

St. Paul's Hospital Millennium Medical College

Department of Emergency and Critical Care Medicine



Knowledge, attitude, practices and associated factors towards VAP prevention bundles among nurses working in adult ICU of specialized teaching hospitals in Addis Ababa, Ethiopia:

Multicenter cross-sectional study.

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ASSURANCE OF PRINCIPAL INVESTIGATOR

I the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I provided timely progress report to my advisor and seek the necessary advice and approval from my primary advisor in the course of the research. I communicated timely to my advisor all stakeholders involved in the study including any source of funding for this research.

Name of the student: _____

Signature: _____

Date: _____

APPROVAL FROM ADVISORS

Approval of the Primary Advisor

Name of the primary advisor: _____

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Date: _____

Approval of the Co-Advisor

Name of the primary advisor: _____

Signature: _____

Date: _____

Name of the primary advisor: _____

Signature: _____

Date: _____

ACKNOWLEDGMENT

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ACRONYMS AND ABBREVIATIONS

AA -----Addis Ababa

AaBET----Addis Ababa burn, emergency and trauma center

ARDS-----Acute respiratory distress syndrome

CDC----- Center for Disease Control

DC -----Data Collectors

FDRE----Federal democratic republic of Ethiopia

ETB-----Ethiopian birr

ESEP----Ethiopian society of emergency professionals

ECCM-----Emergency & Critical care medicine

HAP-----Hospital acquired pneumonia

ICU-----Intensive care unit

HAP-----Hospital acquired pneumonia

HOB-----Head of Bed

KAP-----Knowledge, Attitude and Practice

MD -----Medical doctor

MOH---Ministry of health

MSc-----Master of Science

MV-----Mechanical Ventilator

PI ----- Principal Investigator

SPHMMC-----St. Paul's hospital millennium medical college

SPSS -----Statistical Package for Social science

VAE-----Ventilator associated event

VAP-----Ventilator associated pneumonia

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ABSTRACT

BACKGROUND

Ventilator Associated Pneumonia (VAP) is a prevalent nosocomial infections among patients on mechanical ventilation/intubation with rate ranging from 7%-10% in intensive care units that characterized by “a new or progressive pulmonary infiltrate, fever, leukocytosis and purulent trachea-bronchial secretions . VAP is not present at the time of hospitalization, rather occurs 48 hours after the patient put on mechanical ventilation/intubation. The study was conducted to assess the knowledge, attitudes, practices and their influencing factors among adult ICU nurses in specialized teaching hospitals in Addis Ababa.

METHODS

A study design was multicenter cross sectional survey design that used structured close and open ended questions.

the convenient sampling was employed in the selection of participant nurses. All adult ICU nurses who were available during the data collection period and willing to participate was included in this study.

The sample size was 120 with a response rate of 99.1%. The study was conducted from April 01-December 30, 2023 with the prepared questionnaires.. Epi-info version 7.0 and SPSS-25 were used for data clearing and statistical analysis. The level of KAP was calculated from the participants’ scores of the questions and associations were done by using bivariate and multivariate logistic regression.

RESULTS: Of the participants, 62.5% had good level of knowledge, and 64.0% had good level of practice while 82.5% had positive attitude. And there were significant positive association found between practices of ICU nurses and educational level, the length of work experience and history of previous training

CONCLUSION: The majority of the participants had good level of knowledge, good level of practice and good perceptions towards VAP prevention bundles

KEYWORDS: VAP, VAP prevention bundle, specialized teaching hospitals ICU, Addis Ababa, Ethiopia

CHAPTER ONE: INTRODUCTION

1.1. Background

Ventilator-associated pneumonia (VAP) refers to pneumonia that develops at least 48 hours after the initiation of mechanical ventilation (2,3,7). It is a prevalent nosocomial infection among patients on mechanical ventilation/intubation with a rate ranging from 7%-10% in intensive care units that is characterized by "a new or progressive pulmonary infiltrate, fever, leukocytosis and purulent trachea-bronchial secretions [1-3]. VAP is not present at the time of hospitalization, rather it occurs 48 hours after the patient is put on mechanical ventilation/intubation.

The risks of VAP in critical/intensive care unit patients are 6-20 times higher since the intubation brings bacterial oropharyngeal pathogens into the lung as aspiration is the primary route of transmission of pathogens from the upper respiratory systems to the lower respiratory tract; since the tube is located in the trachea [5-7]. Bacterial colonization of the lower respiratory tract is characterized by the absence/weak cough reflex and mucus secretions in patients on ventilation [8-9]. In addition to this, a cross contamination in the ICU is the major cause of ventilator-associated pneumonia in critical/intensive care patients [7, 10].

The incidence of VAP depends on the duration of mechanical ventilation (IR of 3% in the first five days, then 2% in the next 6-10 days, and 1% after ten days) and it is a complication in 28% of patients on mechanical ventilation [10]. About 63% of patients admitted to ICU had oral colonization with pathogens [11]. Hospital stay dramatically increases mortality rates and risks [4, 12]. But, early detection (dx) and management may contribute to lower the incidence [4, 13].

VAP is a known serious health hazard among patients on mechanical ventilations with a mortality rate that ranges from 6-60% and as high as 74% [4, 10, 14]. In contrast to this, a systematic review and meta-analysis found no evidence of mortality related to VAP in patients with trauma (RR=1.09, 95%CI=0.87-1.37) and ARDS (RR=0.86, 95%CI=0.72-1.04)[10]. But, the study from Algeria [12, 15] and Senegal [16] shows 1.7% and 2.9% hospital-wide mortality of VAP, respectively. In Senegalese ICU about half of those patients on mechanical ventilation acquired VAP [2, 16].

Lack of adequate nursing staffs (should ideally be 1:1) would greatly compromise the quality of care intended to be given to the patients which may be the reason for increased incidence in developing countries [7, 10]. Even though, VAP is also a problem in developed countries [3, 17, 18], the incidences of the disease in developing countries were contributed a lot by inadequate knowledge and awareness of the disease.

1.2. Statement of the problem

Even though VAP is a serious problem across the world its high incidences in developing countries is contributed by inadequate knowledge and awareness about the problem. Several strategies have been created in an attempt to find a solution to the problem of VAP in the world; these strategies incorporate many evidence-based strategies proved in the literature to decrease VAP and increase positive patient outcomes [11].

The nurses working in the ICU are in the best position to put the evidence-based knowledge into practice as they are at the patient's bedside 24 h a day and therefore they play an important role in the prevention of VAP.

Determining critical care nurses' knowledge, attitude and practice of VAP prevention is useful in improving their awareness, thus leading to better practices and preventing this problem in Ethiopia.

Reviewed literatures in Ethiopia, there was not adequate study done on assessment of knowledge, attitude and practice of nurses on VAP bundle. Even though the magnitude of VAP is high in Ethiopia, the predisposing factors (preventive strategies) are not well studied (26). Thus, this study after assessing knowledge, attitude and practice of critical care nurses on VAP bundle, will identify gaps and put some recommendations to take corrective actions.

1.3. Significance of the Study

The finding of this study is a grand input to be used by facilities that have been delineated with knowledge and practice of critical/intensive care nurses, and it helps other governmental and private ICUs as guidance/fertile land when working in improving and strengthening the knowledge and practice of adult intensive care nurses.

Overall, the findings have important implications for policy and decision making in health care planning, in allocating resources (human, financial and...etc) and also helps those program efforts working towards prevention of VAP and as well as in improving nurses' knowledge and practice (nursing care) with an entail to reduce or preventing VAP in the institution providing these services.

This study also enables academic and researchers to use the information for other related studies and also as a reference in their data banks.

