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RESEARCH ARTICLE

Compliance of ventilator associated pneumonia care bundle by staff nurses in critical care units

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Abstract

INTRODUCTION: Ventilator-associated pneumonia (VAP) is a type of hospital-acquired pneumonia that occurs in patients who are mechanically ventilated for more than 48 hours. VAP is the leading cause of nosocomial infections in patients in intensive care units (ICUs). The pathogenesis of VAP originates from microbial pathogens that are aspirated through the tracheal tube cuff and into the lower respiratory tract. Subsequent colonization and overwhelming of the host's mechanical, body fluids, and cellular defense mechanisms leads to the development of VAP. **Objectives**:1. To assess the compliance on VAP care Bundle by staff nurses in critical care units.2. To identify the reason for the non-compliance on VAP care bundle.3.To associate the level of compliance on VAP care bundle with demographic variables.

Material and Methods: A Descriptive study conducted in critical care units at a tertiary teaching hospital at Puducherry. Institutional review board permission was obtained. The data collection period was one month in the year 2018. The population was nurses who are taking care of mechanical ventilator patients. Samples were selected by census method. The sample size was 50. After getting group consent (verbal consent) from each staff nurses, they were observed by using observational checklist to assess the compliance of VAP care bundle in critical care units. After continuous 3 observations, the participant information sheet was provided and written consent was obtained from each staff nurses. After that the data related to demographic variables and self administered questionnaires on compliance of VAP care bundle was administered over a period of 20 minutes for every participant.

Results: In the present study majority 76% (38) staff nurses had average level of compliance to VAP care bundle, 72% (36) of the staff nurses belongs to the age group of 22-25 years,86% (43) of them were females ,96% (48) had completed BSc Nursing,46% (23) of them had 13-36 months of working experience and 58%(29) had not attended CNE regarding VAP care bundle.

Conclusion: The present study assessed the level of compliance of VAP care bundle by staff nurses in critical care units. The practices were observed by using observational checklist and the reasons for non compliance to VAP care bundle given by staff nurses were expensive equipment, lack of awareness and dependence on doctor's order. The study concludes that the level of compliance among majority of staff nurses were average, so there is need for improvement in nurses performance in implementing VAP care bundle protocol in critical care units.

1 | INTRODUCTION

Ventilator-associated pneumonia (VAP) is one of the hospital-acquired pneumonia that occurs in patients who are for more than 48 hours in mechanical ventilator. VAP is the one of the leading cause of nosocomial infections among patients in intensive care units (ICUs). [1] VAP is the common infectious complication among patients with mechanical ventilator in the intensive care unit . It develops within 48 to 72 hours after the intubation of the tracheal tube. [2] VAP represents a common nosocomial complication arising in the ICU, which affects about 8 -20 % of ICU patients and in mechanically ventilated patients 27% ,it is one of the leading cause of hospital acquired infections in ICU . [3] A semi –upright position (30-45 degree) in ventilated patients are recommended to prevent VAP and if one of the components in the ventilator care bundle for health care improvement . [4] ET tube disrupts normal mucus clearance and there is a collection of secretions above the cuff which contaminates subglottic pool. Contaminated secretions can be aspirated into the trachea and reach to the lungs. ET tube further reduces cough mechanisms. [5] The VAP incidence ranges from 13 to 51 per 1000 ventilator days. Early-onset VAP is usually less severe, associated with a better prognosis and is more likely caused due to antibiotic-sensitive bacteria. Late onset of VAP is usually caused by multi-drug resistant (MDR) pathogens and is associated with increased mortality and morbidity. [6] The incidence of VAP in MICU and CCU were 31.77 and 16.47 per 1,000 ventilator days respectively. 60% of the cases were late-onset VAP, while 40% were early-onset VAP, according to the retrospective study done by Sanjay Melville et al, (2016) in the tertiary care teaching Institution of Northern India. [7]

Nurses play a major role in taking care of patients with mechanical ventilator. So they need to adhere to the VAP care bundle to reduce the incidence of VAP. This study is undertaken to know the compliance on VAP care Bundle by staff nurses in critical care units.

