A Study to Assess the Knowledge and Practice of Nurses on Prevention of Ventilator Associated Pneumonia (VAP), and to Seek Its Relationship with the Selected Factors at Selected Hospitals of Delhi and NCR

Jacqulin John[1], Sunita Srivastava[2]

[1]Bsc(N), Msc (N), Plot no 218 A, Flat no. G-1, Shalimar Garden, Extension 1, Near Dayanand Park, Sahibabad, Ghaziabad, UP , [2]Professor, Amity College of Nursing, Manesar, Gurgaon, Haryana

Abstract

Introduction: Ventilator associated pneumonia is one of the most frequent hospital acquired infections occurring in intubated patients within 48 hours of endotrachial intubation[1][2]. Because VAP is associated with higher mortality, morbidity and costs[3], there is a need to keep a check on skills and knowledge upgrading among the healthcare professions and especially nursing personnel on regular intervals, as they are the prime care givers to the patients in intensive care units. Several healthcare agencies have developed evidence based guidelines to prevent nosocomial infections in healthcare settings and with which various healthcare facilities had formulated certain care bundles to fend off VAP. [4][5][6]

Methodology: In this study the knowledge & practice of nursing personnel on prevention of Ventilator Associated Pneumonia were assessed using a structured knowledge questionnaire &structured observational checklist. Data from three selected tertiary care hospitals of Delhi & NCR region were analyzed &interpreted using descriptive & inferential statistics at 0.05 level of significance.

Results: Majority of the nurses were found to have adequate knowledge (54%) and practice (74%) scores. However there was no positive co-relation found for knowledge and practice of the nurses in preventing VAP, although factors as qualification, experience of nurses &any special training on prevention of VAP were found to have association with knowledge & practice of nurses.

Conclusion : Knowledge and practice of nurses needs to be explored so as to deliver quality care to patients on ventilator.

Introduction and Background of the study

Hospital acquired pneumonia is a significant public issue in Asian countries. A National and local surveillance on epidemiology, etiology and diagnosis of hospital acquired pneumonia reported that in Asia, Ventilator Associated Pneumonia acquired at the rate of 5 – 10 cases per 1000[7]. In Asian countries hospital acquired pneumonia is associated with crude mortality rate up to 70 % and attributable rate as high as 33 – 35 %[8]. According to survey done (2008) in India, the overall incidence of Ventilator Associated Pneumonia mortality rate ranges from 37 – 47.3%[9]. A

Corresponding Author:
Jacqulin John
Email: jacqulinjohnc@gmail.com

country with great diversity, India has one hand state of the art corporate hospitals and on the other, there are basic health care centers which are all starved for resources. Lack of awareness and knowledge among health care staffs is one of the most prominent issues of our country[10][11].

Ventilator associated pneumonia (VAP) 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 occurs 48 hours after intubation and mechanical ventilation[12][2]. It is characterized by a new or a progressive pulmonary infiltrate, fever, leukocytosis and purulent tracheo-bronchial secretions[13]. It carries a high mortality rate ranging 6% - 68% and may be as high as 74% in high risk populations, indicating a serious health hazard among ventilated patients[14]. VAP rates range from **1.2 to 8.5 per 1,000 ventilator days** and are reliant on the definition used for diagnosis. Risk for VAP is greatest during the first 5 days of mechanical ventilation (3 %) with the mean duration between intubation and development of VAP being 3.3 days. This risk declines to 2 %/day between days 5 to 10 of ventilation, and 1 %/day thereafter. Earlier studies placed the attributable mortality for VAP at between 33-50 %, but this rate is variable and relies heavily on the underlying medical illness**, (by *Scottish Intensive Care Society Audit Group/NHS National Services Scotland VAP Prevention Bundle)***

In the past 10 years, a great deal of progress has been made in understanding VAP. New concepts of infection-related ventilator-associated complications (IVACs) and ventilator-associated events (VAEs) have been proposed as outcome indicators for prevention strategies. For VAP prevention, the concept of bundle of care was defined. It enabled great successes in VAP prevention; however, the insufficient compliance observed in clinical practice needs to be addressed in order to define easier-to-apply procedures[15][2][5].

Objectives

This study was done to assess level of knowledge and practice of nurses on prevention of Ventilator Associated Pneumonia (VAP) and also to determine the relationship between knowledge & practice and relationship with selected factors.

Material and Methods

In this descriptive survey study, a Descriptive co relational design was applied to find a co relation between the variables under study as well as to see the effect of the independent variables. A total of 100 nurses from critical areas as surgical ICU, Cardiac ICU & Medical ICU from purposively selected 3 hospitals participated in the main study.

