ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF MEDICINE

DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE NURSING

KNOWLEDGE AND PRACTICE OF INTENSIVE CARE UNIT NURSES TOWARDS VENTILATOR CARE BUNDLE TO PREVENT VENTILATOR ASSOCIATED PNEUMONIA IN PUBLIC HOSPITALS OF ADDIS ABABA, ETHIOPIA (2024).

BY: - MILLION KASSAHUN (B.Sc.)

THESIS SUBMITTED TO COLLEGE OF HEALTH SCIENCES DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE NURSING, FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER OF SCIENCE EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

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ADDIS ABABA, ETHIOPIA

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M.Sc. THESIS

KNOWLEDGE AND PRACTICE OF ICU NURSES TOWARDS VENTILATOR CARE BUNDL TO PREVENT VENTILATOR ASSOCIATED PNEUMONIA IN PUBLIC HOSPITALS OF ADDIS ABABA, ETHIOPIA (2024).

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APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Million Kassahun is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in emergency medicine and critical care nursing.

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DECLARATION

Letter of declaration

By my signature below, I declare and affirm that this is entirely that this thesis is my original work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis, and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis. This thesis submitted to Addis Ababa University College of health sciences department of emergency medicine and critical care, for partial fulfillment of the requirements for the Master of Science emergency medicine and critical care nursing.

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List of abbreviations and acronyms

AAU --------- Addis Ababa University

ALERT -------- Africa Leprosy Rehabilitation and Treatment

BLH --------- Black Lion Hospital

B.Sc. ---------- Bachelor of Sciences

CDC ---------- Centers for Disease Control and Prevention

CHS --------- College of Health Science

DVT --------- Deep Veins Thrombosis

ETB --------- Ethiopian Birr

HAI --------- Hospital Acquired Infection

ICU --------- Intensive Care Unit

MOH -------- Minster of Health

M.Sc. --------- Master of sciences

MV ---------- Mechanical ventilation

PPI ---------- Proton Pump Inhibitor

SPSS -------- Statistical product and social service

ST ------- Saint

VAP --------- Ventilator Associated Pneumonia

VCB --------- Ventilator care bundle

WHO --------- World Health Organization

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Abstract

Ventilator-associated pneumonia (VAP) is a significant healthcare issue affecting individuals receiving mechanical ventilation. It is a major cause of morbidity, mortality, and healthcare costs. VAP can be prevented through ventilator care bundles, which include interventions like bed elevation, oral care, cuff pressure maintenance, sedation vacations, and extubation readiness assessment. Adequate knowledge and practice among healthcare professionals, especially ICU nurses, are crucial.

Objective: To assess knowledge and practice of ICU nurses towards ventilator care bundles to prevent ventilator-associated pneumonia in public hospitals in Addis Ababa, Ethiopia, 2024.

Method: An institutional-based cross-sectional quantitative study design was conducted. Data was collected using a structured, self-administered questionnaire and an observational checklist. Data analysis was done using SPSS version 27. Descriptive statistics (frequencies, percentage, mean, and standard deviation) were calculated. Odds ratio will be used to determine association between dependent and independent variables.

Result: 187 ICU nurses participated in the study, making a response rate of 94.4%. Out of the total of 187 respondents, 57.2% were female. The nurses were between the age group of (26-30) years old; about 74.9% of nurses were B.Sc. holders in nursing. Regarding the training, 44.9% of respondents were trained related to VCB. The mean years of work experience were 3.40, and most of them were single (52.9%). There are 54.5% and 42.2% of the participants who have been found to have good knowledge related to the VCB. Level of education, training, and work experience was significantly associated with the knowledge and practice level of participants (P = 0.05).

Conclusion: Knowledge regarding ventilator care bundles among nurses in the selected public hospitals was unsatisfactory, and the practice of nurses was poor.

Key words: ventilator care bundle, knowledge, practice, intensive care unit.

CHAPTER ONE
INTRODUCTION
1.1 Background

Any infection that a patient contracts while staying in a healthcare facility such as a hospital or nursing home is referred to as a nosocomial infection, or healthcare-associated infection (HAI). When the patient is admitted, these infections are either not present or are still in the incubation stage. Numerous bacteria can cause nosocomial infections, which are frequently linked to invasive medical procedures, the use of medical devices, and patients' compromised immune systems in hospital settings. One major global public health concern is the effect of nosocomial infections on antimicrobial resistance, healthcare expenditures, and patient outcomes. Globally, the highest rates of healthcare-associated infections (HAIs) are found in intensive care units (ICUs). Compared to other hospital departments, the ICU has a 5–10 times greater rate of nosocomial infections. (1–3)

The study found that the most common infection seen in ICU patients was pneumonia, which was followed by bacteremia and urinary tract infections. Pathogens that were frequently isolated were gram-negative organisms such as Escherichia coli, Klebsiella pneumoniae, and Acinetobacter species. Resistant to methicillin additionally common was Staphylococcus aureus (MRSA), which was discovered in specimens from tracheal aspirates, urine, central venous cannula tips, and blood. The use of mechanical ventilation systems with endotracheal tubes was the main cause of nosocomial pneumonia in the intensive care unit, also known as ventilation-associated pneumonia (VAP). (4,5)

VAP is a kind of pneumonia that develops in individuals receiving mechanical ventilation in hospitals or other healthcare facilities. It usually shows symptoms 48 hours or longer after starting a ventilator. VAP is a major source of morbidity, mortality, and healthcare costs worldwide. But VAP is preventable by using of ventilator care bundles (VCB). (6)

In all health delivery systems, clinical guidelines make up a significant portion of the management protocol. Care bundles, which standardize care and enhance results, were established to provide affordable, high-quality services. The use of care bundles in critical care units has demonstrated a decrease in fatality rates and an improvement in survivors' quality of life. (7)

A ventilator bundle care refers to a set of evidence-based practices aimed at preventing VAP in patients on mechanical ventilation. This bundle typically includes a combination of interventions such as elevation of the head of the bed, regular oral care, maintaining proper cuff pressure, daily sedation vacations, and assessing readiness for extubation. Adhering to these bundled care practices has been shown to reduce the risk of developing VAP in critically ill patients. Adequate knowledge and practice with prevention strategies among healthcare professionals, especially ICU nurses, are crucial in reducing the incidence of VAP.(8,9)

The study aims to identify any gaps between knowledge and actual practices of nurses in the selected ICUs of public hospitals Addis Ababa, Ethiopia.

