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Incidence and Risk Factors for Ventilator Associated Pneumonia in ICUS of Medical College Hospital Kottayam

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ABSTRACT

Introduction: *Ventilator Associated Pneumonia (VAP) is defined as pneumonia occurring more than 48 hours after initiation of intubation and mechanical ventilation. VAP continues to complicate the course of 8-28% of patients receiving mechanical ventilation[1]. The mortality rate for VAP ranges from 24-50%[2] and may reach 76% in some specific settings or when lung infection is caused by high risk pathogens.*

The aim of the study was to find out the incidence of VAP in ICUs of Government Medical College Hospital (GMCH), Kottayam, to study the underlying risk factors, percentage of early outset VAP, identify the bacterial pathogens and to study the mortality attribute to VAP.

Materials and Methods: *A total of 89 patients satisfying all inclusion and exclusion criteria, who underwent mechanical ventilation in Medical ICU, Neurosurgery ICU and Surgical ICU were included. The patients were monitored every third day for development of VAP using modified CPIS criteria until either discharge from ICU or death. Data were analysed using Microsoft excel, Microsoft word and SPSS.12.*

Results: *Incidence of VAP in GMCH, Kottayam in three ICUs combined is 24.7%. Risk factors found to have statistical significance in the current study are age >60 years, duration of ventilation >5 days and the presence of diabetes mellitus.*

Conclusion: *Incidence of VAP in GMCH, Kottayam is comparable to other tertiary care centres. VAP is associated with significant mortality in ventilated patients.*

Keywords: *Ventilator Associated Pneumonia (VAP), Early Onset VAP (EOVAP), Late onset VAP (LOVAP), Risk factor.*

Background

VAP is pneumonia occurring 48 hours after the initiation of endotracheal intubation and mechanical ventilation. VAP continues to complicate 8-28% of patients receiving mechanical ventilation[1]. In contrast to infections of more frequently involved organs (e.g., Urinary Tract and Skin), for which mortality is low, ranging from 1-4%, the mortality rate for VAP ranges from 24-50% and can reach 76% when lung infection is caused by high risk pathogens.

VAP is classified as either early onset (EOVAP) occurring within the first 4 days of mechanical ventilation (48-96 hrs.) or late onset (LOVAP) developing 5 or more days after initiation of mechanical ventilation. Generally EOVAP is having a better prognosis and is more likely caused by aspiration of antibiotic sensitive

bacteria colonising the oropharynx. LOVAP is caused by more unusual or multidrug resistant pathogens and is associated with a greater morbidity and mortality. Pneumonia is the 2nd most common nosocomial infection in critically ill patients (27%)[3].

VAP continues to be a major cause of morbidity and mortality among critically ill patients. A major component of the problem is the ineffectiveness of therapy once VAP is diagnosed[5].

Given the burden of VAP, both physical and financial, and the difficulties in treatment, prevention strategies would be of paramount importance. Strategies and a more thorough discussion on prevention within the ATS/IDSA statement and papers by Kollef and by Dodek *et al.*,- Zak *et al.*[6] have demonstrated that a multifaceted and multidisciplinary approach to VAP prevention can indeed reduce the incidence[7].

In this study, the incidence, aetiology –profile of organisms, percentage of EOVAP/LOVAP, underlying risk factors and their mortality and morbidity were analysed.

Materials and Methods

The study was conducted among 89 patients who were admitted and underwent mechanical ventilation for 48 hours in MICU, Neurosurgery ICU or Surgical ICU during the period 1st January to 31st October 2011, with age >12 years. Patients who had lower respiratory tract infection on admission were excluded from the study. VAP was diagnosed in patients with CPIS score 6 or more[8]. (Table I). The relevant data were recorded from medical records, bedside flow sheets, radiographic reports and reports of microbiological studies of the patients. Endotracheal aspirate was sent for culture and sensitivity.

There was no conflict of interest or financial support for the study.