A total of 100 Intensive care nurses working in various intensive care units of selected hospitals of Delhi and NCR were selected. Age, sex, professional qualification, years of experience, type of ICU and any special training in prevention of nosocomial infection of nurses were the Independent variables whereas, nurses' Knowledge and Practice were the dependent variables. The inclusion criteria's were the nursing personnel availability and consent for the study along with minimum 6 months of experience in ICU. Purposive sampling technique was used to select the nurses for the study.

The conceptual framework is based on **System Model** adopted from WHO publication (1995). It provide guidance for development, utilization and evaluation via survey and objectives of the study a structured knowledge questionnaire and a structured observational checklist were developed to assess the knowledge and practical application regarding prevention of ventilator associated pneumonia (VAP).

The structured knowledge questionnaire had total 30 questions which were all MCQ's, each item had one correct answer and score of One (1) was awarded

to a correct response and Zero (0) was assigned to each wrong answer. The maximum possible score was 30. The knowledge scores were categorized as good (21-30), average (11-20), and below average (< 20). The areas of knowledge included in the questionnaire were: identification, signs and symptoms, risk factor and etiology affecting VAP along with understanding of VAP bundles and demonstration of best practice in it.

In structured observational checklist there were 46 practice items which were been observed for done or not done, hence a score of 1 was been awarded if certain step was completed and 0 if not. The main areas covered in the checklist were: hand washing, ET suctioning[16], oral care[17], handling of NG tube, handling of mechanical ventilator, PPE usage, practical knowledge of nurses and documentation.

Administrative approval was taken before commencing the study. Also informed written consents were taken from all the selected nurses working in ICU's after assuring them the anonymity and confidentiality of obtained information.

Validity of demographic data sheet, structured knowledge questionnaire and structured observational checklist were established with a group of 9 (nine) experts, 8 (eight) from the field of Nursing and one Physician from the field of Medicine. Also the reliability of the Structured Knowledge questionnaire was established by using K R 20 formula which was 0.86, found to be highly reliable and for structured observational checklist, Inter Observer Reliability technique was used. A 100% agreement on the tool was established via this technique. Once a consensus was obtained among all the healthcare experts on all the items of the questionnaire and checklist, it was further tried out on a sample of 20 staff nurses.

The demographic profile which was collected from the selected nursing personnel were related to their age, sex, professional qualification, years of experience, type of ICU and any special training in prevention of VAP.

The knowledge questionnaire was administered to the selected nurses earlier in their break time and observations were made on the same day of their practical applications while giving nursing care to the patients as per the steps mentioned in validated structured observational checklist. They were observed on their work during their duty hours while following VAP bundle care, by the researcher to fulfill the criteria of assessing their skills and practice. The results of all the nurses who were selected were included for final analysis.

Data Analysis

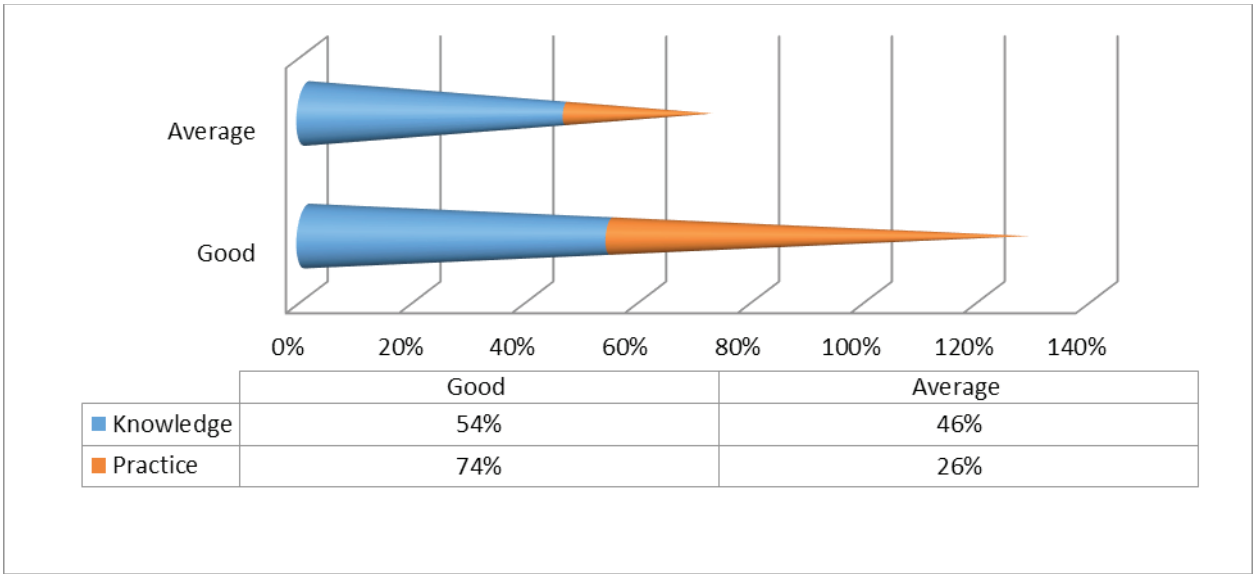
Data was coded in the excel sheet and descriptive and inferential statistics were used to analyze it. It includes analysis and interpretation of description of samples characteristics by using frequency and percentage, while findings related to level of knowledge and practice of staff nurses, and the association of knowledge and practice with the selected factors was done by using Chi square test at 0.05 % level of significance.