CHAPTER TWO: LITERATURES REVIEW

Ventilator associated pneumonia is defined as a pneumonia in a patient receiving mechanical ventilation that was not present at the time of admission to hospital or that occurs 48 hours after intubation and mechanical ventilation. It is characterized by a new or a progressive pulmonary infiltrate, fever, leukocytosis and purulent tracheobronchial secretions (1-7)

VAP is the most common nosocomial infection in critically ill patients who require mechanical ventilation (2,7). It is an important cause of morbidity and mortality in intensive care units. It accounts for 47% of infections in the intensive care unit and it complicates the course of illness of 8% to 28% of mechanically ventilated patients (7).

Mortality rates reach 24% to 50% and 74% in high risk patients such as the elderly, immunocompromised patients, patients with chronic obstructive pulmonary disease, burns, neurosurgical conditions, acute respiratory distress syndrome and witnessed aspiration (3). Those who are reintubated and those who receive paralytic agents or enteral nutrition are also at high risk for acquiring VAP.

Evidence based practice is currently one of the most important ways, if not the most important way, to provide best quality care to patients in the intensive care unit. As technology and research in health care expands, evidence based practice (EBP) is becoming essential in delivering high quality care to critically ill patients (6).

Evidence based practice has become a very important tool in the prevention of nosocomial infections in the intensive care unit. The most common and frequent nosocomial infection in the critically ill patient – ventilator associated pneumonia – can be prevented by the use of evidence based strategies, which ultimately increases positive outcomes to patients (3).

Therefore, it becomes extremely important that intensive care nurses have knowledge of such strategies and are able to implement evidence based nursing in the intensive care units, aiming at achieving high quality care as well as optimal outcomes for their patients(9).

Ventilator-associated pneumonia (VAP) is among the most common health care-acquired infections in the intensive care unit (ICU)(1,3). Approximately 10 to 20 percent of patients receiving mechanical ventilation develop VAP, and patients suffering from VAP are twice as likely to die.

The attributable mortality for VAP exceeds 10 percent⁴ or 36,000 deaths per year(2). The average increase in length of stay is 4–9 days for patients suffering from VAP.VAP is the most significant independent risk factor for mortality among all ICU patients, with an increased hazard ratio in the cardiac surgery population of almost 9 percent(1,2).

A multicenter, cross-sectional study on 'Knowledge of intensive care nurses' towards prevention of ventilator-associated pneumonia in North West Ethiopia referral hospitals, indicates that the knowledge of intensive care nurses about VAP prevention is not sufficient (21).

Higher academic qualifications and taking intensive care unit training are significantly associated with a good level of knowledge. Therefore it shows the necessity for thorough training and education. The school of nursing should revise the nursing curriculum in Ethiopia and incorporate intensive care infection prevention initiatives. In addition policy makers and administrators should give attention to implementing and updating VAP prevention guidelines, which would be useful for improving the quality of nursing care and increasing the knowledge of the nurses to make the right decisions (21).

According to European care bundle for prevention of ventilator-associated pneumonia, an article conducted in intensive Care Medicine March 2010, the occurrence of VAP increases patient mortality to an estimated 20–55% and increases the duration of hospital stay by approximately 6 days, cost has been estimated to be above \$40,000 (20). The care bundle approach has also been investigated in the VAP setting. The 100k Lives Campaign (<http://www.ihl.org>) defined a four-component ventilator bundle designed to reduce the incidence of clinical complications in patients with VAP (20,21).

The Egyptian journal of health care on ventilator associated pneumonia bundle among mechanically ventilated patient: nurses' perception --regarding the total nurses' perception, the finding was attributed to many reasons as; lack of knowledge about VAP bundle (three quarters of the studied nurses had unsatisfactory knowledge regarding VAP bundle), lack of experience in the critical care unit (more than two thirds of the studied nurses had experience less than one year), lack of in-service training and educational courses about evidence based guidelines and absence of consistent policies and protocols regarding VAP bundle in ICU, 2018 EJHC Vol.9 No.2 EJHC 264(25).

There are various ways to introduce evidence into a practice setting, for example through the development of evidence based protocols or guidelines (3).

One must bare in mind though that evidence based practice also has limits and despite the use of protocols and guidelines, treatment must nevertheless be individualized for each patient. The limitations to evidence based practice may include the lack of data to answer some clinical questions, difficulty in applying research results to the general population, the need for quick access to resources and time limitations during clinical practice (22).

Intensive care nurses are in the best position to put evidence based guidelines into practice as they are at the patient's bedside 24 hours daily providing nursing care and therefore play an

important role in the prevention of VAP (17). Nevertheless nurses need to have an awareness of the problem as well as knowledge on current research evidence so as to adhere to such practices.

Various measures to prevent VAP have been reported in the literature, however there are very few data concerning nurse's knowledge of VAP prevention strategies and the degree of adherence to them, as well as factors that may influence their application at the bedside. While knowledge may not ensure adherence to evidence based guidelines, a lack of knowledge may be a barrier to adherence (17).

Understanding the importance of recommended practices increases the likelihood of adherence and overcome barriers such as lack of knowledge (6). If the nurse does not have enough knowledge on measures proven to decrease VAP rates she may not have the necessary confidence to take action and make decisions regarding such practices. Patient recovery may be delayed and not to mention the increased risks of complications from mechanical ventilation such as ventilator associated pneumonia, which are risks that can be prevented(6).

A large number of nurses have received their basic nursing education before 1990 which was before the availability of electronic information resources and personal computers (5). Most nurses practice nursing according to what they learned in nursing school as well as their experiences in practice. If one takes into consideration the number of changes that occur in nursing practice on a regular basis, it is essential to keep updated and have knowledge of the best current practice (5). Decisions must be made quickly, nurses trust a real person – a colleague, clinical specialist or a supervisor – more than they do printed and electronic resources(5). This demonstrates nurses' lack of value and understanding for research and is of concern that sources of new information, new evidence and research are not used by nurses.

The prevention and control of VAP in intensive care units are dependent on the education and sensitization of ICU staff members towards the problem and on the application of measures to prevent its occurrence. Critical thinking is needed for appropriate decision making, as one needs to be able to evaluate their actions and their possible outcomes (14). Data indicates that nurses tend to apply measures automatically by simply following protocols and instructions given by physicians or colleagues without being fully aware of what and why they actually do (17). Preventive strategies are widely applied by nurses, but not in a responsible and informed manner. This study demonstrates the importance of education and continuous career development and update so as to be able to rationale actions taken. As intensive care nurses, they are responsible for lives of critically ill patients and advanced knowledge is needed to prevent complications and for provision of quality patient care(15). They are responsible and liable for their acts and omissions towards the patient and knowledge is important to ensure responsible nursing practice. However, education alone is insufficient to ensure compliance

with clinical guidelines (13,15). Intensive care nurses that occupy leadership roles are essential in motivating staff to follow guidelines as well as in providing reasoning as to the need and the use of guidelines(12). They are needed to support staff members and empower them with knowledge to provide quality nursing care in the intensive care unit (12).

Prevention and control of ventilator associated pneumonia are dependent on education and awareness of ICU staff towards the problem and on the application of evidence based strategies (7). Adherence to the evidence based guidelines on prevention of ventilator associated pneumonia will only occur once staff involved directly with the patient's care has knowledge of such guidelines and can understand why it is important to put them into practice (14). In another study, a lack of human resources such as professionally trained and dedicated personnel was also found to prevent the application of VAP containing strategies, despite the fact that these strategies have been indicated as fundamental means of reducing the rate of pneumonia in mechanically ventilated patients (4).

