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Research Article

INTENSIVE CARE NURSE'S COMPLIANCE TO VENTILATOR ASSOCIATED PNEUMONIA PREVENTION PRACTICES

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ABSTRACT

The incidence of Ventilator associated pneumonia (VAP) is on a rise in Intensive care units (ICU's) leading to burden of costs due to increased length of stay, morbidity and mortality. The compliance to practices by nurses on Ventilator associated pneumonia prevention guidelines can lower the incidence of VAP in ICU's. This article aims to assess the compliance to VAP prevention guidelines among intensive care nurses. A descriptive approach was used to assess the practices of 150 nurses working in ICU's of multispecialty hospitals using non-probability convenient sampling. Data was collected using structured observational checklist on practices followed by nurses for prevention of VAP. Present study found nurses lacking incompliance to practices on VAP prevention. Regular in-service education programme in hospitals is required to keep the nurses updated with evidence-based guidelines to achieve positive patient outcomes.

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INTRODUCTION

Intensive care units handle critically ill patients, usually on mechanical ventilation. It is a life-saving therapy for patients in respiratory failure that need critical care support. Various studies have estimated more than 3 lakh patients to be on mechanical ventilatory support in the United States each year (Dhadke et al, 2015). Ventilator associated pneumonia (VAP) continues to be the common cause for hospital morbidity and mortality despite the latest advancement in diagnostic means and technologies (Othman et al 2017). "Prevention is better than cure" is an appropriate phrase concerning VAP because of the fact that it is preventable and an approach towards prevention can reduce the hospital length of stay, costs, risk of morbidity and mortality (Gadani et al, 2010). Ventilator-associated pneumonia (VAP) is defined as the onset of pneumonia in patients with tracheal intubation or tracheotomy after 48 hours of mechanical ventilation. Even after withdrawal or extubation, pneumonia within 48 hours is still concluded as VAP. The incidence rate of VAP stands at 15% to 60% and the mortality rate at 25% to 76% highlights the need for preventive measures to cut down the risk factors and prevent its occurrence (Chang et al, 2017). The primary risk factor for VAP is mechanical ventilation. The other risk factors include,

the duration of mechanical ventilation, parenteral nutrition, invasive lines and devices, re-intubation events, changes in mental status, colonization of the oral cavity, and contamination from other patients and healthcare providers (Tabaeian et al, 2017). Preventive measures require the involvement of the entire team. Many studies have proved that simple and cost-effective measures can significantly reduce the incidence of VAP in the developed world. In the hospitals, nurses make up the largest work force of health care providers (Tabaeian et al 2017). Evidence based guidelines are available which need to be adhered to for achieving good patient outcomes. This study aims to assess the practices of intensive care nurses in multispecialty hospitals in Mumbai and to find the association of the practice scores with the demographic characteristics of the participants.

METHODOLOGY

A descriptive approach was used to assess the practices of nurses working in ICU's of multispecialty hospitals. The sample was 150 registered staff nurses who had minimum of 6 months ICU experience. Non-probability convenient sampling was used. Staff nurses working in the ICU, but who were not assigned to ventilated patients were excluded from the study

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(Fernandes *et al.*, 2018). The data was collected using a structured observational tool. It consisted of two categories. The first category was based on the demographic profile which included, age, gender, level of education, years of experience, the department presently working and any ICU trainings or in-service education classes attended by the participant. The second part was an observational checklist which comprised of 33 items that was designed to observe the nurse's current practices and was based on CDC guidelines and evidenced based practices. The validity of the tool was reviewed by an expert panel and changes in the tool were made as suggested. The reliability was tested using the inter-rater reliability by using a second observer and no significant differences were identified. Every correct compliance to practice was scored as one and noncompliance was marked a zero. The Ethical Review Committee, MGM Institute of Health Sciences, Navi Mumbai granted the ethical clearance. Permissions were taken from respective head of hospital management before conducting the study. The participant's consent was obtained after explaining the need and objectives of the study. The staff were audited during their duty hours. The analysis of the data was calculated by descriptive statistics including frequencies and percentage. One mark was given for each correct answer and zero to every incorrect answer. Continuous variables were described as means \pm SD. The association between the practice scores and the participant's demographic characteristics was determined using t-test. The statistical package of version 17 was used for statistical analysis. Statistical significance was set at $p < 0.05$ and 95% confidence intervals.

