

A Study to Assess the Knowledge and Practices Regarding Prevention of Ventilator Associated Pneumonia among the Staff Nurses Working in Intensive Care Unit of Selected Hospitals in Kamrup Metro, Assam

Bhanita Barman

Assistant Professor, Department of Medical - Surgical Nursing, The Assam Royal Global University, Guwahati, Assam, India
Email id: [bhanitamatu92\[at\]gmail.com](mailto:bhanitamatu92[at]gmail.com)

Abstract: *Background:* The use of artificial airway and mechanical ventilation (MV) is essential and common life - saving measure in the intensive care unit (ICU). Ventilator associated Pneumonia is a preventable complication of mechanical ventilator. Caring for the patient on mechanical ventilation has become an integral part of nursing care in critical care unit. *Aim:* The aim is to assess the knowledge and practice regarding prevention of VAP and also to determine the co - relation between knowledge and practice of the staff nurses regarding nursing care of patient on MV. *Methods:* Study was conducted in selected hospitals of Kamrup metro. 115 samples were drawn by using purposive sampling technique. The knowledge and practices of staff nurses were assessed by using a self-administered structured questionnaire and an observation check list, respectively. *Results and conclusion:* The study findings revealed that majority (60 %) of the staff nurses had 'moderately adequate knowledge' while 53.91% of the staff nurses had 'moderately adequate practice'. Study also revealed a moderate positive correlation ($r=0.352, p=.0001$) between knowledge and practices. To improve knowledge with practice a deliberate effort should be instituted to nursing personnel regarding prevention of VAP/care of patient on MV through the establishment of training programme.

Keywords: Ventilator associated pneumonia, mechanical ventilator, intensive care unit, staff nurse, knowledge and practice

1. Introduction

Oxygen is one of the most important elements required to sustain life, without it our health begins to suffer and /or we die. Unhealthy or weak cells due to improper metabolism lose their natural immunity and thus susceptible to infections and lead the various kinds of serious health problems. Most of us suffer from oxygen deficiency due to improper breathing. For proper breathing we can put the patient on ventilator to provide proper oxygen. Some complications occur with ventilator which of one is ventilator associated pneumonia. Ventilator associated pneumonia is defined as a type of pneumonia in a patient receiving mechanical ventilation that was not present at the time of admission to hospital or that other 48 hours after intubation and mechanical ventilation. It's characterized by new or a progressive pulmonary infiltrate, fever, leucocytosis and purulent tracheobronchial secretions.¹ The VAP incidence rate varies from 3.6 to 73.4 per 1000 ventilator - days, with a mortality rate from 16% to as high as 94% in some specific settings, and when VAP is caused by antibiotic resistant pathogens.^{2, 3} prevention of VAP is a multidisciplinary issue, the role of intensive care nurses is essential and should not be underestimated.⁴ Many nonpharmacological evidence - based strategies aimed at preventing VAP can be seen as part of basic and routine nursing care, direct responsibility of the bedside intensive care nurse, and can easily be instituted at minimal costs; and neglecting any of these could put the patient at risk for infection.⁵ Nevertheless nurses need to have an awareness of the problem as well as evidence - based preventive strategies so as to adhere to such practices

and integrate them into their nursing care. Nurses' knowledge would facilitate optimal delivery of patient care, bring confidence to make appropriate decisions, and prevent poor outcomes in the recovery of mechanically ventilated patients.⁶

2. Review of Literature

Zeb A, Hasnain M, Ahmad I, Khan S and Shah AA (2018)⁷ conducted a cross - sectional study to assess knowledge regarding prevention of ventilator associated pneumonia among 100 critical care nurses of both public and private tertiary care hospitals in Pakistan. A structured questionnaire was used to assess the knowledge of the critical care nurses. Results revealed that 88% nurses had average knowledge, 5% of them has excellent knowledge and 7% nurses had poor knowledge about prevention of VAP. Thus, it can be concluded that several educational programs should be arranged for nurses to improve their knowledge from average to excellent and to decrease Ventilator associated Pneumonia among patient with mechanical ventilator.