OBJECTIVES

1. To assess the compliance on VAP care Bundle by staff nurses in critical care units.
2. To identify the reason for the non-compliance on VAP care bundle.
3. To associate the level of compliance on VAP care bundle with demographic variables.

2 | MATERIAL AND METHODS

The design adopted for the study is non-experimental descriptive research design. The study was conducted in critical care units in a selected tertiary care teaching hospital at Puducherry. In this study the participants were staff nurses who are taking care of mechanical ventilated patients in ICU and CCU. The study participants were selected by using census method. Staff Nurses who were taking care of patients with mechanical ventilator connected to endotracheal tube or tracheostomy tube was included in this study. Tool consists of 3 sections. Section A - Demographic variables of the staff nurses. Section B - Observational checklist to assess the compliance of VAP care bundle by staff nurses in critical care units. Section-C - Self administered questionnaire to identify the factors which influence the non compliance to VAP care bundle

Formal administrative permission was obtained from Institutional Review Board. (IRB/PIMS/M.SC(N)/1813 Dated 15.02.2018). The study was explained by the Supervisors in the group and the group consent (verbal consent) was obtained for the observation. The data collection was done from September 2018 to October 2018. Each staff nurse was observed by participant observation method by using observational checklist to assess

Supplementary information The online version of this article (https://doi.org/10.15520/ijmhs.v10i06.3017) contains supplementary material, which is available to authorized users.

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the compliance of VAP care bundle in critical care units. After the 3 observations participant information sheet was provided and written consent was obtained from staff nurses. After that the data related to demographic variables and self administered questionnaires on compliance of VAP care bundle was administered over a period of 20 minutes for every participant.

STATISTICAL ANALYSIS

All data were recorded and entered in Microsoft Excel sheet. Frequency and percentage distribution were used to assess the compliance of VAP care bundle by staff nurses in critical care units. Fishers exact test was used to associate the level of compliance on VAP care bundle with demographic variables.

3 | OBSERVATION AND RESULTS

Demographic variables of staff nurses:

Among 50 staff nurses 72 % (36) of the staff nurses belongs to the age group of 22-25 years, 86%(43) of them were females, 96% (48) of staff nurses completed B.Sc. nursing degree, 46%(23) of them were working in ICU, 46%(23) of them had 13-36 months of working experience and 58%(19) of the participant had not attended CNE about VAP care bundle (Table 1)

Level of compliance on Ventilator Associated Pneumonia (VAP) care bundle by staff nurses

Among 50 staff nurses 76%(38) of the nurses had only average level of compliance on VAP care bundle, 18%(9) had good level of compliance and 6% (3) had poor level of compliance of VAP care bundle .(Figure 1)

Factors affecting compliance to VAP care bundle

Staff nurses were following all the steps of infection control measure and patient positioning. In ventilator care measure, the ventilator circuit was not replaced regularly by 20% of the staff nurses because it is expensive. Closed suction tube, suction catheter and anti-embolic stocking (TED) were expensive and not replaced by the relatives, so it was not changed as per the protocol. The staff nurses expect for doctors order for assessment of RASS–Richmond Agitation

TABLE 1:

Demographic Variables	Frequency (%)
Age in years	
a. 22-25	36 (72%)
b. 26-30	14(28%)
Gender	
a. Male	7(14%)
b. Female	43(86%)
Qualification	
a. B.Sc nursing	48 (96%)
b. Post basic B.Sc. nursing	2 (4%)
Area of work	
a. CCU	9(18%)
b. ICU-1	23(46%)
c. MICU	18(36%)
Working experience	
a. 1-12month	9(18%)
b. 13-36 years	23(46%)
c. >36 years	18(36%)
CNE attended regarding VAP care bundle	
a. Not attended	29(58%
b. 1-3 times	19(38%)
c. More than 3 times	2(4%)

