Section: Microbiology

Original Research Article

IMPACT OF BUNDLE CARE IN VENTILATOR ASSOCIATED PNEUMONIAE IN A TERTIARY CARE HOSPITAL

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Received : 05/07/2025
Received in revised form : 20/08/2025
Accepted : 08/09/2025

Keywords:
Ventilator associated pneumonia (VAP), Mechanical ventilation, Antimicrobial resistance.

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DOI: 10.47009/jamp.2025.7.5.186

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (5); 977-979

ABSTRACT

Background: Ventilator-associated pneumonia (VAP) is one of the most important health care associated infections (HAIs), resulting in high morbidity and mortality. VAP has been shown to affect more than >50% of patients on mechanical ventilators, making it one of the most prevalent Hospital-acquired infections. Many studies have linked VAP to poorer outcomes like longer IMV durations and ICU stays, higher and inappropriate use of antimicrobials[3] and increased average hospitalization cost of patients. This Study is aimed to identify the relationship between ventilator bundle compliance and the occurrence of VAEs. **Materials and Methods:** This study was conducted in the department of Department of Microbiology and all the ICUs of Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram Andhra Pradesh from June 2021 to April 2025. Ethical approval taken from institutional ethics committee of Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram. The Study is retrospective and prospective observational study. After approval of ethics committee and Hospital Infection Control Committee data was collected.
Results: The VAE rates previously i.e from June 2021 to May 2023 were ranging between 30% to 50% but one sensitization of VAP bundle care was done and daily checks of the 5 bundle care are being implemented, the VAE rates decreased day by day and also there is a good improvement in patients who are on mechanic ventilators.
Conclusion: Proper application of the VAP bundle can decrease the incidence of VAE in patients receiving mechanical ventilation.

INTRODUCTION

Ventilator-associated pneumonia (VAP) is one of the most important health care associated infections (HAIs), resulting in high morbidity and mortality.[1] Ventilator-associated pneumonia (VAP) is defined as infection of the lung parenchyma in patients at least after 48 h of exposure to invasive mechanical ventilation (IMV) and it is a common and serious nosocomial infection in intensive care units (ICUs). VAP has been shown to affect more than >50% of patients on mechanical ventilators,[2] making it one of the most prevalent Hospital-acquired infections. Many studies have linked VAP to poorer outcomes like longer IMV durations and ICU stays, higher and inappropriate use of antimicrobials.[3] and increased average hospitalization cost of patients.[4] ventilator care (VC) bundle comprising five interventions: 1. head of the bed elevation to 30–45 degrees, 2. daily sedation interruption and daily assessment of readiness to extubate, 3. peptic ulcer prophylaxis, 4. deep vein thrombosis (DVT) prophylaxis, and 5. Daily oral care with chlorhexidine. While the care bundle approach has been shown to be effective in reducing VAP incidence.[5] there have been conflicting results on the impact of each individual intervention in reducing VAP incidence.[6–12] Therefore, all interventions in the bundle care needed to be implemented collectively and reliably, making on-the-ground compliance to the interventions of VAP.[13]

Objectives: This Study is aimed to identify the relationship between ventilator bundle compliance and the occurrence of VAEs.

MATERIALS AND METHODS

Place of study: This study was conducted in the department of Department of Microbiology and all the ICUs of Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram Andhra Pradesh.

Duration of study: From June 2021 to April 2025

Ethics: Ethical approval taken from institutional ethics committee of Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram.

Study design: retrospective and prospective observational study

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Collection of data: After approval of ethics committee and Hospital Infection Control Committee data was collected.

Method: The ventilator associated events (VAE) data which is recorded already is studied carefully and all the data analysis was taken from June 2021 to June 2023. Then after from July 2023 to April 2025 the Vap bundle care is being strictly followed and the VAE statistics are noted. An infection control practitioner evaluated each and every patients in ICUs daily to check compliance with each bundle component. Head of the bed elevation was checked every 4 hours and considered done if checked "yes" all 6 times. The VAE bundle care lists include Patients should be nursed in a semi-recumbent position (300-450) unless contraindicated. Peptic ulcer disease prophylaxis was considered done if an H1 blocker, proton pump inhibitor, or sucralfate was given daily. Deep venous thrombosis prophylaxis was considered done if low-dose heparin, compression stocking application, or pneumatic compression was provided daily. Oral decontamination with chlorhexidine was verified every 8 hours and considered done if checked "yes" all 3 times. We educated all of the ICU teams, including doctors and nurses, on VAP, the importance of the VAP bundle, and need to follow the protocol for each bundle element. Daily sedation interruption and daily assessment of readiness to extubate is also done and noted. Compliance with bundle elements was recorded daily using a checklist, and all interventions were monitored by infection control practitioners. Nurses intervened in this process at the time of monitoring if noncompliance with a bundle element was detected. Regular feedback on compliance was provided to the ICU teams. Given the time limitations of the study period, the VAP rate after implementation of the VAP bundle was compared with the rate in the previous months. All study procedures were approved by the Institutional.

Statistical analysis: Data will be analyzed using Statistical Package for the Social Sciences (SPSS®) software version 24. For continuous variable will be analyzed by mean with standard deviation and for categorical variables will be analyzed by frequencies and percentages.

RESULTS

The VAE rates previously i.e from June 2021 to May 2023 were ranging between 30% to 50% but one sensitization of VAP bundle care was done and daily checks of the 5 bundle care are being implemented, the VAE rates decreased day by day and also there is a good improvement in patients who are on mechanic ventilators.

Table 1

2023	VAE
JUN	22.5
JUL	11.6
AUG	10
SEP	15.5
OCT	25
NOV	8
DEC	20

Table 2

2024	VAE
JAN	22
FEB	18.5
MAR	27.8
APR	22
MAY	26
JUN	10
JUL	20
AUG	26.3
SEP	5
0CT	0
NOV	5
DEC	6

Table 3

2024	VAE
JAN	18
FEB	0
MAR	8
APR	5
MAY	6
JUN	0

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

Our study shows a great difference between the rates of VAE before and after adherence to the VAP bundle care**.** The regular sensitization programs and workshops on VAP bundle care to the nurses and doctors and also the daily checks integrity helped us to bring the VAE rates from 50-30**%** before implementing strict adherence to VAP Bundle care and less than 25**%** after implementing VAP bundle care and after continuous adherence to bundle care now it is < 10**%** in the past 6 months**.** Our study is showing similar results to the study done by Joong Sik Eom MD et al where they have done the VAP bundle care according to the guidelines**.**[15] Chen T-J et al also showed that VAE rate can be decreased if all the bundle care of VAP are performed and checked each and every day**.**[8] Miano TA et al in their study stated that treatment for peptic ulcer prophylaxis also helps in decreasing VAE ratio which is coinciding with our study**.**[11] Sachetti A et al also have done a similar study and stated that if we adhere to all the VAP bundle care elements, we can surely see a great result of decreased VAE rates**.**

CONCLUSION

Proper application of the VAP bundle can decrease the incidence of VAE in patients receiving mechanical ventilation**.** VAP Bundle was effective in Prevention of ventilator associated pneumonia and improves outcomes such as ICUs length of stay, duration of ventilator support and pulmonary function**.**

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ISSN (O): 2687-5365; ISSN (P): 2753-6556