INTRODUCTION

## 1.1. BACKGROUND

Ventilator associated pneumonia (VAP) is defined as nosocomial pneumonia in ventilated patients that develop more than 48 hours after initiation of mechanical ventilation (MV). VAP is the second most common nosocomial infection after urinary tract infection in intensive care unit patients accounting for 20% of nosocomial infection in this population (1,2). Its occurrence has been linked to increased length of ICU and hospital stay, duration of mechanical ventilation, as well as higher crude and/or attributable mortality (2). When a bundle is performed collectively and reliably, patient outcomes are expected to improve. Knowledge of guidelines for prevention of VAP among healthcare workers (HCWs) has been infrequently assessed and mainly in staff nurses only. The gaps between individual knowledge of VAP prevention bundles and actual daily clinical practice have not been compared (3).

VAP occurs because the obtunded, endotracheally intubated patient is at risk of inoculation of the lower respiratory tract with microorganisms. The source of the potential inoculate includes the oropharynx, subglottic area, sinuses and gastrointestinal (GI) tract. Access to the lower respiratory tract occurs around the endotracheal tube (ETT) cuff. Interventions to prevent VAP aim either to prevent repeated microaspiration, colonization of upper airway and GI tract with potentially pathogenic organisms, or contamination (4). Bundles of care are evidenced-based practices that are grouped together to encourage the consistent delivery of these practices. These bundles are common in the ICU and have been developed for the prevention of VAP (4,5).

A bundle, also called a care bundle, is a set of about three to five care practices that, implemented together, will improve patient outcomes (IHI, 2015). Examples of VAP bundles that may apply include (but are not limited to) hand hygiene, oral care, clean suctioning, stress ulcer prophylaxis, sedation vacation, and ventilator circuit changes. The four primary recommended practices includes: elevating the head of the bed to 30 degrees, sedation vacations, oral care with chlorhexidine (CHG) and subglottic suctioning endotracheal tubes.

Ventilator “bundles” usually include other elements such as deep venous thrombosis (DVT) prophylaxis, peptic ulcer prophylaxis. (6–8)

## **1.2. STATEMENT OF THE PROBLEM**

The prevention of ventilator Associated Pneumonia (VAP), a hospital acquired infection, among intensive care patients is a major clinical challenge. It is a condition that is associated with high rates of morbidity, mortality, length of stay and hospital costs.(1,6)Care bundles generally specify interventions that can be applied to the care of an individual patient at a particular time and place, ensuring their deliverability and accessibility.(7)The Ventilator Bundle is an effective method to reduce VAP rates in ICUs. The ventilator bundle should be modified and expanded to include specific processes of care that have been definitively demonstrated to be effective in VAP reduction or a specific VAP bundle created to focus on VAP prevention(8–12).VAP has been in the spotlight as a leading cause of death among critically ill, ventilated patients. The incidence of VAP is high; some studies indicate that up to 27% of ventilated ICU patients are “associated with increased length of ICU and hospital stay, hospital mortality, and financial burden. Mortality can increase from 29.2%–63.5% if care is delayed or inadequate, thus increasing hospital stay by 16.4 days.(13–15)

Patients with ventilator acquired pneumonia (VAP) have increased Stay-length in hospital and have up to a 20- 30% death rate. The incidence of VAP is 22.8% in patients on mechanical ventilation in developed countries. The incidence in developing countries is higher. This is due to inadequacy of experienced HCWs, insufficient knowledge and understanding about the pathophysiology, prevention of VAP and practice of VAP bundles.(16) Both physicians and nurses working in critical care are requested to attend educational courses including at least information about the impact of VAP and the evidence background of the selected recommendations for its prevention. Some studies have shown significant reductions of VAP when multidisciplinary structured educational programs were delivered to ICU HCW in charge of ventilated patients.(2,17,18)

For this, improving the knowledge and practice of critical care healthcare workers towards ventilator associated pneumonia (VAP) bundles is paramount to reduce the burden of VAP among ICU patients, understanding their knowledge, and practice patterns with regard to VAP bundles may be an important mode by which this health care issue may be addressed. Health care providers, planners and evaluators should not ignore this high morbidity and life threatening infection situation. On top of these, unless appropriate VAP prevention bundle is in practice health care facilities can be the source of infection and epidemic disease for the community at large. Therefore this study is intended to assess level of knowledge and practice and awareness among health care providers about VAP prevention bundle. The purpose of this study is to investigate the level of knowledge and practice of critical care health care providers with regards to VAP prevention bundles and compare the knowledge, and practice in novice and experienced health care providers with regards to VAP prevention bundles.

### **1.3. Significance of the study**

To ensure the highest standards of critical care, HCWs practice must be based on a strong body of scientific knowledge. This can be achieved through adherence to the evidence based guidelines for prevention of VAP, ultimately improving patients' outcomes. Improved outcomes will shorten patient's ICU length of stay, hospitalization as well as benefit the patient financially with decreased hospital costs. Hospitals also gain benefits as they are continually faced with the challenge of providing cost effective services to patients and communities.(6). Findings from the study will be used by FMOH, the hospital management, and other stakeholders in planning and targeting appropriate measures/interventions to improve knowledge and practice of VAP bundles among adult ICU HCWs.

## 2.LITERATURE REVIEW

A literature was reviewed based on classes of concepts that blended with and ease to guide this study. The review of the literature is begin with the entail description of the primary concepts in the intended categories of General characteristics of the population, knowledge for the prevention of VAP, practice on the prevention of VAP . An overview of the conceptual framework and literature review is described as follows.

Cross-sectional-study was conducted at both public and private tertiary care hospitals in Peshawar, Pakistan from March to April 2018 on Nurses' Knowledge Regarding Prevention of Ventilator Associated Pneumonia by Aurang Z., Muhammad H., Ijaz A., Shafiq K. and Aftab A. conducted on 100 Participants including 30% males and 70% females. The mean ICU experiences of participants were 2.79+3.0 years. The mean Score in the knowledge part of VAP prevention out of 15 marks was 8.14+1.8 and concludes several educational programs shall be arranged for nurses to improve their knowledge of VAP prevention and can decrease Ventilator associated Pneumonia among patients.(16)

A descriptive cross-sectional survey was carried out in 37 ICUs of 23 hospitals in Sana'a city, Yemen. A self-administered multiple-choice questionnaire listing 15 evidence-based preventive strategies was distributed to all nurses and collected between December 2012 and February 2013. The nurses were most frequently correct (>60%) regarding regular oral care, semi-recumbent position, preventing unplanned Extubation, emptying of condensate from ventilator tubing, daily sedation interruption and assessment of readiness for weaning, and endotracheal tubes with extra lumen for subglottic secretions drainage. Nurses had the least knowledge. Nurses had the least knowledge (<24%) regarding frequency of humidifier and suction systems changes, use of kinetic beds, and oral route for tracheal intubation. The nurses' knowledge mean total score was 47.3% (7.1 on 15 items). Holding a bachelor degree in nursing and acquisition of a short course in respiratory therapy were shown to be associated with better knowledge scores.(13)

A cross-sectional study, A self-administered structured questionnaire done India, June 2019, on A Study to Assess the Knowledge and Compliance of Critical Care Nurses Regarding Ventilator Care Bundle in Prevention of Ventilator Associated Pneumonia on total

of 60 nurses showed that More than half (56.7%) of the staff nurses had excellent knowledge regarding ventilator care bundle and 43.3% of them had good knowledge regarding ventilator care bundle. Majority (71.7%) of the staff nurses had good compliance regarding ventilator care bundle, 18.3% of them had satisfactory compliance and 10% of them had excellent compliance regarding ventilator care bundle. It shows that knowledge and compliance of staff nurses regarding ventilator care bundle were found to have significant association. More the knowledge better is the compliance, as the p-value is less than 0.05.(7)

descriptive exploratory study was done in Cairo university in 2013 among critical care nurses on Critical Care Nurses' Knowledge and Compliance with Ventilator Associated Pneumonia Bundle at Cairo University Hospitals showed that all critical care nurses with different educational levels, irrespective of their years of experience or area of work had unexpectedly unsatisfactory knowledge scores about ventilator associated pneumonia and VAP bundle preventive measure. Majority of the nurses in this part acquire their knowledge of taking care of critically ill patients from their basic educational programs, or from hospital policies and procedures. Finally, The study finding revealed that more than three fourth of nurses had low knowledge regarding predisposing, risk factors, signs and symptoms, diagnosis , treatment and components of ventilator bundle practices in ventilator associated pneumonia. The findings of Nurses' compliance with VAP bundle practices indicate that a large percentage of critical care nurses implemented some preventive measures for VAP while didn't comply with most VAP bundle practices.(1)

