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A STUDY ON INCIDENCE, ETIOLOGY, RISK FACTORS, OUTCOME AND PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA IN ICU PATIENTS ADMITTED IN A TERTIARY CARE HOSPITAL.

General Medicine

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ABSTRACT

Objectives: To study the incidence of VAP in ICU Patients admitted in Asram medical college, to study the pathogens involved in the causation of VAP. To identify the percentage of early onset and late onset VAP.To identify the various risk factors involved in the developmentto ascertain the significance of clinical pulmonary infection score CPIS in the diagnosis of VAP. To identify the association between ICU mortality and VAP **Methods:** This study is an observational study with a sample size of50 patientsconducted in the department of General medicine in Alluri Sita Rama Raju Academy of Medical sciences,Eluru,Andhra Pradesh. **Results:** Among the 50 patients studied 41(82%) had no VAP and 9(18%) had VAP. Among the 9 who developed VAP 3(6%) had early VAP and 6(12%) had late VAP I.e. early VAP was 33.3% and late VAP 66.7% respectively. In our study among the 9 cases of VAP, 6 (66.7 %) had a CPIS score more than 6 and 3 (33.3% had a score of 6. CPIS score of more than 6 had a significant association with the diagnosis of VAP ($p<0.001$) **Conclusion:** The Incidence of VAP in our study is directly proportional to the duration of mechanical ventilation. Patients should be placed in semi-recumbent position with the head end elevated to 45° as the supine positioning promotes aspiration which is a strong underlying factor for the development of VAP.Acinetobacter and Pseudomonas are the most common organism in our institution. Thus, there is an increased incidence of MDR organisms involved in VAP unlike in CAP The major goals in VAP management are prompt and early diagnosis, appropriate antibiotics according to the organism and sensitivity followed by meticulous de-escalation according to the microbiological profile and clinical response of the patient

KEYWORDS

INTRODUCTION

Health care associated infections (HAI) result in significant economic and clinical burden on health care system.[1,2] This burden is magnified by the increasing infection rates due to multi drug resistant (MDR) pathogens.[4,5] Pneumonia is the second most common nosocomial infection and accounts for 15 to 20% of all nosocomial infections[3,4].

Nosocomial pneumonia forms a very important etiology of hospital acquired infections and consists of the three distinct entities namely ventilator associated pneumonia (VAP), health care associated pneumonia (HACP) and Hospital acquired pneumonia (HAP)[5,6]. Nosocomial pneumonia results in excessive health care utilization and also leads to greater mortality[7,8].

MATERIALS AND METHODS

It is an observational study, with a sample size of 50 patients admitted in ICU, ASRAM medical college Eluru. Study duration from June 2023 to December 2023.

Inclusion Criteria:

Patients above the age of 18 years of age who were on mechanical ventilation for more than 48 hours irrespective of the primary etiology, Patient with normal CXR on admission, Either sex.

Exclusion Criteria:

Patients intubated outside, Patients with pneumonia or who developed pneumonia less than 48 hrs. of mechanical ventilation, Patients with abnormal chest x ray on admission, Decline of consent by guardian. Patients who were on mechanical ventilation for more than 48hrs in Ticu was included in our study and the following investigations was noted.

Tc, dc, hb, platelets, chest xray on admission, chest x ray 48hrs after intubation, organisms grown in endotracheal aspirate

Table 1: clinical pulmonary infection score

	CPIS SCORE	
CRITERIA	Day 0	Day 3
TEMPERATURE		
LEUKOCYTE COUNT		
CHEST X RAY		
CULTURE OF TRACHEAL ASPIRATE		
PA02/FIO2 RATIO		

RESULTS

Among the 50 patients studied 41(82%) had no VAP and 9(18%) had VAP. Among the 9 who developed VAP 3(6%) had early VAP and 6(12%) had late VAP i.e. early VAP was 33.3% and late VAP 66.7% respectively. In this study 30 patients underwent emergency intubation and 20 patients underwent elective intubation.

Among 50 patients 10 patients had purulent tracheal aspirate and 40 patients had non purulent tracheal aspirateout of those 10 patients 9 had developed VAP.So, there is a significant association between purulent tracheal aspirate and development of VAP.