1.2 Statement of the problem

VAP is a serious and potentially life-threatening infection that affects the lungs and is associated with the use of ventilators in hospital settings. VAP can lead to prolonged hospital stays, increased healthcare costs, and higher mortality rates among critically ill patients. (10)

VAP is a common nosocomial infection in adult ICUs, with a rate of 15.7/1000 ventilator days. The mortality rate in VAP+ patients was 65.2%, with 23.6% attributed to VAP (11). The mortality rate among patients with VAP was 30.5% in the USA and 44.4% in China; in developing countries, the mortality rate was high; and the overall mortality rate among mechanically ventilated patients was 57.1% in Ethiopia. (12–14)

When VAP occurs, it prolongs the ICU length of stay, ultimately increasing hospital stay and the risk of death in critically ill patients. VAP is also associated with an increased duration of mechanical ventilation and increased health care costs due to an increased ICU and hospital length of stay. VAP prolongs the length of stay by up to 50 days and increases the duration of mechanical ventilation by 5 to 9 days, which generates the substantial extra cost of care. (15)

The implementation of the VAP Prevention Bundle (VCB) was associated with a clinically important sustained reduction in the incidence of VAP. Compliance with the bundle led to significant improvements in patient outcomes, including a decrease in VAP rates, antibiotic use, MRSA acquisition rates, prolonged hospital stays, health care costs, and mortality rate. The

studies reported a decrease in the incidence rate of VAP following the implementation of the VAP prevention bundle (VCB). The incident density of VAP declined from 32 cases per 1000 ventilator days to 12 cases per 1000 ventilator days in Scotland.(16). The reduction rate of VAP density after implementing the VAP care bundle was 57.6% in china (17). The VAP incidence rate in 2009 was 3.39 per 1,000 ventilator days. In 2010, the rate decreased to 1.98 per 1,000 ventilator days, showing a reduction of 1.41 infections per 1,000 ventilator days in Saudi Arabia. (18).

The responsible health professionals for implementing and monitoring measures to prevent ventilator-associated pneumonia (VAP) include nursing staff, respiratory therapists, intensivists, infection control practitioners, and other healthcare providers involved in the care of critically ill patients in the intensive care unit (ICU). Nurses play a crucial role in preventing ventilator-associated pneumonia (VAP) by adhering to VAP care bundles and guidelines. Their responsibilities include implementing measures such as head of bed elevation, hand hygiene, daily sedative interruption, readiness assessment for extubation, peptic ulcer prophylaxis, deep vein thrombosis prophylaxis, daily oral care with chlorohexidine, and monitoring endotracheal tube cuff pressure. Nurses are also responsible for compliance monitoring, education, and providing feedback to improve adherence to VAP prevention protocols, ultimately contributing to better patient outcomes and reduced VAP rates. (19)

Intensive care unit (ICU) nurses ventilator care bundle or evidence-based guideline knowledge and practice is important to prevent VAP. However, most studies indicated that ICU nurses knowledge and practice were poor. The incidence rate of nurses' knowledge about pneumonia and VAP was notably low. (The study found that 67% of nurses had poor knowledge about pneumonia and VAP) in Iraq. The majority of critical care nurses had unexpectedly unsatisfactory knowledge scores about VAP and VAP bundle preventive measures in Egypt. The study found that 54.9% of nurses had adequate knowledge of VAP prevention, while 68.4% practiced most of the prevention interventions in Kenya. The study found that 54% of adult ICU nurses had poor knowledge of mechanical ventilation management, while only 24% demonstrated good practice in Ethiopia. This indicates a significant gap in knowledge and practice among the nurses.(20–23)

This low level of nurse knowledge highlights the need for improved education and training on VAP prevention strategies to enhance patient care and outcomes.

1.3 Significance of the study

The results of this research will be a great resource for facilities that have been defined by the expertise of critical care nurses, and they will also serve as fertile ground for other governmental and non-governmental organizations seeking to strengthen and improve the expertise of critical care nurses.

The results will have a significant implications for policy and decision-making regarding health care planning, the distribution of resources (human, financial, and others), support programs aimed at preventing VAP, and enhancing nurses' knowledge and practice in nursing care with the goal of decreasing or eliminating VAP in the facility offering these services.

The study will enable academics and researchers to use the information for other related studies and also as a reference in their data banks.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

VAP is a type of lung infection that occurs in people who are on mechanical ventilation. It is a serious and potentially life-threatening condition that can develop in patients who are hospitalized and require assistance with breathing through a ventilator. VAP can have significant impacts on patients, healthcare systems, and outcomes. It can lead to prolonged hospital stays, increased healthcare costs, higher mortality rates, and additional complications for patients already in critical condition. Preventing VAP is crucial to improving patient outcomes and reducing the burden on healthcare resources. (24)

The ventilator care bundle is a set of practices aimed at improving patient outcomes by assisting in promoting changes in patient care and supporting guideline compliance. It consists of various components such as elevating the head of the bed, daily sedation vacation, prophylaxis for peptic ulcer disease, routine acidification of gastric feeding, and deep venous thrombosis prophylaxis (8). Healthcare professionals, especially nurses, play a crucial role in adhering to the bundle protocol to prevent disease complications. The bundle protocol practices include hand hygiene, wearing protective clothing, care of mechanical ventilator patients, ventilator settings, endotracheal intubation tube care, enteral feeding, oral hygiene, patients' positioning, chest physiotherapy, and closed suctioning systems. (25)

2.2 Knowledge

The impact of nurses' knowledge on preventing ventilator-associated pneumonia (VAP) is significant. Nurses play a crucial role in implementing preventive measures at the bedside, such as hand hygiene, ventilator circuit changes, and tracheal suctioning. The study showed that nurses had a statistically significant correlation between knowledge and practice scores, indicating that better knowledge led to improved implementation of preventive strategies. (26)

Research conducted in 2020 throughout Europe and Asia using the systematic review and meta-analysis technique. In the analysis, 8 of the 1193 papers that were located were used. The nurses achieved 48.31% of the VAP preventive total score (CI: 95%: 44.63-52). The lowest and highest VAP prevention scores were found to be correlated with the frequency of humidifier adjustments (15.13%, 95% CI: 11.35-18.92) and patient placement respectively. Compared to European

studies, a higher percentage of nurses (44.92% versus 54.71%) were knowledgeable with VAP prevention in Asian studies. (27)

According to a quantitative cross-sectional survey done in Malaysia, 86.7% (n = 30) of respondents knew the VCB at a high level. The degree of VCB knowledge and registration as a registered nurse (p = 0.03), ICU post-basic qualification (p = 0.02), and nursing education level (p = 0.001) are significantly correlated. The degree of schooling (r = 0.71; p = 0.001), the number of years of registration (r = 0.38; p = 0.03), and post-basic qualification (r = 0.42; p = 0.02) were all substantially correlated with the level of knowledge.(28)

In India, a descriptive survey conducted in 2019 revealed that 56.7 percent of staff nurses had great understanding about ventilator care bundles, and 43.3% of them had outstanding knowledge within the first 60 participants. (29)

In South Africa, a two-phase, non-experimental, descriptive, co relational, and contextual study design was employed. The evidence-based guidelines for preventing ventilator-associated pneumonia were found to be deficient in the knowledge of both ICU-trained and non-ICU-trained nurses working in the ICUs of the three hospitals. Of the 83 participants, 18 (21.69%; CI 95% 13.4%; 32.1%) passed the multiple-choice portion of the test with a score of 70%, indicating that they knew enough about the evidence-based recommendations for preventing VAP. On nine questions, the participants' mean score was 4.25 (SD 1.537 CI 95% 3.92; 4.59). The mean average score of nurses with ICU training and nurses without ICU training differed by quite little.(30)

In Egypt, a descriptive exploratory design was applied. throughout the period from March 2010 to September 2011. For this study, 45 critical care nurses were enlisted. Unsatisfactory knowledge scores (mean = 7.46 + 2.37) and noncompliance with ventilator-associated pneumonia bundling practices (average mean = 8.62 + 7.9 out of 29) were found in the findings of a 20-item questionnaire. Additionally, no specific procedure was followed for the prevention of ventilator-associated pneumonia. (21)

