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## RESEARCH ARTICLE

### ASSESSMENT OF KNOWLEDGE OF HEALTH CARE WORKERS ON VENTILATOR CARE BUNDLE IN THE INTENSIVE CARE UNIT OF A TERTIARY CARE HOSPITAL BENGALURU, INDIA

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#### ABSTRACT

**Introduction:** Health care associated infection or hospital acquired infection is one of common problems faced by hospitals in all countries. Ventilator-associated Pneumonia (VAP) is a major healthcare burden in terms of mortality, escalating healthcare costs, increased length of ventilator days and hospital stay. Despite advances in antimicrobial therapy, better basic care of ventilated patients on mechanical ventilation and a wide variety of preventive measures. **Aims and objectives:** To assess & compare knowledge of health care workers (doctors and nurses) on ventilator care bundle in ICU before and after a structured training programme. **Materials and Method:** It is a Cross-sectional study Conducted at Intensive Care unit in a tertiary care centre Bengaluru, over a period of three months. Interventions were through an educational module which consisted of lectures on VAP prevention. The lectures were preceded by a pre-test and followed by a post-test, held a series of 60-min training sessions covering VAP definition, risk factors, aetiology, and importance and components of care bundles. Questions included were specific to definition and cause of VAP, route of intubation, position of patient, suction system, humidifier, components of ventilator bundle care, role of Culture in diagnosis of VAP, change of ventilator circuits. **Statistics:** Descriptive statistics was used to analyse the results. **Results:** The mean total scores of physicians, nurses were 90%, 69.7% pretest and was increases to 96% and 85% respectively in post test, there was significant increase in score of nurses in post test. **Conclusion:** Knowledge on recommended guidelines does not necessarily reflect appropriate practices but it is important for implementing evidence-based guidelines for preventing VAP. The study was intended to assess knowledge of ICU health care providers (physicians, nurses) knowledge of evidence-based guidelines for preventing VAP and not to evaluate the practices.

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## INTRODUCTION

Health care associated infection or hospital acquired infection is one of common problems faced by hospitals in all countries. Ventilator-associated Pneumonia (VAP) is a major healthcare burden in terms of mortality, escalating healthcare costs, increased length of ventilator days and hospital stay. Despite advances in antimicrobial therapy, better basic care of ventilated patients on mechanical ventilation and a wide variety of preventive measures. Ventilator-associated pneumonia (VAP) is where the patient is on mechanical ventilation for >48hrs on the date of event, with day of

ventilator placement being Day 1, and the ventilator was in place on the date of event or the day before (CDC). Strategies aimed at reducing the incidence of this complication may improve clinical outcomes, minimise costs related to health care; and foster patient safety. Awareness of prevention and control of VAP also can avoid overdiagnosis and excessive use of antibiotics, diminish the emergence of multi-drug resistant microorganisms, resulting in better intensive care unit performance. The doctors and nurses are part of health care system and play very vital role in controlling infection in hospital hence the study taken up and if VAP prevention care bundle is used effectively, then this can be prevented. Awareness among health care providers about such measures is crucial. Hence this study was done to assess the knowledge levels among the staff and then an intervention was done by

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conducting trainings about the same to inculcate good practices amongst them.

### Aims and objectives

To assess & compare knowledge of health care workers (doctors and nurses) on ventilator care bundle in ICU before and after a structured training programme.

## MATERIALS AND METHODS

It is a Cross-sectional study Conducted at Intensive Care unit in a tertiary care centre Bengaluru. The study was done over a period of three months. Interventions were through an educational module and consisted of lectures on VAP prevention. These lectures were preceded by a pre-test and followed by a post-test. The study was divided into three phases:

Before lectures the following aspects were assessed basic knowledge using the questionnaire. Intervention phase the team designed and held a series of 60-min lecture sessions covering VAP definition, problem epidemiology and scope, risk factors, aetiology, and importance and components of care bundles. The session was ensure maximum attendance of the of all nursing shifts. The session included the oreticallectures and informative posters, After lectures all were assessed identically to the before lectures. All ICU professionals (doctors, nurses), who delivered care for patients had attended these lectures. Questions included were specific to definition of VAP, route of intubation, position of a patient, change of suction system, peptic ulcer prophylaxis, aspiration of subglottic secretion in reducing incidence of VAP, components of ventilator bundle care, role of culture in diagnosis of VAP, causes of VAP, change of ventilator circuit, change of humidifier. Demographic data included were age, gender, years of intensive care experience and qualification. Descriptive statistics was used to analyse the results.

