

**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES,
ADDIS ABABA, ETHIOPIA**



**ASSESSMENT OF KNOWLEDGE AND BARRIERS TOWARDS
APPLICATION OF VENTILATOR-ASSOCIATED PNEUMONIA
PREVENTION BUNDLE AMONG NURSES WORKING IN EMERGENCY
AND ICU, TIKUR ANBESSA SPECIALIZED HOSPITAL**

BY: Dr.Tirsit Nigussie (Emergency and Critical care resident)

ADVISOR: Dr.Tigisit Zewdu [MD, Assistant professor of emergency and critical care]

JANUARY, 2024

AAU, ADDIS ABABA, ETHIOPIA

**A RESEARCH THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY,
COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE,
DEPARTEMENT OF EMERGENCY AND CRITICAL CARE MEDICINE
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
POSTGRADUATE SPECIALITY CERTIFICATE IN EMERGENCY AND
CRITICAL CARE MEDICINE**

APPROVAL

This thesis on “Assessment of knowledge and barriers towards application of ventilator associated pneumonia prevention bundle among nurses working in emergency and ICU” is accepted by the board of examiners for partial fulfillment of specialty certificate in emergency and critical care medicine.

Advisor: Dr. Tigrisit Zewdu (MD, Assistant professor of emergency and critical care)

Signature-----

Date-----

Examiner

External: _____

Signature ----- Date-----

Internal: _____

Signature -----Date -----

BY	Dr Tirsit Nigussie (MD, Emergency and critical care resident)
Title Of Research Project	Assessment of knowledge and barriers towards the application of ventilator associated pneumonia prevention bundle among nurses working in emergency and ICU
Study Area	TASH Emergency and ICUs, Addis Ababa, Ethiopia
Study Type	A Descriptive cross-sectional study
No of participants	103
Funding	By Addis Ababa university college of health science
Address of the investigator	Tirsit Nigussie Mobile Number:0910379145 Email address: tirseldnig@gmail.Com
Advisor name	Dr .Tigisit Zewdu (MD ,assistant professor of emergency and critical care)

ACKNOWLEDGMENT

I would like to thank the God for helping me through this thesis and I would also like to thank Addis Ababa University, college of health science, Department emergency and critical care medicine.

I would like to acknowledge my advisor, Dr. Tigisit Zewdu (MD, Assistant professor EMCC) for her review and comment on proposal and thesis writing.

I would also like to give my deepest gratitude for Dr .Meron Tesfaye (MD, Assistant professor of EMCC) and Dr. Demelash Gezahagn (MD, Assistant professor of EMCC) for their tremendous help throughout. My special thanks goes to Dr Abraham .M (PhD) and Mr.Tagay Firde (PhD candidate at AAU, school of commerce) for their continuous support on my thesis. Finally i would like to thank my family and friends for their support throughout.

ACRONYMS AND ABBREVIATIONS

- AAU – Addis Ababa University
- CDC - Center for disease control and prevention
- DSI - Daily sedation interruption
- ED -Emergency department
- ETT – Endotracheal tube
- GI –Gastrointestinal
- HAI –Hospital-acquired infection
- HCW- Healthcare workers
- ICU –Intensive care unit
- MICU – Medical ICU
- MOH –Ministry of Health
- MV- Mechanical ventilator
- PICU –pediatric ICU
- SBT- Spontaneous breathing trial
- SICU –Surgical ICU
- TASH- Tikur Anbessa Specialized hospital
- VAP- Ventilator-associated pneumonia

TABLE LISTS

PAGE NO

Table 4.1: Frequencies and percentage of answers on knowledge questions provided for nurses in TASH adult emergency and all ICUs Addis Ababa, 2023.....16

Table 4.2: Perceived barriers and adherence reported by nurses in TASH adult emergency and all ICUs Addis Ababa, 2023.....18

FIGURES

Fig 4.1: knowledge score on VAP preventive bundles of nurses in TASH adult emergency and ICU Addis Ababa, 2023.....14

Fig 4.2: Knowledge score distribution15

Fig 4.3: Percentage and frequency of barriers reported towards oral care17

Fig 4.4: Percentage of barriers towards sedation interruption19

TABLE OF CONTENTS

APPROVAL	i
ACKNOWLEDGMENT	iii
ACRONYMS AND ABBREVIATIONS	iv
TABLE LISTS	v
FIGURES	v
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background.....	1
1.2 Statement of the problem.....	2
1.3 Significance of the Study.....	2
1.4 Literature review.....	3
CHAPTER TWO: OBJECTIVES	6
2.1 General objectives.....	6
2.2 Specific objectives	6
CHAPTER THREE: METHODS AND MATERIALS	7
3.1 Study Area	7
3.2 Study period and design	7
3.3 Source population	7
3.4 Study population.....	7
3.5 Eligibility Criteria.....	8
3.6 Sample Size Determination and Sampling Technique	8
3.8 Operational definitions	9
3.9 Data collection tools and procedures.....	10
3.11 Data processing and analysis.....	10

3.12 Ethical consideration11

CHAPTER FIVE: DISCUSSIONS19

6.1 Conclusions.....21

6.2 Recommendations.....21

ANNEX.....25

ABSTRACT

Background: Ventilator-associated pneumonia (VAP) is an infection of lung parenchymal that occurs in patients who are intubated for 48 hours or longer. It's a serious healthcare-associated infection which lengthens patients stay in the intensive care unit (ICU) and hospital. It also results in higher mortality and medical costs. Effective application of VAP prevention bundle is a requirement for VAP prevention.

Objectives: The study aims to assessing knowledge and barriers towards the application of VAP prevention bundle among nurses working in emergency and ICU, Tikur Anbessa Specialised Hospital (TASH).

Methodology: Descriptive cross sectional study conducted using a semi-structured questionnaire and Convenience sampling technique for selecting participants. Descriptive analysis was done by SPSS version 27. Sixty percent and above was used as good knowledge score.

Results: About 72.5% of had good knowledge towards VAP prevention bundle. Inadequate resource (88.7%), lack of guidelines (80.4%), lack of training of VAP bundle (68%), lack of skill (50%), and fear of adverse effects (57.1%) were the major barriers mentioned by the nurses towards the application of VAP prevention bundle.

Conclusions: In this study majority of the nurses are knowledgeable towards ventilator associated pneumonia prevention bundle and there are major perceived barriers that alter the application of this bundle which are a lack of guidelines, inadequate training, limited resources, a lack of skill, and a fear of adverse effects.

Keywords: Knowledge, Barrier, ventilator-associated pneumonia, VAP bundle.