Strict working rhythms and insufficient staff numbers were identified as reasons for not using the strategies, such as regularly changing the posture of patients in order to allow the drainage of bronchial secretions or the hourly removal of condensation from ventilator circuits. These findings are important because ICU nurse/ patient ratio has been identified as factor potentially affecting the incidence of VAP (7).

Lack of human resources may also affect the implementation of prevention strategies in South African hospitals, as the shortage of trained and dedicated intensive care nurses is huge and, as its findings, it may be a potential risk in increasing the incidence of VAP (7,8,12).

Based the above reviews, despite the heterogeneity of VAP bundle components from the mentioned articles, five elements yielded substantial evidence in the prevention of VAP in the ICU setting (1,3,7,17). These components include hand hygiene, oral care, head of bed elevation, ventilator care, and clean suctioning. Efficacy is enhanced when care bundle elements are implemented as a single unit rather than independently.

So, this study aimed at determining the knowledge, practice and attitude towards VAP prevention among ICU nurses' in a specialized teaching hospitals specific to AA focusing on major strategies of VAP prevention and finally to argument the projects of the hospitals quality improvement VAP bundle protocols at the hospital or ICU level.

CHAPTER THREE: OBJECTIVES

3.1. General objective

To assess the knowledge, attitudes and practices of adult ICU nurses towards VAP prevention bundle in specialized teaching hospitals in Addis Ababa, Ethiopia

3.2. Specific objectives

- To determine the knowledge of VAP prevention bundle among nurses in specialized teaching hospitals ICU in Addis Ababa.
- To describe attitudes of VAP prevention bundle among nurses in specialized hospitals ICU in Addis Ababa.
- To identify practices of VAP prevention bundle among nurses in specialized hospitals ICU in Addis Ababa.
- To determine factors that influence the practices of adult ICU nurses towards VAP prevention bundle in specialized teaching hospitals in Addis Ababa.

CHAPTER FOUR: METHODOLOGY

4.1. Study area

The study was conducted at adult ICUs of specialized teaching hospitals in Addis Ababa, which is a capital city of Ethiopia & seating for the African Union (AU). It covers an area of 530 square kilometers and has a population size of 3, 048,63, of whom 1,595,968 were females and the rest 1,452,663 were males. All sides of the capital city is bordered by Oromia Regional state and located at the heart of the country. The city has an altitude ranging from 2,100 meters at Akaki in the south to 3,000 meters at Entoto Hill in the North. Astronomically, Addis Ababa is located at 09° 02' N Latitude and 38° 44' E Longitude. The city is divided into 11 sub-cities and has 49 hospitals.

13 are governmental hospitals and 36 of the city's hospitals are private, from which twenty two hospitals are served as general hospitals. Furthermore, the city has 51 health centers and 700 different level private clinics.

For this study all the specialized teaching hospitals found in AA were selected (SPHMMC , AaBET hospital,Tikur ambesa hospital and Yekatit 12 hospital)

4.2. Study design: The study design was a multicenter cross sectional survey by using structured close and open ended questions.

4.3. Study period: The study was conducted from August 10/2023 -December 30, 2023 with the prepared questionnaires.

4.4. Source population

All Nurses working in all 4 specialized teaching hospitals during the study period was considered as the source population, Addis Ababa, Ethiopia

4.5. Study population

All Nurses working in adult ICU of four-specialized teaching hospitals who fulfilled the inclusion criteria, at Addis Ababa city was the study population

4.6 Eligibility criteria

4.6.1. Inclusion criteria

All nurses currently assigned and working in adult intensive care unit of all specialized teaching hospitals in Addis Ababa, Ethiopia

4.4.2. Exclusion criteria

✓ Nurses who were working there below 6 months

✓ Nurses who were not voluntary to give response

✓ Nurses on annual leave

4.5. Sample size determination

The sample size was calculated by double population proportion formula using Epi-info7.2. The following parameters were considered for the calculation: Proportion of nurses who took training and had good knowledge was 38% and proportion of nurses who took training and did not have good knowledge 60%, 84% power, AOR 1.61 and 95% CI [18]. Then, after using design effect of [2] and non- response rate 10%, the final sample size was 120.

4.6. Sampling Procedures

In this study, the convenient sampling technique was employed in the selection of participant nurses.

Naturalistic observational pretest study conducted on 10% (12) of the total sample size a week before and 12 of the total sample were selected using the convenience sampling technique for the observational checklist tool proportionally allocating to each all adult ICU nurses who were available during the data collection period and willing to participate was included in this study

A total of 4 specialized teaching hospitals with a total of 154 nurse were identified in Addis Ababa city and the study was conducted at these 4 hospitals ; Tikur Anbesa specialized hospital (53 nurses),St.Paul hospital(43 nurses),AaBET hospital(38 nurses),and Yekatit 12 hospital(20 nurses)

The questionnaires consists of socio-demographic, knowledge,attitude and practice questions and adapted from studies done in Ethiopia done in Addis ababa,Egypt,Turkey, Rwanda, and

South Africa were used for knowledge and practice of MV and VAP prevention bundle assessment (6,7).

4.7. Study variable

4.7.1. Dependent variables

- Knowledge
- Attitude
- Practice

4.7.2. Independent variables

- Age
- Sex
- Educational level
- Experience
- Working place/ hospital

4.8. Data Collection tools

Structured open & close ended questionnaires were distributed to the study participants.

4.9. Operational definitions

Bundle – A collection of things or a package of several things tied together (18)

Knowledge—an arranged of information and understanding stored in memory concerning VAP bundle (18,19, 22)

Good knowledge—those nurses who scored equal to or above the mean (18, 19, 22)

Poor knowledge—those nurses who scored below the mean (18, 19, 22)

Attitude—a positive or negative view of the way nurses thinks about VAP bundle (18, 22)

Positive attitude—those nurses scored equal to or above the mean (18, 22)

Negative attitude—those nurses who scored below the mean

Practice— the act of prevention of VAP or applying VAP bundle activities (18,22)

Good practice—practice of VAP bundle activities as the standard or above (18, 22)

poor practice—practice of the VAP bundle below the standard(18,22)

4.10. Data Quality Control and Management

All data was checked for clarity, completeness and correct recording of all the necessary information by the principal investigator. The quality of data was further ascertained during data entry and cleaning process. Finally data was digitalized for further processing

4.11. Data Analysis and procedures

Data coding and entering was performed using Epi-info version 7.0. Frequency and cross tabulation was used to check for missed values and variables. Statistical analysis was done using SPSS (Statistical Package for Social science) version 25. Chi square test was used to identify clinically pertinent categorical variables associated with the dependent variable. Descriptive analyses of the data was reported and presented as figures and tables.

4.12. Ethical Consideration

Ethical clearance and approval was obtained from the Ethical and Research Committee of SPHMMC. Official letters was obtained from the department of Emergency and critical care medicine. The hospitals administrations were informed about the purpose of the study, anticipated benefits, selection criteria, and data collection procedures and a written legal ethical clearance regarding the study was obtained from St. Paul's Hospital Millennium Medical College institutional review board official letter written with Ref.No.pm23/127.

Confidentiality of participants was kept during the study and during dissemination of the result.

4.13. Dissemination of Results

The result will be submitted to the Department of Emergency and Critical Care Medicine and presented at the final research defense seminar. It will also be published in reputable journal.

CHAPTER FIVE: RESULTS

5.1. Population Characteristics

5.1.1. Sociodemographic Characteristics.

Regarding the age, out of 120 participants, most 69 (57.5%) was 20-30 years and the mean age of the study participants was 27.89 with (SD =5.15).