A cross-sectional survey conducted in Ethiopia in 2021 reveals that 213 critical care nurses were involved in the study, with 204 (95.77%) of them responding. Out of 20 questions, the mean

knowledge score of intensive care nurses for preventing ventilator-associated pneumonia is (10.1 ± 2.41). Regarding the general knowledge connected to the prevention of ventilator-associated pneumonia, 98 (48.04%) of the participants were determined to have good knowledge and 106 (51.96%) to have poor knowledge. In multi-variable logistic regression, having training in an intensive care unit and having higher educational credentials were strongly correlated with having a good understanding of ventilator-associated pneumonia prevention. (31)

2.3 Practice

By following recommendations and best practices, nurses have a vital role to play in preventing ventilator-associated pneumonia (VAP). Good nursing practices can lower the risk of VAP and other infections linked to healthcare, improving patient safety. Improved patient outcomes and a decrease in hospitalization rates can result from effective nursing practices in the prevention of VAP. Overall, sustaining high standards of care and encouraging favorable patient outcomes in intensive care units depend on nurses adhering to policies and best practices. (32)

In Pakistan, a cross-sectional, survey-based descriptive study was carried out from November 2018 to September 2019. The study, which included 136 nurses, reveals that the nurses' average score on the major VCB items was 60.8%, falling short of the required threshold. Additionally, their average score on the individual bundle items was below 80%. Out of all the dental care components, just two met the practice standard. (33)

A study was carried out in 2023 in India. The majority of the 115 ICU staff nurses, or 62 (53.91%), had "moderately adequate practice," 19 (16.52%) had "inadequate practice," and only 34 (29.57%) had "adequate practice" on preventing ventilator-associated pneumonia. (34)

The study conducted in Turkey 2017, it was found that 98.0% of nurses practiced hand hygiene, 96.1% aspirated sub glottis secretions on a regular basis, 71.6% did not change the mechanical ventilator circuits on a regular basis, 97.1% discharged the fluid that accumulated in the breathing circuits on a regular basis, 81.4% used sterile water in humidifier containers and did not add water when the water in the humidifier containers decreased, 100.0% used heat-moisture exchangers instead of heated humidifiers, 94.1% used sterile catheters for patients undergoing open aspiration at all times, 95.1% kept the endotracheal tube cuff pressure above 20 cmH2O,

and 98.0% ensured the patients had a head height of 30 to 45 degrees unless there was a contraindication. 88.2% of patients utilized chlorohexidine solution for dental care, 93.1% cleaned the tracheotomy stoma with saline solution, and 81.4% chose enteral feeding. (35)

In 2018, a descriptive cross-sectional study was conducted among ICU nurses working at public hospitals in Sana, Yemen. The study tested the nurses' skills using an observational checklist. Of the nurses, 28% performed hand disinfection before oral care and before tracheal suction, and 74% performed wearing gloves and a gown before oral care and tracheal suction. The study was conducted before and after every patient care. Oral care was administered using an antiseptic solution to 32% of nurses. Of the ICU nurses, 32% sterilized the suctioning equipment, and 100% did not use the closed endotracheal suction system. During tracheal suction, 42% of patients followed sterile protocol, and 54% of patients disposed of the suction catheter right away following a single use. The majority of nurses (78%) kept the patient in a semi-sitting position, 88% employed a kinetic bed for patients who needed ventilation, and 62% completed respiratory chest physical therapy. (36% utilized the technique for weaning off of artificial ventilation, and 54% examined the nasogastric tube). (36)

In 2021, cross-sectional research was done in Ethiopia. According to the study, 86 (58.9%) had bad ventilator care practices, whereas 60 (41.1%) had good ones. The nursing practices of item-wise care for ventilators. The majority of 134 (90.4%) participants in the ventilator care practice pre-oxygenated the patient prior to suctioning; 61 (41.8%) performed suctioning as necessary; and more than two-thirds of the 106 (72.6%) nurses administered normal saline prior to suctioning. The majority of nurses, 117 (80.1%), monitor the endotracheal tube's level, and 54 (37%) of them move the ETT once per 24 hours.(37)

2.4 Associated factors

An assessment of ICU nurses' knowledge and practices regarding the prevention of ventilator-associated pneumonia was carried out by a descriptive cross-sectional survey in public hospitals in Sana'a City, Yemen. There is a strong correlation between education level and prevention knowledge of VAP. Practices of ICU nurses for the prevention of ventilator-associated

pneumonia (VAP) were shown to be statistically correlated with ICU training and years of work experience, but not with educational level. (36)

The results of a descriptive co- relational design in India in 2022 indicate that the staff nurses' years of ICU work experience is affected by their degree of knowledge. As a result, a strong correlation between years of ICU work experience and practice level was discovered. (34)

Descriptive cross-sectional study carried out in Ethiopia in 2021.The practice level components of educational attainment and work experience. In comparison to individuals with a M.Sc. the probability of diploma holders having a good practice was 5.024 times lower. Alternatively, compared to individuals with a 1-4 year experience, those with over 10 years of expertise were 4.543 times more likely to have strong practice. (31)

In Turkey, a cross-sectional study was conducted. The mean total points scored by nurse's on the survey was 4.00±2.00. The comparison of the median value of the nurses' questionnaire scores with their levels of education, years of work experience, and involvement in ventilator-associated pneumonia prevention in-service training programs was shown to be statistically significant ($p<0.05$). (40)

Conceptual framework

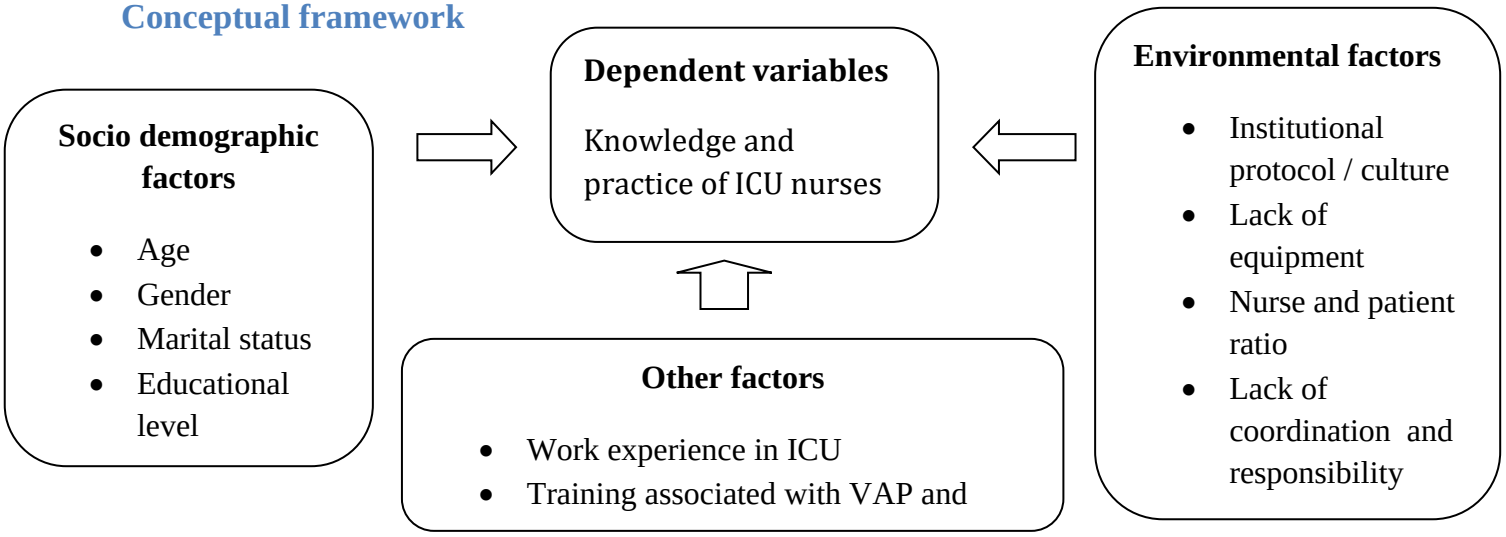

Figure 1: conceptual framework of ventilator care variables adopted from knowledge and practice of nurses working in ICU regarding ventilator care bundles.