CHAPTER ONE: INTRODUCTION

1.1 Background

Ventilator associated pneumonia (VAP) is lung infection that develops in patients who are intubated for 48 or longer hours and who have not previously displayed any symptoms of a lower respiratory infection (1). It is prevalent health care associated infection, with prevalence of 10% to 70% and marked by progression in the infiltrate, systemic signs and symptoms of infection, modifications in sputum characteristics, and identification of a causal agent (2).

It occurs in 28% patients on mechanical ventilation with risk in the first 5 days being 3%, 2% for 6 to 10 days and 1% after 10 days (3).

There is proof that using a VAP preventive package offers reliable directives, a successful reduction in VAP rates, and an improvement in patient safety and treatment quality (4). The effective application of VAP prevention measures is a requirement for VAP prevention (5).

VAP prevention bundle is a standardized evidence based practice which incorporates the following major core practices: semi-recumbent positioning, oral care, subglottic suctioning or “closed” ETT suction systems, sedation interruptions, spontaneous breathing trials, and protocols to reduce routine ventilator circuit changes. Hand hygiene, prophylaxis of stress ulcers and deep vein thrombosis are also included. (6).

Previously done studies revealed that nurses have inadequate knowledge towards VAP prevention practices. A study done in Iran showed emergency nurses have inadequate knowledge on VAP prevention and other studies done in Turkey and Yemen showed ICU nurses have poor knowledge towards VAP prevention (4).

Staff shortage, increased work load, insufficient time, inadequate education and absence of protocols and policies are the major reported barriers towards application of VAP prevention bundle (4).

1.2 Statement of the problem

The reported incidence of VAP density in United States ICUs was 3.6 per 1000 ventilator days and in poor nations 10 to 41.7 per 1000 ventilator days. According to Safdar et al 10 to 20% of patients on mechanical ventilation for greater 48 hours developed VAP (7).

The anticipated cost of VAP is additional 40,000 dollar for each patient admitted and a total of 1.2 billion dollar per year in industrialized countries. In the ICU increased length of stay by 5 to 7 days and 27% of death are VAP related (8).

The Ventilator Bundle is a successful strategy for lowering VAP rates. Studies have shown that the delivery of multidisciplinary educational programs, which are well structured, to health care workers caring for mechanically ventilated patients reduced VAP significantly (9).

In addition to these, healthcare institutions can also be a source of infection and epidemic for the general community if the proper VAP preventive package is not in use. The current study aims to evaluate VAP preventive bundle knowledge among nurses and to assess barriers to the application of the VAP bundle.

1.3 Significance of the Study

This study is going to help in assessing the level of knowledge towards VAP bundle and identify possible barriers to the application of the VAP preventive bundle. Understanding the knowledge of nurses about care bundles can guide the development of educational strategies to increase adherence to evidence-based practices. Identifying the barriers to implementing care bundles can help develop interventions to overcome these barriers and leads to improvement in the quality of care for patients.

1.4 Literature review

Implementing VAP bundles are recommended by international guidelines for reducing the incidence of VAP among critically ill patients. However, the knowledge and barriers towards application of VAP bundle care among healthcare workers are crucial factors that can impact the effectiveness of VAP prevention programs. Therefore, this literature review aimed to explore the recent developments in the assessment of knowledge and barriers related to VAP bundle care.

A systematic review done in the eastern Mediterranean critical care nurses to assess their knowledge, practice, compliance and barriers towards VAP showed that nurses have low levels of knowledge. Overall, the findings indicated that the majority of the sampled nurses did not follow recommended levels of compliance or recommended strategies for preventing ventilator-associated pneumonia. Lack in education, lack of policies and protocols, inadequate time, and short staffed nurses were the primary impediments identified across the analyzed studies (4).

A systematic review conducted in Athens, Greece, to identify the interventions that have been used by ICUs since the implementation of "Institute for Healthcare Improvement Ventilator Bundle" 22 researchers reported a VAP loss more than 36%, and out of these 10 of them has a decline above 65%. Four studies showed a minor VAP reduction. Four of these trials showed that the after-intervention VAP rates were either nil or almost zero. In those with the maximum VAP reduction "IHI Ventilator Bundle" was used, together with sufficient endotracheal tube cuff pressure and subglottic suctioning (12).

A survey which included 120 Belgian ICUs shows patient characteristics requiring mechanical ventilation were consistent over time, the proportion of patients requiring mechanical ventilation support and the length of ventilation were significantly reduced before and after the national VAP bundle campaign. Cuff pressure control and head elevation above 30° were achieved in more than 90% of patients. Utilizing concentrated chlorhexidine solutions, oral care procedures were carried out more frequently throughout the day. In the most recent years, subglottic

suctioning was also employed, only in 24.7%. When it comes to VAP prevalence, there was a significant reduction from 28% in 2010 to 10.1% in 2016(13).

Descriptive cross-sectional study involving 127 ICU nurses in Sri Lanka revealed that overall knowledge of VAP and its prevention was average in 62.2% of participants, good in 33.1% and poor in 4.7%. Most of them had a strong awareness of natural preventative measures, use of suction catheters and minimizing oropharynx colonization. On the other hand, there was a lack of understanding of the required endotracheal (ET) suction and cuff pressure, early ventilator weaning and cleanliness of ventilator parts. The study concluded that ICU nurses' general understanding of VAP and related preventive strategies was average and showed knowledge gaps in preventive techniques for cleaning and maintaining airways (14).

A study which was conducted in southeast Iran to investigate the barriers towards VAP prevention among registered nurses who worked in emergency rooms and intensive care units showed that barriers perceived by nurses towards VAP prevention had a mean score of 2.82 +/- 0.46. The items "lack of staff," "lack of a team-based approach to care and interventions," and "lack of support from management" had the highest mean scores for perceived barriers (3).

A systematic review focused on barriers towards compliance to VAP prevention guideline was conducted in the United Arab Emirates where inadequate time, inadequate equipment and supplies, limited personal competencies, patient discomfort and adverse events were the major obstacles found in this review (15).

In chitwan a descriptive cross-sectional study on ICU nurses revealed that 14.7% of respondents had a good knowledge level and lack of VAP guidelines, lack of guidance, lack of training, lack of time, inadequate resources and staff shortage were the major barriers reported in this study (16).

A study conducted in Tanzania where 116 ICU nurses participated showed the mean knowledge score was 38.6%. The major barriers reported towards VAP prevention in this study were lack of information (79.3%), inadequate staff (95.5%), and a lack of skills (96.6%) (17).