A facility based cross-sectional and observational study was conducted on 129 Adult Intensive Care nurses to assess their knowledge, practice and other associated factors by using self-administered questionnaire and observational checklist in ethiopia,june 2014 showed that 66 (51.2%) scored below mean score, had inadequate knowledge. There was a significant difference in knowledge between respondents with ICU training as found (p value = 0.04) and between participants with different educational level (pvalue = 0.021). Significant difference in practice was found between ICU nurses who had ICU training (p value = 0.038) and between nurses with different years of Experiences (p value = 0.041) and concludes that majority of nurses working in the Adult Intensive Care Units had inadequate knowledge and practice. Nevertheless, those nurses who trained and had high educational

level have adequate knowledge than those nurses who had more years of experience, where as those experienced and trained nurses were practicing more adequately than those nurses who hold first and second degree.(19)

Descriptive research with Structure interview questionnaire utilized in intensive care units at Menoufia University Hospital on 100 nurses in 2016 Subjects: on nurses' knowledge, attitude and practice toward mouth hygiene among critical ill patients revealed that More than half (64%) of nurses had good knowledge and (16%) of the nurses had not any knowledge about oral care. majority (100.0%) of nurses had poor practice toward oral care. However practice score did not correlate significantly with their knowledge of oral care. Conclusion: Majority of the nurses had good knowledge; however the majority of them had poor practice about oral care in the intensive care unit. There was no statistically significant difference between knowledge and practice. (20)

The study conducted on knowledge and practice of intensive care nurses on prevention of ventilator associated pneumonia at Muhimbili national hospital, Dar es salaam, in 2012 in Tanzania on 118 ICU Nurses was suggesting the knowledge scored and their levels were as follows: Of the 118 ICU nurses 54.2% scored 100% - 70% leveled excellent, 16.1% scored between 69% - 60% leveled very good, 19.5% scored between 59% - 50% leveled good, 8.5% scored 49% - 40% leveled average and 1.7 scored between 39% - 0% leveled poor. And it concluded that adequate ICU nurses' knowledge on VAP preventive strategies but through observation of their practice result into different findings. No significant association found between ICU training, level of education, years of working experience and knowledge. Practice of ICU nurses on prevention of VAP was found to be statistically associated with education level but not statistically associated with ICU training and years of working experience.

This study revealed adequate ICU nurses' knowledge on VAP preventive strategies but knowledge did not reflect in their practice. Hand washing, environment and equipment cleanness during ETS and oral care was observed to be inadequate therefore knowledge of the ICU nurses on VAP preventive strategies does not necessarily reflect adequate practical skills, but knowledge remains the first step toward the implementation of the VAP preventive strategies.(21)

Generally speaking though there are a lot of studies conducted on nurses in other hospitals in Ethiopia, studies in ICU context are limited. There is no published data available on the ICU context from the literature review we understood that knowledge was the base and this alone would not help but practice of VAP Prevention bundles is the one that can reduce the load of VAP in the ICU. VAP bundle Prevention measures are a set of infection control practices used to prevent infection related to the ventilator in the ICU. It is such a vital issue that has to be strictly followed. The present study focuses on Assessment of Critical Care HCW Knowledge and practice towards Ventilator Associated Pneumonia Bundles in TASH ICU.

### **3. OBJECTIVES**

#### **3.1. General objective**

To Assess Knowledge and practice of Critical Care HCWs towards Ventilator Associated Pneumonia Bundles in TASH adult ICU

#### **3.2. Specific objectives**

- To assess Knowledge of critical care HCWs towards VAP Bundles in TASH adult ICU
- To assess practice of critical care HCWs towards VAP Bundles in TASH adult ICU
- To determine factors associated with knowledge and practice of critical care HCWs towards VAP bundles in TASH adult ICU.

## **4. Methods and Materials**

### **4.1. Study Setting**

The study was conducted at Addis Ababa University, College of Health Science, TASH from September to October 2020. TASH is the largest referral hospital in Ethiopia established since 1972 GC at Addis Ababa which is capital city of the country specifically at Lideta sub city and given to Addis Ababa University (AAU) by the Ministry of Health (MoH) since 1998 GC for the faculty as a main teaching hospital. The hospital provides a tertiary level referral treatment and is open 24 hours for emergency services. The hospital is administered by Addis Ababa University and is the largest and oldest teaching hospital among all in Ethiopia, staffed with the most senior specialists providing teaching for about 300 medical students and 350 Residents every year. The hospital offers diagnosis and treatment for approximately 370,000- 400,000 patients a year. The hospital has 800 beds, with 130 specialists, 50 non-teaching doctors, 854 nurses and 900 professionals who support the hospital activities. Currently the hospital have multidisciplinary ICU which have MICU(6 beds) run by pulmonologist,SICU(6 beds) run by anesthesiology,PICU(4 beds) by pediatrics intensivist and cardiac ICU(4 beds) by cardiologist and anesthesiologist. The TASH ICU has specialists, fellow, residents, nurses, pharmacists and other non-medical HCWs (porters, oxygen workers, hygiene workers and biomedical technologists) who are dedicated to providing health care services.

### **4.2. Study Design and Study Period**

This was a cross-sectional study conducted at TASH from September 2020 to November 2020. A structured questionnaire was distributed to the study group (of doctors and nurses). Questions used in the questionnaire was developed after reviewing published literature for relevant items. Data on knowledge and practice of VAP bundles were obtained and analyzed. The research assistants was explained the purpose of the study to respondents and obtained their consent before the questionnaire was filled anonymously by the respondents. Study population was selected by stratified sampling.

### **4.3. Population**

#### **4.3.1 Source population**

Health care workers of TASH

#### **4.3.2. Study population**

All health care workers in TASH adult ICU. Doctors and nurses who were on duty in the TASH adult ICU at the time period of the study.

### **4.4. Eligibility Criteria**

#### **4.4.1. Inclusion criteria**

All doctors and nurses who were on duty in the TASH adult ICU (SICU, MICU, CICU) at the time period of the study.

#### **4.4.2. Exclusion criteria**

Those who were off duty were excluded and attaching residents, pharmacist, pediatrics ICU HCWs and nonmedical personnel (porters, oxygen workers, hygiene workers and biomedical technologists) were also excluded. HCWs who didn't accept to participate in the study also excluded.

### **4.5. Sample Size Determination and Sampling Technique**

#### **4.5.1. Sample size determination**

The Sample size determined by the following formula

$$n = \frac{Z_{\frac{\alpha}{2}}^2 P (1 - P )}{d^2}$$

Where;

n = required sample size for infinite population

$Z_{\alpha/2}$  = critical value for normal distribution at 95% confidence interval= 1.96 ( $\alpha = 0.05$ ).

P = Proportion =50%

d = margin of error= 5%

$$\text{So, } n = \frac{(1.96)^2 * (0.5) (1-0.5)}{(0.05)^2} = 384$$

Therefore, the total required sample size for infinite population is 384.

In the adult ICU (cardiac ICU, surgical ICU, and medical ICU) the number of HCWs (Doctors and Nurses) who were practicing and working estimated to a total of 232 HCWs.

The sample size for this study is calculated using the formula,  $NF = n/1 + (n/N)$ .