## RESULTS

Questions were distributed among 164 subjects and response rate of pre and post test 78% (128), Among 128 subjects included in study 24 subjects were doctors and 104 subjects were nurses working in ICU. Mean age of both nurses and doctors was found to be 31.65 years and 29.75 years. Mean ICU experience was 3years and 2years respectively. Among the study subjects 80 were female and 48 were male. Table 1 shows the scores of nurses regarding knowledge on VAP, the recommended position in reducing VAP, the response rate increased from 65.4% to 92.3% which was statistically significant and knowledge on role of head elevation of 30-45 degrees in reducing VAP was very high. Knowledge on role of PUD prophylaxis was high (96.2%) and was increased to 100% following lectures. 51.9% of the subject correctly identified the components of ventilator care bundle which was increased to 85.6% in post test. Knowledge regarding change of ventilator circuit was 26.9% and increased to 68.3%. response to change of endotracheal suctioning was 51.92% and increased to 65.3% which was statistically significant. Response rate for choice of air humidifier was73%increased to 93% respectively. Nurses had Very high knowledge on recommended route of intubation (100%), role of head end elevation in reducing VAP (100%).

**Table 1. Table showing score of health care workers before a structured training programme**

	Nurses (n=104) before In percentage	Nurses (n=104) after In percentage	P Value
Change of airway humidifier	73	93	0.0001*
Change of endotracheal suctioning	51.9	65.3	0.049*
Change of ventilator circuit	26.9	68.3	0
Organism causing VAP	76.9	87.5	.046*
PUD prophylaxis	96.2	100	.043*
Recommended route of endotracheal suctioning system	73	86.5	.015*
Recommended route of intubation	100	100	-
Role of cultures diagnosis of vap with endotracheal aspirate	73	83.7	-
Role of head end elevation	100	100	-
Semi recumbent position	65.4	92.3	0
Subglottic aspiration	76	92.3	.00124*
Type of humidifier	36.5	66.3	0
VAP defination	76	96.2	-
Components of Ventilator care bundle	51.9	85.6	-

\* significant at p value >.005

Table 1 shows that with respect to the recommended position from 65.4% to 92.3% was statistically significant and knowledge on role of head elevation of 30-45 degrees in reducing cap was very high.Role of PUD prophylaxis, other components of ventilator care bundle from 96.15% to 100%, 51.9% to 85.6% respectively. Knowledge regarding change of ventilator circuit, endotracheal suctioning, air humidifier was 26.9% to 68.3%,51.92% to 65.3%, and 73% to 93% respectively.

**Table 1. Showing score of health care workers after a structured training programme**

	Doctors (n=24) before In percentage	Doctor (n=24) afterIn percentage	P value
Change of airway humidifier	79	100	0.018*
Change of endotracheal suctioning	75	100	0.008*
Change of ventilator circuit	83.3	83.3	-
Helicobacter pylori not cause of VAP	100	100	-
PUDprophylaxis	100	100	-
Recommended route of endotracheal suctioning system	83.3	100	.037*
Recommended route of intubation	100	100	-
Role of cultures diagnosis of VAP with endotracheal aspirate	100	100	-
Role of head end elevation	100	100	-
Semi recumbent position	100	100	-
Subglottic aspiration	100	100	-
Type of humidifier	66	75	0.52*
VAP definition	100	100	-
Components of Ventilator care bundle	76	92	0.12*

Table 2 compares the knowledge related to the VAP prevention bundle of doctors before and after lectures.It showed thatThere was improvement in response rate to recommended route endotracheal suction system from 83% to 100%, change in endotracheal suctioning from 75% to 100% and change in air way humidifier 79% to 100%which were statistically significant. \* significant at p value >.005. Poor response was seen in Type of humidifier to use 36.5%,Change of ventilator circuit 26.9%, before the lecture and was increased to 66.3% and 68.3% respectively. Regarding knowledge about peptic ulcer prophylaxis (100%), head end elevation (100%) was very high. All could identify *H.pylori* was not the cause of VAP and the response rate to role of

cultures in diagnosing VAP was high (100%). With respect to components of care bundle doctor knowledge had been improved from 76% to 92% and use of humidifier was improved from 66% to 75% which was statistically insignificant.