CHAPTER THREE

3. OBJECTIVE OF THE STUDY

3.1. General objective

To assess knowledge and practice of ICU nurses towards ventilator care bundle to prevent ventilator associated pneumonia in public hospitals of Addis Ababa, Ethiopia 2024.

3.2. Specific objective

- To identify the knowledge of ICU nurses towards ventilator care bundle to prevent VAP.
- To determine the existing practice of ICU nurses towards ventilator care bundle to prevent VAP.
- To determine the associated factor of ICU nurses towards ventilator care bundle to prevent VAP.

CHAPTER FOUR:-METHODOLOGY

4.1 Study area and period

The study was conducted in selected public hospitals in Addis Ababa, Ethiopia, from March to April 2024. Ethiopia's capital, Addis Ababa, is home to the Africa Union and the Economic Commission of Africa. It has a total area of 540 square kilometers. The city is more slum-like and crowded. The city has 13 public hospitals; from these hospitals, 12 have ICUs. The research was conducted on selected six Addis Ababa public hospitals. These six public hospitals will be selected randomly from a total of 12 public hospitals with ICU setups in Addis Ababa City for the study in order to address within the given resource and time. (39)

Black Lion Hospital, established in 1964, is a specialized hospital in Addis Ababa, Ethiopia. It serves as a teaching hospital for the School of Medicine at Addis Ababa University and offers specialized clinical services. With 200 doctors, 700 beds, and 379 nurses, it provides healthcare services alongside 115 other health professionals. The hospital plans to construct its own private hospital, covering 15 hectares of land for expansion, to gain autonomy and establish financial assets.

St. Paul's Hospital, established in 1969 as St. Paul General Specialized Hospital, is a collaborative effort between Emperor Haile Selassie and the German Evangelical Church. With 392 beds, it serves over 200,000 patients annually and a catchment population of over 5 million. About 75% of patients receive free medical services. The hospital has 13 departments staffed by over 1300 individuals, including the recently launched hemodialysis unit and the country's National Kidney Transplant Center. The Medical School was established in 2014.

ALERT, a medical facility in Addis Ababa, focuses on Hansen's disease (leprosy). Originally named All Africa Leprosy Rehabilitation and Training Center, it now includes tuberculosis in its official name. ALERT offers leprosy training for Addis Ababa University's medical students and houses Armauer Hansen Research Institute (AHRI) for leprosy research. The facility includes a 240-bed teaching hospital with dermatology, ophthalmology, and surgery departments, as well as an orthopedic workshop and rehabilitation program.

Menelik II Referral Hospital in Addis Ababa, Ethiopia, is an esteemed public healthcare facility established in 1909 and named after Emperor Menelik II. Operated by Addis Ababa City Administration, it offers specialized services in various fields such as cardiology, neurology, and oncology. With a capacity of over 800 beds, the hospital serves over 15,000 patients daily and employs more than 2,300 staff members.

St. Peter hospital is located in the northern part of Addis Ababa near'shiromeda', Ethiopia. It was established by the regime of Emperor Hailesilase. Currently, it has many specialty cares, and it is well known as a center of poisoning treatment. Currently, it is serving over 15000 patients. It has a mixed adult medical and surgical ICU with 12 beds, and there are 30 ICU nurses currently actively working.

Zewditu Hospital, located in central Addis Ababa, Ethiopia, was originally established by the Seventh-day Adventist Church but was later nationalized during the Derg regime in 1976. Today, it is operated by the Ministry of Health and is known as Ethiopia's premier hospital for treating ART patients. Zewditu has become the largest HIV clinic in Ethiopia, serving over 14,000 patients.

4.2 Study design

Institutional based cross-sectional study design was used.

4.3 Population

4.3.1 Source population

Nurse's who are work in the designated government hospital in Addis Ababa, Ethiopia.

4.3.2 Study population

The study population was comprise all nurses employed in the ICU of the designated government hospitals in Addis Ababa, including those in medical and surgical and stroke units, during the data collection period.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

All nurses who are working in ICU during study period were included.

4.4.2. Exclusion criteria

- Nurses who was not be available during the study period due to maternal leave, annually leave and other reasons.
- Nurses who are not willing to participate in the study.

4.5. Sample size determination

All nurses working in the ICU of selected hospitals who fulfill the inclusion criteria were taken as the sample size of the study. Because the total number of nurses working in the ICU of selected hospitals were small. 198 (SPMMC =48, TASH =42, ALERT =30, MRH =20, ZMH = 30, SPSH =28)

4.6. Sample techniques

A convenient sampling technique was used.

4.7. Study variables

4.7.1. Dependent variables

- Knowledge of adult ICU nurses about ventilator care bundle
- Practice of adult ICU nurses about ventilator care bundle

4.7.2. Independent variables

Socio demographic variables

- Age
- Sex
- Marital status
- Educational level
- Work experience in ICU
- Training on VCB
- Availability of equipment
- Guideline/protocol
- Work load/ Nurse to bed ratio

4.8. Operational definition

Knowledge: In this study, it refers to the ability of nurses in to answer questions regarding ventilator care bundle which is measured as two scores. (31)

- **Good knowledge**: nurses who scored greater than or equal to the mean of knowledge assessing questions.
- **Poor knowledge**: nurses who scored less than the mean of knowledge assessing questions.

Practice: in this study the practice of ventilator care bundle performed by nurses is observed with the help of an observational check list and leveled in two categories. (22)

- Good practice: score $\geq 75\%$
- poor practice: score <75%

Ventilator care bundle: is a package of evidence -based interventions that include:

- Elevation of patient's head of bed to 30- 45 degrees
- Daily sedation vacation
- Daily assessment of readiness to extubation
- Peptic ulcer prophylaxis
- Deep vein thrombosis (DVT) prophylaxis.

4.9. Data collection instruments and techniques

A structured self-administered questionnaire and observational check list were used to assess the knowledge and practice of ICU nurses. The questioners was adopted from other research (31,33,40) and modified according to our setup. The questionnaires have three parts; part one socio-demographic question, part two knowledge assessment questions, and part three practice assessment observational check list. A questionnaire prepared in the English language was used since all nurses learn (t) and are trained in English. Structured questionnaire was collected by trained data collectors and supervisor. A total of three trained data collector nurses and one supervisor were participating during data collection time.