Table I. CPIS Score

CPIS points	0	1	2
Temperature (^{0}C)	>36.5 7 <38.4	>38.5 & <38.9	>39 or <36
Leucocyte count (per mm^3)	4000-11,000	<4000 or >11,000	<4000 or >11,000 +band forms>500
Tracheal secretions	Rare	Abundant	Abundant + Purulent <240 & no ARDS
PaO_2/FiO_2 mm Hg	<240 or ARDS		<240 and no ARDS
Chest radiograph	No infiltrate	Diffuse infiltrate	Localised infiltrate
Culture of tracheal aspirate	Light Growth or no growth	Moderate or heavy growth	Heavy growth of pathogenic bacteria and presence of same in Gram stain

Observations

Table II. Patient Profile

Diagnosis	Frequency	Percentage (%)
SDH	14	15.7
Head injury	20	22.5
Post Neuro surgery	14	15.7
O.P. poison intake	5	5.6
GBS	3	3.37
Attempt hanging	2	2.24
IC bleed	3	3.37
CNS inflammation/infection	4	4.49
Hepatic coma	3	3.37
Snake bite	1	1.12
Abdominal surgery	10	11.2
Neck and oral cavity Sx	10	11.2
Total	89	100

Table III. Incidence of VAP

	No.	Percentage (%)
VAP	22	24.7
Non VAP	67	75.3
Total	89	100

Table IV. Incidence in various ICUS

ICU	VAP				Total	
	Present		Absent			
	N	%	N	%	N	%
NSICU	12	27.9	31	72.1	43	100
MICU	4	18.2	18	81.8	22	100
SICU	6	25.0	18	75.0	24	100
TOTAL	22	24.7	67	75.3	89	100

Table V. Age distribution

Age distribution	VAP				Total	
	Present		Absent			
	N	%	N	%	N	%
<60	8	15.1	45	84.9	53	100
>60	14	38.9	22	61.1	36	100
Total	22	24.7	67	75.3	89	100

Table VI. Diabetes mellitus

DM	VAP				Total	
	Present		Absent			
	N	%	N	%	N	%
YES	12	38.7	19	61.3	31	100
NO	10	17.2	48	82.8	58	100
Total	22	24.7	67	75.3	89	100

Table VII. Duration of ventilation

Duration of ventilated days without Pneumonia	VAP				Total	
	Present		Absent			
	N	%	N	%	N	%
<5 days	7	14.9	40	85.1	47	100
≥ 5 days	15	35.7	27	64.3	42	100
Total	22	24.7	67	75.3	89	100

Discussion

Incidence of VAP in GMCH, Kottayam in 3 ICUs *viz*., MICU, SICU & NSICU combined is 24.7%. Several Indian studies showed varying values ranging from 2.6% (Pawar & Mehta *et al*. At Cardiothoracic ICU, Department of Anaesthesi-ology and Microbiology, Escorts Heart Institute & Research centre, New Delhi) to 28% (Alok Gupta *et a*l., Department of Medicine, Chattarpati shivaji Maharaj Medical Univeristy, Lucknow U.P) 18.5% and 35.45 in JIPMER, Pondicherry by Noyal Maria Joseph, Sujatha Sistle *et al*. In United Staes the incidence of VAP varies from 17% to 27%. There was no significant difference between the ICUs in the medicine of VAP with P value-0.69.

Age of the study population varies from 14-85 years. There was significant increase i the incidence of VAP in .60 days group, with 15.1% incidence in <60 years group and 38.9% in >60 age group with P-value-0.01.

Glasgow Coma Scale at the time of intubation didn't show any significant difference. Similarly emergency versus elective intubation and re-intubation was not significant.

38.7% of diabetic patients developed VAP which 17.2% non-diabetics developed VAP. Result was statistically significant with P value-0.025.

There was no difference in the incidence of VAP in smokers when compared with non-smokers or patients who received steroids when compared with those who didn't get steroids.

The incidence of early onset VAP was 31.8% and Late onset VAP was 58.2%. This is because of the probability of getting VAP increases as the duration of ventilation increases. There was an increased incidence of VAP as the duration of ventilation increased. In this study, there was a statistically significant increase in the incidence of VAP in the >5 day ventilated group[9].

In the current study, Gram Negative organisms predominated as the cause of VAP in 72.2% followed by Gram positive and polymicrobial infection respectively. No organism could be identified in 13.6%.

Conclusion

Incidence of VAP in various ICUs combined in Medical College, Kottayam is 24.7%. Incidence of VAP is more in ventilated patients with age >60 years, when the duration of ventilation is >5 days and in diabetics.

Limitations

CPIS scoring system has limitations as SIRS and non infectious causes can lead to wrong interpretations.

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