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General Medicine

A STUDY OF RISK FACTORS AND CPIS IN PREDICTING THE SEVERITY AND PROGNOSIS IN ICU PATIENTS WITH VENTILATOR ASSOCIATED PNEUMONIA

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ABSTRACT **Background And Aims:** Ventilator associated pneumonia is second most common nosocomial infection diagnosed in intensive care units. VAP is defined as pneumonia that occurs 48 hours or more after endotracheal intubation or tracheostomy caused by infectious agents not present or incubating at the time mechanical ventilation was started. VAP poses major threat to patients admitted in in ICU and receiving mechanical ventilation. Hence, this study is being undertaken to focus on risk factors, prognosis in relation to the CPIS score and various pathogens in ICU patients who are in mechanical ventilation. **Materials And Methods:** Patients who are admitted in Medical ICU in Kurnool Medical college, Kurnool as per the inclusion criteria, Data will be collected using a pretested proforma meeting the objectives of the study randomly who admitted in Dept. Of General Medicine,govt.general hospital from june 1st 2022 to september 1st 2022, Detailed history and necessary investigations will be undertaken. The purpose of the study will be explained to the patient and informed consent obtained.

Results:

In our study 50 patients,

- Most affected age group is 51-70 yrs (40%).
- Male affected more than female gender (72%).
- 84% affected in emergency intubation.
- 44% , 54% are HTN and DM respectively.
- Rt side of the lung mostly affected (67%).
- Gram negative organisms affecting most commonly (66%).
- CPIS score >6 on 4 th day seen in 20 and on 8 th day 30 patients.
- 36 % patients survived.

Conclusion:

The risk factors like DM/HTN/Alcoholism/Aspiration are associated with higher risk of VAP. If CPIS score >6 it suggests the VAP ,by the use of appropriate antibiotics we can prevent the morbidity and mortality.

KEYWORDS : Clinical Pulmonary Infection Score(CPIS),ventilator Associated Pneumonia(VAP), Mortality

INTRODUCTION:

Pneumonia is an inflammation of the lung that is most often caused by infection with bacteria, viruses, or other organisms. Healthy people can usually fight off pneumonia infections. However, people who are sick, including those who are recovering from the flu (influenza) or an upper respiratory illness,have weakened immune systems that make it easier for bacteria to grow in their lungs.

DEFINING PNEUMONIA BY LOCATION IN THE LUNG:

Pneumonia may be defined according to its location in the lung:
Lobar pneumonia occurs in one part, or lobe, of the lung.
Bronchopneumonia tends to be scattered throughout the lung.

DEFINING PNEUMONIA BY ORIGIN OF INFECTION COMMUNITY

ACQUIRED PNEUMONIA (CAP):

People with this type of pneumonia caused by the infection outside the hospital from the community. It is the most common infectious diseases. It mostly follows the viral respiratory infection, such as the flu. Most commonest organism causing community acquired pneumonia is Streptococcus pneumonia. Other pathogensinclude Haemophilus influenzae, Mycoplasma, and Chlamydia.

HOSPITALACQUIRED PNEUMONIA. (HAP):

An infection of the lungs contracted during a hospital stay is known as hospital-acquired pneumonia. Because hospital patients already have reduced defence mechanisms, this type of pneumonia is frequently more deadly, and the infecting organisms are usually more hazardous than those found in the community. Gram-negative organisms and staphylococci are particularly to hospital patients. Nosocomial pneumonia is a term for pneumonia in a hospital.VAP is a particularly fatal form of hospital-acquired pneumonia obtained by patients on ventilators in hospitals and long-term nursing institutions. VAP is defined as nosocomial pneumonia that develops in a patient after 48 hours of artificial breathing through a endotracheal or tracheostomy tube. It's usually divided into two categories: early onset (within 96 hours of starting mechanical ventilation) and late onset (more than 96 hours after starting mechanical ventilation).Its progression lengthens a patient's stay in the intensive care unit (ICU) and is linked to high morbidity and death. The majority of cases appear to be caused by aspiration of infectious material that colonises the oropharyngeal airways of critically ill patients. Simple strategies to lessen the risk of aspiration or the burden of oropharyngeal colonisation could help to prevent VAP. If proper antibiotics are delivered in a timely manner, a favourable outcome appears to be more likely

AIMS AND OBJECTIVES OF STUDY:

- To determine the risk factors and prognosis in associated with ventilator associated pneumonia in ICU patients.
- To identify the various bacterial pathogens causing VAP in ICU patients and also identify the significance of CPIS score as prognostic indicator