Shrestha S and Shrestha R (2018)⁸ conducted a study to assess knowledge and practice regarding endotracheal suctioning among 95 critical care nurses of two teaching hospitals in Bharatpur, Chitwan. A semi - structured self - administered questionnaire was used to assess knowledge and structured observational checklist was used to assess practices regarding endotracheal suctioning. Result of the study showed that 55.8% had adequate knowledge and

44.2% had satisfactory practice on endotracheal suctioning. There was a significant association found between knowledge level with working hospital and working area, and practice level with the religion and ethnicity. Also, there is a significant weak positive correlation ($r = 0.197$) was found between knowledge and practice score on endotracheal suctioning. Results indicated that there was a need of training/demonstration on ET suctioning or a strict protocol to follow on endotracheal suctioning for the staff nurses.

Zaben F et al. (2017)⁹ conducted a cross-sectional study to assess the knowledge and practice on VAP prevention bundle among the 160 ICU nurse from 6 governments and 8 private hospitals of middle and northern West Bank in Palestine. Results of the study revealed that nurses' knowledge level were moderate whereas the practice level was excellent. A significant association was found between knowledge score and level of education, years of experience and acquisition of training about VAP prevention guidelines but there was no association found between practice score and ICU training, level of education, area of work and years of work experience. Majority (73.3%) of participants indicated that infection control training programme was very much needed for better knowledge and practice.

3. Research Objectives

- To assess the knowledge regarding prevention of Ventilator Associated Pneumonia among the staff nurses working in intensive care unit.
- To assess the practices regarding prevention of Ventilator Associated Pneumonia among the staff nurses working in intensive care unit.
- To determine the correlation between knowledge and practice regarding prevention of Ventilator Associated Pneumonia among the staff nurses working in intensive care unit.
- To find out the association between knowledge of ICU nurses regarding ventilator associated pneumonia with some selected demographic variables such as age, sex, professional qualification, years of working experience in ICU and exposure to training programme on prevention of ventilator associated pneumonia /care of patient on mechanical ventilation.
- To find out the association between practice of ICU nurses regarding ventilator associated pneumonia with some selected demographic variables such as age, sex, professional qualification and years of working experience in ICU and exposure to training programme on prevention of ventilator associated pneumonia /care of patient on mechanical ventilation.

4. Research Methodology

Research approach - Quantitative approach

Research design - Descriptive correlational design

Settings - The study was conducted in Dispur GNRC Hospital, Nemcare Hospital Guwahati and Apollo Hospital Guwahati.

Population: Staff nurses working in ICU of Dispur GNRC hospital, Nemcare Hospital and Apollo Hospital Guwahati

Sample size - In the present study sample size consist of 50% of the total accessible population which was found to be 115 staff nurses who met the inclusion criteria

Sample technique - The sampling technique used to select the sample of population was 'purposive sampling technique'. Staff nurses who ever assigned ventilator patient to provide care fulfilling the inclusion criteria were selected as a sample in the study.

Criteria for sampling selection

Inclusion criteria

- Staff nurses who have completed at least 1 month of working experience in ICU
- Staff nurses who are directly engaged in providing patient care to mechanical ventilator patient in different ICU settings.
- Staff nurses who are willing to give consent in the study

Exclusion criteria

- Staff nurses who are not available during the time of data collection

Variables under the study

In the present study, two types of variables are used. They are:

- Research variables: Knowledge and practices of the staff nurses regarding prevention of ventilator associated pneumonia.
- Demographic variables: Age, gender, professional qualification, year of working experience in ICU and exposure to training programme on prevention of ventilator associated pneumonia/ care of ventilator patient.

Development of the tool

These tools consist of two sections.

Section I: Structured self-administered questionnaire for Demographic data and Knowledge questionnaire regarding prevention of ventilator associated pneumonia.