Where:

NF = the desired sample size when population is less than 10,000

n= the desired sample size when the population is more than 10,000=384

N = the estimate of the population size = 232

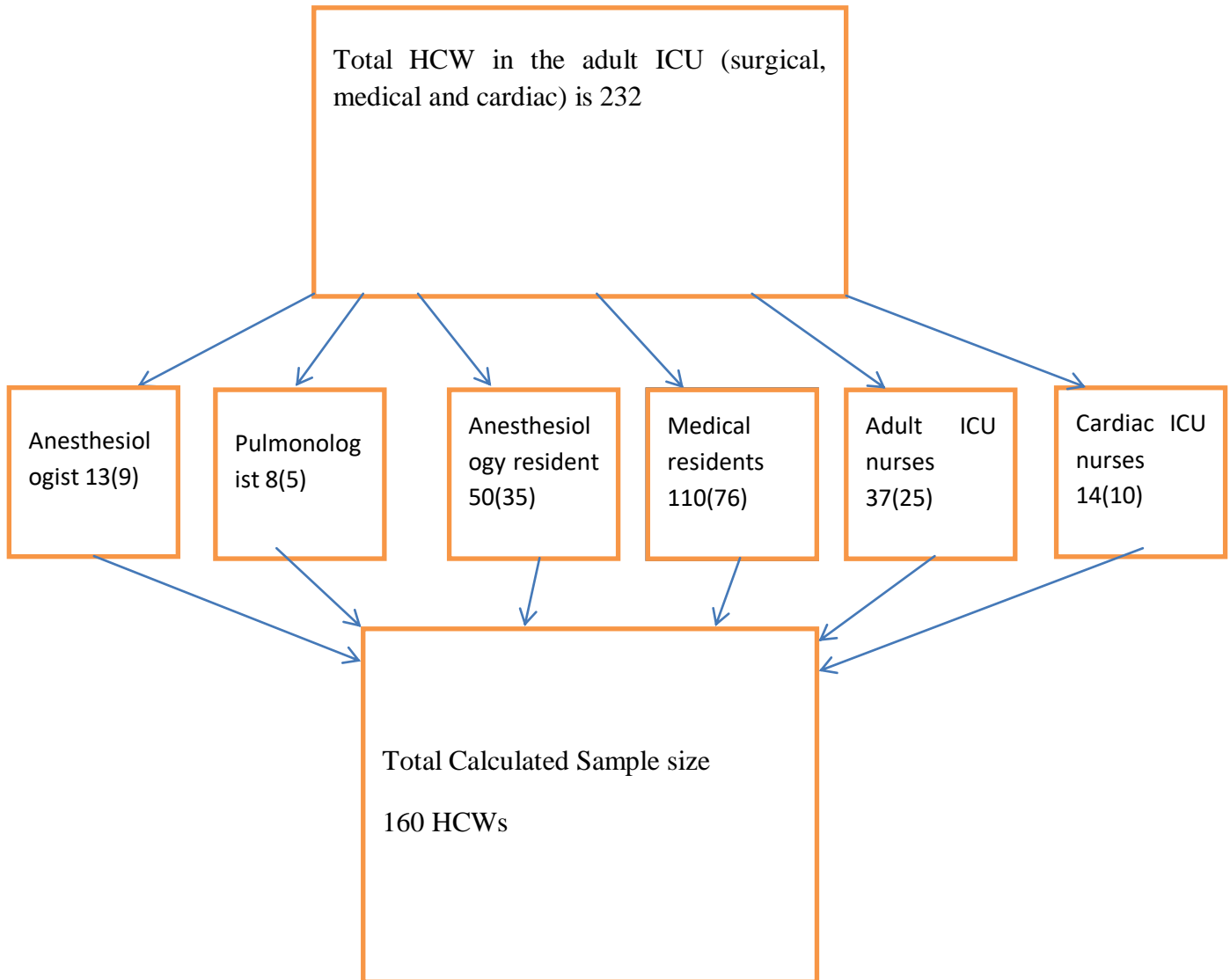
The sample size  $nf = 384 / \{1 + (384/232)\} = 145$

Minimum sample size will be 145 patients.

With an addition of 10% for possible non respondents the final required adjusted sample size becomes 160 (**145+15**).

### 4.5.2. Sampling procedure and Technique

Stratified random sampling method was employed to recruit the study participants. There are 51 nurses (adult ICU being 37 and cardiac ICU 14), 21 specialists (anesthesiologist 13 and pulmonologist 8) and 160 residents (anesthesiology resident 50 and medical resident 110)



## **4.6. Study variables**

### **4.6.1. Dependent variables**

- ✓ Knowledge of HCWs regarding VAP bundles
- ✓ practice of HCWs on VAP bundles

### **4.6.2. Independent variables**

- ✓ Socio demographic characteristics
- ✓ Educational Level
- ✓ Job title
- ✓ Year of work experience

## **4.7. Data Collection Procedure and Technique**

### **4.7.1. Data Collection Tool**

A questionnaire consists of part-I Questions used to assess on demographic information's and part-II with 16 questions which used to assess HCWs level of knowledge and part-III, an assessment of the practice of intensive care HCWs with 24 items. Some of the questions were adopted from the similar research done in India(7), Tanzania(21), Egypt(1), and Ethiopia(19) and modified according to Ethiopian context. Both adopted questions were again checked and assessed for their validity with the ICU. Data on knowledge, practice of VAP bundles was obtained.

### **4.7.2. Data Collection and Quality Control**

A standard questionnaire with information letter and a consent form attached to it was handed out by two of my data collectors to HCWs working in the TASH adult ICU. A code number was used in a place of participant's name and an open code system for pilot study samples were used to exclude them from study samples. HCWs Participants was told to sign the consent form first and then provide them a self-administered Questionnaire. A questionnaire prepared in English language was used, since all HCWs were learn (t) and trained in English. If some of the items in the questionnaire were not clear to few participants, questionnaires were filled in the presence of two well-trained data collectors, and participants was free to ask questions or clarifications. Data

collectors were trained Residents. Questionnaires was filled in working hours; Consent forms and filled questionnaires was placed into sealed envelopes by the data collectors and taken from each unit daily. 10% of the collected data was checked by the supervisor daily for completeness and finally the principal investigator monitored the overall quality of data collection.

#### **4.8. Data Entry, Process and Data Analysis**

Each questionnaire was checked for completeness, missed value. Data was cross checked for consistency and accuracy. The collected data was entered and analyzed by using SPSS version 26 by the investigator. Frequency distributions, figures and tables were used to provide an overall and coherent presentation and description of data. Multivariate regression tests was used to express the magnitude and direction of the association between sociodemographic variables, education levels, years of working experience , job title and intensive care HCWs' knowledge and practice on prevention bundles of VAP.

#### **4.9. Operational definition**

- **Intensive care unit:** A special area in a hospital where critically ill patients or highly dependent patient who need close and frequent observation can be cared for by qualified and special trained staff working under the best possible condition.
- **Intensive care HCW:** any HCW working in surgical ICU, Cardiac ICU and medical ICU at TASH who is able to work in ICU.
- **Ventilator associated pneumonia:** is nosocomial pneumonia in a patient on mechanical ventilator support by endotracheal tube or tracheostomy for more than 48 hours with signs and symptoms of pneumonia.(1)
- **Knowledge:** is awareness and understanding of HCWs regarding VAP bundles.(19,21)in this study the knowledge refers to measurements of Intensive Care HCWs' response to 16 knowledge related questions. The correct response had the value of 1 and considered as having knowledge on that item(s). Whereas, the incorrect response had the value of 0 and considered as having no knowledge on that item(s).By using the mean as a cut-off point; Respondents who score above the mean was considered as having good knowledge and those who score below the mean are considered as having poor knowledge.