Out of 120 respondents, 64 (52.9%) were females and 56(47.1%) were males, and the male to female ratio was 0.9:1

Majority 73 (61.3%) of the participants were bachelor degree holders

Majority of adult intensive care nurses 87(72.5%) had no previous training, and higher proportion of the participants 55 (45.5 %) had been working in the ICU for less than 2 years.

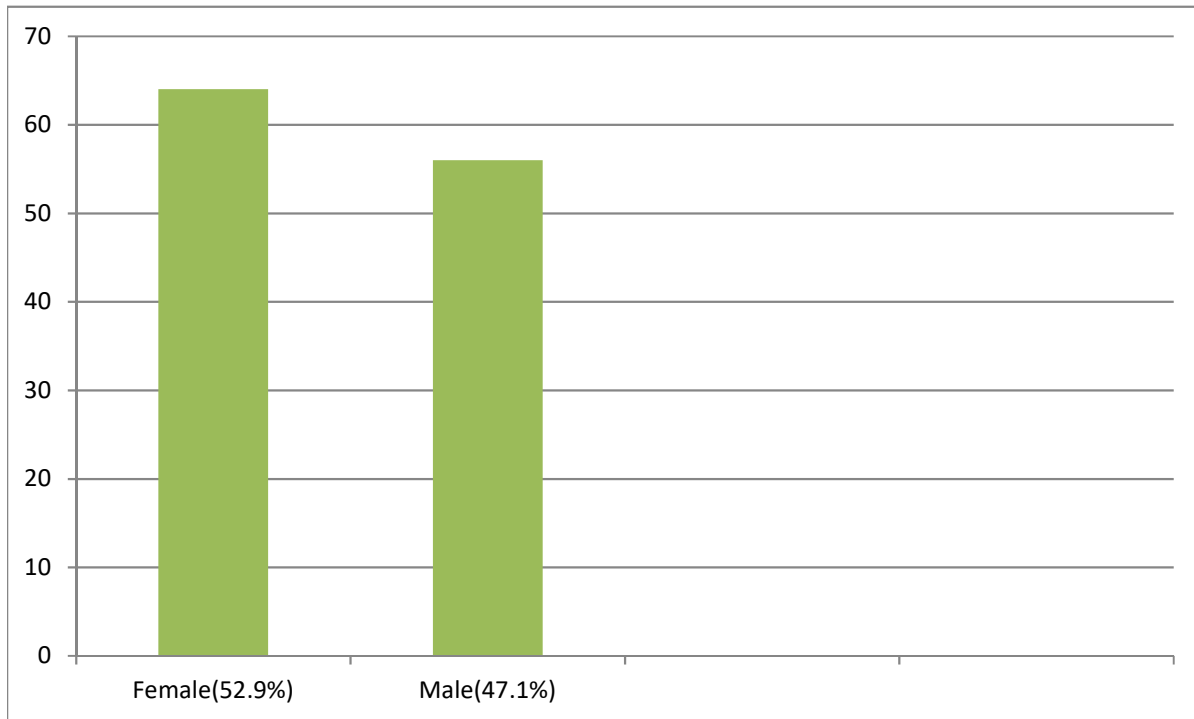


Fig.5.1.frequencies of the participants based on sex(N=120)

		N	Percentage
Sex of the respondent	Male	56	47.1%
	Female	64	52.9%
Age of the respondent	20-30 yrs	68	57.1%
	30-40 yrs	40	33.6%
	40-50 yrs	11	9.2%
Level of education	Diploma	36	30.3%
	Degree	73	61.3%
	Master	10	8.4%
Work experience in the ICU	< 1 yr	8	6.7%
	1-2 yrs	47	39.5%
	2-3yrs	36	30.3%
	3-5yrs	16	13.4%
	5-10yrs	9	7.6%
	>10 yrs	3	2.5%

Previous training on VAP prevention bundle	Yes	33	27.5%
	No	87	72.5%

Table 5.1. Proportion of Adult Intensive Care nurses according

to their demographic

characteristics in specialized teaching hospitals in Addis Ababa, 2023 (n=120)

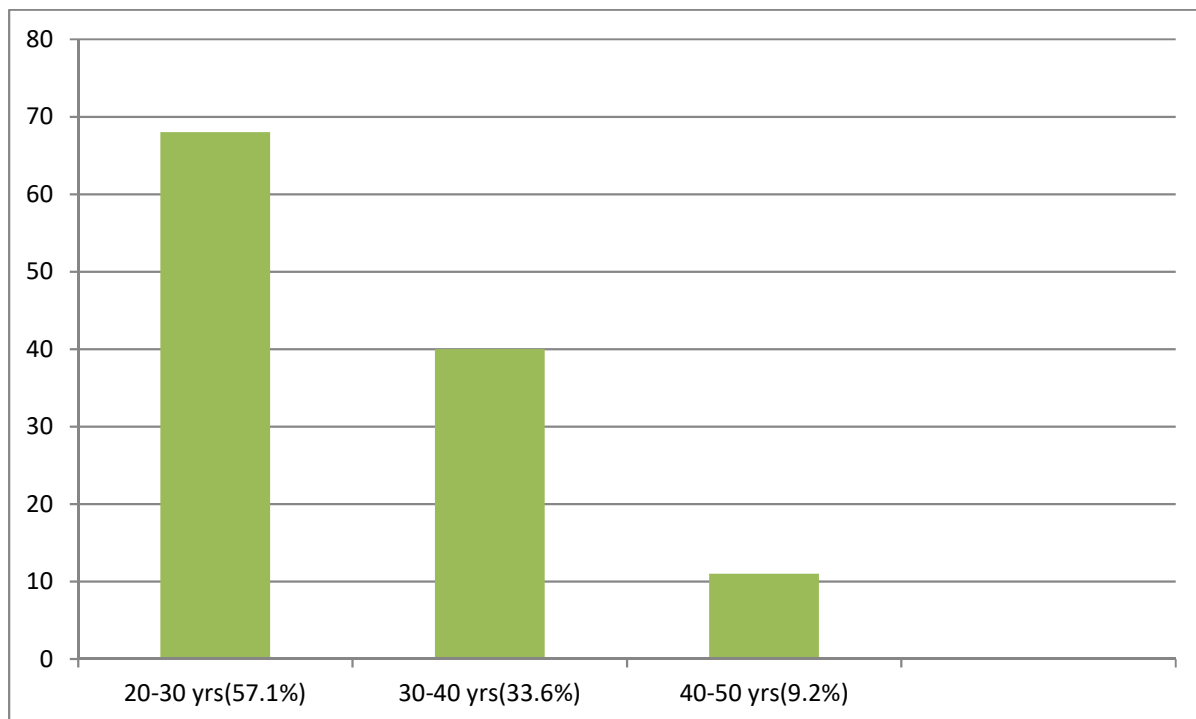


Fig 5.2.frequencies of the participants based on age

5.2. Level of Knowledge

The mean score and mean value was used to classify ICU nurses knowledge about ventilator VAP prevention bundle.

The level of nurses knowledge was ranked in to two levels score above or equal to the mean value was 8.8 (62.9%) were taken as having good knowledge score and those who had below the score (<62.9%) were considered as having poor level of knowledge .

There were 14 knowledge related questions about the prevention of VAP of which 8 MCQ and 6 “yes/no” questions and out of 120 adult intensive care nurses, about 75 (62.5%) had scores of mean and above mean score and had good knowledge, whereas 45 (34.5%) of the participants had scores below mean score and had a poor knowledge.