Results

The maximum number of nurses in ICU belonged to the age of group of 21 - 25 yrs (52%), among which 51% were found to be male nurses. Most of the nursing personnel were having B.Sc. Nursing as the basic qualification (48%), although only 18% of them were having professional experience in ICU of more than 5 year or more. And most of the nurses (60%) had attended some kind of special training program in relation to prevention on ventilator associated pneumonia.

Table 1: Demographic profile of the nursing personnel working in ICU's

S. NO.	SAMPLE CHARACTERSTICS	FREQUENCY (Percentage)
1	Age	
	21 - 25 yrs.	52 (52%)
	26 - 30 yrs.	43 (43%)
	31 - 35 yrs.	5 (5%)
2	Gender	
	Male	51 (51%)
	Female(mean age 23.56 yrs)	49(49%)
S. NO.	SAMPLE CHARACTERSTICS	FREQUENCY (Percentage)
3	Professional Qualification	
	GNM	36 (36%)
	B.Sc. Nursing	48 (48%)
	P.B.Sc. Nursing	16 (16%)
4	Yrs. of Experience In ICU	
	6 month - 1 yr	15 (15%)
	2 yr - 4 yr	66 (66%)
	5 - 7 yrs	14 (14%)
	Above 7 yrs	5 (5%)
5	Working Area	
	Medical ICU	28 (28%)
	Surgical ICU	38(38%)
	Cardiac ICU	34(34%)
6	Special Training	
	No	40(40%)
	YES	60 (60%)
	If Yes	
	a. Workshop	23 (38.33%)
	b. Short Term Course	37 (61.66%)



	Good	Average
Knowledge	54%	46%
Practice	74%	26%

Figure 1: Cone graph showing Frequency and Percentage of Level of Knowledge and Practice of Nurses Regarding Prevention of Ventilator Associated Pneumonia

The majority of the nursing personnel havehad good knowledge scores (54%) which had fallen in normal distribution with the Mean of 21 and same for Median i.e. 19. Also seeing the uniformity in Practice score i.e. 74% of the nurses were found to have good level of practice in prevention of VAP with Mean scores of 39, Median at 40. Therefore, the groupwas found to be homogenous.

No co-relation was found between nurses' knowledge and practice regarding prevention of VAP when calculated under co-efficient of co-relation ($p = 0.05$ / $r = 0.000$). Although when an association was computed between knowledge and practice of nurses with independent variables it was found that the Chi – square values were significant at 0.05 levels with professional qualification, years of ICU experience and exposure to any special training related to prevention of nosocomial infections. However there was no association was found with age, gender and working area of the nurses.

Discussion

The findings of the study suggests that the lion's share of nurses have good knowledge regarding prevention of ventilator associated pneumonia as assessed by a structured knowledge questionnaire and results of the level of practice of nurses (as assessed through a structured observational checklist) were also found indistinguishable from the knowledge scores. These findings differ from the many other research findings done worldwide and by many researchers like **Jam Gatell. M.R. et. al. (1999), Labeau S. et al. (2006), Lam Soh K. et. al. (2010), Joyce Mary Joy (2014)** and many more, as they concluded that the nurses were having inadequate knowledge and practice.[18]

Findings of the present study also exhibits that there was no relationship between knowledge and practice of staff nurses which is unvarying with the study conducted by **Gomes, Viviana Paula Ribeiro (2010).**