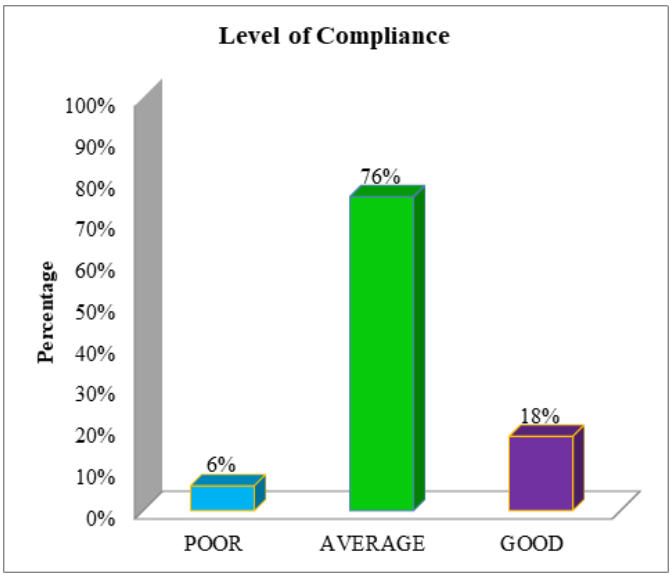

FIGURE 1: Level of compliance on Ventilator Associated Pneumonia care bundle by staff nurses.

Sedation Scale and some are not aware of the RASS scale, patients who had less secretion were not connected to continuous subglottic suction. (Table 2)

Association of compliance to VAP care bundle with the demographic variables.

There is a statistically significant association between the area of work and the level of compliance to VAP care bundle by staff nurses. There is no significant association between the age, gender, qualification, year of working and CNE attended regarding VAP care bundle. (Table.3)

4 | DISCUSSION

Among 50 staff nurses 76% of nurses had average level of compliance on VAP care bundle, 18% had good level of compliance and 6% had as poor level of compliance of VAP care bundle. A descriptive cross sectional study done among 120 nurses at intensive care units of hospitals affiliated to Isfahan university of medical science, Iran. The implementation of measures for prevention of VAP was observed using checklist .The mean compliances with the standards for prevention of VAP in ICU by the staff nurses 56.32%. [8] So there is a need for frequent reinforcement for staff nurses to follow the VAP care bundle.

The reasons for non compliance to VAP care bundle as expressed by the staff nurses were the ventilator circuit, closed suction tube, suction catheter and anti-embolic stocking (TED) were expensive and not replaced by the relatives, so it was not changed as per the protocol. The staff nurses expect for doctors order for assessment of RASS–Richmond Agitation Sedation Scale and some are not aware of the RASS scale, patients who had less secretion were not connected to continuous subglottic suction. A quantitative cross sectional survey was done among critical care nurses to assess the barriers towards evidence based guidelines for prevention of VAP. The barriers identified were inadequate resources, lack of time, skill, knowledge and guidance. [9] An observational study was conducted on 10 Intensive Care Units of four university affiliated hospitals in Iran. Mean VAP care bundle compliance in pre-education and post education stages was 36.5% and 41.2%, respectively. More than 90% of nurses felt that lack of monitoring of VAP care bundle is a main reason of low adherence for VAP care bundle. Education alone is not enough to improve the adherence to the VAP care bundle. Frequent reinforcement of the importance of the VAP care bundle and the continuous supervision of ICU staffs is needed. [10] ICU nurses need adequate supply of the resources and frequent training on RASS scale and VAP prevention.

There is statistically significant association between the area of work and the level of compliance to VAP care bundle by staff nurses. There is no statistical significant association between the age, gender, qualification, years of working and CNE regarding VAP care bundle. A study was conducted on Prevention of VAP in Yemen and results showed that there was a significant association between the qualification and attending short course on respiratory therapy with the level of knowledge regarding VAP care bundle. [11]

5 | CONCLUSION

The present study assessed the level of compliance of VAP care bundle by staff nurses in critical care units in a tertiary care teaching hospital, Puducherry. The practices were observed by using observational

TABLE 2: Reasons for non-complianceto VAP care bundle. (n=50)