A hospital-based study in Khartoum ICUS which involved 120 nurses working with patients requiring MV was conducted and results showed that nurses have average knowledge towards VAP prevention, which is a subpar score and indicates that the majority of nurses lack sufficient knowledge of the topic (18).

A study in North-West Ethiopian referral hospitals where 204 ICU nurses participated showed that 52% of nurses have poor knowledge towards VAP prevention (19).

CHAPTER TWO: OBJECTIVES

2.1 General objectives

- Assessing knowledge and barriers towards application of VAP prevention bundle among nurses working in emergency and ICU

2.2 Specific objectives

- Assessing knowledge towards VAP prevention bundle
- To assess barriers towards application of the VAP prevention bundle

CHAPTER THREE: METHODS AND MATERIALS

3.1 Study Area

It was conducted in the TASH Adult Emergency Unit and ICUs in Addis Ababa, Ethiopia.

TASH, largest tertiary hospital in Ethiopia, is established in 1972 GC in the capital city of the country. It provides tertiary-level referral treatment and emergency services. It is staffed with the most senior subspecialists and specialists in the country.

TASH has more than 700 beds, and provides diagnosis and treatment for thousands of patients yearly by multidisciplinary teams available. Currently there are 854 nurses in the hospital, among which 125 are working in emergency and ICUs. The hospital has multidisciplinary departments among which ICUs having separate beds for adults and pediatric patients and lead by pulmonologist, anesthesiologist and cardiologist with multidisciplinary team involvement in managing critically ill patients. ED, run by emergency and critical care consultants, there are 7 beds in the resuscitation area with 3 mechanical ventilators available where care is given for critical patients.

3.2 Study period and design

The study was a single-centered descriptive cross-sectional study carried at TASH from September to November 2023 to assess the level of knowledge and barriers of towards the application of VAP prevention bundle among nurses working in emergency and ICU, Tikur Anbessa Specialised Hospital (TASH). Data collection was made by the use a semi-structured questionnaire.

3.3 Source population

Nurses working in Tikur anbessa specialized hospital were the source population for this study.

3.4 Study population

Nurses working in adult emergency and ICU of TASH were the study population for this study.

3.5 Eligibility Criteria

3.5.1 *Inclusion criteria*

Nurses who were working in TASH ICU (SICU, MICU, CICU, and PICU) and emergency during the time of the study.

3.5.2 *Exclusion criteria*

Nurses who were unwilling to participate.

All nurses who were not working during the data collection period, like those on leave.

3.6 Sample Size Determination and Sampling Technique

Convenience sampling technique was be used

The sample size was determined by:

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

Where n is the required sample size for infinite population, $Z_{\alpha/2}$, the critical value for normal distribution at 95% confidence interval= 1.96 ($\alpha = 0.05$).

Proportion (P) of 48 % was used from previous study done in North West Ethiopia referral hospitals, 2021 (19), and d is the margin of error= 5%.

Since the study populations are less than 10,000, the above formula was modified by the sample correction method which is $NF = n / (1 + (n/N))$, where NF was the desired sample size when the population under consideration is less than 10,000 and n is the desired sample size when the population is more than 10,000=383. N is the estimate of the population size which 125 in this study. The sample size $NF = 383 / \{1 + (383/N)\}$

10% will be added for possible nonrespondents

Total number of nurses in EMCC and ICU is 125

EMCC nurses; 54

Cardiac ICU; 19

MICU, SICU and PICU; 52

After replacing the numbers total sample size will be 94 and adding 10% for non-respondents will give total sample size =103.

3.7 Study variables

3.7.1 *Dependent variables*

- Knowledge of nurses towards VAP prevention bundles

3.7.2 *Independent variables*

- Socio-demographic characteristics
- Barriers

3.8 Operational definitions

Knowledge: knowledge in this study refers to measurements of nurses' responses to knowledge-related questions where correct response had the value of 1 and was considered as knowing that item(s). Whereas, the incorrect response have 0 value and was considered as not having knowledge towards the given item(s). Respondents who scored 60% and above for knowledge questions were considered as having good knowledge and those who scored below 60% were considered as having poor knowledge.(20) (21)

Barriers: Barriers refer to any factors that hinder or prevent nurses from applying VAP bundle care in their practice.

3.9 Data collection tools and procedures

Data was collected through a semi-structured questionnaire prepared in English language. The questionnaire used was designed based on the literature review and previously used questionnaires.

The questionnaires have three sections: socio-demographic questions on part I, part II knowledge questions which contained 15 question and part III was for barriers towards the application of VAP bundle.

Questionnaire on knowledge was adapted from a previous study done in Ethiopia(9) .The Questionnaire on barrier was adapted from similar study done in India(10). The questionnaire was compiled on Google form and was sent via online link to nurses who gave consent. Verbal consent was obtained before sending the online link and nurses who did not give consent were excluded. The quality of data collection was monitored by the primary investigator and data completeness was checked before entering data into SPSS.

3.10 Data quality control

A clearly articulated semi-structured questionnaire was. Before submission of responses the respondents had to fill all questions that were provided. Data collection was done via an online link provided from Google form and the link was sent for participants.

3.11 Data processing and analysis

Completed data was downloaded from Google form to excel, coded and exported to SPSS version 27 after checking for completeness and descriptive analysis was done by principal investigator.

Percentage and frequency were used for description of demographic variables and barriers toward the application of VAP prevention bundle. In assessing knowledge, each correct answer was given one mark with total score ranging from 0 to 15 and Median, interquartile range, percentage and frequency were used for description of knowledge score which was not normally distributed. Figures and tables were used to provide an overall and coherent presentation and description of data result.

3.12 Ethical consideration

The AAU, department of emergency and critical care medicine Ethics Review Committee granted ethical clearance for the study, and confidentiality was upheld throughout by not using names or other identifying information. Prior to administering the questionnaire, respondents gave their informed consent after being informed of the study's purpose.

CHAPTER FOUR: RESULTS

4.1. Socio-demographic characteristics of the nurses

One hundred three nurses working in TASH Adult Emergency and ICU (MICU, SICU, CICU, and PICU) were included in the study. The respondent rate was 88.4%. Of the respondents, the majority, 48 (52.7%) were aged between 26 and 30 years, 22 (24.2%) between 31 and 35 years, 14 (15.4%) between 21 and 25 years, 5 (5.5%) between 36 and 40 years, and 2 (2.2%) were 41 and older. The standard deviation, mean age, and median age were 4.029, 29.24, and 29.29, respectively.

Sex distribution: Males account for 50 (54.9%) and 41 (45.1%) were females.