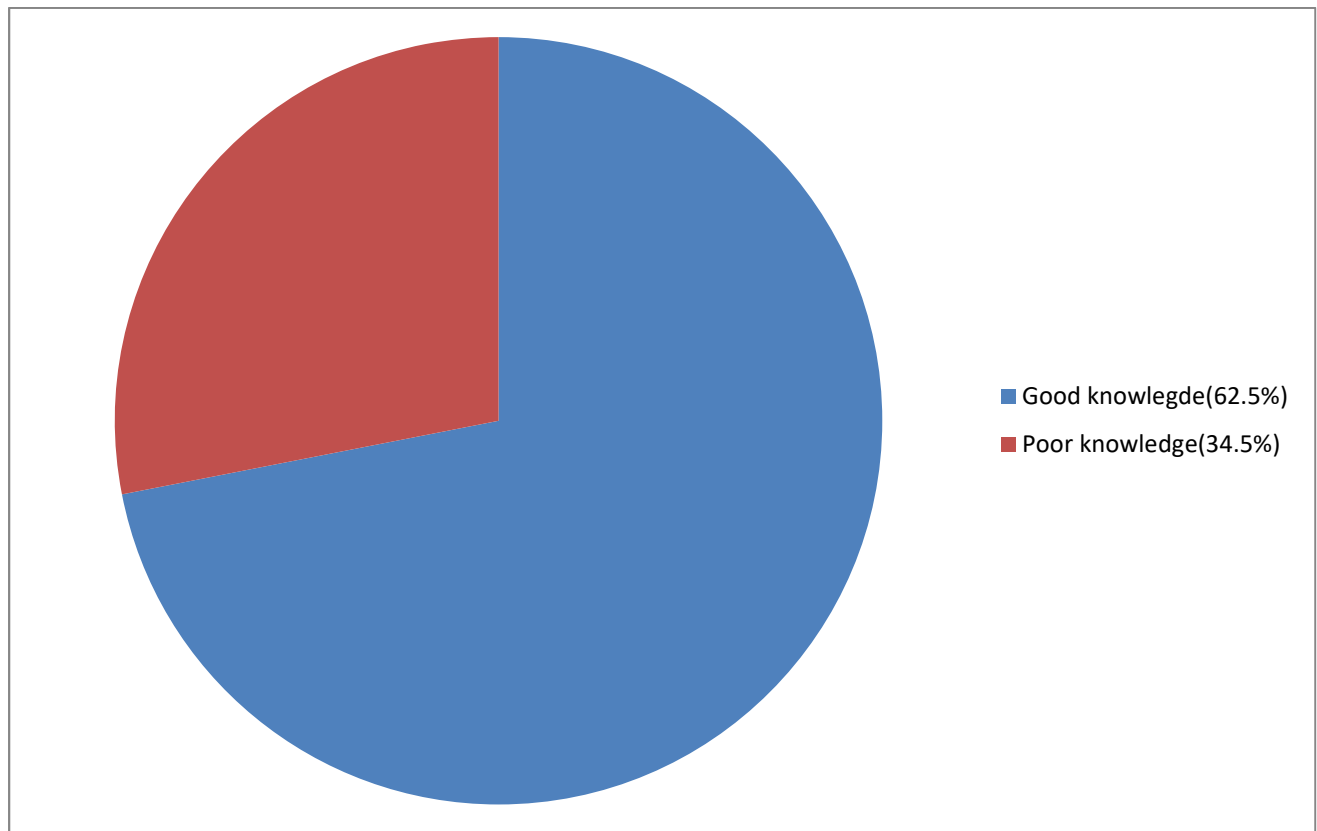


Fig 5.3.mean score of knowledge of the participants (N=120)

5.3. Item-Wise Response of Nurses Regarding Knowledge Related to Mechanical Ventilation.

Out of 120 respondents, about 67(55.7 % %) knew the sedation assessment and hold strategy to prevent VAP

Majority of the respondents 80 (66.7%) of them were aware of the frequency of subglottic suctioning and similar to this 80(66.7%) of them knew that early weaning reduces the risk of VAP.

The highest number of 86(71.7%) of the participants were familiar with recommended frequency of changing the suction systems, and majority 80(66.7%) of the nurses were aware of using adjustable ICU beds decrease the risk of VAP, 78(65%) of the participants were also familiar with GI over distension is a risk to develop VAP.

Out of the 120 adult ICU nurses, about 72(60%) were aware of the recommended HOB to prevent VAP, 70(58.3%) of them were familiar with the prolonged use of stress ulcer prophylaxis as a risk for VAP and 73 (60.8%) were aware of frequency of oral care for ICU patients who are on mechanical ventilator.

Table 5.2. Knowledge scores of adult intensive care nurses' VAP prevention bundle

Knowledge questions of "yes/no" form	Yes		No	
	Frequency	percent	Frequency	Percent
Insertion of suction catheter is sterile procedure	73	60.8	47	39.2
Head of bed should be 30-45°	72	60.0	48	40.0
Oral care is recommended every 4-6 hours	73	60.8	47	39.2
Prolonged use of stress ulcer prophylaxis is a risk for VAP	70	58.3	50	41.7
Chest physiotherapy is useful to decrease VAP	71	59.2	49	40.8
GI over distension can cause VAP	80	66.7	40	33.3

5.4. Factors associated with knowledge of nurses on VAP prevention bundle

In multivariate logistic regression analysis, the level of knowledge was found to be a statistically significant positive association with the level of education, work experience and previous training at a p value of less than 0.05, but the other variables were not found to be statistically significant. The odds of those who had a diploma were 2.160 times more likely (AOR, 2.160; 95% CI, 0.031–8.210) to have poor knowledge than those who had an MSc (Table 5.3).

And those who had work experience of 5-10 years ($p=0.006$) were 8.8 times more likely to have good knowledge than those with experience of 1-3 years, AOR (8.808, CI=95%) and those who didn't have previous training on VAP prevention bundle with ($p=0.015$) had 1.309 times poor knowledge than those ICU nurses who were exposed to training by AOR (1.309), CI=95%

Table 5.3 Factors affecting the level of knowledge of nurses working in the ICU regarding VAP prevention bundles (n=120).A multivariate binary logistic regression result

Variables		Knowledge level		P-value	AOR (CI=95%)	95% C.I.for EXP(B)	
		GOOD	POOR			Lower	Upper
Sex	male	30	26	.662	0.003	.414	2.431
	female	34	30	.501	1.722	.354	8.389
Age	20-30	39	30	.863	1.153	.229	5.813
	30-40	20	20	.052	1.234	.115	2.212
	40-50	5	5	.240	.355	.063	1.995
Educational level	Diploma	15	21	.049	2.160	.031	.821
	Degree	39	35	.018	.0711	.0976	1.412
	Master	7	3	.017	.207	.006	6.821
Work experience in the ICU	<1	3	5	.049	1.538	.009	11.232
	2-3	24	23	.049	1.557	.002	23.792
	3-5	10	6	.013	8.729	.008	15.70
	5-10	3	0	.006	8.808	.050	12.01
Nurses training	Yes	33	87	.015	1.309	.0046	3.453
	No			.985	1.029	.453	3.334

Table 5.3 Factors affecting the level of knowledge of nurses working in the ICU regarding VAP prevention bundles (n=120).A multivariate binary logistic regression result

5.5. ICU Nurses practice towards the VAP prevention strategies

Table 5.5 Practice of nurses working in ICU regarding ventilator care at specialized teaching hospitals (n=120)

Nurse practice	yes	%	No	%
Hand wash before patient contact	80	66.7	40	33.3
Hand wash before entering to ICU	78	65	42	35
Hand wash after patient contact	83	69.2	37	30.8
Hand wash after microorganism source contact	79	65.8	41	34.2
Use of alcohol	74	61.7	46	38.3
ETT cuff pressure maintained	67	55.8	53	44.2
Hand wash before suctioning	76	63.3	43	36.1
Wear surgical gloves	71	59.2	49	40.8
Use sterile equipment during suctioning	81	67.5	39	32.5
Measure the amount and the character of secretions	86	71.7	34	28.3
Hand wash before oral care	87	72.5	33	27.5
Positions of patient in semi recumbent position	85	70.8	35	29.2
Mouth wash with chlorhexidine and water	74	61.7	46	38.3

The level of nurses practice was ranked in to two levels, score above or equal to the mean value 8.5 (65.5%) were taken as having a good practice score and those who below the score of (<65.6%) are considered as having poor practice on strategies of VAP prevention bundle .