- **Good Knowledge:** about VAP bundles refers to those study participants who scored point greater than or equal to the mean score of knowledge questions about the VAP bundles. (1)
- **Poor knowledge:** about VAP bundles Refers to those study participants who scored point less than the mean score of knowledge questions regarding VAP bundles. (1)
- **Practice:** In this study it refers to the HCWs actions done on the subject regarding VAP bundles.
- **Good Practice:** Refers to those study participants who correctly respond to practice questions and score above the mean value.(1,21)
- **Poor Practice:** Refers to those study participants who correctly respond to practice questions and score below mean value.(1,21)

#### **4.10. Ethical Consideration**

Ethical clearance was obtained from ethical review committee of AAU department of anesthesiology and Confidentiality was maintained at all levels of the study by avoiding the use of names and any identifiers. Informed consent was obtained from the respondents prior to the administration of questionnaire after the research assistants explained the purpose of the study to respondents.

#### **4.11. Dissemination and Utilization of Results**

The Findings of this study will be communicated to the TASH adult ICU where the study was conducted and will be disseminated in each unit which participated in this study. to AAU strengthening HCWs level of knowledge and practice through training and education. to Addis Ababa University, Collage of Health Science, School of medicine, Post Graduate Program through soft and hard copy after presentation. The findings will be presented and or submitted to conferences, example Ethiopian Anesthesiology society Association, Symposium, or Workshops. Further, the results will be published for access to other users as well

## 5. RESULTS

### Socio-demographic characteristics

This study was conducted at TASH from September 2020 to November 2020. Adult ICU staffs available during the study period were to participate. All of the 160 available staff filled the self-administered questionnaire. Most 108 (67.5%) of the study participants were male and 113(70.6 %) were ages 25-30 years. Most of the respondents were residents 111 (69.4%) and had a work experience below 5 years 117 (73.1%). See table 5.1

Table 5.1 Socio-demographic characteristics HCWs in TASH adult ICU Addis Ababa, 2020 G.C.

Variable		N (%)
Age (in years)	25-30	113 (70.6%)
	31-35	35 (21.9%)
	>35	12 (7.5%)
	Total	160 (100%)
Gender	Male	108 (67.5 %)
	Female	52 (32.5 %)
	Total	160 (100%)
Work experience (in years )	<5	117 (73.1 %)
	5-10	32 (20%)
	>10	11 (6.9 %)
	Total	160 (100%)
Profession	Nurse	35 (21.9 %)
	Resident	111 (69.4 %)
	Specialist	14 (8.8 %)
	Total	160 (100%)
Department	Surgical ICU	55 (34.4 %)
	Medical ICU	83 (51.9 %)
	Cardiac ICU	22 (13.8 %)
	Total	160 (100%)

## Knowledge

Knowledge was assessed using a 16-item questionnaire regarding VAP prevention bundles extracted from guidelines, text books and related articles. Each item has 1 correct answer with weight of 1 and incorrect response having weight of 0. Total correct answer was calculated for each respondent out of 16. The total mean knowledge score of the participants is 12.4312 out of 16 (Range 5-16, SD= 2.10606). Fifty one point nine percent (51.9 %) of the participants had scores above the mean (i.e. good knowledge score) while 48.1% of the study participants score below the mean (i.e. poor knowledge score). 155 (96.9%) of the study participants scored above 8 out of 16. See Fig.5.1

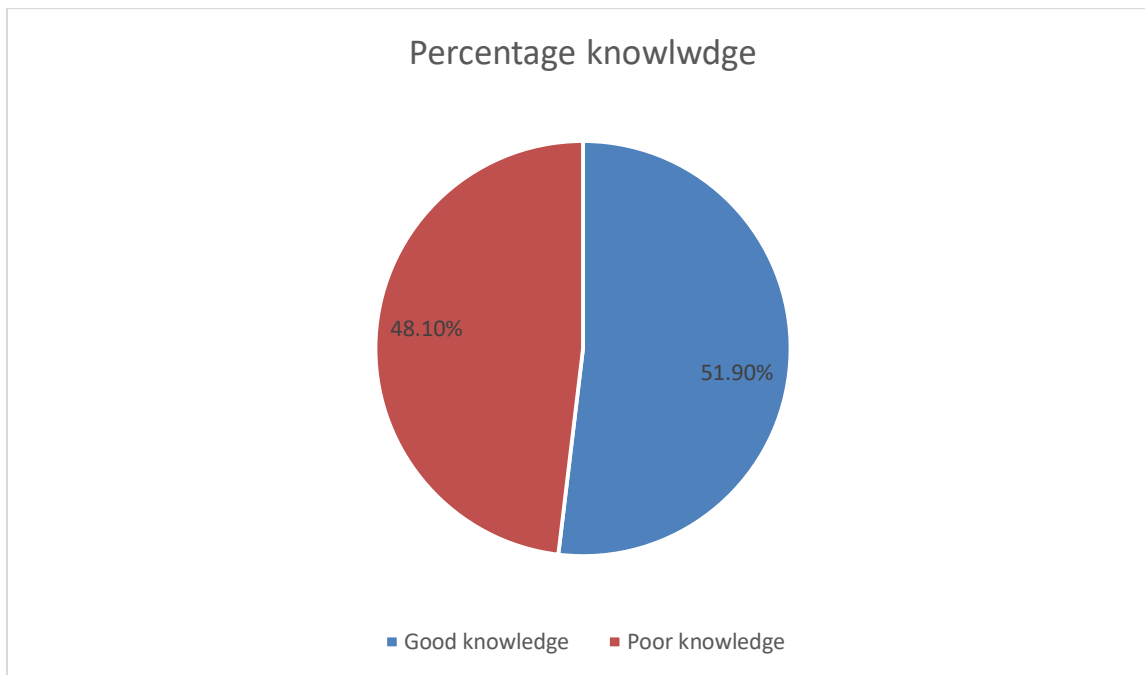


Fig 5.1 percentage of good knowledge score and poor knowledge score on VAP preventive bundles of HCWs inTASH adult ICU Addis Ababa, 2020 G.C

Table 5.2 Mean knowledge score, proportion of good knowledge, proportion of poor knowledge, odds ratio and P value according to sociodemographic variables on VAP preventive bundles of HCWs inTASH adult ICU Addis Ababa, 2020 G.C

<b>Variable</b>		<b>Mean knowledge score and percentage</b>	<b>Proportion with good knowledge</b>	<b>Proportion with poor knowledge</b>	<b>aOR*range(</b>	<b>P value</b>
Gender	M	12.6389	60(55.6%)	48(44.4%)	1.423(.652-3.105)	.376
	F	12.0000	23(44.2%)	29(55.8%)	1	
Age category	25-30	12.6283	62 (54.9%)	51 (45.1%)	.555(047-6.552)	.640
	31-35	11.8286	14(40.0%)	21(60.0%)	.335(.031-3.672)	.370
	Above 35	12.3333	7(58.3%)	5(41.7%)	1	
Year of experience	Below 5	12.6410	65(55.6%)	52(44.4%)	1.089(.075-15.810)	.950
	5-10	11.7500	13(40.6%)	19(59.4%)	.909(.076-10.951)	.940
	Above 10	12.1818	5(45.5%)	6(54.5%)	1	
Job title	Nurse	10.4286	6(17.1%)	29(82.9%)	.056(.012-.266)	.0001
	resident	12.9189	66(59.5%)	45(40.5%)	.400(.106-1.515)	.177
	Specialist	13.5714	11(78.6%)	3(21.4%)	1	
Department	surgical	12.6182	29(52.7%)	26(47.3%)	.524(.149-1.838)	.313

Medical	12.5542	44(53.0%)	39(47.0%)	.611(.191-1.960)	.408
cardiac	11.5000	10(45.5%)	12(54.5%)	1	

Fifty one point nine percent (51.9 %) of the participants had scores above the mean (i.e. good knowledge score) while 48.1% of the study participants score below the mean (i.e. poor knowledge score). Age 25-30 years, male gender, working for less than 5 years, being a specialist and working at the surgical ICU was associated with good knowledge score. It was profession (job title) that had statistically significant impact on having good knowledge score with being a nurse (aOR= .056 (Range (.012-.266) 95% CI p<0.0001) and resident (aOR= 0.400(Range 0.106-1.515) 95% CI p= 0.177) as compared to being a specialist. See Fig 5.2 and Table 5.2