Work experience: Regarding their work experience 49 (53.8%) had experience of 5–10 years, 33 (36.3%) <5 years, and 9 (9.9%) >10 years work experience.

Educational status: Majority 67(73.6%) were Bachelor of Science graduates and 24 (26.4%) have master's degree.

Department where the respondents were working

Of the respondents, 38 (41.8%) were from emergency department, 21 (23.1%) in the medical ICU, 13 (14.3%) in the surgical ICU, 11 (12.1%) in the cardiac ICU, and the remaining 8 (8.8%) were working in the paediatrics ICU.

4.2: Knowledge on VAP prevention Bundle care

Each respondent's total correct response out of 15 was determined. The participants' overall median knowledge score was 11 out of 15 (IQR=8–12). The degree of knowledge was divided into two categories: those with scores of 60% and higher were regarded as having good knowledge and those with scores below 60% were regarded as having poor knowledge.

The frequency and percentage of response for each provided question are listed in table 4.2

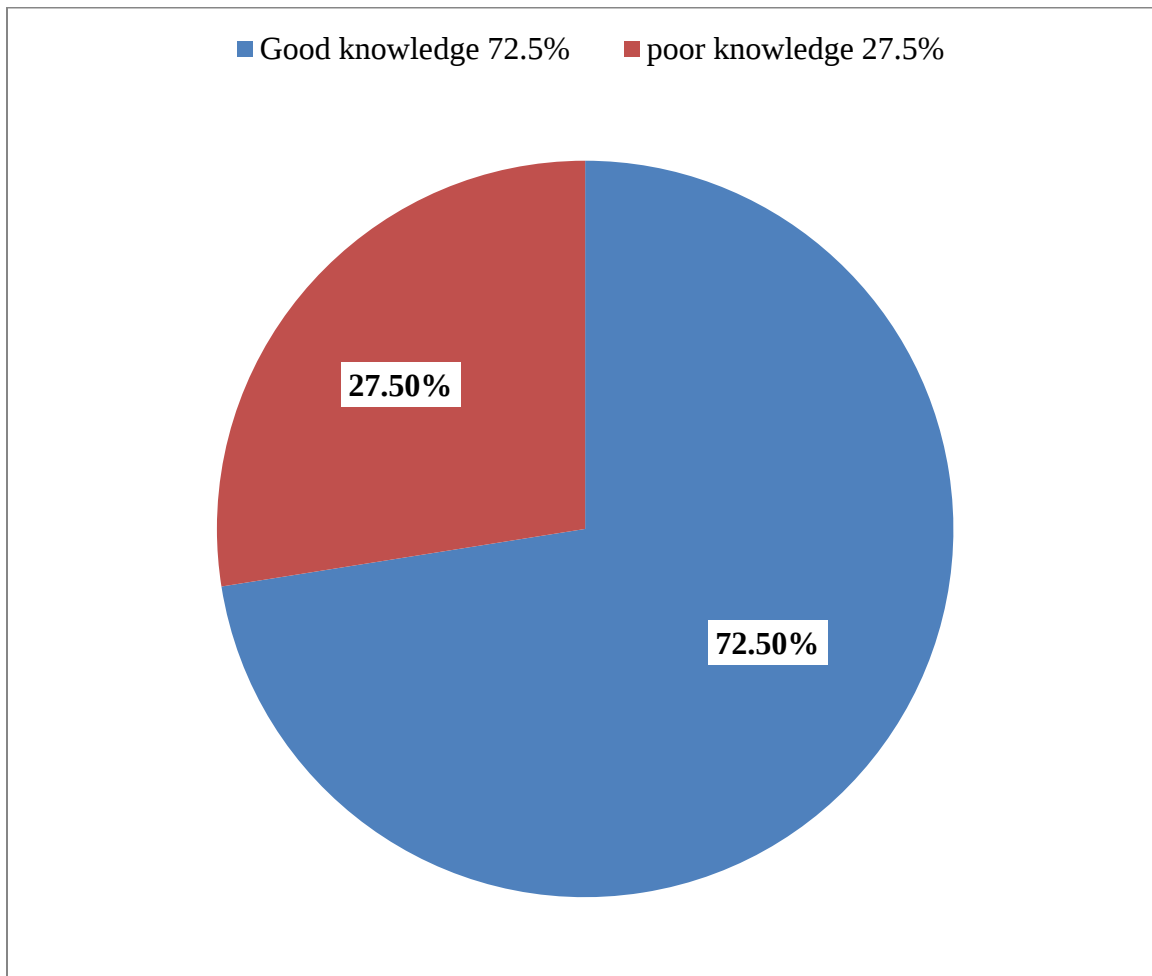


Fig 4.1 knowledge score on VAP preventive bundles of nurses in TASH adult emergency and ICU Addis Ababa, 2023

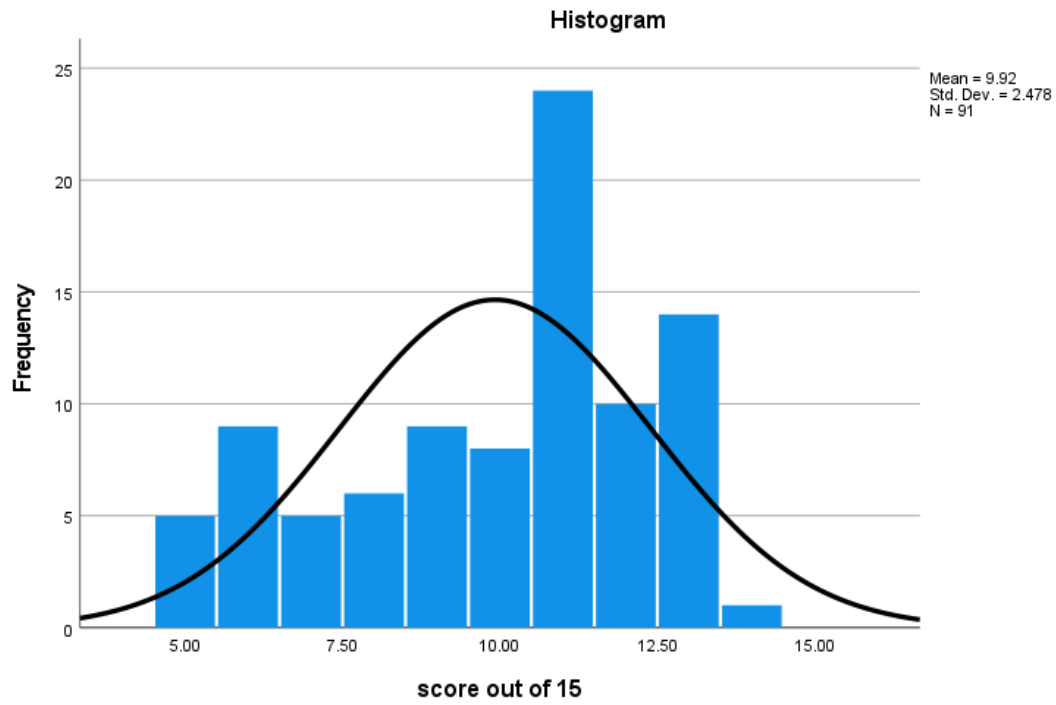


Fig 4.2 Knowledge score distribution

Table 4.1 frequencies and percentage of answers on knowledge questions provided for nurses in TASH adult emergency and all ICUs Addis Ababa, 2023