There were 13 practice related questions about the VAP prevention bundle and out of 120 adult intensive care nurses, about 79 (64.0%) scores mean and above mean and had a good practice towards VAP prevention bundle, whereas 41(36%) had below mean scores and considered to have a poor practice

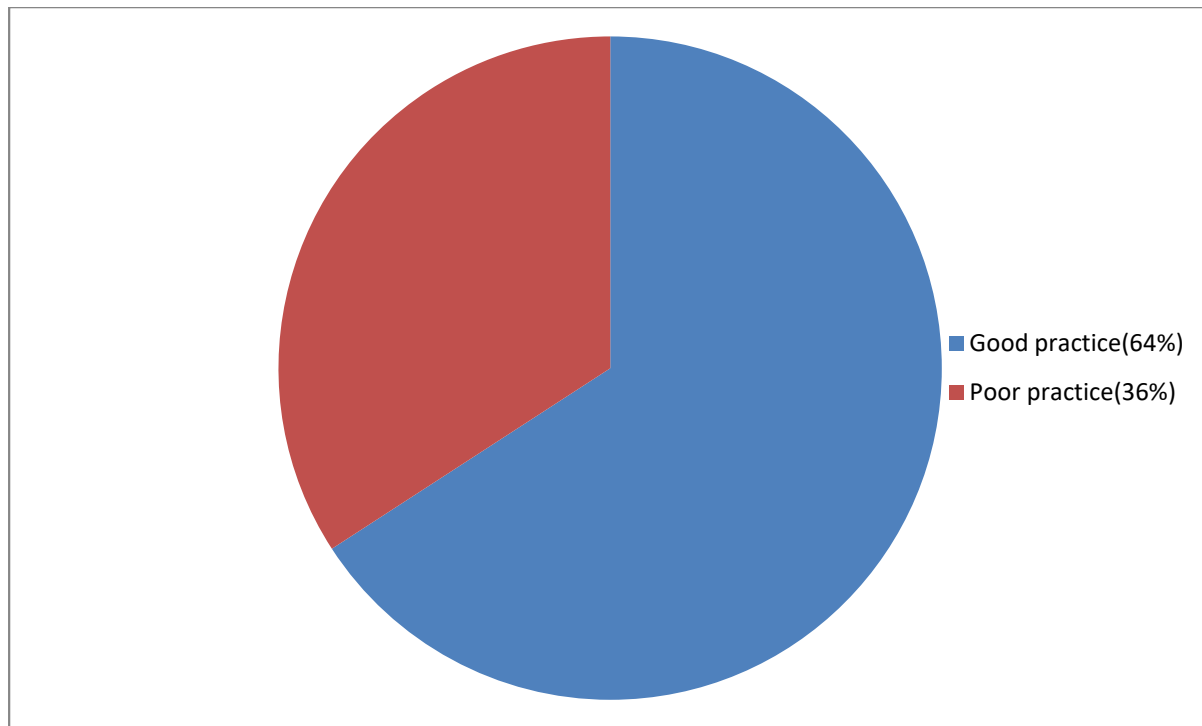


Fig 5.4.mean score of practice of the participants (N=120)

5.6. Factors associated with practice

From variables analyzed into multivariate logistic regression for those having bachelor and master's degree ($p=0.041$) and ($p=0.017$) are positively associated with good level of practice by AOR (1.06), CI=95% and AOR (1.160), CI=95% respectively and it was identified that MSc. degree holders were 1.16 times more likely to have good knowledge as compared to diploma nurses (AOR= 1.160; 95% CI)

And also there were significant difference in practice found between ICU nurses based on the length of work experience and history of previous training, there is a positive association of level of practice with 2-3 years of experience ($p=0.019$), AOR(1.709), CI=95%, 3-5 years($p=0.009$), AOR(2.057), CI=95% and 5-10 years ($p=0.003$), AOR(2.176), CI=95%.

And those who had work experience of 5-10 years ($p=0.003$) were 2.7 times more likely to have good practice than those with experience of < 1year AOR (2.716(0.001-5.411), CI=95%)

Adult ICU nurses who had been trained on VAP prevention strategies were 2.6 times more likely to had good knowledge as compared to those who had not trained (AOR = 2.621, 95% C.I) at p-value 0.023.

Table 5.6. Factors affecting the level of practice of nurses working in the ICU regarding VAP prevention bundles (n=120). A multivariate binary logistic regression result

		Practice level		P-value	AOR (CI-95%)
Variables		Good	poor		
Sex of the respondent	male	27	27	.212	1.670 (0.747-3.738)
	female	32	32	.920	0.921(0.0921-1.122)
Age of the respondent	20-30	35	34	.934	1.067(0.081-2.123)
	30-40	21	19	.771	1.261(0.0761-2.222)
	40-50	6	5	.902	1.110(0.211-3.331)
Level of education	Diploma	18	18	.750	0.09(0.099-4.7160)
	Degree	50	24	.041	1.060(0.011-3.219)
	Masters	8	2	.017	1.160(0.0131-2.017)
Work experience in the ICU	<1	3	5	.099	0.402(0.016-5.175)
	2-3	27	20	.019	1.709(0.003-2.787)
	3-5	11	5	.009	2.057(0.00-3.569)
	5-10	3	0	.003	2.716(0.001-5.411)
Previous nurses training	Yes	33	87	.023	2.621(0.017-2.909)
	No			.697	.834(0.333-2.087)

Table 5.6: Factors associated with the level of practice of nurses working in the ICU regarding mechanical ventilators (n=120).

5.7. Attitude of respondent about VAP prevention bundle (N=120)

There were 6 attitude related questions put on Likert's scale to assess about the prevention strategies of VAP

The level of nurses' perception was ranked in to two levels score above or equal to the mean value.

Attitude score equal or above 4.00 (82.6%) were taken as having positive perception score and those who below the score of (<82.6%) are considered as having negative perception.