Section II: Observation check list to assess the practice of the staff nurses regarding prevention of ventilator associated pneumonia. Each item will have a yes/no response

Content validity of the tool

For ensuring the content validity, the tools have been given to 7 experts. There were 100% agreement on the both structure self-administered questionnaire and observational checklist.

Reliability of the tool

The reliability of the structure self-administered questionnaire was obtained by calculating the coefficient of internal consistency using split half method and observation check list by using inter-rater observational technique and found to be 0.76 & 0.85 respectively.

Data Analysis:

Both descriptive and inferential statistics were used to analyse the data in this present study

5. Result and Discussion

In order to show the findings of the present study, the obtained data were organized, analysed, tabulated, interpreted and presented under the following heading:

Section I: Description of subject characteristics.

This section deals with the description of characteristics of the staff nurses in terms of frequency and percentage and presented in the table 1 to 5

Table 1: Distribution of Staff Nurses according to their Age Group, n=115

Age	Frequency	Percentage
18 - 21 years	24	20.87
22 - 25 years	53	46.09
>26 years	38	33.04
Total	115	100

Table 1 shows that out of 115 ICU staff nurses majority i. e.53 (46.09%) staff nurses are fall under the age group of 22 - 25 years, 24 (20.87%) staff nurses are fall under age group 18 - 21 years and 38 (33.08%) staff nurses are fall under age group >26 years.

Table 2: Distribution of the Staff Nurses according to their Gender, n = 115

Gender	Frequency	Percentage
Male	8	6.96
Female	107	93.04
Transgender	0	0
Total	115	100.00

Table 2 shows that out of 115 ICU staff nurses' majority i. e., 107 (93.04 %) staff nurses are female, 8 (6.96 %) staff nurses are male and no one in transgender category.

Table 3: Distribution of Staff Nurses according to their Professional Qualification, n =115

Professional qualification	Frequency	Percentage
Diploma nursing	61	53.04
Post B. Sc. /B. Sc. nursing	45	39.13
M. Sc. nursing	9	7.83
Total	115	100.00

Table 3 shows that out of 115 ICU staff nurses' majority 61 (53.04%) staff nurses had GNM qualification, whereas 45 (39.13%) had B. Sc. or Post B. Sc. nursing qualification and 9 (7.83 %) had M. Sc. nursing qualification

Table 4: Distribution of Staff Nurses according to their Years of working experience in ICU, n =115

Years of working experience	Frequency	Percentage (%)
1 - 12 month	29	25.22
1 year - 2 years	46	40
>2years	40	34.78
Total	115	100.00

Table 4 shows that out of 115 ICU staff nurses' majority i. e.46 (40%) staff nurses had 1year to2 years of working experience in ICU, 29 (25.22 %) staff nurses had 1 - 12

months of working experience in ICU and rest 40 (34.785) staff nurses had more than 2 years of working experience in ICU

Table 5: Distribution of Staff Nurses according to Exposure to any training programme on Ventilator Associated Pneumonia/care of a patient with MVn=115

Exposure to training programme	Frequency	Percentage (%)
Yes	83	72.17
No	32	27.83
Total	115	100

Table 5 shows that out of 115 ICU staff nurses' majority 83 (72.17%) staff nurses had attended training programme and 32 staff nurses (27.83%) had not attended any training programme on prevention of VAP/ care of a patient with MV

Section II: Knowledge of the staff nurses regarding prevention of ventilator associated pneumonia

Table 6: Mean, standard deviation, frequency and Percentage distribution of Staff Nurses according to their knowledge level. n =115

Knowledge Level	Frequency (f)	Percentage (%)	Mean	SD
Adequate knowledge (17 - 20)	19	16.52	13.08	3.05
Moderately adequate knowledge (10 - 16)	69	60		
Inadequate knowledge (<10)	27	23.48		

Data of the table 6 shows that out of 115 ICU staff nurses' 69 (60 %) staff nurses had 'moderately adequate knowledge', 27 (23.48%) had 'inadequate knowledge' and only19 (16.52 %) staff nurses had 'adequate knowledge' on prevention of ventilator associated pneumonia with overall M= 13.08 and SD=3.05.