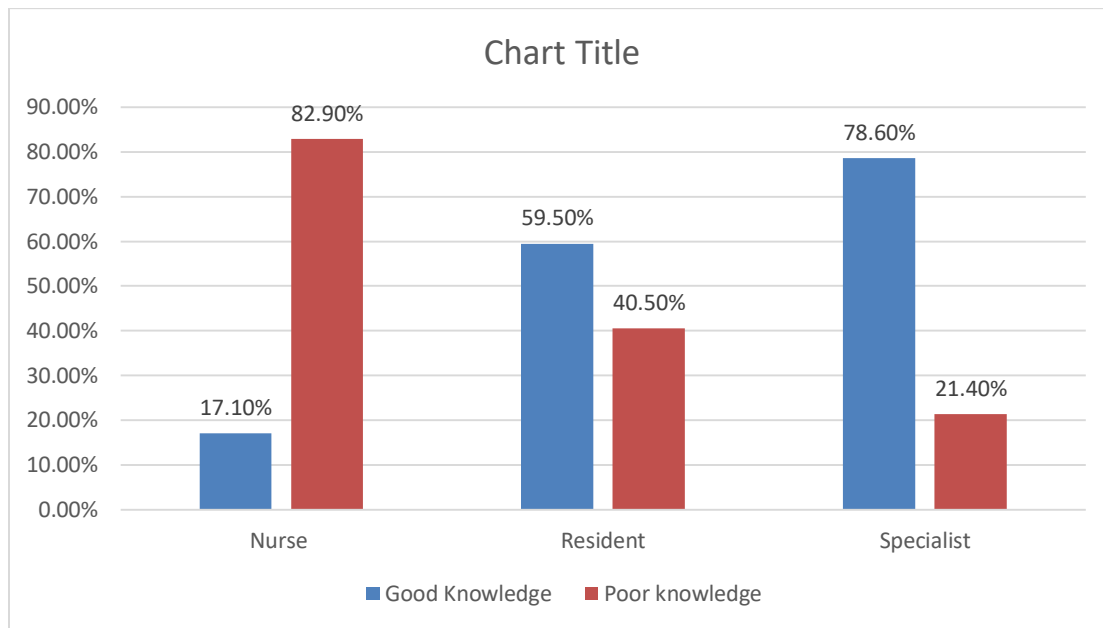


Fig 5.2 Percentage of good and poor knowledge score according to profession (job title)on VAP preventive bundles of HCWs inTASH adult ICU Addis Ababa, 2020 G.

## Practice

Table 5.3 Mean practice score, proportion of good practice, proportion of poor practice, odds ratio and P value according to sociodemographic variables on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C

Variable		Mean practice score and percentage	Proportion with good practice	Proportion with poor practice	aOR*range(	P value
Gender	M	14.7685	55(50.9%)	53(49.1%)	1.034(.486-2.201)	.931
	F	15.3654	30(57.7%)	22(42.3%)	1	
Age category	25-30	14.5752	55(48.7%)	58(51.3%)	.295(.016-5.316)	.408
	31-35	15.1714	19(54.3%)	16(45.7%)	.290(.017-4.938)	.392
	Above 35	18.0000	11(91.7%)	1(8.3%)	1	
Year of experience	Below 5	14.3761	55(47.0%)	62(53.0%)	.473(.028-8.105)	.605
	5-10	15.9375	20(62.5%)	12(37.5%)	.495(.033-7.401)	.610
	Above 10	18.3636	10(90.9%)	1(9.1%)	1	
Job title	Nurse	17.0571	28(80.0%)	7(20.0%)	3.536(.283-44.093)	.327
	resident	13.9910	47(42.3%)	64(57.7%)	.903(.056-14.509)	.943
	Specialist	17.4286	10(71.4%)	4(28.6%)	1	
	surgical	14.8000	29(52.7%)	26(47.3%)	1.096(.339-3.546)	.878

Department	Medical	14.8193	43(51.8%)	40(48.2%)	1.007(.339-2.994)	.990
	cardiac	15.9091	13(59.1%)	9(40.9%)	1	

Practice pertaining VAP prevention bundles was assessed with a 24-item question derived from recommendation from professional society guidelines and similar articles with adjustment to our setting. Each question had one correct response weighing a score of 1 and incorrect response weighing 0 and total score out of 24 calculated. The mean practice score of the respondents was 14.9625 out of 25 (Range 7-23, SD = 3.48562). 85(53.1 %) of the respondents had a mean practice score above the mean (good practice) while 75(46.9%) had poor practice. 25 (15.6 %) respondents had total practice score below 12 out of 24 (i.e. below 50%).

Age above 35, female gender, work experience above 10 years, being a nurse and working at cardiac ICU were associated with good mean practice scores. None however reached statistical significant to affect good practice using logistic regression. As Compared to specialists, nurses (aOR= 3.53 (Range 0.283- 44.09) 95 % CI p= 0.327) had higher odds of having good practice while being a resident (aOR=0.903 range (0.056-14.509) 95% CI p= 0.943) was associated with poor practice scores. After competing with multiple regression there was no correlation between knowledge and practice score (Pearson Correlation Coefficient = -.076).

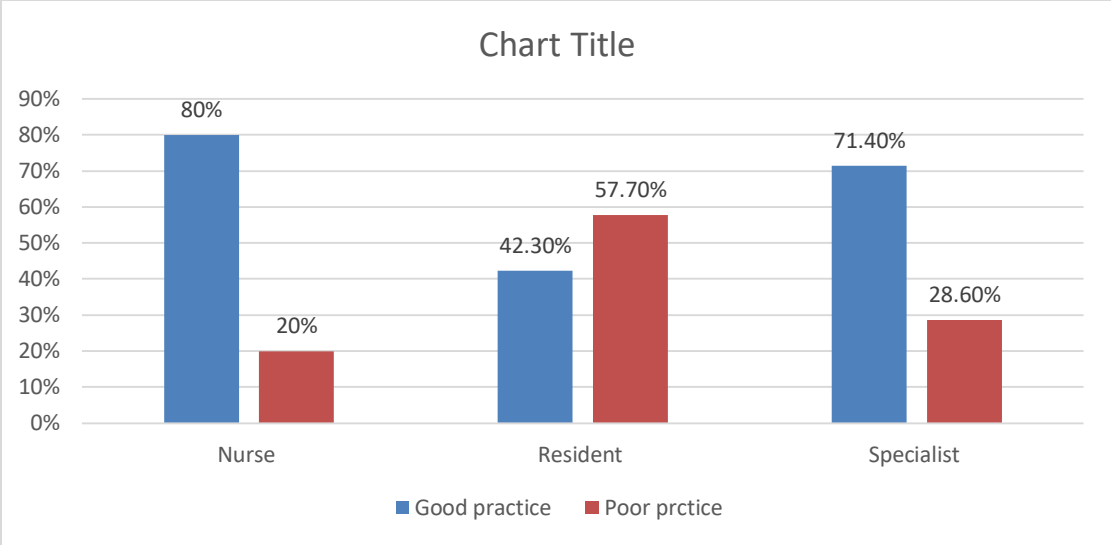


Fig 5.3 Percentage of good and poor practice according to profession (job title) on VAP preventive bundles of HCWs in TASH ICU Addis Ababa, 2020 G.C