The study also revealed that the attribute (demographic) variables such as professional qualification , years of experience in ICU's and exposure to any special training regarding prevention

of nosocomial infections (VAP) were found to be significant which was highly supported and coincides with the findings of research conducted[18]. Whereas, the other factors like age, gender and working area of the staff nurses were proved to be non-significant statistically. It was consistent with the study done by **Gomes, Viviana Paula Ribeiro (2010).**

Hence, the study stresses the concern on evidence based practice and quality of care delivered to the critically ill patient. With increasing advancement in health sciences, including nursing science, there is a rising need for constant updating of new information to develop new skills in order to provide best care to patients as well as for the growth of their careers. In nursing education, more and more students must take part in various research studies to assimilate latest guidelines and test them in practical scenario. Also nursing lecturers and clinical facilitators should incorporate evidence based measures to prevent VAP or VAE in ICU's on regular basis incorporate learning opportunities in the units to raise the topic[5] [22]. Furthermore, resources such as articles, journals and electronic assets such as computers and internet should be made accessible in the units for staff members. Articles on prevention of VAP/ VAE should be discussed in unit meetings as part of staff education.

Recommendations and Conclusions

A similar study can be repeated on a larger sample including various hospitals both government and private sector. Also comparisons can be made in staff nurses' competencies and teaching strategies alongside testing their level of knowledge and practical skills development prior to and after educational programs on evidence based guidelines for prevention of VAP/ VAE.

Evidence based guidelines provided by copious agencies like WHO, CDC, OSHA, FDA, Mayo'sClinic, NHSN, NHS, NABH and many more must be imbibed in our healthcare routine functioning**.** [2][19][20][21][5][6][22]

References

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1592694
2. http://www.who.org
3. https://www.lungdiseasesjournal.com/ventilator-associated-pneumonia-and-in-hospital-mortality-which-risk-factors-may-predict-in-hospital-mortality-in-such-patients.html
4. Centres of Disease Control and Prevention, CDC National Nosocomial Infections Surveillance(NNIS) System Report, data Summary from January 1992 through June 2004, issued October 2004, Am J Infection Control 2004:32:470-485.
5. http://www.cdc.gov/nhsn
6. http://www.nabh.co
7. Times of India, 2012 "Infection Rate in Hospital", by Lambey Farida, 4th December.
8. https://pubmed.ncbi.nlm.nih.gov
9. Chawla, R. et.al. "Epidemiology, Etiology and Diagnosis of Hospital Acquired Pneumonia and Ventilator Associated Pneumonia in Asian Countries", American Journal of Infection Control (2008); 36(4). 93-100.
10. Staudinger, T. et.al. "Effect of an Education Program Aimed at Reducing the Occurrence of Ventilator Associated Pneumonia", Critical Care Medicine (2010); 30. 2407-2412.
11. Julian T. et.al " A study to evaluate the Effectiveness of self instructional module on prevention and management of Ventilator Associated Pneumonia in terms of knowledge and practice of staff nurses and patient outcome in critical care units of selected private hospitals of Delhi", Unpublished Dissertation, University

of Delhi, 2012.

12. American Thoracic Society: Infectious Disease Society America "Guidelines for Management of Adults with Hospital Acquired, Ventilator Associated and Healthcare Associated Pneumonia", American Journal of Critical Care Medicine (2005); 171. 388-416.
13. CDC Guidelines for preventing health care associated pneumonia, 2003. Recommendations of the CDC and the Healthcare Infection Control Practices Advisory. MMWR 2004; 563 (No. RR-3).
14. Mangles, C.J. et.al. "Critical Care Clinician's Knowledge of Evidence Based Guidelines For Preventing Ventilator Associated Pneumonia", American Journal of Infection Control (2010); 19(3). 272-276.
15. Guidelines for the Prevention of Ventilator Associated Pneumonia in Adults: Health Protection Surveillance Centre February 2011, pp 1-20.
16. Alexious, V.G. et. al. "Impact of Patient's Position on Ventilator Acquired Pneumonia: A Metaanalysis of Randomized Controlled Trials ", Journal of Critical Care (2009); 24(4). 515-522.
17. Ranjit, S. et.al. "The Effective of Comprehensive Oral Care Protocol On Patient's at Risk for Ventilator Associated Pneumonia", Journal of Advocate Healthcare (2011); 12(4). 27-30.
18. Blot, S.I. et.al. "Nurses Ration and Risk Of Ventilator Associated Pneumonia in Critical Patients", American Journal of Critical Care (2011); 20(1). 1-9
19. http://www.cid.oxfordjournals.org
20. http://www.ncbi.nlm.nih.gov
21. http://www.aacn.org
22. https://www.cdc.gov/nhsn