4.10. Data quality assurance

The investigator routinely verified the correctness and completeness of the data collection process. The identical English-language instruction document was used by the data collector. Every questionnaire was cheeked prior to data processing to identify any missed or incomplete questions and to ensure that corrective action is taken before the main study is conducted. A pre-test that is not part of the main study was conducted at “Rasdesta” General Hospital for one week

prior to the completion of the actual trial. We were reoriented and made any necessary modifications to the questionnaires based on the outcome. To guarantee the validity and reliability of the data, the principal investigator made every effort to maintain the dependability of the data acquired as much as possible by cross-referencing it with Crombach's alpha. Experts in the field are contacted in this regard, and the questionnaire is examined to extract the required variables. The principal investigator was strictly instructing each participant to answer all of the questions on their own, without seeking advice from others. Respondents were also not being permitted to take the questionnaires home, ensuring that no references are made and that their actual knowledge at the time of the study is analyzed (avoid bias).

4.11. Data processing and analysis

Binary logistic regression was done, and variables having a P-value less than 0.25 were candidates for a multivariable model. In multivariable analysis, variables having a P-value less than 0.05 were decided to be statistically significant and reported using an adjusted odds ratio with a 95% confidence interval. The correlation between independent variables was checked for multicollinearity by using variance inflation factors (VIF). Model goodness fit was checked by using Hosmer-Lemeshow’s test. The result was analyzed using descriptive and proportional percentages, mean, and media. The result was presented using appropriate tables and graphs.

4.12. Dissemination the result

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

4.13. Ethical consideration

An ethical approval letter was obtained from the departmental review committee of Addis Ababa University, College of Health Science, Department of Emergency and Surgical Nursing. A letter of permission was obtained from the medical directors of the study settings before the actual data collection period. A permission letter was provided to the respective head nurses of the ICU. Information will be given to study participants about the purpose and procedure of the study; informed consent was obtained, and confidentiality and privacy were ensured.

5. CHAPTER FIVE: - RESULTS

5.1. Socio-demographic characteristic of nurses working in intensive care units of selected public hospitals

A total of 198 nurses working in ICUs of selected six public hospitals; 187 participated in the study, making a response rate of 94.4%. Out of the total of 187 respondents, the majority 107 (57.2%) were female. The nurses were between the age group of (26-30) years old with a mean age of (28.25); about 140 (74.9%) of nurses were B.Sc. holders in nursing. Regarding the training, 44.9 percent of respondents were trained related to a mechanical ventilator care bundle. The mean years of work experience in the intensive care unit were 3.40, and most of them were single (52.9%). (Table 1)

Table 1: *Socio demographic characteristics of participant nurses working in the intensive unit of selected public hospitals in Addis Ababa, Ethiopia, 2024.*

Variables	Category	Frequency	Percent (%)
Gender	Male	80	42.8
	Female	107	57.2
Age	<or=25 year	34	18.2
	26 – 30 year	122	65.2
	31 – 35 year	21	11.2
	35 and above	10	5.3
Educational level	First degree (BSc)	140	74.9
	Masters degree (MSc)	47	25.1
Marital status	Single	99	52.9
	Married	88	47.1
Participate training on VCB	Yes	84	44.9
	No	103	55.1
Work experience in ICU	Mean	Range	SD
	3.40	15	2.591

5.2. Knowledge of nurses working in intensive care units regarding ventilator care bundle.

The overall mean knowledge score of ICU nurses regarding the ventilator care bundle out of 20 questions is (12.34) however due to skewed nature of the study data; I have selected the median for central tendency measure. By using the median score as a cut of value, divide the respondents into two groups for analysis purposes, which include respondents with good knowledge (who score ≥13 correct answers of 20 items) and poor knowledge (who score <13 correct answers of 20 items).

5.2.1 Level of knowledge of nurse's working in ICU regarding VCB

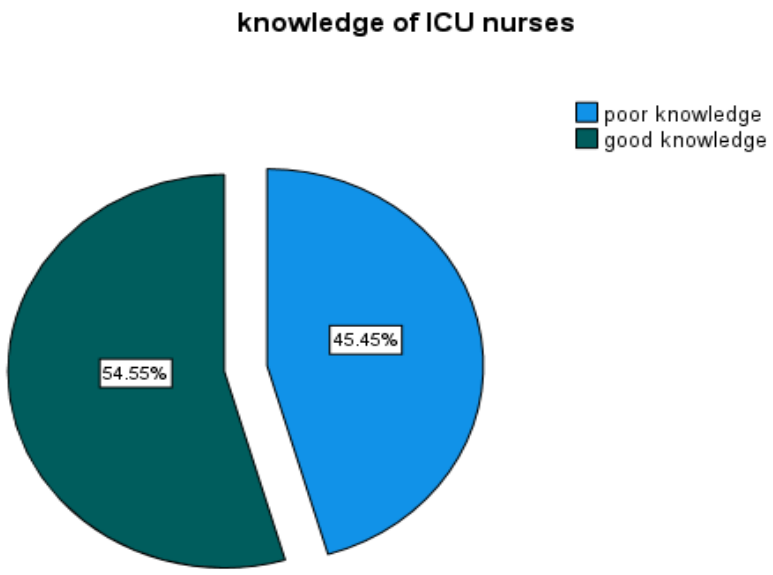

Figure 2: knowledge level of nurses working in intensive care unit of selected public hospitals of Addis Ababa, Ethiopia 2024.

There are 102 (54.5%) of the participants have been found to have good knowledge about the overall knowledge related to the VCB.

5.2.2 Knowledge of VCB among nurses working in ICU of selected public hospitals in Addis Ababa, Ethiopia 2024.

Most respondents 126 (67.4%) were unaware of the primary goal or noncompliance of VCB and the component of VCB 119 (63.6%); however, the majority of respondents 130 (69.5%) knew the definition of ventilator care bundle. Furthermore, almost half (53.5%) of ICU nurses were ignorant about how to position patients who are on mechanical ventilation.

While the majority of respondents, 135 (72.2%), were aware of the evidence-based guidelines' recommended route for intubation, and most nurses are aware of the importance of washing hands properly before and after oral or ETT sectioning, 143 (76.5%) also had adequate awareness of the benefits of early weaning. Less than half of respondents (46.5%) correctly answered the question about the recommended frequency of oral care with chlorohexidine 1%, and fewer (26.2%) respondents correctly answered the question about the contraindication of DVT prophylaxis.

More than 80% of respondents agreed that ongoing training of ICU nurses and maintenance of a sufficient nurse-patient ratio in the ICU are advantageous for reducing VAP. (Table 2)

Table 2 knowledge distribution of participant nurses about VCB in selected public hospitals of Addis Ababa, Ethiopia 2024.