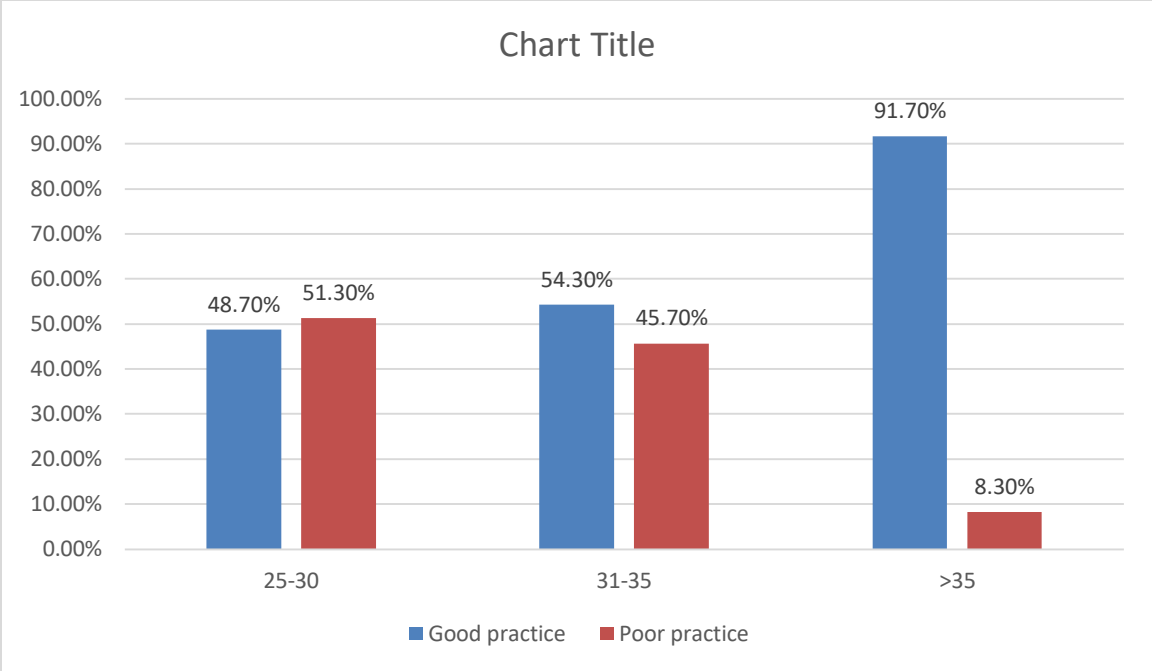


Fig 5.4 Percentage of good and poor practice according to age category on VAP preventive bundles of HCWs in TASH ICU Addis Ababa, 2020 G.C

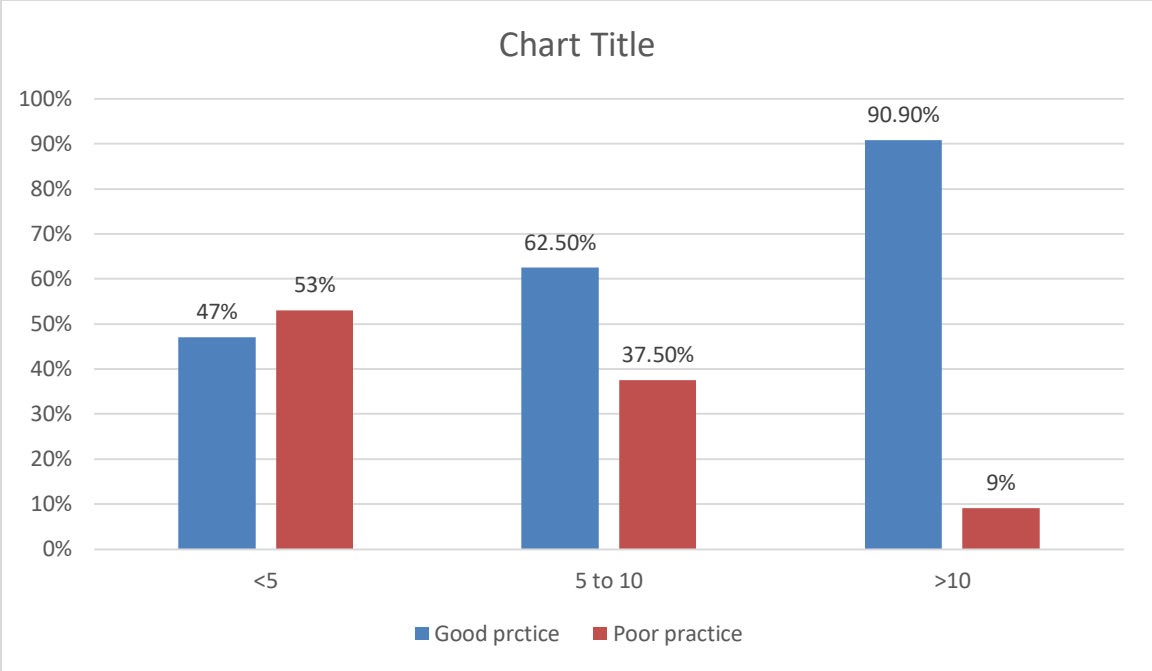


Fig 5.5 Percentage of good and poor practice according to years of work experience on VAP preventive bundles of HCWs in TASH adult ICU Addis Ababa, 2020 G.C

## 6. DISCUSSION

The overall mean knowledge score is  $12.4312 \pm 2.10606$  out of 16 (i.e. 77.68%) with the proportion of good (mean and above) and poor (below mean) being near 52% and 48% respectively is lower than a study done in India which 56.75% among ICU Nurses score excellent knowledge(7) but higher than a study among ICU nurses 66(51.2%) having a score above mean in a study done at selected hospitals in Addis Ababa on nurses having a sample size of 129 nurses(19)and mean knowledge of 47.5% among nurses a study done in Yemen(13) . in comparison to the above study nurses on this study had low mean knowledge score(17.1%) from sample of 35 nurses. This may be because of sample size is not comparable and educational status of nurses more knowledgeable with higher level as mentioned in that study compared to this study small no MSc holders 6(35) and the rest are BSc.

In this study the mean knowledge was lower for nurses with only 17 % of them having a knowledge score above the mean which is lower than in the above-mentioned studies. But there is similarity knowledge score of nurses in a study done in Cairo university hospitals which had un satisfactory knowledge scores(1)a study on Critical Care Nurses' Knowledge and Compliance with Ventilator Associated Pneumonia Bundle with sample size of 45 nurses in medical ICU,coronary ICU and surgical ICU. Specialists have the highest mean knowledge score than residents and nurses. No other sociodemographic factor has statistically significant impact on knowledge score. In the study from India mentioned above year of experience has significant effect on knowledge score.

The mean practice score in this study was  $14.9625 \pm 3.48562$  out of 24 (i.e. 62.3%) with 53.1 % respondents having practice score above the mean (good practice). Score were higher for those older than 35 years, having more than 10 years' work experience and nurses which is similar to study in India Majority (71.7%) of the staff nurses had good compliance regarding ventilator care bundle, 18.3% of them had satisfactory compliance and 10% of them had excellent compliance regarding ventilator care bundle(7). but Score were higher for those older than 35 years, having more than 10 years' work experience and nurses did not reach statistical

significance and does not correlate with knowledge score similar to study from Egypt(1) a study on Critical Care Nurses' Knowledge and Compliance with Ventilator Associated Pneumonia Bundle with sample size of 45 nurses in medical ICU, coronary ICU and surgical ICU but contrary to a study from India in which It shows that knowledge and compliance of staff nurses regarding ventilator care bundle were found to have significant association. More the knowledge better is the compliance, as the p-value is less than 0.05(7)

## **STRENGTH AND LIMITATION OF THE STUDY**

### **Strength:**

- ✓ This study is a prospective study in nature which makes it reliable.
- ✓ Data was collected on appropriate time and respondents were given enough time (can take home and fill when they are free if they were busy).
- ✓ Questionnaire was developed from similar previous study and was tailored to our setup.
- ✓ Since the study is quantitative, it minimizes subjectivity.
- ✓ Since standard questionnaire was used, it maximizes Validity.
- ✓ The response rate was 100%, which also maximizes the representativeness of the sample for the source population.

### **Limitation:**

Most of The litterateurs were on nurses.

Due to time constraints it was difficult to make the practice observational using check list.