Out of 120 adult intensive care nurses, about 99 (82.5%) scores mean and above mean scores had positive perception towards VAP prevention bundle, whereas 21(17.5%) were scores below mean scores had negative perception

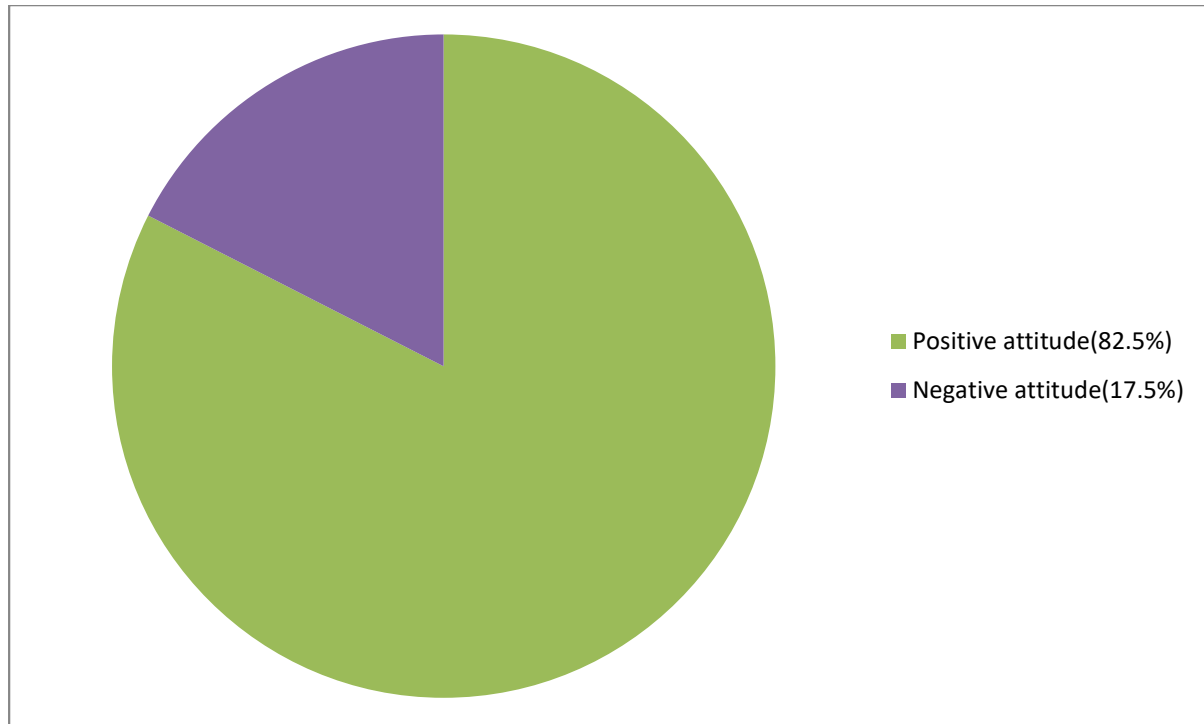


Fig 5.7.mean score of attitude of the participants (N=120)

Table (6): Frequency and percentage distribution of the studied nurses' total level of perception regarding VAP bundle (n=120).

Attitude variables	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	Freq	%	Fre q.	%	Fre q.	%	Freq	%	Fre q.	%
Suctioning is always sterile	1	0.8	3	2.5	20	16.7	62	51.7	34	28.4
Nursing staff should get training on VAP	2	1.7	6	5.0	18	15.0	64	53.3	30	25
ETT suctioning should be done frequently	2	1.7	1	0.8	20	16.7	63	52.5	34	28.3
Oral care should be with antiseptic	1	0.8	2	1.7	9	7.5	62	51.7	45	39.3
Every ICU nurse should know components of VAP BUNDLE	2	1.7	2	1.7	12	10.0	60	50.0	43	35.8
VAP BUNDLE should be evaluated as part of hospital IPC management	3	2.5	6	5.0	13	10.8	54	45.0	44	36.7

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CHATER SIX: DISCUSSION

Nurses play a vital role in the management of patients on mechanical ventilators. It is known that nurses are expected to be found in the acceptable level of knowledge background and involve in ICU work with evidence based practice in providing care to mechanically ventilated patients.

So in this study, the average age of the participant 69 (57.5%) was 20-30 years. This finding was similar to a study conducted in Ethiopia, Iraq and India, and similar studies showed that 56%, 58% and 64% of the participant were males which didn't happened to this study and the majority 57%, 55% and 58% of nurses were in the age group below 29 [2,3, 18].

Regarding the training-level majority (72.5. %) of adult ICU nurses had no training related to VAP and mechanical ventilator care. However, the study conducted in Ethiopia (Addis Ababa military hospital) and Egypt showed a higher proportions of nurses of trained nurses in their adult ICUs, which are 57.8% and 56% respectively [7, 11]. This difference might be due to this research conducted where considerable attention is not given to critical care

Majority of (62.5%) of the study participants had good knowledge on VAP prevention bundles. However, this finding didn't go with the study conducted in southern India in which 53.5% of the nurses had poor knowledge [11]. On the other hand, the study conducted in Sri Lanka and Eastern India showed a higher knowledge level among nurses, which are 73% and 69.7% of the participants, had good knowledge respectively regarding mechanical ventilation prevention strategies [6, 12]. This discrepancy could be attributed to the sociodemographic difference and the difference in the type of ICU set up.

The majority (64%) of nurses from the study participants had good practice regarding VAP prevention strategies. These results are consistent with the study from Sri Lanka revealed that the majority (57.8%) of the nurses had good practice regarding the care of ventilated patients to prevent VAP [13]. But the study conducted in Ethiopia showed 50.4% of the sample had poor practice(18)

This inconsistency may be due to the deference in the tool used to assess the practice and another possible explanation for this is the difference in the study setting.

The highest 99 (82.5%) of the participants had positive attitude towards VAP prevention bundle, but on the contrary researches done in Addis Ababa, Ethiopia and Egypt showed that 60% of the respondents had negative attitude about VAP prevention bundle(18,22).

A significant relationship was found between nurses' educational level and their knowledge in this study.

In this study, nurses who had diplomas were found to have less knowledge about VAP prevention strategies than BSc and MSc holders. This finding is consistent with that of the study in Ethiopia and Sri Lanka, in which the educational level was statistically associated with nurses' knowledge level. Similarly, those who had diplomas had less knowledge than BSc and MSc holders (13, 18).

The educational level and work experience of nurses were significantly associated with the practice of nurses which is similar with the study conducted in Ethiopia (18). The finding is different from the study conducted in Egypt, which showed job position as a factor that affects the practice level (19). These results are probably related to the socioeconomic differences between study settings

6.1. Strength of the study

- Withstand a lots of challenges (such as: repetitive appointment, plead and disregard as well as difficulty in contacting all organizational hierarchy
- The data was collected using structured questionnaires and check list
- Adapted and modified from other researches question
- Since standard questionnaire was used, it maximizes Validity.
- Data collators were health professionals

6.2. Limitations of the study

- Time constraint
- The sample was collected using convenient sampling technique which is quite prone to bias
- Misreporting by respondents cannot be ruled out
- The main limitation of this study was the relatively small sample size
- The study is limited to ICU nurses working in the five hospitals so cannot be generalized to other hospitals ICU

CHAPTER EIGHT: CONCLUSION

This study found out that:

- Majority of adult intensive Care nurses had good knowledge
- Majority of adult ICU nurses had good practice on VAP prevention bundle
- Most adult ICU nurses had positive perception regarding VAP prevention strategies
- The current study revealed that ICU nurses' good knowledge on VAP preventive strategies but through checklist of their practice result in to different findings, no significant association found between age, sex and knowledge. However, the knowledge of ICU nurses on prevention of VAP was found to be statistically associated with level of education, previous training and working experience.
- Practice of ICU nurses on prevention of VAP found to be statistically associated with ICU educational level , years of working experience and previous training but not statistically associated with nurse's age and sex
- Attitude of ICU nurses on prevention of VAP found not to be statistically associated with age,sex, educational level , working experience and previous training

CHAPTER NINE: RECOMMENDATIONS

- I would like to recommend:

To SPHMMC - to open training center and to arrange periodic training sessions to ICU nurse and also to give institutional academic opportunities for ICU nursing staff to develop their level of education

To ESEP- to develop a local VAP prevention bundle guideline and to open training center and to expand training sessions to ICU nurses.

To FDRE MOH- to support and encourage the ICU departments and their nurses to follow strict acceptable evidence based practice protocol/ guidelines and provide them with guidebook, in service training and or education.

