

ASSESSMENT OF VENTILATOR ASSOCIATED PNEUMONIA IN ICU PATIENTS

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Abstract

Background: To assess ventilator associated pneumonia in hospitalized patients. **Materials and Methods:** Ninety patients who developed pneumonia of both genders were enrolled in this prospective, observational study. Parameters such as incidence of VAP, duration of mechanical ventilation and duration of hospital stay were recorded. **Result:** Males were 50 (55.5%) and females were 40 (45.5%). Diagnosis was cardiogenic shock in 15 and 11, dengue shock syndrome in 8 and 7, hepatic encephalopathy in 10 and 4, meningitis seen in 5 in VAP and 3 in non VAP, GBS in 1 and 5, stroke in 5 and 1, malaria in 7 and 4 and sepsis in 1 and 3 cases respectively. The difference was significant ($P < 0.05$). The Apache II score in VAP was 23.5 and in non-VAP was 17.2. The mechanical ventilation days was 12.5 and 7.2 respectively. The mean hospital stay was 14.2 days and 7.8 days respectively. The difference was significant ($P < 0.05$). **Conclusion:** Apache II score and hospital stay was higher among VAP patients as compared to non-VAP patients. The most common diagnosis was cardiogenic shock and dengue shock syndrome.

INTRODUCTION

Ventilator-associated pneumonia (VAP) refers to bacterial pneumonia developed in patients who have been mechanically ventilated for a duration of more than 48 hours.^[1] It ranges from 6 to 52% and can reach 76% in some specific settings.^[2] The clinical pulmonary infection scoring (CPIS) system for diagnosis are as follows- mechanical ventilation for greater than 48 hours, new or persistent or progressive radiographic infiltrates, fever greater than 38.5 Celsius, leukocytosis or leukopenia and positive culture for endotracheal aspirate.^[3] Risk factors include prolonged mechanical ventilation, reintubation after extubation. If the infection occurs within 48 -72 hours of intubation then it is called early onset type and after 72 hours of intubation it is called late onset type VAP respectively.^[4] Delay in initiating appropriate antibiotic therapy can increase the mortality associated with VAP, and thus therapy should not be postponed for the purpose of performing diagnosis.^[5,6] This initial empirical antimicrobial therapy can be modified based on the knowledge of local microbiological data, patient characteristics, and sensitivity pattern of expected pathogens at the institution.^[7] Considering this, we performed this study to assess ventilator associated pneumonia in hospitalized patients.

MATERIALS AND METHODS

A sum total of ninety patients who developed pneumonia of both genders were enrolled in this prospective, observational study. Ethical approval was also obtained before starting the study. All patients gave their written consent for their participation in the study. Clinical pulmonary infection score (CPIS) greater than six was used as diagnostic criteria for VAP. Data such as name, age, gender etc. was recorded. The severity of illness based on APACHE II score during first 24 hours of admission was noted. Endotracheal aspirate was preferred over protected specimen brush (PSB) sampling and bronchoalveolar lavage (BAL). Parameters such as incidence of VAP, duration of mechanical ventilation and duration of hospital stay were recorded. Results of the study were subjected to statistical analysis performed using SPSS version 18.0 and Mann Whitney U test. P value less than 0.05 was considered significant.

RESULTS

Out of 90 patients, males were 50 (55.5%) and females were 40 (45.5%) [Table 1]. Diagnosis was cardiogenic shock in 15 and 11, dengue shock syndrome in 8 and 7, hepatic

encephalopathy in 10 and 4, meningitis seen in 5 in VAP and 3 in non-VAP, GBS in 1 and 5, stroke in 5 and 1, malaria in 7 and 4 and sepsis in 1 and 3 cases

respectively. The difference was significant ($P < 0.05$) [Table 2].

Table 1: Patients distribution

Gender	Males	Females
Number	50 (55.5%)	40 (45.5%)

Table 2: Diagnosis of cases

Diagnosis	VAP (52)	Non- VAP (38)	P value
Cardiogenic shock	15	11	0.05
Dengue shock syndrome	8	7	
Hepatic encephalopathy	10	4	
Meningitis	5	3	
GBS	1	5	
Stroke	5	1	
Malaria	7	4	
Sepsis	1	3	

Table 3: Baseline characteristics

Parameters	VAP (52)	Non- VAP (38)	P value
Apache II score	23.5	17.2	0.05
Mechanical ventilation (days)	12.5	7.2	0.03
Hospital stay (days)	14.2	7.8	0.01

The Apache II score in VAP was 23.5 and in non-VAP was 17.2. The mechanical ventilation days was 12.5 and 7.2 respectively. The mean hospital stay was 14.2 days and 7.8 days respectively. The difference was significant ($P < 0.05$) [Table 3].