This study is cross-sectional study and some participants were filling the questionnaire at home, this may be subject to recall Bias

## **7. CONCLUSION AND RECCOMENDATION**

### **7.1. CONCLUSION**

In this study, around half of HCWs have good knowledge (i.e. 51.9%) and around half of HCWs have good practice (i.e.53.1%). The percentage of HCWs who score good practice is higher than who score good knowledge. No significant association between age, gender, working department, years of working experience and knowledge. It was profession (job title) that had statistically significant impact on having good knowledge score. Practice of adult ICU HCWs on VAP prevention bundles was not statistically associated with age, gender, working department, years of working experience and profesion.but nurses had higher odds of having good practice. There was no correlation between knowledge and practice score. Based on the research finding Nurses' knowledge regarding VAP bundle was inadequate and physician was poor on the practice of VAP bundles.

### **7.2. RECOMMENDATIONS**

Based on the results of the present study, the following recommendations were made:

- ✓ HCWs taking care of critically ill patients should acquire knowledge of VAP bundles from their basic educational programs, or from hospital policies and procedures.
- ✓ The need for in- service education and integration of evidence based knowledge regarding prevention of ventilator associated pneumonia bundles with practice .
- ✓ VAP prevention bundle training to be given and continuous monitoring for adherence using protocolized approach be implemented at the adult ICUs of TASH.
- ✓ The need for developing a unified protocol for VAP prevention based upon current evidence based guidelines.
- ✓ The need for establishing a system to ensure that VAP prevention protocol will be implemented consistently in all ICUs.
- ✓ There is a need implement all the individual elements of a bundle evidence-based practices when applied together they result in significantly better outcomes than when implemented individually.

## Reference

1. Shaaban N. Critical Care Nurses ' Knowledge and Compliance with Ventilator Associated Pneumonia Bundle at Cairo University Hospitals. 2013;4(15):66–78.
2. Álvarez-Lerma F, Sánchez García M. “The multimodal approach for ventilator-associated pneumonia prevention”—requirements for nationwide implementation. *Ann Transl Med.* 2018;6(21):420–420.
3. Pérez-Granda MJ, Muñoz P, Heras C, Sánchez G, Rello J, Bouza E. Prevention of ventilator-associated pneumonia: Can knowledge and clinical practice be Simply assessed in a large institution? *Respir Care.* 2013;58(7):1213–9.
4. Hellyer TP, Ewan V, Wilson P, Simpson AJ. The Intensive Care Society recommended bundle of interventions for the prevention of ventilator-associated pneumonia. *J Intensive Care Soc.* 2016;17(3):238–43.
5. Silva SG da, Salles RK de, Nascimento ERP do, Bertoncetto KCG, Cavalcanti CDK. Evaluation of a bundle to prevent ventilator-associated pneumonia in an intensive care unit. *Texto Context - Enferm.* 2014;23(3):744–50.
6. Wip C, Napolitano L. Bundles to prevent ventilator-associated pneumonia: How valuable are they? *Curr Opin Infect Dis.* 2009;22(2):159–66.
7. Dumbre DU. A study to assess the knowledge and compliance of critical care nurses regarding ventilator care bundle in prevention of ventilator associated pneumonia. *Medico-Legal Updat.* 2019;19(1):176–8.
8. Rello J, Lode H, Cornaglia G, Masterton R. A European care bundle for prevention of ventilator-associated pneumonia. *Intensive Care Med.* 2010;36(5):773–80.
9. Xie X, Lyu J, Hussain T, Li M. Drug prevention and control of ventilator-associated pneumonia. *Front Pharmacol.* 2019;10(MAR):1–9.
10. Wan K, Liang H, Yan G, Zou B, Huang C, Jiang M. A quality assessment of evidence-based guidelines for the prevention and management of ventilator-associated pneumonia:

- A systematic review. *J Thorac Dis.* 2019;11(7):2795–807.
11. Centers for Disease Control and Prevention (CDC). Library of Congress Catalog Number 76 – 641496 For sale by Superintendent of Documents U . S . Government Printing Office Washington , DC 20402. 2016;
  12. Sanders-thompson DJ. Examining ICU Nurses ’ Knowledge of Ventilator-Associated Walden University. 2020;
  13. Al-sayaghi KM. Prevention of ventilator-associated pneumonia. 2014;35(1):269–76.
  14. Botha L. Level of Nurses ’ Competence in Mechanical Ventilation in Intensive Care Units of Two Tertiary Health Care Institutions in Gauteng. *J Nurs Sci.* 2012;1–152.
  15. Wisplinghoff H, Seifert H, Steven M. GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING *Pseudomonas aeruginosa.* *Int Soc Infect Dis.* 2018;(January 2018).
  16. Zeb A. Nurses’ Knowledge Regarding Prevention of Ventilator Associated Pneumonia. *Lupine Online J Nurs Heal care.* 2018;1(5):123–7.
  17. Kalil AC, Metersky ML, Klompas M, Muscedere J, Sweeney DA, Palmer LB, et al. Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. *Clin Infect Dis.* 2016;63(5):e61–111.
  18. Su KC, Kou YR, Lin FC, Wu CH, Feng JY, Huang SF, et al. A simplified prevention bundle with dual hand hygiene audit reduces early-onset ventilator-associated pneumonia in cardiovascular surgery units: An interrupted time-series analysis. *PLoS One.* 2017;12(8):1–18.
  19. Aliyie HA. College of Health Sciences School of Allied Health Sciences Department of Nursing and Midwifery College of Health Sciences School of Allied Health Sciences. 2014;(June):1–28.
  20. Aboalizm SE, Abdel Z, Kasemy A. Nurses’ Knowledge, Attitude and Practice Toward

Mouth Hygiene Among Critical Ill Patients. Int J Nov Res Healthc Nurs [Internet]. 2018;3(15). Available from: [www.noveltyjournals.com](http://www.noveltyjournals.com)

21. Said AT. Knowledge and practice of intensive care nurses on prevention of Ventilator Associated Pneumonia At Muhimbili National Hospital ,Dar ES Salaam Tanzania: MSc Nursing ( Critical Care and Trauma ) Dissertation, Muhimbili University of Health. 2012;23–30. Available from: [http://ihi.eprints.org/1594/1/Ally\\_Tatu\\_Said.pdf](http://ihi.eprints.org/1594/1/Ally_Tatu_Said.pdf)

## ANNEX

### ANNEX I: Questionnaire (English version)

#### Informed Consent Form for Quantitative survey questionnaires:

Date\_\_\_\_\_ Code number of the checklist\_\_\_\_\_

The researcher is a department of anesthesiology, critical care and pain medicine. Today, I am here to collect data on the assessment of knowledge and practice of VAP prevention bundles of HCWs working in ICU which will be done by Gebrehans Kidanu who is the member of anesthesiology, critical care and pain medicine resident. The objective of this questionnaire is to assess the knowledge, practice VAP prevention bundles of HCWs working in the ICU, TASH.

We would like to assure you that the study is confidential. I will not keep a record of your name and address. You have a right to skip any question that you do not want to answer. Your correct answer can make the study to achieve the goals. Therefore, you are kindly requested to respond genuinely and voluntarily with patience. The questions may take about 10-15 minutes.

Are you voluntary?

Yes\_\_\_\_\_ No\_\_\_\_\_

#### CONTACT

if you have questions at any time about the study, you may contact [kidanugebrehans@gmail.com](mailto:kidanugebrehans@gmail.com) or via phone No+251914377418

Thank you.