Questions.	Correct Answer	In correct Answer
1. Recommended route of intubation	83(91.2%)	8(8.8%)
2. Route in Q.1 will decrease the risk of VAP because	57(62.6%)	34(37.4%)
3. When to change humidifiers	28(30.8%)	63(69.2%)
4. Degree of Head of the bed elevation	67(73.6%)	24(26.4%)
5. When to wear sterile gloves	45(49.5%)	46(50.5%)
6. When is an HCW caring for a ventilated patient required to wash hands	78(85.7%)	13(14.3%)
7. When perform Oral care by using a swab moistened with mouthwash and water	63(69.2%)	28(30.8%)
8. Role of prolonged use of Stress ulcer prophylaxis	29(31.9%)	62(68.1%)
9. Maintenance of an adequate number of health care workers-to-patient ratios in a critical care setting	81(89%)	10(11%)
10. Associated with continuous education to ICU health care workers	81(89%)	10(11%)
11. Importance of performing chest physiotherapy	68(74.7%)	23(25.3%)
12. Adjustable beds	74(81.3%)	17(18.7%)
13. When should ETT suctioning be done to the patient?	35(38.5%)	56(61.5%)
14. overfeeding carbonated foods or fluids	54(59.3%)	37(40.7%)
15. Adequate cuff pressure maintenance	59(64.8%)	32(35.2%)
Median knowledge score	11(IQR=8-12)	

4.3; Barriers towards VAP bundle care

In this study, barriers were assessed using 12 questions, and about 48 (52.7%) nurses reported barriers to not complying with the VAP bundle: inadequate resource (75%), lack of guidelines (68.75%), lack of training on VAP bundle care (54.2%), increased work load (33.3%), inadequate staff (31.25%), fear of patient discomfort (29.2%), lack of teamwork (27%), lack of skill (25%), and cost (22.9%). The reported compliance by the respondents to VAP bundle care in the study was 43 (47.3%).

The most reported barriers towards application to oral care, and for not using chlorhexidine during oral care are shown in figures below.

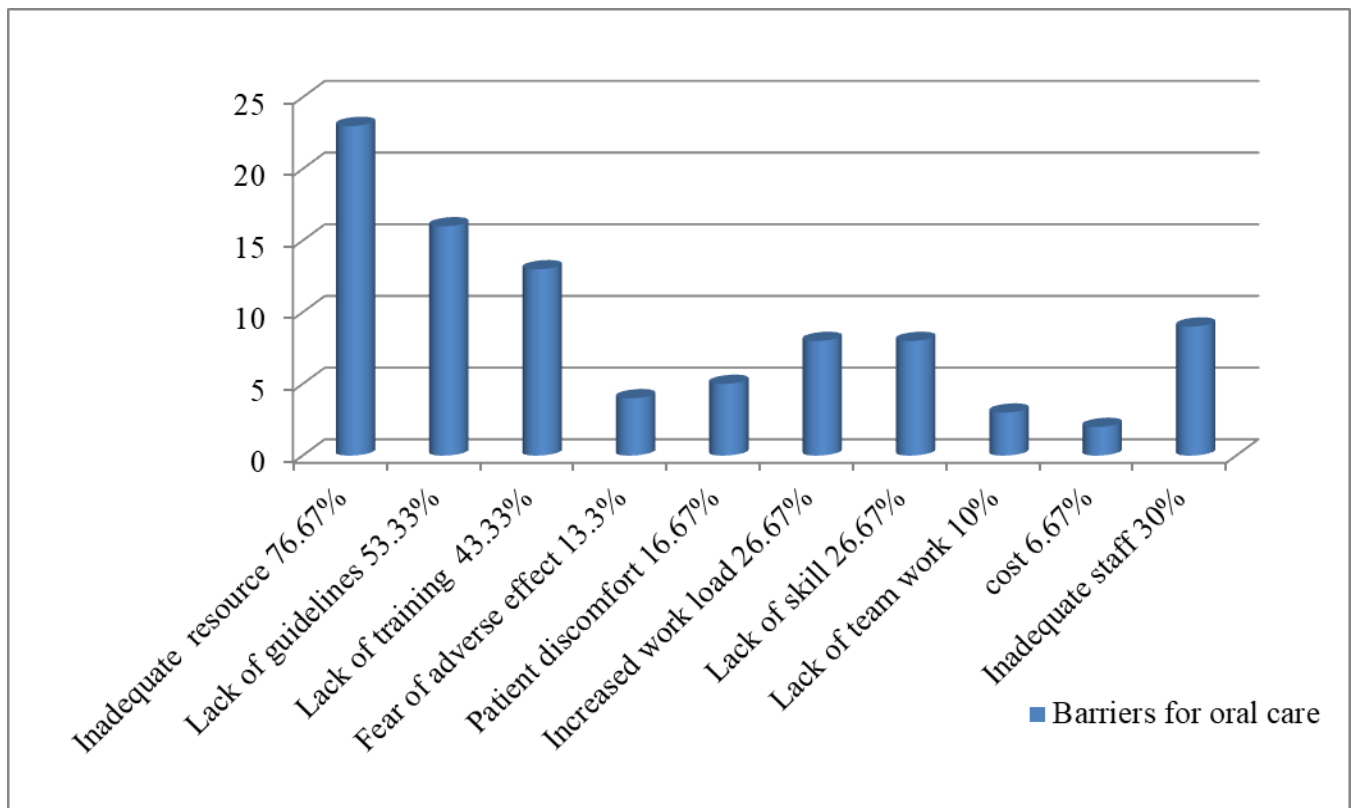


Fig 4.3 percentage and frequency of barriers reported towards oral care

Table 4.2 Perceived barriers and adherence reported by nurses in TASH adult emergency and ICUs in TASH Addis Ababa, 2023