MATERIALS AND METHODS:

Source of Data

Patients who are admitted in ICU in Kurnool Medical College, Kurnool as per the inclusion criteria

Method of Collection of Data

Sample size: 50

Study period: June 1st 2022 to September 1st 2022
Design study: Prospective observational study
Sampling Method: Purposive random sampling

Inclusion Criteria:
1. Subjects who are on mechanical ventilation for more than 48 hours.
2. >13 years age
3. Both sexes

Exclusion Criteria:
1. Subjects with preexisting pneumonia and lung infections in less than 48 hours of intubation.
2. Subjects with post CPR status
3. Patients on cancer chemotherapy and immunosuppressive drugs.
4. Patients intubated and mechanically ventilated outside the ICU before admission.

Method of study:
Data will be collected using a pretested proforma meeting the objectives of the study. Detailed history and necessary investigations will be undertaken. The purpose of the study will be explained to the patient and informed consent obtained. Patients are selected for study who satisfied all inclusion and exclusion criteria. Relevant history including symptoms and signs at presentation, past medical history, drug history and examination findings are to be noted. CPIS score and Culture of endotracheal aspirate samples for diagnosis of VAP.

INVESTIGATIONS:
1. CBC includes TC, DC and Haemoglobin%
2. RFT
3. LFT
4. Serum electrolytes, includes sodium, potassium and chloride levels
5. Chest x ray
6. Culture of endotracheal aspirate samples.
7. Rbs and Viral screening
8. ECG
9. Complete urine examination

STATISTICAL METHODS:
1. Descriptive statistics
2. Contingency table analysis

The data were collected and analysed for the following:
1. Age and gender based distribution of ventilator associated pneumonia cases.
2. Association between ventilator associated pneumonia cases and their comorbidities.
3. Association between ventilator associated pneumonia patients with respect to duration of ventilation.
4. Outcome of ventilator associated pneumonia.
5. Microbiological profile of ventilator associated pneumonia.

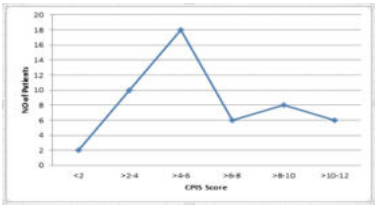
RESULTS:
Patients of more than 18 years of age, of both sexes, having received mechanical ventilation for more than 48 hours in the intensive medical care unit at Kurnool Medical College, Kurnool were studied. Total no. of patients in the study - 50

No. of males - 36
No. of females - 14
Mean age of patients in the study – 52

TABLE 1: DISTRIBUTION OF ORGANISMS AMONG VAP

S.NO	ORGANISMS ON CULTURE	NO OFPATIENTS	Percentage
1	Pseudomonas	10	20%
2	MRSA	13	26%
3	Acenobacterium	3	6%
4	Polymicrobial	2	4%
5	E.coli	4	8%
6	Klebsiella	16	32%
7	Culture negative	2	4%

GRAPH 1: CPS SCORE ON 4TH DAY



GRAPH 2:CPIS SCORE ON 8TH DAY

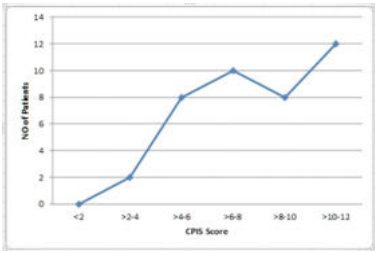


TABLE 2:EARLY Vs LATE VAP

	Frequency	Percentage
Early	22	44%
Late	28	56%

Table 3:Outcome of VAP Patients

Total cases of VAP	Survived		Expired	
	No of cases	%	No of cases	%
50	18	36%	32	64%

DISCUSSION:
Nosocomial infections causes serious morbidity, mortality, personal distress, and cost. VAP is considered to be one of the most worrisome problem in every ICU set up. Nosocimial pneumonia is a particularly common problem in intubated patients getting mechaniacal in ICU. Endotracheal intubation and prevention of micro aspiration of pathogens to the lower air ways will be the ultimate measures that should be taken.

AGE DISTRIBUTION
In our study most of the patients were around 51-70 Yrs age group next comes the 31-50Yrs. The higher the incidence of VAP in that age group can be attributed to more number of patients getting admitted and undergoing mechanical ventilation in this age group.

SEX DISTRIBUTION
In our hospital among patients developed vap nearly 2/3rd were males(72%) and nearly 1/3rd were females(28%).this is because of increased number of male patients getting admitted.and also male gender as such is a risk factor for the development of VAP 61% of male VAP patients were dead.male patients with VAP were in a higher risk of going to complications.