TO Hospitals on which the study was conducted:- To make on ICU environment enable nurses to translate knowledge attitude into practice by ensuring availability of facilities like there is no hand washing sinks before entering ICU except of hand washing soap and disinfectants for cleaning and disinfecting equipment, adoption of acceptable guidelines based on evidence based practice protocol was recommended.

Managers and Head nurse(s) of the unit:- To motivate opinion leaders amongst nurses in the units which promote unified and wormed interaction within the nurses. That ease way to put guidelines for prevention of VAP into- practice within in themselves Besides, Learning resources such as articles, journals and electronic resources such as computers and internet should be made accessible in the units for staff members.

Similar study is recommended: to include large sample size in other hospitals, which provide care for critically ill patients, further research on factors affecting implementation of VAP prevention strategies was recommended

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CHAPTER ELEVEN: ANNEX

Annex 1: Questionnaires for VAP BUNDLE study

Part1: Socio-demographics information

1. Age in years _____
2. Sex: 1) Male _____ 2) Female _____
3. Marital Status: 1) Married _____ 2) Single _____ 3) Divorced/separated/Widowed-- _____
4. Workplace-- _____

5. Level of education 1) Diploma 2) Degree 3) Master

8. Experiences working in ICU: _____

- 1) <1 year___
- 2) 1-2 years___
- 3) 2-3 years___
- 4) 3-5 years___
- 5) 5-10 years___
- 6) >10years----

Part 2.Evaluation questionnaire concerning intensive care nurses' knowledge for prevention of ventilator-associated pneumonia (VAP) bundle

Please indicate the following

1. Which sedation assessment strategy do you use to prevent VAP (choose only one)

A, Regular assessment and daily sedation hold

B. Every patient should be always on continuous sedation until extubation

C, Sedation has no relation with development of VAP

D. All intubated patients should be sedated during night time

E.I don't know

2. How often do you do ETT suctioning (choose only one)

A, Every 2 HRS C, Daily D, Suction secretions as they accumulate, if necessary

B, Every 4 HRS E, I don't know

3. Early weaning

a. Early weaning reduces the risk for VAP b. Early weaning increase the risk for VAP

c. Early weaning do not influence the risk for VAP.

d. No relation with risk of VAP E. I don't know

4. Frequency of change in suction systems

A, Daily changes are recommended (or when clinically indicated) B, Weekly changes are recommended (or when clinically indicated) C, It is recommended to change systems for every new patient (or when clinically indicated) D,Q 6HRSE, I do not know

5. Adjustable vs. non-adjustable beds

a. Adjustable beds increase the risk for VAP b. Adjustable beds reduce the risk for VAP

c. Adjustable beds have no influence upon the risk for VAP. d. No relation with risk of VAP

E, I don't know

6. Patient positioning

A, Supine positioning is recommended

B, Semi-recumbent positioning is recommended

C, The position of the patient does not influence the risk of VAP. D. Has no relation with risk of VAP E. I do not know

7. During the care of ventilated patient maintenance of adequate cuff pressure

a. Is important because it decrease the risk for VAP b. Can increase the risk for VA

c. Do not influence the risk for VAP d.Has no relation with risk of VAP E. I don't know

8. Over feeding a ventilated patient is associated with

a. increased the risk for VAP b. decreased the risk for VAP

c. do not influence the risk for VAP d. I don't know

Part 2.1 Mark yes /no for the questions listed in the table

S.NO	Knowledge questions	YES	NO
1	Insertion of the suction catheter in to ETT is a sterile procedure		
2	Dusting of Respiratory and bedside equipment should be done every shift, whenever soiled.		
3	Head of the bed should be elevated from 30-45 degrees		
4	It is recommended to perform oral care every 4-6 hrs, whenever necessary using swab moistened with mouth wash and water		
5	Chest physiotherapy is useful for decreasing risks for VAP		
6	GI over distension can cause VAP		

Table1. Knowledge assessment questions

Part 3.Attitude test VAP prevention among the study participants

Read each statement carefully and tick the mark sign“V” in the corresponding column that most likely reflects your answer to the following questions. Use number: 5 for “strongly agree”, 4 for “Agree”, 3 for “neither agree nor disagree”, 2 for “disagree”, and 1 for “strongly disagree.”

Attitude variables	5	4	3	2	1
1. Suctioning procedures must be always sterile					
2. ICU nursing department should get training on VAP bundle					
3. ETT suctioning should be done frequently for any intubated patients					
4.Recomendation for head elevation is 30-45°					
5. Oral care should be with antiseptic					
6.Avoiding GI ulcer prophylaxis is unlikely to decrease risk of VAP					
7.Every ICU nurse should know all components of VAP bundle					
8. VAP bundle should be evaluated as part of hospital IPC management					

Table 2.questions for attitude assessment

Part 4. Mark using (x) ‘or (✓) in the box provided

SN	Variables	Response	
1	In the past one year, have you jumped any of components of VAP BUNDLE on your patients during your shift	1) Yes	2) No (<i>Please skip the next question</i>)
1.1	How many times do you have missed in the last year (<i>Please state on the provided space and put your reason</i>)		
2	Do you believe that your practice is sufficient to prevent VAP	1) Yes	2) No (<i>please skip the next question</i>)
2.1	How often training on prevention of VAP are provided to you within a year? (<i>Please state on the provided space</i>)		
3	Do you believe that your training is enough to control VAP	1) Yes	2) No

Table 3.checklist for nurse’s prevention practices on VAP

4.1. Practice assessment for each individual VAP prevention strategies

S.no	Hand wash practice	Yes	No
1	Hand washing before entering ICU		
2	Hand washing Before patient contact		
3	Hand washing After patient contact		
4	After contact with a source of microorganisms		
5	Use of alcohol		

Table 3A

	Suctioning from the ETT/tracheotomy practice	Yes	No
6	Endotracheal tube cuff pressure maintained		
7	Hand washing before suctioning		
8	Wear surgical gloves		
9	Prepare sterile equipments required during suctioning		
10	Insert the catheter into the ETT gently by using aseptic technique		
11	Measure the amount and characteristics of secretion		

	Oral care practice	Yes	No
12	Hand washing before oral care		
13	Position a patient in a semi recumbent		

Table 3C

Annex: II CONSENT EXPLANATION

My name is Dr. Mekonnen Andualem Getaneh, a 3rd year post graduate student in Emergency Medicine and Critical Care at St. Paul Hospital millennium medical College and AaBET hospital. As part of my post graduate academic course work, I am required to do a clinical research for the completion.

I'm conducting a survey on the knowledge, attitude and practice of nurses working in ICU in AA governmental Hospitals on VAP bundle.

The aim of the research is to study our knowledge, attitude and practice of VAP bundle and identify our strengths & weaknesses. This will help improve the quality care given to patients on mechanical ventilation.

To do this I shall obtain data in the form of a questionnaire administered to volunteer participants from ICU nurses. The results obtained will enable us come up with recommendations. Therefore, I shall need your consent as the participant in order to be included in the study.

This is the volunteer exercise and no victimization will occur on the basis of refusal to participate in the study. One can withdraw from the study at any point in time. Any information obtained in the course of the study is beneficial to the management of the patient. All information shall be treated with utmost confidentiality.

ANNEX: III INFORMED CONSENT FORM

I have understood the explanation by the investigator and hereby give informed consent to participate in the study:

1. I accept to participate in the study.
2. I accept to be interviewed concerning knowledge, attitudes and practices of VAP bundle amongst nurses working in-----hospital/ICU.

3. I understand that the information I give will be treated with utmost confidence.

4. I understand that my participation in the study is voluntary and I can withdraw my consent at any point of study and that such withdrawal will not affect my work in any way.

Participant's Name

Signature

Investigator's name

signature