No	Knowledge assessment question (correct answer)	Correct Frequency (%)	Incorrect Frequency (%)
1	Ventilator care bundle is (A checklist used as a protocol of care for mechanically ventilated patients)	130 (69.5)	57 (30.5)
2	Non- Compliance to VCB tends to be associated with; (High mortality in MV patients)	61 (32.6)	126 (67.4)
3	Which component is not included in the		

	VCB for the prevention of VAP? (Administration of antibiotics)	68 (36.4)	119 (63.6)
4	VAP would occur in patients who are on mechanical ventilation for; (48 hours)	121 (64.7)	66 (35.3)
5	Which is the recommended position for mechanically ventilated patient for the prevention of VAP? (Semi sitting position)	87 (46.5)	100 (53.5)
6	Head side of the bed should be elevated at? (30-45 degrees)	127 (67.9)	60 (32.1)
7	What is the effect of kinetic beds for the prevention of VAP (Reduces the risk for VAP)	132 (70.6)	55 (29.4)
8	Which route is best recommended when intubating a patient? (Oral rout)	135 (72.2)	52 (27.8)
9	Evidence based guidelines for preventing VAP recommended changing ventilator circuits how frequently? (Every week)	58 (31.0)	129 (69.0)
10	A nurse caring a ventilated patient is required to wash hands? (Before and after oral / ETT suctioning)	159 (85.0)	28 (15.0)
11	It is recommended to perform oral care by using a swab moistened with chlorohexidine 1%; (Twice daily)	87 (46.5)	100 (53.5)
12	One of the components of VCB is; (Sedation Interruption)	41 (21.9)	146 (78.1)
13	Early weaning; (Reduces the risk for VAP)	143 (76.5)	44 (23.5)
14	What is the role of respiratory physiotherapy for preventing VAP?	175 (93.6)	12 (6.4)

	(Maintain lung function)		
15	Contraindication for DVT prophylaxis include; (Active bleeding (GI bleed))	49 (26.2)	138 (73.8)
16	Unplanned extubation is associated with increased risk of aspiration, therefore, increase the risk for VAP (True)	162 (86.6)	25 (13.4)
17	Overfeeding of carbonated foods or fluids to a ventilated patient is associated with decreased risk of VAP (False)	116 (62.0)	71 (38.0)
18	Continuous education to ICU nurses on prevention of Nosocomial infection is associated with decreased rates of VAP (True)	159 (85.0)	28 (15.0)
19	Maintenance of adequate number of nurse to patient ratio in critical care setting is associated with decreased risk of VAP (True)	165 (88.2)	22(11.8)
20	Dusting of Respiratory and bedside equipment should be done every shift, whenever soiled (True)	142 (75.9)	45(24.1)

5.3. Participant level of practice towards caring of the patient on a ventilator care bundles.

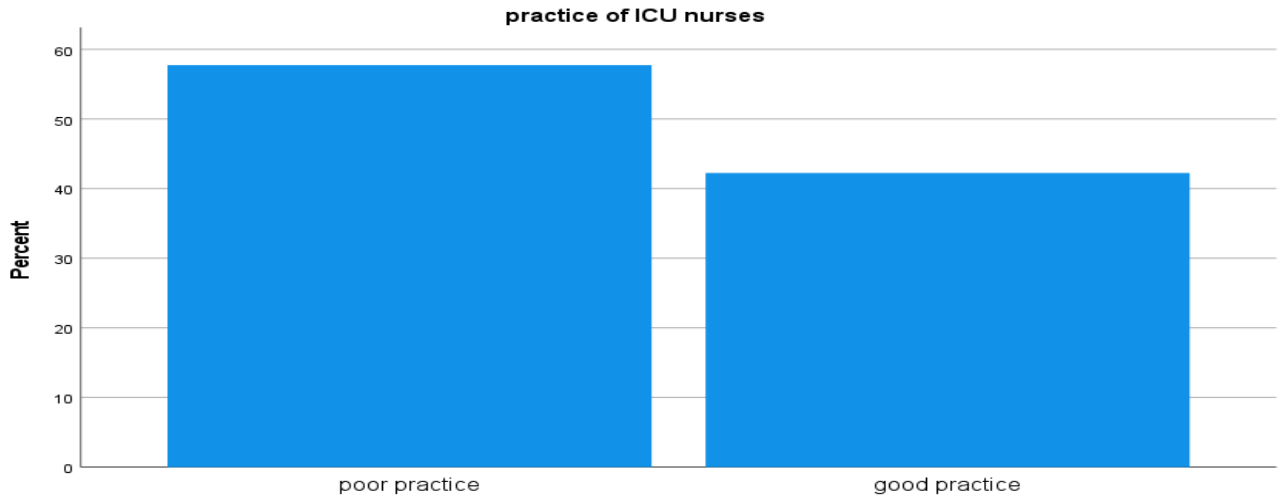

Figure 3 practice of nurses working in intensive care units towards VCB in selected public hospitals of Addis Ababa, Ethiopia 2024.

In this study, more than half 107 (57.2%) of nurses had poor practice of ventilator care bundle.

5.3.1 Practice of VCB among nurses working in ICU of selected public hospitals in Addis Ababa, Ethiopia 2024.

In an analysis of ICU nurses' practices on the care of patients on mechanical ventilation in order to prevent ventilator-associated pneumonia, it was found that 183 (97.9%) nurses raised the head of the bed to 35^{o}– 45^{o}.

When it comes to oral care, the majority of respondents (61%) keep the patient in a semi-recumbent position. Additionally, 52.4% of respondents wash their hands correctly or clean them with an antiseptic solution before performing oral care, although nearly all (97.9%) of caregivers wear clean gloves during oral care. Furthermore, only 43.9% of respondents said they use chlorohexidine 1% solution.

According to hospital protocol, the majority of nurses (75.9%) in this survey administers daily sedation vacations and performs spontaneous breathing as directed by physicians (64.2%). Additionally, more than 95% of nurses administer DVT and peptic ulcer prophylaxis as directed by physicians. (Table 3)

Table 3: VCB practice of nurses working in intensive care units of selected public hospitals of Addis Ababa, Ethiopia 2024.

Checklist items in practice of individual bundle items	Practice	
	Yes Frequency (%)	**No** Frequency (%)
1. Elevation of the Head of Bed		
Do the nurse elevate the head of the bed to 30-45̊?	183(97.9)	4(2.1)
2. **Oral care with 1% chlorohexidine**		
Position a patient in a semi recumbent	114(61.0)	73(39.0)
Hand washing before oral care	98(52.4)	89(47.6)
Apply clean gloves and rinse mouth with a clean swab	183(97.9)	4(2.1)
Provide oral care with chlorohexidine 1% according to hospital policy	82(43.9)	105(56.1)
Clean equipment and return it to its proper place	144(77.0)	43(23.0)
3. Sedation interruption Protocol		
Implementation of daily sedation vacations based on the hospital's policy?	142(75.9)	45(24.1)
Does the nurse provide daily sedation vacations according to policy?	107(57.2)	80(42.8)
Does the nurse provide spontaneous breathing trials as ordered by doctor?	120(64.2)	67(35.8)
4. Peptic ulcer prophylaxis		
Does the nurse provide peptic ulcer prophylaxis as ordered by doctor?	179(95.7)	8(4.3)
Implementation of peptic ulcer prophylaxis based on the hospital's policy?	149(79.7)	38(20.3)
5. Deep vein thrombosis prophylaxis		
Does the nurse provide DVT prophylaxis as ordered by doctor?	183(97.9)	4(2.1)

5.4. Associated factors of nurses working in ICU regarding ventilator care bundle.

5.4.1 Factors associated with knowledge of nurses working in ICU regarding ventilator care bundle.

In bivariate logistic regression analysis, the factors found to be associated with knowledge of nurses working in ICU regarding VCB were educational level, VCB training, and work experience related to VCB. After doing multivariate logistic regression analysis, it was discovered that every bivariate logistic regression analysis component was statistically significant. Educational level (p-value = 0.007, AOR = 4.544 (1.506–13.709)), VCB training (p-value = 0.001, AOR = 4.512 (2.132–9.545)), and work experience (p-value = 0.005, AOR = 1.320 (1.008–1.601).