RESULT

Majority of the nurses were females (72%), between 25-29 years of age (49.3%) with most of them (36%) having more than 5 years of experience. The nurses with diploma in nursing were majority (51.3%) followed by graduate nurses (43.3%). Although, 43.3% of nurses had attended ICU trainings in the hospital, more than half (56.7%) stated that they did not attend any trainings pertaining to ICU. The staff deployment showed that 29.3% were from General ICU, 28% from SICU, and 22.7% of MICU

Table 1 Demographic characteristics of ICU nurses.

Characteristics	f	%
Gender		
Female	108	72
Male	42	28
Age in Years		
20-24	35	23.3
25-29	74	49.3
30-34	20	13.3
35-39	13	8.7
40 & above	8	5.3
Educational Level		
General Nursing & Midwifery	77	51.3
B.Sc Nursing	65	43.3
Post Basic B.Sc Nursing	4	2.7
M.Sc Nursing	4	2.7
ICU Experience		
6 months-1 year	26	17.3
1-3 years	39	26.0
3-5 years	31	20.7
5 years and above	54	36.0
ICU training		
Attended	65	43.3

Not attended	85	56.7
Type of ICU		
MICU	34	22.7
SICU	42	28.0
CCU	20	13.3
CVTS	7	4.7
GICU	47	29.3

Table 2 Overall observed practice scores of ICU nurses related to adherence to VAP prevention guidelines

Overall practice scores	f	%
Poor (<25%)	0	0
Inadequate (26-50%)	17	11.33
Moderate (51-75)%	63	42
Adequate (75%)	70	46.66

The table 2 indicates that only 46.66% staff nurses adhered to practice guidelines on VAP prevention.

Table 3 Itemwise practice scores of nurses based on VAP prevention guidelines

Items	Mean	Std. Deviation
Hand Hygiene	7.81	1.600
Patient positioning	1.65	0.657
Ventilator care measures	0.83	1.304
Endotracheal suctioning care	0.69	1.706
Oral Care	0.69	1.036
PUD prophylaxis	0.70	0.576
DVT prophylaxis	0.49	0.501
Sedation vacation and weaning	0.34	0.793
Nasogastric feeding	0.98	0.728

Total mean number (n) of correct practices \pm SD= (13.2 \pm 8.173)

Table 3 depicts that most of the nurses complied to hand hygiene practices (7.81 \pm 1.600), adhered to positioning of the patient (0.98 \pm 0.728) and naso-gastric feeding practices (0.98 \pm 0.728). The nurses lacked compliance to various other aspects of VAP prevention guidelines such as endotracheal suctioning care, oral care, PUD prophylaxis, DVT prophylaxis, sedation vacation and weaning practices. The general overall practice score of nurses regarding VAP prevention was (mean=13.2 \pm 8.173)

Table 4 Association of practice scores of nurses with demographic characteristics.

Demographic variable	Practice scores			df	χ^2_{cal}	χ^2_{tab}	p value				
	Average (n%)	Good (n%)	Excellent (n%)								
Age (years)											
20-24 years	28.60%	48.60%	22.90%	8	22.246	15.507	0.004*				
25-29 years	6.80%	40.50%	52.70%								
30-34 years	5.00%	25.00%	70.00%								
35-39 years	7.70%	46.2%	46.20%								
40 & above	0.00%	62.50%	37.50%								
Gender											
Female	13.90%	50.00%	36.10%	2	17.309	5.991	0.0001*				
Male	4.80%	21.40%	73.80%								
Education status											
Diploma in Nursing	9.10%	40.30%	50.60%	6	4.2	12.592	0.65 ^(n.s)				
B.Sc in Nursing	15.40%	41.50%	43.10%								
P.B.Bsc	0	75%	25%								
Post graduate	0	50%	50%	6	30.869	12.59	0.001*				
Years of Experience											
6 months-1 year	37.50%	50%	12.50%								
1-3 years	10.30%	48.70%	41.00%								
3-5 years	3.20%	38.70%	58.10%								
5+ years	3.70%	35.20%	61.10%								

ICU Training							
Not attended	17.60%	48.20%	34.10%	2	15.334	5.99	0.001*
Attended	3.10%	33.80%	63.10%				
Type of ICU							
MICU	8.80%	32.40%	58.80%				
SICU	11.90%	33.30%	54.80%				
CCU	00.0%	30.0%	70.0%				
CVTS	14.3%	85.70%	0%	8	22.13	15.51	0.005*
GICU	17.00%	55.30%	27.70%				

(N.S)= Not significant

* significant at $p < 0.05$

Table 4 indicates that a significant association was found between practices of nurses with age, years of experience, ICU training and type of ICU at $p < 0.05$ level of significance.