## DISCUSSION

Ventilator-associated pneumonia (VAP) is reported to be the most common device-associated nosocomial infection acquired among patients who are mechanically ventilated in the Intensive Care Unit (ICU). While the international nosocomial infection control consortium (INICC) data suggests a VAP incidence as high as 13.6/1000 mechanical ventilation (MV) days (Rosenthal, 2010). The occurrence of VAP in Asian countries is much higher, and ranges from 3.5 to 46 infections/1000 MV days (Chawla, 2008). This prospective study was conducted to assess the knowledge of health care workers about ventilator associated pneumonia. By educating nurses and providing them with education enhance patient outcomes. This is especially true for nurses who are new to the critical care units. Orientation of nurses, needs to include VAP rate, bundle care which is not typically taught during nursing education. In the study conducted there is significant differences in the knowledge of guidelines for the prevention of VAP among the doctors, nurses working in the ICU. As both health care professionals and nurses are involved in providing direct care for patient. This study compares the knowledge of other health care professionals as well as nurses. In the study conducted response rate was found to be is 78% to questionnaire which compared to the study conducted by S. Labeau *et al.* where response rate was 75% to questionnaires. The average score of the doctors 90%, nurses was 69.7% was to similar to conducted Mohamad *et al.* (Mohamad, 2010), where doctors had score of 80.2%, the nurses score was 78.1%,but higher than the study conducted by Blot *et al.*<sup>8</sup> where the score was 41.2% but the study surveyed 638 intensive care nurses, study population in the present study was 128 Knowledge related to VAP, it was found that all doctors knew the definition of VAP before the lectureprogramme and among nurses 76% knew definition of VAP before and which was improved to 96.2%. Similar findings were found in role of Subglottic aspiration in reducing VAP which was improved from 76% to 92.3%. But study conducted by Rashad Ismail *et al.* (Rashad Ismail) had score of 41.7% which improved to 100% regarding the definition of VAP.

The study revealed, all the subjects knew role of the HOB elevation in reducing VAP. Response in role of extra lumen for subglottic aspiration in reducing risk of VAP was high (90%),But the choice route of suctioning system was found to be 73% in of nurses, 83.3% in doctors and was increased to 86.5% and 100%. Nurses knowledge regarding PUD prophylaxis in reducing VAP was also improved post lectures and doctors knew role of PUD in reducing VAP knew before lectures. All the doctors identified *H.pylori* was not causative organism of VAP, but 73% of nurses could identify *H.pylori* wasnot causative organismand the response was increased to 87.5% following lecture. Role of culture in diagnoses of VAP was to known to all doctors and In nurses 73% knew and was improved to 83.7% following lectures. In the current study, the lowest score achieved by nurses was on the question of frequency in change of ventilator circuit, change of airway humidifier and Change of endotracheal suctioning

26.9%,51.9%, 73% in nurses and in doctors 83.3%,79%,75% respectively, which was improved following lectures.

## Limitations

Although our study has the advantage of including all health care professionals in the ICU, it has several limitations.

- The study population in this survey is smaller than in previous, similar studies.
- Concerning nurses compliance to VAP Prevention Bundle practices before and after the lectures was not monitored.
- The effect of implementing these guidelines on patients outcomes reducing VAP incidence was not monitored.
- No enough data to compare the knowledge among the experienced and inexperienced health care professional.

## Conclusion

- Knowledge on recommended guidelines does not necessarily reflect appropriate practices but it is important for implementing evidence-based guidelines for preventing VAP.
- Our study was intended to assess knowledge of ICU health care providers (physicians, nurses) knowledge of evidence-based guidelines for preventing VAP and not to evaluate the practices.
- Education alone is not enough to reduce the incidence of VAP. Providing bundle care without educating the nurses on appropriate use cannot reduce the incidence of VAP.
- By using both education and improving nurses skill, the incidence of VAP will reduce.

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