This indicates that B.Sc. nurses' expertise was 4.544 times less knowledge than that of M.Sc. nurses. Untrained nurses had 4.512 times less knowledge than VCB-trained nurses, and low-work experience nurses had 1.32 times less knowledge than high-work experience nurses.(Table 4)

Table 4: factors associated with knowledge of nurses working in intensive care units of selected public hospitals of Addis Ababa, Ethiopia 2024.

Variables	Category	Knowledge		COR(95%CI)	(p-value)	AOR(95%CI)	(p-value)
		good	poor				
Educational Level	B.Sc.	60	80	1		1	0.007
	M.Sc.	42	5	11.200(4.179 – 30.015	<0.001	4.544(1.506 - 13.709)	
Training	Yes	65	19	6.102(3.184 – 11.697)	<0.001	4.512(2.132 – 9.545)	<0.001
	No	37	66	1		1	
Work experience	Mean 3.40	Range 15	SD 2.59	1.513(1.283 – 1.783)	<0.001	1.320(1.008 – 1.601)	0.005

5.4.2. Factors associated with practice of nurses working in ICU regarding ventilator care bundle.

Three factors were identified in the bivariate logistic regression analysis as being associated with the practice of VCB among ICU nurses: educational level, VCB training, and VCB-related work experience. After doing multivariate logistic regression analysis, it was discovered that two (educational level and VCB training) bivariate logistic regression analysis components were statistically significant. Educational level (p-value = 0.002, AOR = 5.422 (1.814 – 16.206)) and VCB training (p-value = <0xC6><0xB0>0.001, AOR = 17.350 (7.013 – 42.924)). There are no significant associations between nurses' practice and work experience related to VCB. (P-values= 0.491).

This indicates that B.Sc. nurses' expertise was 5.422 times less practice than that of M.Sc. nurses. Untrained nurses had 17.350 times less practice than VCB-trained nurses. (Table 5)

Table 5: factors associated with practice of nurses working in intensive care units of selected public hospital of Addis Ababa, Ethiopia 2024.

Variables	Category	Practice		COR(95%CI)	(p-value)	AOR(95%CI)	(p-value)
		good	poor				
Educational Level	B.Sc.	46	94	1		1	0.002
	M.Sc.	33	14	4.817(2.350 – 9.874)	0.001	4.544(1.506 - 13.709)	
Training	Yes	61	23	12.524(6.226 – 15.195)	0.001	4.512(2.132 – 9.545)	<0.001
	No	18	85	1		1	
Work experience	Mean 3.40	Range 15	SD 2.59	1.217(1.075 – 1.378)	0.002		

CHAPTER SIX
DISCUSION

Nurses play a crucial role in the management of patients on a mechanical ventilator. There is no doubt that the nurse's knowledge and practice regarding VCB is highly important in critical care setting. So the aim of this study was to assess knowledge and practice of nurses working in the intensive care unit towards ventilator care bundle to prevent ventilator associated pneumonia in selected public hospitals of Addis Ababa, Ethiopia. It was found that (54.4%) of nurses had good knowledge and 42.2% of nurses had good practice of VCB.

More than half (54.4%) of the study participants had good knowledge of ventilator care bundle. This finding agrees with the study conducted in India and Yemen. In which 60%, 56.7% and 59.2% of nurses had good knowledge. (29,34,36) On the other hand the study conducted in Ethiopia and Pakistan showed a lower knowledge level among ICU nurses, which are 51.2%, 51.4% and 50.46% had poor knowledge regarding VCB. (31,33,37) this discrepancy could be attributed to the socio demographic difference.

In this study, nurse's educational level (p-value= 0.007, AOR = 4.544 (1.506 – 13.709)), VCB training (p-value= <0.001, AOR = 4.512 (2.132 – 9.545)) and work experience (p-value= 0.005, AOR =1.320 (1.008 – 1.601)). Statically significant association with knowledge of nurse's about ventilator care bundle. The finding is in line with the study done in Turkey. (38) who evaluate nurse's knowledge regarding prevention of ventilator associated pneumonia and reported that there are significant relation between educational level, training and work experience (p- value < 0.005) and the study conducted in Malaysia (28) showed that there are significant association between educational level (p- value < 0.001) and work experience (p- value= 0.003).

The above findings similar with the study conducted in Yemen (36) reported that educational level (p- value= 0.001) and the study done in India (34) shows work experience (p –value= 0.003) significant association with knowledge regarding ventilator care bundle. Additionally the study conducted in North west, Ethiopia (31) where nurse's who had VCB training and educational level significantly showed higher knowledge on ventilator care bundle (p-value < 0.05). Those findings indicate that educational qualification, training and work experience may be important factors for improving the knowledge of nurse's in this area.

The majority (57.8%) of nurses had poor practice in this study regarding the care of a patient on a mechanical ventilator care bundles. These results are consistent with study conducted in Ethiopia, India and Pakistan. In which 58.6%, 64% and 60.8% of nurses had poor practice. (33,37,41) On the other hand the study conducted in India showed moderately adequate practice level (53.9%) among nurses working in ICU. (34) This might be due to the sample size used, difference in study characteristics, criteria to classify practice and the tool used to assess practice.

There is significant association of nurse's practice with educational level (p-value= 0.002, AOR = 5.422 (1.814 – 16.206)) and VCB training (p-value= <0.001, AOR = 17.350 (7.013 – 42.924)) about ventilator care bundles. This finding agrees with the study conducted in Addis Ababa, Ethiopia. (37) Who evaluate nurse's practice regarding prevention of VAP shows there is significant relation with educational level (p- value< 0.05). And additionally the study done in Yemen (36) reported that nurse's who had training on VCB has more practice than those who did not (p-value = 0.03).

7. CHAPTER SEVEN
STUDY STRENGTH AND LIMITATION

7.1. Strength of the study

- The study was multi centered and addressed its objective.
- The study used primary data direct from ICU nurses.
- The study implemented observational check list and found baseline information for future.

7.2. Limitation

The cross-sectional study design utilized in this research makes it unable to determine cause and effect relationships. Additionally, because the research was conducted in the intensive care unit of six public hospitals, not all government hospitals were included in the results. Furthermore, an observational check list was implemented in the study; however, the time of observation was short.

8. CHAPTER EIGHT
CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion

Knowledge regarding ventilator care bundles of ventilator care among nurses in the selected public hospitals was unsatisfactory, and the practice of nurses was poor. Educational level and training were found to be statistically significantly associated with both the knowledge and practice of nurses.

8.2. Recommendations

To FMOH; should set up training courses, educational opportunities, and experience exchanges overseas so that nurses remain updated on the most recent evidence-based procedures. Furthermore, hospitals should be regularly supervised by the ministry of health at least once every year.

To Addis Ababa Health Bureau; Encouraging nurses to become more knowledgeable about the ventilator care bundle, mechanical ventilator and furthermore infection prevention practices can be achieved by offering specialized training, education, guidelines, and different guidebooks. It is also important to rigorously adhere to the nurse's practices for applicability.

To AAU; There is currently no specialty that may improve the knowledge and skills of nurses working in the intensive care unit, so the College of Health Sciences School of Medicine and Critical Care will be opening a specialty track in intensive care and critical care nurses in Bachelor of Sciences by creating its own curriculum.

To Hospital on which the study was conducted; to develop an ICU A setting that offers nurses specialized in-service training, refresher courses or programs, and the adoption and preparation of various protocols and guidelines helps them to put their knowledge into practice.