Questions	Answers		Most common barrier
	Yes	No	
Comply with the VAP bundle	43(47.3%)	48(52.7%)	Inadequate resource (75%)
Sedation interruption	48(52.7%)	43(47.3%)	Fear of adverse effect (69.8%)
Oral care protocol	61(67%)	30(33%)	Inadequate resource (76.6%)
Chlorhexidine oral rinse use	20(22%)	71(78%)	Inadequate resource (88.7%)
Endotracheal suctioning	64(70.3%)	27(29.7%)	Lack of guideline and inadequate resource (51.9%)
Closed suction system	33(36.3%)	58(63.7%)	Inadequate resource (84.48%)
Assessment of depth of sedation	41(48.4%)	47(51.6%)	Lack of guideline (78%)
Use of validated tool for depth of sedation assessment	28(30.8%)	63(69.2%)	Lack of guideline (74.6%)
Spontaneous breathing tests	35 (38.5%)	56(61.5%)	Lack of guideline (80.4%)
Head of the bed elevated to 30-45 degrees	87(95.6%)	4(4.4%)	Lack of guideline and inadequate resource (55.5%)
DVT prophylaxis	85(93.4%)	6(6.5%)	Inadequate resource (83.3%)
Ulcer prophylaxis	80(87.9%)	9(12.1%)	Inadequate resource, lack of guideline and lack of training (55.5%)

For assessing depth of sedation, the most reported barriers were lack of guidelines (78.72%), lack of training on VAP bundle care (68.08%), lack of skill (46.8%), and patient discomfort (46.8%).

For assessing sedation depth using a validated tool, lack of guidelines (74.6%), lack of training (55.6%), and lack of skill (44.4%) were the most reported barriers. For spontaneous breathing

trials, the most reported barriers are lack of guidelines (80.4%), lack of training (64.3%), fear of adverse effects (57.1%), and lack of skill (50%).

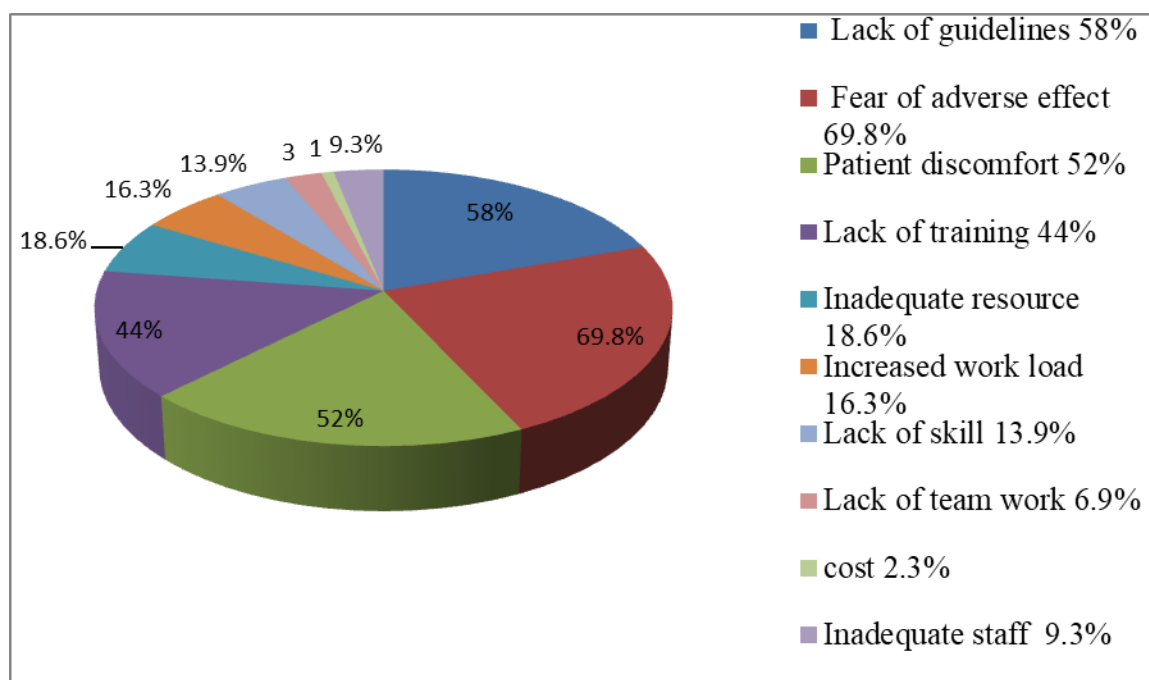


Fig 4.4 percentage of barriers towards sedation interruption

CHAPTER FIVE: DISCUSSIONS

The objective of the study was assessing knowledge and barriers among nurses working in emergency unit and ICUs (paediatrics ICU included) at TASH towards application of VAP prevention bundle. 103 participants were invited for the self-administered questionnaires, of which 91 respondents filled them out completely, making the respondent rate 88.4%, and among which males were predominant. 67 (73.6%) of the nurses were graduates of Bachelor of Science. The mean age of participants was 29.24(SD =4.029) with the majority having work experience between five and ten years, 49 (53.8%).

Regarding the knowledge in this study 66(72.5%) of the respondents have good knowledge which is higher than a study done in Addis Ababa by G/Hans, 2020 where 17.1% of the nurses had good knowledge this can be due to sample size which included 35 nurses and scoring method where mean core was used and the mean knowledge score in the study was 77.68% which is higher than the mean score in the current study (66.6%) (9).

Another study done in Gondar Ethiopia ,2021 showed about 48% of nurses had good knowledge and 51.96% had poor knowledge this difference can be attributed to the sample which is not comparable to the current study (204 participants).(19)

A study in EL Fayoum university hospital, 2018 where 40 nurses participated and the result showed only 25% has satisfactory knowledge which is not consistent to the current study where 72.5% had good knowledge .similarly this difference can be due to sample and the scoring where score of 75% was used as cut off for satisfactory knowledge(22)

In this study more than fifty two percent of participants (52.7%) don't comply with VAP bundle care, with the main reported barriers being inadequate resources (75%), a lack of guidelines (68.75%), a lack of training on VAP bundle care (54.2%), and an increased work load (33.3%). This result has similarities with a study done in Chitwan Medical College in 2018 (16), in which the major barriers reported towards VAP prevention were lack of guidelines, lack of training,

inadequate resources and inadequate staff. In a study done in India in 2023 (10), fear of potential adverse effects and unawareness of guidelines were identified as barriers.