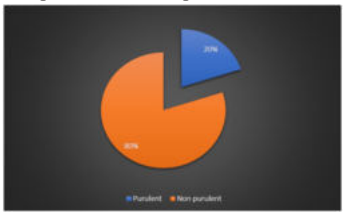

Figure 1: Pie chart of tracheal aspirate in study population (N=50)

Our study showed that out of the 9 cases of VAP, 8 (88.9%) were due to gram negative organisms and 1 (11.1%) was due to gram positive organism.

Table 2: Descriptive analysis of culture in study population

Culture	Frequency	Percentage
Acinetobacter	3	33.3%
CONS	1	11.1%
Kleibsella pneumoniae	2	22.2%
Pseudomonas aeruginosa	3	33.3%
Total	9	100%

In our study among the 9 cases of VAP,7(77.7 %) had a CPIS score more than 6 and 2(22.2% had a score of 6. CPIS score of more than 6 had a significant association with the diagnosis of VAP ($p<0.001$) according to chi square test in our study

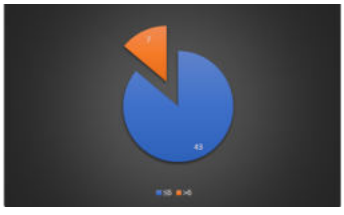

Figure 2: Piechart of CPIS Score in study population (N=50)

Among the 9 cases of VAP ,6 patients were on mechanical ventilation for more than a week and 3 patients were on ventilator for less than a week. In our study there is a significant association between duration of mechanical ventilation and the development of VAP

DISCUSSION

The chest x ray was normal in 35 out of 50 patients evaluated (70%). Threepatients (6%) had infiltrates in left lung, while nine patients (18%) had infiltrates in right lung. Bilateralinfiltrates were found in 3(6%) of them, because aspiration is the most prevalent precipitating mechanism for VAP, Previous research studies have revealed that it frequently involves the posterior right lobe.

According to our findings, 8 (88.9%) of the 9 instances of VAP were caused by gram negative organisms, whereas 1 (11.1%) was caused by gram positive organisms. The following organisms were found in culture: Acinetobacter species – 3 (33.3%)Pseudomonas aeruginosa – 3 (33.3 %) Klebsiella pneumoniae – 2 (22.2 %) Coagulase negative staphylococcus aureus (CONS) – 1 (11.1 %)

CPIS score of more than 6 is most often associated with a VAP diagnosis. 7(77.7 %) had a CPIS score more than 6 and 2(22.2% had a score of 6.

In our study 6 of the 9 patients with VAP had been on mechanical ventilation for more than a week, while 3 had been on it for less than a week. There is a statistical significance between the duration of mechanical ventilation and the development of VAP in our study ($p<0.001$).

According to our study, the mortality rate in our study was observed to be 33% in case of patients with VAP and 41.5% in case of patients in NO VAP category. there is no statistical significance between the development of VAP and mortality as the outcome not only depends on the development of VAP but multifactorial and depends on various other factors like the primary diagnosis, underlying risk factors, age of the patient and many others

CONCLUSION

The Incidence of VAP in our study is directly proportional tothe duration of mechanical ventilation. To reduce the morbidity and mortalityassociated withmechanical ventilation, the length of ventilation must be reduced, whichcan be accomplished by devising an appropriate weaning procedure and titrating the sedative regimesaccording to the patient's demands. The other factors like age, gender, the primary diagnosis does not have a statistically significant association with the development of VAP. Patients should be placed in semi-recumbent position with the head end elevated to 45° as the supine positioning promotesaspiration which is a strong underlying factor for the development of VAP.

Aspiration is a major proven precipitating factor for development of VAP and Diabetes mellitus is an important risk factor influencing the mortality and morbidity, Patients should be placed in semi-recumbent position with the head end elevated to 45° as the supinepositioning promotes aspiration which is a strong underlying factor for the development of VAP.

Acinetobacter and Pseudomonas are the most common organism in our institution. Thus, there isan increased incidence of MDR organisms involved in VAP unlike in CAP.

The major goals in VAP management are prompt and early diagnosis, appropriate antibiotics according to the organism and sensitivity followed by meticulous de-escalation according to the microbiological profile and clinical response of the patient. Prevention of VAP is of paramount importance and all measures aimed at prevention like educating the care givers regarding following the ventilator bundle are to be followed appropriately. Prevention of VAP is of paramount importance and all measures aimed at prevention like educating the care givers regarding following the ventilator bundle are to be followed appropriately.

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