To ICU nurses; ICU nurses should read a variety of resources to keep up with current developments in the field and then apply what they learn to patient care. Better-versed nurses ought to impart their knowledge and expertise to their peers.

To the researchers; a similar study is recommended to include a large sample size with an observational checklist and further research on factors affecting nurses' knowledge and practice level was recommended.

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APPENDIX

Appendix 1:- consent form

English Version participant Information Sheet and Informed Voluntary Consent

Information Sheet

Greeting: Good morning/afternoon!

My name is _____. I am working as a data collector for the study being conducted on the knowledge and practice of ICU nurses towards ventilator care bundle to prevent ventilator associated pneumonia in public hospitals of Addis Ababa, Ethiopia 2024.

The Aim of this study is; to assessment knowledge and practice of ICU nurses towards ventilator care bundle to prevent ventilator associated pneumonia in public hospitals of Addis Ababa, Ethiopia 2024.

Risk/Discomfort: There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you and you will not be provided any incentives to take part in this project, but your participation is likely to help us in assessing knowledge and practice of Intensive care unit nurses and this will help the concerned bodies for developing appropriate interventions.

Confidentiality: The information collected from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it and it will not be revealed to anyone except the principal investigator.

Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish.

Procedure and duration: Totally the questionnaires contain knowledge, practice and barriers related questions. And some of the questions may have more than one answer as alternatives.

Do you agree to participate?

Yes ☐ continue to the next page No ☐ Thank the participant

Individual Consent Form

First I would like to thank you for taking your time and participating in our study.

I the undersigned participated in the study on " knowledge and practice of ventilator care bundle for prevention of ventilator associated pneumonia of adult ICU nurses working in public hospitals Addis Ababa, Ethiopia 2024." on my free will and interest after being oriented about the purpose of the study.

Can you sign for your voluntariness?

Yes ---------- NO----------

Interviewer name: ---------- Signature ----------

Date ----------

Person to Contact: If you want more information and check about this project you can contact the following people.

Principal Investigator Name and Address:

Name: Million Kassahun Mitku Phone number: +251929113922

Email Millikassahun38@gmail.com

Do you have any question that you want to ask me about the study?

Annex 2: English version Questionnaires

Table 6: Part I socio demographic characteristics questionnaires for nurses working in ICU.

Variables	Categories	Remark
Name of institution	1) Black Lion SH 2) St. Paul's SH 3) Minilik SH 4) Alert SH 5) Zewditu SH 6) St peter hospital	
Gender	1) Male 2) Female	
Age	_____	
Marital status	1) Married 2) Widowed 3) Single 4) Diverged	
Educational level	1) Diploma 2) First degree (B.Sc.) 3) Masters (M.Sc.) 4) Others _____	
Participated training related to VCB	1) Yes 2) No	
Work experience in ICU	_____	

Part II ICU nurses knowledge of VCB

1. Ventilator care bundle is
   A) A checklist used as a protocol of care for mechanically ventilated patients
   B) Guidelines used to reduce the risk of atelectasis
   C) Interventions to treat malignancies of lungs
   D) I do not know.
2. Non- Compliance to VCB tends to be associated with;
   A) Decreased risk of VAP
   B) High mortality in mechanically ventilated patients.
   C) Reduced morbidity in mechanically ventilated patients.
   D) I don't know
3. Which component is not included in the VCB for the prevention of VAP?
   A) Oral Care
   B) Head of bed elevation.
   C) Daily sedation vacation.
   D) Administration of antibiotics.
4. VAP would occur in patients who are on mechanical ventilation for;
   A. 6 hours.
   B. 12 hours.
   C. 24 hours.
   D. 48 hours.
5. Which is the recommended position for mechanically ventilated patient for the prevention of VAP?
   A) Supine position.
   B) Semi sitting position.
   C) Prone position.
   D) Side lying position.
6. Head side of the bed should be elevated at?
   A) 0-15 degree
   B) 15-30 degrees.
   C) 30-45 degrees.

D) I do not know.

7. What is the effect of kinetic beds for the prevention of VAP reduces the risk for VAP?
   A) Increases the risk for VAP.
   B) Reduces the risk for VAP.
   C) No effect.
   D) I don't know.
8. Which route is best recommended when intubating a patient?
   A) Oral rout
   B) Nasal rout
   C) Both routes are recommended
   D) I do not know
9. Evidence based guidelines for preventing VAP recommended changing ventilator circuits how frequently?
   A) Every 48 hours
   B) Every 72 hours
   C) Every week
   D) Every new patient
10. A nurse caring a ventilated patient is 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.
11. It is recommended to perform oral care by using a swab moistened with chlorhexidine 1%;
    A) Once in a shift
    B) Every 4 to 6 hours and whenever necessary
    C) Twice daily
    D) I do not know.
12. One of the components of VCB is;
    A) Chest Physiotherapy
    B) Sedation Interruption

C) Daily ventilator circuit changes

D) I do not know

13. Early weaning;

A) Reduces the risk for VAP.

B) Increases the risk for VAP

C) Early weaning do not influence the risk for VAP

D) I don't know

14. What is the role of respiratory physiotherapy for preventing VAP?

A) Maintain airway clearance.

B) Maintain lung function.

C) There is no evidence of efficacy.

D) I don't know

15. Contraindication for DVT prophylaxis include;

A) Thrombocytopenia (HIIT)

B) Active bleeding (GI bleed)

C) Presumed or confirmed clot in lower extremity

D) All of above

16. Unplanned extubation is associated with increased risk of aspiration, therefore, increase the risk for VAP

A) True

B) False

C) I don't know

17. Overfeeding of carbonated foods or fluids to a ventilated patient is associated with decreased risk of VAP

A) True

B) False

C) I don't know

18. Continuous education to ICU nurses on prevention of Nosocomial infection is associated with decreased rates of VAP

A) True

B) False

C) I don’t know

19. Maintenance of adequate number of nurse to patient ratio in critical care setting is associated with decreased risk of VAP
    A) True
    B) False
    C) I don’t know
20. Dusting of Respiratory and bedside equipment should be done every shift, whenever soiled
    A) True
    B) False
    C) I don’t know

Table 7: Part III Observational check list about ventilator care bundle practice.

Checklist items in practice of individual bundle items	**Practice**	
	Yes	**No**
6. Elevation of the Head of Bed		
Do the nurse elevate the head of the bed to 30-45?		
7. **Oral care with 1% chlorohexidine**		
Position a patient in a semi recumbent		
Hand washing before oral care		
Apply clean gloves and rinse mouth with a clean swab		
Provide oral care with chlorohexidine 1% according to hospital policy for mechanically ventilated patients		
Clean equipment and return it to its proper place		
8. Sedation interruption Protocol		
Is the Implementation of daily sedation vacations based on the hospital's policy?		
Does the nurse provide daily sedation vacations to mechanically ventilated patients according to policy?		
Does the nurse provide spontaneous breathing trials as ordered by doctor?		
9. Peptic ulcer prophylaxis		
Does the nurse provide peptic ulcer prophylaxis as ordered by doctor?		
Is the implementation of peptic ulcer prophylaxis based on the hospital's policy?		
10. Deep vein thrombosis prophylaxis		
Does the nurse provide DVT prophylaxis as ordered by doctor?		