Section III: Practice of the staff nurses regarding prevention of ventilator associated pneumonia.

Table 7: Mean, Standard deviation, frequency and percentage distribution of staff nurses according to their practice level, n=115

Practice Level	Frequency (f)	Percentage (%)	Mean	SD
Adequate practice (18 - 20)	34	29.57	14.71	2.95
Moderately adequate practice (11 - 17)	62	53.91		
Inadequate practice (<11)	19	16.52		

Data of the table 9 shows that out of 115 ICU staff nurses' majority i. e.62 (53.91%) staff nurses had 'moderately adequate practice', 19 (16.52 %) staff nurses had 'inadequate practice' and only 34 (29.57 %) staff nurses had 'adequate practice' on prevention of ventilator associated pneumonia with overall M=14.71 and SD=2.95.

Section IV: Correlation between knowledge and practice of the staff nurses regarding prevention of ventilator associated pneumonia

Table 8: Correlation between Knowledge level and Practice level of the Staff Nurses regarding Prevention of Ventilator Associated Pneumonia, n=115

Variables	Mean	SD	Correlation coefficient (r)	Probability (p)
Knowledge	13.08	3.05	0.3521	.0001
Practice	14.71	2.95		

The calculated value of correlation coefficient 'r' was found to be 0.3521 and p value is 0.0001. This indicated that there is a moderately positive correlation between two variables. Therefore, the null hypothesis (H₀₁) is rejected and research hypothesis i. e., there is a significant relationship

between knowledge and practice regarding prevention of ventilator associated pneumonia among the staff nurses working in intensive care unit is accepted.

Hence it can be inferred that knowledge and practice of the staff nurses regarding ventilator associated pneumonia is positively correlated.

Section V: Association between Knowledge of the Staff Nurses regarding Prevention of Ventilator Associated Pneumonia with Selected Variables.

Table 9: Association between level of Knowledge and Years of working experience in ICU, n=115

Year of working experience in ICU	Knowledge			Chi - square (calculated)	df	P value
	Adequate	Moderately adequate	Inadequate			
1month - 12month	8	10	11	15.75	4	0.003**
1year - 2years	2	35	9			
>2 years	9	24	7			

NS=non - significant, * =significant at p (<0.05), **=significant at p (<0.01)

Table 12 shows that obtained chi - square value for the knowledge of staff nurses with is years of working experiences was 15.75 (tab value 9.49) at df=4 and p value = 0.003. Hence significant association was found between the level of knowledge of the staff nurses and their years of working experiences in ICU.

with selected variables, a significant association was found only with years of working experiences in ICU. Hence the null hypothesis was rejected and research hypothesis was accepted only in case of years of working experience in ICU.

Therefore, while assessing the association between knowledge of the staff nurses regarding prevention of VAP

Section VI: Association between Practice of the Staff Nurses regarding Prevention of Ventilator Associated Pneumonia with Selected Variables.

Table 10: Association between level of Practice and Years of working experience in ICU, n=115

Years of working experience in ICU	Practice			Chi - square (calculated)	df	P value
	Adequate	Moderately Adequate	Inadequate			
1month - 12month	10	9	10	17.74	4	0.001**
1 year - 2years	18	25	3			
>2 years	6	28	6			

NS=non - significant, * =significant at p (<0.05), **=significant at p (<0.01)

Table 17 shows that obtained chi - square value for the practice of staff nurses with is years of working experiences in ICU was 17.74 (tab value 9.49) at df=4 and p value = 0.001. Hence significant association was found between the level of practice and years of working experience in ICU.

knowledge regarding prevention of ventilator associated pneumonia in Pakistan. Here the results revealed that 88% nurses had average knowledge, 5% of them has excellent knowledge and 7% nurses had poor knowledge about ventilator acquired pneumonia prevention. Contrary to these findings, the study conducted by Suhara KAFet al (2013)¹⁰ on assessment of knowledge regarding mechanical ventilation among the staff nurses working at Yenepoya Medical College Hospital, Mangalore. Results of this study showed that majority of the subjects 33 (66%) were having poor knowledge, 16 (32%) subjects were having average knowledge and only one subject (2%) had good knowledge regarding mechanical ventilation.