DISCUSSION

Hospital-acquired pneumonia (HAP) is the pneumonia after 48 hours or more after admission, which did not appear to be incubating at the time of admission.^[8] The presence of HAP increases hospital stay by an average of 7–9 days per patient, also imposes an extra financial burden to the hospital.^[9] The risk of VAP is highest early in the course of hospital stay, and is estimated to be 3%/day during the first 5 days of ventilation, 2% per day during 5–10 days of ventilation and 1% per day after this.^[10] Lack of a gold standard for diagnosis is the major culprit of poor outcome of VAP. Fever and leukocytosis are non-specific and can be caused by any condition that releases cytokines.^[11] Although microbiology helps in diagnosis, it is not devoid of pitfalls. In fact, it was proven that colonization of airway is common and presence of pathogens in tracheal secretions in the absence of clinical findings does not suggest VAP.^[12] The clinical diagnosis based on purulent sputum may follow intubation or oropharyngeal secretion leakage around airway, chest X-ray changes suspected of VAP may also be a feature of pulmonary oedema, pulmonary infarction, atelectasis or acute respiratory distress syndrome.^[13] Considering this, we performed this study to assess ventilator associated pneumonia in hospitalized patients.

We enrolled 90 patients. Males were 50 (55.5%) and females were 40 (45.5%). Gadani et al,^[14] studied 100 patients on ventilatory support. Out of which 37

patients developed VAP. The risk factor significantly associated with VAP was found to be duration of ventilator support, reintubation, supine position, advanced age and altered consciousness. Declining ratio of partial pressure to inspired fraction of oxygen ($\text{PaO}_2/\text{FiO}_2$ ratio) was found to be the earliest indicator of VAP. The most common organism isolated in our institution was *Pseudomonas*. The incidence of early-onset VAP (within 96 hours) was found to be 27% while the late-onset type (>96 h) was 73%. Late-onset VAP had poor prognosis in terms of mortality (66%) as compared to the early-onset type (20%). The mortality of patients of the non-VAP group was found to be 41% while that of VAP patients was 54%.

Our results showed that diagnosis was cardiogenic shock in 15 and 11, dengue shock syndrome in 8 and 7, hepatic encephalopathy in 10 and 4, meningitis seen in 5 in VAP and 3 in non-VAP, GBS in 1 and 5, stroke in 5 and 1, malaria in 7 and 4 and sepsis in 1 and 3 cases respectively. Mohanty et al,^[15] studied 100 patients. The patients were classified into four groups named VAP, non-VAP, survivors and non survivors. The incidence of VAP in this study was 30%. The association between genders, age and VAP infection was not found to be significant. There was no significant correlation between the primary disease and development of VAP. Most common organism isolated was *P. aeruginosa*, (9 isolates) followed by MRSA (7 isolates) and most of them were resistant to commonly used antibiotics.

Our results showed that the Apache II score in VAP was 23.5 and in non-VAP was 17.2. The mechanical ventilation days were 12.5 and 7.2 respectively. The mean hospital stay was 14.2 days and 7.8 days respectively. Joseph et al,^[16] evaluated the incidence and the risk factors for development of VAP in critically ill patients. The incidence of VAP was

30.67 and 15.87 per 1,000 ventilator days in the two different ICUs. In our study 58.3% of the cases were late-onset VAP, while 41.7% were early-onset VAP. Impaired consciousness, tracheostomy, re-intubation, emergency intubation, and nasogastric tube were significantly associated with VAP. Emergency intubation and intravenous sedatives were found to be the specific risk factors for early onset VAP, while tracheostomy and re-intubation were the independent predictors of late-onset VAP by multivariate logistic regression analysis.

Karatas et al.^[17] researched 1560 patients in adult ICUs, 1152 (73.8%) of whom were mechanically ventilated. The MV use rate was 52%. VAP developed in 15.4% of patients. The VAP rate was calculated as 15.7/1000 ventilator days. Mean length of stay in the ICU for VAP (+) and VAP (-) patients were (26.7±16.3 and 18.1±12.7 days) and mean length of MV use was (23.5±10.3 and 12.6±7.4 days). High APACHE II and Charlson co-morbidity index scores, extended length of hospitalization and MV time, previous history of hospitalization and antibiotic therapy, reintubation, enteral nutrition, chronic obstructive pulmonary disease, cerebrovascular disease, diabetes mellitus and organ failure were determined as significant risk factors for VAP. The mortality rate in the VAP (+) was 65.2%, with 23.6% being attributed to VAP.

CONCLUSION

Apache II score and hospital stay was higher among VAP patients as compared to non-VAP patients. The most common diagnosis was cardiogenic shock and dengue shock syndrome.

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