Limitation:

- Single center study
- The barriers studied were perceived barriers
- Recall bias
- Observational check list was not used to assess compliance

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Current study shows, around (72.5 %) of nurses have good knowledge. However, they encounter several barriers that hinder the application of this care bundle. These barriers include a lack of guidelines, inadequate training, limited resources, insufficient skills, fear of adverse effects, and inadequate staffing. It is crucial to address these barriers to ensure the effective implementation of VAP bundle care and enhance patient outcomes.

6.2 Recommendations

- Training on ventilator associated pneumonia bundle care should be given to nurses working emergency and ICU
- Adequate resource mobilizing and continuous follow up on providing resources needed for implementing VAP bundle
- Continuous follow up and guidance is needed for nurses towards application of VAP bundle

REFERENCES

1. Al-Sayaghi KM. Critical care nurses' compliance and barriers toward ventilator-associated pneumonia prevention guidelines: cross-sectional survey. *J Taibah Univ Med Sci*. 2021 Apr 1;16(2):274–82.
2. Sisay B. Assessment of knowledge, attitude and practices on the prevention of ventilator associated pneumonia among nurses working in five selected adult intensive care units of government hospitals, addis ababa, ethiopia. *sciencesc*,. 2017.
3. Dehghan M, Arab M, Akafzadeh T, Malakoutikhah A, Mazallahi M, Forouzi MA. Intensive care unit registered nurses' perceived barriers towards ventilated associated pneumonia prevention in southeast Iran: a cross-sectional descriptive - an analytical study. *BMJ Open*. 2022 Sep 26;12(9).
4. AL-Mugheed K, Bani-Issa W, Rababa M, Hayajneh AA, Syouf A Al, Al-Bsheish M, et al. Knowledge, Practice, Compliance, and Barriers toward Ventilator-Associated Pneumonia among Critical Care Nurses in Eastern Mediterranean Region: A Systematic Review. Vol. 10, *Healthcare (Switzerland)*. MDPI; 2022.
5. Zenas J, Mwakawanga D, Ndomondo MD, Ndile ML. Experience of Nurses in the Prevention of Ventilator-Associated Pneumonia Among Critically Ill Patients at Muhimbili National Hospital in Dar es Salaam. *Res J Heal Sci [Internet]*. 2022;12(2):1–14. Available from: <https://doi.org/10.21203/rs.3.rs-2144958/v1>
6. Kallet RH. Ventilator Bundles in Transition : From Prevention of Ventilator- Associated Pneumonia to Prevention of Ventilator-Associated Events. 2019;64:994–1006.
7. Lim K, Kuo S, Ko W, Sheng W, Chang Y, Hong M, et al. ScienceDirect Efficacy of ventilator-associated pneumonia care bundle for prevention of ventilator-associated pneumonia in the surgical intensive care units of a medical. *J Microbiol Immunol Infect [Internet]*. 2015;48(3):316–21. Available from:

<http://dx.doi.org/10.1016/j.jmii.2013.09.007>

8. Weheida SM, Omran ES, Taha AS. Effect of Designed Bundle Protocol about Ventilator Associated Pneumonia on Nurses ' Performance , Compliance , and Patient Outcomes. 2022;4(3):71–85.
9. Hans G/. 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 Anesthesiology and Critical C. 2020.
10. Paliwal N, Bihani P, Mohammed S, Rao S, Jaju R, Janweja S. Assessment of Knowledge, Barrier in Implementation, and Compliance to Ventilator Bundle among Resident Doctors and Nurses Working in Intensive Care Units of a Tertiary Care Center of Western India: A Cross-sectional Survey. *Indian J Crit Care Med.* 2023;27(4):270–6.
11. Álvarez-Lerma F, Sánchez García M. “The multimodal approach for ventilator-associated pneumonia prevention”—requirements for nationwide implementation. *Ann Transl Med* [Internet]. 2018 Nov;6(21):420–420. Available from: <http://atm.amegroups.com/article/view/21829/21650>
12. Mastrogianni M, Katsoulas T, Galanis P, Korompeli A, Myrianthefts P. The Impact of Care Bundles on Ventilator-Associated Pneumonia (VAP) Prevention in Adult ICUs: A Systematic Review. *Antibiotics.* 2023;12(2).
13. Jadot L, Huyghens L, De Jaeger A, Bourgeois M, Biarent D, Higuët A, et al. Impact of a VAP bundle in Belgian intensive care units. *Ann Intensive Care* [Internet]. 2018;8(1). Available from: <https://doi.org/10.1186/s13613-018-0412-8>
14. Muralitharan P., Seneviratne S.M.K.S. Knowledge Regarding Ventilator-associated Pneumonia and its Prevention Among Nurses Working at Intensive Care Units of Two Teaching Hospitals in Sri Lanka. *J Heal Sci Innov Res.* 2022;3(01):29–38.
15. Al-Tamimi M, Refaat F, Bani Issa W. Barriers to compliance with evidence-based guidelines for ventilator-associated pneumonia among critical care nurses: A scoping review. *F1000Research.* 2022;11:1551.

16. Mehta SKCRK. Knowledge, Adherence and Barriers towards the Prevention of Ventilator Associated Pneumonia among Nurses. *Int J Sci Res* [Internet]. 2018;7(11):358–63. Available from: <https://www.ijsr.net/archive/v7i11/ART20192482.pdf>
17. Bankanie V, Outwater AH, Wan L, Yinglan L. Assessment of knowledge and compliance to evidence-based guidelines for VAP prevention among ICU nurses in Tanzania. 2021;1–12.
18. Fa AS. Critical Care Nurse ' s Knowledge of Ventilator -Associated Pneumonia Prevention in Selected Hospitals , Khartoum. 2017;1–7.
19. Getahun AB, Belsti Y, Getnet M, Bitew DA, Gela YY, Belay DG, et al. Knowledge of intensive care nurses' towards prevention of ventilator-associated pneumonia in North West Ethiopia referral hospitals, 2021: A multicenter, cross-sectional study. *Ann Med Surg* [Internet]. 2022;78(June):103895. Available from: <https://doi.org/10.1016/j.amsu.2022.103895>
20. Assessment of knowledge and practice of ICU care bundles in infection control among physicians and nurses working in three government hospitals Teshome M,2021
21. Shaaban N. Critical Care Nurses ' Knowledge and Compliance with Ventilator Associated Pneumonia Bundle at Cairo University Hospitals. 2013;4(15):66–78.
22. Sobeih Sobeih H, Nabil Abd-Elsalam S, Qurany Ahmed R. Ventilator Associated Pneumonia Bundle among Mechanically Ventilated Patient: Nurses' Perception. *Egypt J Heal Care*. 2018;9(2):264–77.