DISCUSSION

The aim of the present study was to assess the compliance of intensive care nurses on VAP prevention guidelines. The demographic profile indicated that most of the nurses were female, belonged to the 25-29 year age group and diploma holders. It also indicated that majority had more than 5 years of experience and did not attend any ICU trainings. These findings were similar to the findings of the study done in Khartoum where most of the nurses in the study were females, but graduates and having varied years of experience (Al Shameri, 2017)

The overall compliance of the nurses was found to be satisfactory. 46.6% showed adequate compliance to practices. This is contradictory to a study, where 63% of nurses showed insufficient compliance to VAP prevention practices (Aloush 2017). Another study showed that most of the nurses were not complying to the VAP prevention guidelines (average mean = 8.62 ± 7.93) (Ali 2013) whereas in the present study the average mean value was 13.2 ± 8.173

It was evident that majority of the nurses performed hand hygiene (mean = 7.81 ± 1.600). Many did not comply to 5 moments of hand hygiene. Similar findings were also observed in a study where 98.3% of nurses did hand hygiene using alcohol-based solution, and only 54.2% carried it out adequately (Alhirish *et al* 2010)

Patient positioning, especially elevating the head of bed to 30-45 degrees is strongly recommended especially for patients on enteral feeds. Though a simple measure, the adherence to this practice was low (mean = 1.65 ± 0.657) as most of the beds were not equipped with an angle indicator. These findings are consistent with a study where, 55.5% of adherence was noted, despite the beds having an angle indicator. The level of conformity was found to be less than 30 degrees thus compromising the patient's level of care. (Guterres da Silva, *et al* 2014)

With respect to ventilator care measures, the nurses were evaluated for checking the tubing for condensation and draining and discarding the condensate, checking the ET cuff pressure during shifts, use HME filters and change it when it gets soiled and replacing the ventilator circuits when soiled and taking care not to disconnect the tubing during repositioning. In the present study, the compliance was noted to be (mean = 0.83 ± 1.304). Another study indicated that the criteria for timely evacuation of the water container in the ventilator circuit was followed by 96.6% of cases. Also, the disinfected humidification system use of each patient and its replacement

in case of contamination was followed by 84.1% and 97.5% respectively (Tabaeian *et al.* 2017). This showed better status as compared to the present study.

Endotracheal suctioning care in the present study showed the compliance of nurses to be low (mean = 0.69 ± 1.706). It was observed that only few patients were on closed suction system. Many of the nurses did not maintain aseptic measures during open suctioning. The endotracheal tube pressure monitoring compliance was inadequate. A study showed the mean practice of endotracheal suctioning was $80.37\% \pm 8.37$ (Zeb *et al.* 2017) This showed that their practices were good, contradictory to the present study.

Oral Care is an important intervention carried out by nurses daily. In mechanically ventilated patients, providing a good oral hygiene, helps to lower the bacterial colonization that may further lead to infections. In the present study, the oral care practice was found to be unsatisfactory as per guidelines with a mean score of 0.69 ± 1.036 . Many nurses missed out on providing oral care every shift and not using antimicrobial agents for oral decontamination. A study showed that oral care was performed every 2(50%) or 4 hours (42%), usually with foam swabs (97%) (Feider *et al* 2010) while another described compliance rate to oral hygiene as 83.3% by the nurses. (Lin *et al* 2014)

The other components of VAP guidelines were PUD prophylaxis, DVT prophylaxis, sedation vacation, weaning and nasogastric feeding. A study showed that nurses compliances to DVT and PUD prophylaxis was 72.74% and 79.54% respectively (Ismail *et al* 2015). Daily sedation vacation compliance was found to be 12.89%, daily assessment of readiness to wean was 22.25% and daily spontaneous breathing trials if patient is ready to wean was 3.54%. The present study showed compliance of ICU nurses varied for PUD prophylaxis, the mean score was 0.70 ± 0.576 , DVT prophylaxis compliance 0.49 ± 0.501 , Sedation vacation and weaning readiness 0.34 ± 0.793 . The mean scores for compliance tonasogastric feeding was found to be 0.98 ± 0.728 (mean \pm S.D).

CONCLUSIONS

The study revealed that compliance to VAP prevention guidelines by nurses need to be improved. These results stress the need of periodic re-enforcements in hospitals to organize and mandate in-service education programmes for clinical practice for VAP prevention and other evidenced based protocols. This will enhance the practices of nurses, thus improving quality of care and patient outcomes.

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