#### Part I: Socio-Demographic Characteristics

S.N.	Questions	Options
101	What is your age (in years)?	1. 20-24      4. 30-35 2. 25-30      5. Above 35 3. 25-30
	Gender	6. Male      7. Female

102	What is your year of experiences?	<ol style="list-style-type: none"> <li>1. &lt;5 years</li> <li>2. 5-10 years</li> <li>3. &gt;10 years</li> </ol>	
103	What is your educational status?	Nurse	<ol style="list-style-type: none"> <li>1. Diploma</li> <li>2. BSc.</li> <li>3. Master</li> <li>4. Ph.D.</li> </ol>
		Resident	<ol style="list-style-type: none"> <li>1. Year I</li> <li>2. Year II</li> <li>3. Year III</li> </ol>
		Specialist	
104	Which departments have you been working?	<ol style="list-style-type: none"> <li>1. Surgical ICU</li> <li>2. Medical ICU</li> <li>3. Cardiac ICU</li> </ol>	

**Part II: Assessing Adult Intensive Care Health Care Worker knowledge on Prevention bundles of Ventilator Associated Pneumonia**

S.N.	Questions	Options
201	Which route is best recommended when intubating a patient?	<ol style="list-style-type: none"> <li>1. Oral intubation</li> <li>2. Nasal intubation</li> <li>3. Both routes</li> <li>4. I do not know</li> </ol>
202	The recommended route of intubation in Q.201 will decrease the risk of VAP because	<ol style="list-style-type: none"> <li>1. It is associated with sinusitis</li> <li>2. It is not associated with sinusitis</li> <li>3. Both routes of intubation are associated with sinusitis</li> <li>4. I don't know</li> </ol>
203	When is it recommended to change humidifiers?	<ol style="list-style-type: none"> <li>1. Every 2-7 days (or whenever necessary)</li> <li>2. Every day (or whenever necessary)</li> <li>3. Every month (or whenever necessary)</li> <li>4. I do not know</li> </ol>

204	What should the range of Head of the bed elevation be?	<ol style="list-style-type: none"> <li>1. 0-15 degree</li> <li>2. 15-30 degrees</li> <li>3. 30-45 degrees</li> <li>4. I do not know</li> </ol>
205	When is a HCW caring a ventilated patient required to wear sterile gloves?	<ol style="list-style-type: none"> <li>1. During oral suctioning</li> <li>2. ETT suctioning</li> <li>3. Oral and ETT suctioning</li> </ol>
206	When is a HCW caring a ventilated patient required to wash hands?	<ol style="list-style-type: none"> <li>1. Before oral and ETT suctioning</li> <li>2. After oral and ETT suctioning</li> <li>3. Before and after oral / ETT suctioning</li> <li>4. I don't know</li> </ol>
207	When is it recommended to perform Oral care by using a swab moistened with mouthwash and water	<ol style="list-style-type: none"> <li>1. Once in a shift</li> <li>2. Every 4 to 6 hours and whenever necessary</li> <li>3. Whenever necessary</li> <li>4. I do not know</li> </ol>
208	What is the role of prolonged use of Stress ulcer prophylaxis to a ventilated patient?	<ol style="list-style-type: none"> <li>1. Not to be used for patients who are at high risk of developing a stress ulcer</li> <li>2. May increase the colonization density of the aero digestive tract</li> <li>3. Routine stress ulcer prophylaxis does not influence the risk of VAP</li> <li>4. I don't know</li> </ol>
209	Which one is associated with maintenance of adequate number of HCW to patient ratio in critical care setting?	<ol style="list-style-type: none"> <li>1. Increased risk for VAP</li> <li>2. decreased risk for VAP</li> <li>3. does not influence the risk for VAP</li> <li>4. I don't know</li> </ol>
210	Which one is associated with continuous education to ICU HCW on prevention of nosocomial infection?	<ol style="list-style-type: none"> <li>1. Increased rates of VAP</li> <li>2. Decreased rates of VAP</li> <li>3. Does not influence the rates VAP</li> </ol>

		4. I don't know
211	What is the importance of performing chest physiotherapy?	<ol style="list-style-type: none"> <li>1. Chest physiotherapy reduce the risk for VAP</li> <li>2. Chest physiotherapy increase the risk for VAP</li> <li>3. Does not influence the risk for VAP</li> <li>4. I do not know</li> </ol>
212	Why do adjustable beds are useful in critical care setting?	<ol style="list-style-type: none"> <li>1. Adjustable beds increase the risk for VAP</li> <li>2. Adjustable beds reduce the risk for VAP</li> <li>3. Adjustable beds have no influence upon the risk for VAP</li> <li>4. I don't know</li> </ol>
213	When should ETT suctioning be done to patient?	<ol style="list-style-type: none"> <li>1. Routinely to every shift</li> <li>2. As needed</li> <li>3. It should be done through ETT only.</li> <li>4. d. I do not know</li> </ol>
214	What is the effect of over feeding of carbonated foods or fluids to a ventilated patient?	<ol style="list-style-type: none"> <li>1. Increased the risk for VAP</li> <li>2. Decreased the risk for VAP</li> <li>3. Do not influence the risk for VAP</li> <li>4. I don't know</li> </ol>
215	What is the effect of maintenance of adequate cuff pressure during care of ventilated patient?	<ol style="list-style-type: none"> <li>1. Is important because it decrease the risk for VAP</li> <li>2. Can increase the risk for VAP</li> <li>3. Do not influence the risk for VAP</li> <li>4. I don't know</li> </ol>
216	Which of the following is the most appropriate measure to prevent ventilator-associated pneumonia in this patient?	<ol style="list-style-type: none"> <li>1. Bathe patient daily in chlorhexidine</li> <li>2. Begin preoperative antimicrobial prophylaxis immediately and continue until Extubation</li> <li>3. Maintain the head of bed above a 30-degree angle</li> <li>4. Perform tracheotomy and remove</li> </ol>

		endotracheal tube 5. Replace endotracheal tube with a silver-coated endotracheal tube
--	--	--

### Practice of health care workers on VAP bundles

#### Part III: Infection control measure

S.N.	Questions	Options
301	Do you wash your hands before and after patient contact?	1. Yes 2. No
302	Do you wash your hands between patients?	1. Yes 2. No
303	Do you change gloves between patients?	1. Yes 2. No
304	Do you use a sterile ambu bag/ disinfect it before use	1. Yes 2. No
305	Do you Change ambu bag between patients?	1. Yes 2. No
306	Do you maintain continuously patient's position in (30°-45°) if not contraindicated?	1. Yes 2. No

#### Part IV: Ventilator care measures

S.N.	Questions	Options
401	Do you drain and discard Periodically any condensate that collects in the tubing of a mechanical ventilator?	1. Yes 2. No
402	Do you humidify respiratory circuit using humidity and heat exchange filter?	1. Yes 2. No
403	Do you replace the ventilator circuit regularly?	1. Yes 2. No
404	Do you change a heat moisture exchanger that is used	1. Yes

	by a patient when it becomes visibly soiled?	2. No
--	--	-------

**Part V: End tracheal Suctioning care**

S.N.	Questions	Options
501	Do you maintain adequate pressure in endotracheal tube cuff?	1. Yes 2. No
502	Do you wear clean gloves with Closed suctioning?	1. Yes 2. No
503	Do you wear sterile gloves with an open suction system?	1. Yes 2. No
504	Do you using sterile technique when applying tracheal suctioning?	1. Yes 2. No
505	Do you replacement of suction systems?	1. Yes 2. No
506	Do you use Saline/ distilled water prior to suctioning?	1. Yes 2. No
507	Do you replace the solution used for suction?	1. Yes 2. No
508	Do you continuous aspiration of sub glottis secretions if ventilator more than 48 hours?	1. Yes 2. No

**Part VI: Oral care**

S.N.	Questions	Options
601	Do you perform oral hygiene with antiseptic mouth wash?	1. Yes 2. No
602	Do you use topical antimicrobial agents for oral decontamination regularly?	1. Yes 2. No

**Part VII: Peptic ulcer prophylaxis**

S.N.	Questions	Options
701	Do you check the gastric residual volume (GRV) every 4 to 6 hours?	1. Yes 2. No

702	Do you administer intermittent rather than continuous enteral feeding?	1. Yes 2. No
703	Do you perform Routine acidification of gastric feeding?	1. Yes 2. No

**Part VIII: Extubation and Weaning trials**

<b>S.N.</b>	<b>Questions</b>	<b>Options</b>
801	Do you perform daily assessments of readiness to wean and extubate?	1. Yes 2. No

**Thank you very much.**