While assessing the association between practices of the staff nurses regarding prevention of VAP with selected variables, a significant association was found with years of experience in ICU. Hence the null hypothesis was rejected and research hypothesis was accepted only in case of years of working experience in ICU. But no significant association was found between the nurse's level of practice and age, gender, educational qualification and exposure to training program.

6. Discussion

The findings of the present study showed that majority, i. e. 69 (60%) staff nurses had moderately adequate knowledge, 27 staff nurses (23.48%) had inadequate knowledge and only 19 staff nurses (16.52 %) had adequate knowledge on prevention of VAP. Similar trends were observed in the study conducted by Zeb A et al (2018)⁷ on nurses'

The findings of the present study showed that majority of the staff nurses (53.91%) had moderately adequate practice, 16.52 % had inadequate practice and only 29.57 % had adequate practice on prevention of ventilator associated pneumonia. Similar trends were observed in the study conducted by Augustine J et al (2004)¹¹ in Vellore, India on adequacy of care provided by nursing personnel in selected areas of nursing care given to patients on mechanical ventilator. This study results shows that the practice of the staff nurses on care given to patient on MV was 'moderately

adequate' with a score of 75%. Contrary to these findings, a study was conducted by Zaben F et al (2017)⁹ to assess Critical Care Nurses' Knowledge and Practice on VAP Prevention Bundle among the ICU nurse in West Bank in Palestine where investigator found that nurses practice level on VAP bundles was excellent. Similarly, a study conducted by Fashafsheh I et al (2015)¹² on Knowledge and Practice towards Infection Control Measures among the staff nurses also found that majority (91.1%) of the staff nurses had good practice.

The findings of this present study revealed that there is a moderate positive correlation ($r=0.352$) between knowledge and practices of the staff nurses regarding prevention of ventilator associated pneumonia. This finding of the study is similar with the study conducted by Shrestha S and Shrestha R (2018)⁸ on Knowledge and Practice regarding Endotracheal Suctioning among Nurses of Selected Teaching Hospitals, Bharatpur, Chitwan where a significant weak positive correlation ($r = 0.197$) was found between knowledge and practice score. Contrary to these findings, a study was conducted by Varghese M (2009)¹³ on Knowledge and Practices of Staff Nurses Regarding Care of Immobilized Patient under MV, found no significant association between knowledge and practice.

The present study revealed that a significant association between knowledge of the staff nurses and year of working experience in ICU. The findings of this study is similar with a study conducted by Pérez - Granda M Jet al (2013)¹⁴ on Assessment of Knowledge of And Adherence to Guidelines for Prevention of VAP among Physicians, Nurses, and Students in adult ICUs which showed a significant association between knowledge score and year of working experience in ICU ($P = .004$)

7. Conclusion

The conclusion drawn from the findings of the study is that the maximum staff nurses were having moderately adequate knowledge and practice regarding prevention of VAP. Study findings also revealed that knowledge and practices of the staff nurses regarding VAP was positively correlated which infers adequate knowledge leads adequate practice. Further both knowledge and practices of the staff nurses were found to be significantly influenced by their years of working experience in ICU.

8. Suggestion

Based on the above findings the following suggestions can be made:

- 1) In - service education should be conducted periodically for the ICU nurses in relation to the care of a patient on mechanical ventilation/prevention of VAP.
- 2) In - service education to the nursing professionals to make them aware of the computer application on the patient data entry, laboratory investigation etc. to reduce the manual workload so that they can spend more time in caring for patient.

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