Items	Always No. (%)	Sometimes No. (%)	Never No. (%)	Reason if not followed Always
Infection Control Measures				
1. Washed my hands before and after contacting patient	50 (100%)	0	0	-
2. Washed hands between each procedure.	50(100%)	0	0	-
3. Changed gloves for each patient.	50 (100%)	0	0	-
4. Used sterile AMBU bag/disinfect it before use.	50 (100%)	0	0	-
5. Changed AMBU bag for each patients	50 (100%)	0	0	-
Patient Positioning				
1. Maintains patients position 30-45 degree of head end elevation (if not contra indicated)	50 (100%)	0	0	-
Ventilator Care Measure				
1. Drained and discarded the condensate collected in the tubing of a mechanical ventilator	50 (100%)	0	0	-
2. Humidified respiratory circuit using humidity and heat exchange filter	50 (100%)	0	0	-
3. Replaced humidifiers when it is soiled visibly.	50 (100%)	0	0	-
4. Replaced the ventilator circuit regularly once in 7 days or whenever soiled	40 (80%)	6 (12%)	4 (8%)	Expensive
Endotracheal Suctioning Care				
1. Maintained adequate pressure in endotracheal cuff(20-25 cmh_2o)	50 (100%)	0	0	-
2. Wears clean gloves dunng closed suctioning	50 (100%)	0	0	-
3. Wears sterile gloves during an open suction system	50 (100%)	0	0	-
4. Used sterile suction equipment	50 (100%)	0	0	-
5. Replaced suction tube once in 3 days in closed suction method	30 (60%)	13 (26%)	7 (14%)	Expensive
6. Replaced suction tubes after each use in open suction method	45(90)	5 (10%)	-	Expensive
7. Used sterile saline/distilled water for suctioning	50 (100%)	0	0	-
8. Discarded the solution used for suction after single use	50 (100%)	0	0	-
9. Connected the mucous extractor for continuous aspiration of sub-glottic secretions if patient is on ventilated for >48hrs	30 (60%)	9(18%)	11 (22%)	Patient has less secretion
Oral Care				
1. Performed oral hygiene with chlorohexidine mouth wash every 8th hourly	50 (100%)	0	0	-
Peptic Ulcer Propylaxis				
1. Checked the gastric residual volume before each feed	50 (100%)	0	0	-
2. Administered the drug for stress ulcer prophylaxis if ordered	50 (100%)	0	0	-
Extubation And Weaning Trials				
1. RASS-richmond agitation sedation scale assessment was done	33 (66%)	7 (14%)	10(20%)	Not aware, depend on doctor's order
2. Performed daily assessment of readiness to wean and extubate	50 (100%)	0	0	-
DVT Prophylaxis				
1. Applied anti-embolic stocking(TED)or sequential compression by physiotherapy	45 (90%)	5 (10%)	-	Expensive

TABLE 3: Association between compliance to VAP care bundle and demographic variables of staff nurses. (n=50)

Demographic variables	Level of Compliance Poor (<60%)	Average (60.1-80%)	Good (80-100%)	Fishers exact test	p value
Age in years					
22-25	2	30	4	4.359	0.109 NS
26-30	1	8	5		
Gender					
Male	1	3	3	5.236	0.084 NS
Female	2	35	6		
Qualification					
B.sc nursing	3	37	8	2.374	0.426 NS
Post basic nursing	0	0	1		
Area of work					
CCU	1	3	5	12.316	**0.004* S**
ICU-1	0	21	2		
MICU	2	14	2		
Year of working					
0-12month	1	4	0	3.346	0.226 NS
13-36 month	2	18	7		
More than 36 years	0	16	2		
CNE					
Not attended	1	22	6	1.099	0.859 NS
Less than 3 times	2	14	3		
More than 3 times	0	2	0		

NS – Not significant, *Significant

checklist. The study concludes that the level of compliance among majority of staff nurses were average, so there is a need for reinforcement to follow the VAP care bundle protocol in critical care units. Continuing nursing education programs can be arranged on VAP care bundle and role of nurse in preventing VAP.

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