ANNEX

ANNEX I: Questionnaire (English version)

Informed Consent Form for Quantitative survey questionnaires:

Date_____ Code number of the checklist_____

My name is Dr. Tirsit Nigussie, and I am a 3rd year emergency and critical care medicine resident. I am currently doing my research on “Assessment of knowledge and barriers towards the application of VAP bundle care among nurses working in emergency and ICU at TASH, and the research undertaken in the partial fulfillment of my specialization in emergency and critical care medicine. The objective of this questionnaire is to assess the knowledge and barriers towards the application of VAP bundle care among nurses working in emergency and ICU at TASH. I would like to assure you that the study is confidential. I will not keep a record of your name and address. You have the right to skip any question that you do not want to answer. Your correct answer can help the study achieve its goals. Therefore, you are kindly requested to respond genuinely and voluntarily with patience. The questions may take about 5-10 minutes. Are you voluntary?

Yes_____ No_____

CONTACT

If you have questions at any time about the study, you may contact tirseldnig@gmail.com

Or via phone No+251910379145

Thank you.

ANNEX II

Part I: Socio-Demographic Characteristics

1. Age -----
2. Gender -----
3. What is your year of experience?
 - a. <5 years
 - b. 5-10 years
 - c. >10 years
4. What is your educational status?
 - a. Diploma
 - b. BSc.
 - c. Master
 - d. Ph.D.
5. Which departments have you been working in?
 - a. Surgical ICU
 - b. Medical ICU
 - c. Cardiac ICU
 - d. Pediatrics ICU
 - e. Emergency

Part II :Assessing Nurses Caring for mechanically ventilated patients' Knowledge of Prevention bundles of Ventilator-Associated Pneumonia

1. Which route is best recommended when intubating a patient?
 - a. Oral intubation
 - b. Nasal intubation
 - c. Both routes
 - d. I do not know
2. The recommended route of intubation in Q.1 will decrease the risk of VAP because
 - a. It is associated with sinusitis
 - b. It is not associated with sinusitis
 - c. Both routes of intubation are associated with sinusitis
 - d. I don't know
3. When is it recommended to change humidifiers?
 - a. Every 2-7 days (or whenever necessary)
 - b. Every day (or whenever necessary)
 - c. Every month (or whenever necessary)
 - d. I do not know
4. What should the range of the Head of the bed elevation be?
 - a. 0-15 degree
 - b. 15-30 degrees
 - c. 30-45 degrees
 - d. I do not know
5. When is an HCW caring for a ventilated patient required to wear sterile gloves?
 - a. During oral suctioning
 - b. ETT suctioning
 - c. Oral and ETT suctioning
6. When is an HCW caring for a ventilated patient required to wash hands?
 - a. Before oral and ETT suctioning
 - b. After oral and ETT suctioning
 - c. Before and after oral / ETT suctioning

- d. I don't know
7. When is it recommended to perform Oral care by using a swab moistened with mouthwash and water?
- a. Once in a shift
 - b. Every 4 to 6 hours and whenever
 - c. necessary
 - d. Whenever necessary
 - e. I do not know
8. What is the role of prolonged use of Stress ulcer prophylaxis in a ventilated patient?
- a. Not to be used for patients who are at high risk of developing a stress ulcer
 - b. May increase the colonization density of the aero-digestive tract
 - c. Routine stress ulcer prophylaxis does not influence the risk of VAP
 - d. I don't know
9. Which one is associated with the maintenance of an adequate number of HCWs-to-patient ratios in a critical care setting?
- a. Increased risk for VAP
 - b. Decreased risk for VAP
 - c. Does not influence the risk for VAP
 - d. I don't know
10. Which one is associated with continuous education to ICU HCWs on the prevention of nosocomial infection?
- a. Increased rates of VAP
 - b. Decreased rates of VAP
 - c. Does not influence the rates of VAP
 - d. I don't know
11. What is the importance of performing chest physiotherapy?
- a. Chest physiotherapy reduces the risk of VAP
 - b. Chest physiotherapy increases the risk of VAP
 - c. Does not influence the risk for VAP
 - d. I do not know

12. Why do adjustable beds are useful in critical care settings?
- a. Adjustable beds increase the risk of VAP
 - b. Adjustable beds reduce the risk of VAP
 - c. Adjustable beds do not influence the risk for VAP
 - d. I don't know
13. When should ETT suctioning be done to the patient?
- a. Routinely to every shift
 - b. As needed
 - c. It should be done through ETT only
 - d. I do not know
14. What is the effect of overfeeding carbonated foods or fluids on a ventilated patient?
- a. Increased risk for VAP
 - b. Decreased the risk for VAP
 - c. Do not influence the risk for VAP
 - d. I don't know
15. What is the effect of maintenance of adequate cuff pressure during the care of ventilated patients?
- a. Is important because it decreases the risk of VAP
 - b. Can increase the risk of VAP
 - c. Do not influence the risk for VAP
 - d. I don't know.

PART III: Barriers to the VAP Bundle

1. I always comply with the VAP bundle. Yes____ No____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill

- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

2. I always interrupt continuous sedative infusions as recommended. Yes_____ No_____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

3. I always adhere to the existing oral care protocol Yes_____ No_____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

4. I always use chlorhexidine oral rinse as recommended. Yes____ No____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

5. I always perform endotracheal suctioning as recommended. Yes____ No____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

6. I always use the closed suction system for all my patients. Yes____ No____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

7. I always assess the depth of sedation as often as recommended. Yes____ No____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

8. I always assess the depth of sedation using a validated tool. Yes____ No____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

9. I always perform spontaneous breathing tests as recommended. Yes_____ No_____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

10. I always keep the head of the bed elevated to 30-45 degrees. Yes_____ No_____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines

- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

11. I always make sure that DVT prophylaxis is given as recommended.

Yes_____ No_____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

12 I always make sure patient is taking ulcer prophylaxis, as recommended. Yes_____ No_____

If not, why not? (Encircle all that applies)

- a. Lack of guidelines
- b. Inadequate resources
- c. Fear of potential adverse effects
- d. Costs
- e. Patient discomfort
- f. Lack of skill
- g. Lack of adequate staff
- h. Lack of team work
- i. Lack of training on VAP bundle care
- j. Increased work load

I, the undersigned, declare that this is my original work and that all sources of materials used for this thesis are duly acknowledged

Name: Dr. Tirsit Nigussie Signature: _____ Date_____