TYPES OF VAP:
Early onset VAP is pneumonia follows after 2 days of mechanical ventilation. While late onset pneumonia arises after 4 days of intubation. Among 50 patients studied 22(56%) had late onset VAP. Among those 22 who developed early onset VAP 14 were expired. In late onset 18 were expired. The probability of getting VAP increases with the duration of mechanical ventilation. In our study early onset VAP is more severe and has high mortality compared to late onset VAP.

ELECTIVE AND EMERGENCY INTUBATION:
In our study 42 patients underwent emergency intubation and 8 patients with elective intubation. Out of which emergency intubation has high mortality rate around 70%. The method of intubation has significant association with the development of onset of VAP and mortality.

COMORBIDITIES:
Regarding comorbidities present in our study population 22% had no comorbidities, here most of the patients are elder age group and about 27 patients are DM and 22 patients are HTN. It indicates the DM is the one of the most important risk factor for developing VAP.

CHEST X RAY FINDINGS:
In our study 67% patients had infiltrates in RT Lung and 27% in Left

Lung 6% Bilaterally. The higher the percentage of infiltration in the RT lung lower lobe is because of aspiration being the most common precipitating factor for VAP. Autopsy studies by Marquette, C.H., M.C.Copin, F.Wallet, R.Neviere, F.Saulnier, D.Mathieu, A.Durocher, P.Roman, and A.B.Tonnel, 1995 indicated that VAP frequently involves posterior right lower lobe.

The profile of organisms in our study as follows gram negative 66%, gram positive 26%, poly microbial 4%. The organisms cultured in our study in descending order were klebsiella 32%, MRSA 26%, pseudomonas 20%, E.COLI 8%, Acenetobacter 6% reflecting the higher incidence of gram negative organisms in patients with VAP unlike in community acquired pneumonia where streptococcus pneumonia is common.

CPIS SCORE:

The clinical pulmonary infection score (CPIS) comprises of clinical,microbiological and radiological evidence to allow a numerical value to determine the presence or absence of VAP. Scores vary between 0 and 12. CPIS score more than 6 is reliable with diagnosis of VAP. In our study 20 patients have >6 on 4th day as if the score >6 it more favourable of VAP, as in our study early VAP is 22 patients of 50 vap patients and on 8th day 30 patients had >6 score it indicates the significant value of patient having CPIS score >6 and which more favours the VAP. And score >10 on 8th day is 12 patients, higher the CPIS score higher the risk of mortality. Significant association between CPIS score and mortality rate has been found.

OUTCOME OF VAP:

In our study group more deaths occurred in emergency intubation group. In total 18 patients were alive and 32 patients were dead. Males have more deaths 44% compared to females 20%.

Most deaths occurred in males and in the age group of 51-70 yrs because of more number of cases and association of comorbidities in the elder age group compared with other age group.

CONCLUSION:

The observations based on our study are

- VAP is associated with significant morbidity in critically ill patients.
- The incidence of VAP is directly depends on the duration mechanical ventilation. In our study early onset VAP is more severe and has high mortality compared to late onset VAP.
- DM ,HTN,Alcoholism and Aspiration are asssociaed with high risk of VAP and poor prognosis.
- Elder age group associated with higher risk in developing VAP.
- Trauma, steroid use, enteral feeding, nasogastric tube installation, tracheostomy, reintubation, central venous catheter, blood transfusion, and COPD have all been identified as risk factors for increased VAP in Asian research. Aging males, increased ventilation time, consciousness abnormalities such as swallowing and coughing; burn complications,chronic disease, long-term prophylactic antibiotic usage, and gene polymorphisms, as well as smoking, were all determined to be risk factors. VAP incidence and death can be reduced by reducing these risk factors among patients.
- The method of intubation has significant association with the development of onset of VAP and mortality as emergency intubation has high mortality rate around 70%.
- Higher the incidence of gram negative organisms, MDR pathogens in patients with VAP compared with community acquired pneumonia.Which suggests that appropriate broad spectrum antibiotics should be prescribed. The organisms cultured in our study in descending order were klebsiella 32%, MRSA 26%, pseudomonas 20%. Arabi et al. showing Gram-negative bacilli as the most common pathogen (41–92%), followed by Gram-positive cocci (6–58%).
- CPIS Score >6 then strongly suggests the poor prognosis that need use of broad spectrum antibiotics which has to cover gram negative including pseudomonas.The major aim of VAP management are early and appropriate antibiotics,we canprevent the morbidity and mortality.

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