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Research Article

Clinical profile of hospital acquired pneumonia in a tertiary care hospital, South India

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ABSTRACT

Background: Hospital acquired infections continue to be an important cause of morbidity and mortality among hospitalized patients. Hospital acquired pneumonia (HAP) results in a significant increase in the cost of care of hospitalized patients. Its development prolongs a patient's stay in the Intensive Care Unit (ICU). Accurate information concerning the clinical profile of HAP is lacking in South India. This study was conducted prospectively to evaluate the clinical profile of HAP in ICU patients.
Methods: This prospective study was conducted over a period of one year among 2454 patients admitted in IMCU of Coimbatore Medical College & Hospital, Tamil Nadu. The specimens' sputum, bronchoscopic alveolar lavage (BAL) and endotracheal aspirate (ETA) were collected for microbiological confirmation and processed using standard laboratory techniques.
Results: Out of 2454 cases, 253 (10.3%) patients developed HAP. The incidence of HAP was higher (55.73%) in the age group more than 60 years. Out of 1352 patients on mechanical ventilation, 62.0% of patients (n=157) developed HAP.
Conclusions: This study provides an insight into the incidence of HAP with the occurrence being most in the age group more than 60 years. Our study also highlights that mechanical ventilation was an important risk factor for the development of HAP.

Keywords: Hospital acquired pneumonia, Intensive care unit, Mechanical ventilation

INTRODUCTION

Hospital acquired infections continue to be an important cause of morbidity and mortality among hospitalized patients.[1,2] The critically ill patient is at particular risk of developing ICU acquired infection, with the lungs being especially vulnerable.[3] Hospital acquired pneumonia (HAP) is currently the second most common hospital infection accounting for 13 to 18% of all nosocomial infections, with estimates of associated mortality ranging from 20 to 50 percent.[3]

The majority of cases of HAP occur outside of ICUs. However the highest risk is in patients on mechanical ventilation. Estimates of incidence range from 4 to 7 episodes per 1000 hospitalizations.[4] Intubated patients may have rates of pneumonia 7 to 21- fold higher than patients without a respiratory therapy device.[5] Infection rates are twice as high in large teaching hospitals as compared with smaller institutions.[5] HAP results in a significant increase in the cost of care of hospitalized patients.[4] Its development prolongs a patient's stay in the ICU[4,6] and most of the extra cost is due to an increased length of hospital stay.[4,7]

Accurate information concerning the clinical profile of HAP is lacking in South India. Though HAP is widely studied by many researchers, not much is known about the incidence and clinical profile since only few studies are being published by them. This study was conducted prospectively to evaluate the clinical profile of HAP in ICU patients.

METHODS

This prospective study was conducted over a period of one year among patients admitted in intensive medical care unit (IMCU) of Coimbatore Medical College & Hospital, Tamil Nadu. The study population comprised all patients admitted to the IMCU from May, 2007 to April, 2008. Approval was obtained from the Ethical Committee prior to conducting the study and informed consent from all patients under study was also obtained. HAP was diagnosed based on standard diagnostic criteria adapted by the Centers for Disease Control and Prevention for the diagnosis of pneumonia if signs of pneumonia occurred after 48 hours following IMCU admission.[8] The following cases were excluded from the study: 1. Patients who died within 48 hours from the time of admission to the IMCU, 2. Patients discharged or went home against medical advice within 48 hours of admission and 3. Patients who were diagnosed to have pneumonia during the time of or within 48 hours of admission (Pneumonia in these cases were presumed to have developed from a previous hospital admission or community).

Data collection began from the time of admission to the IMCU and continued until the occurrence of HAP, death or discharge from IMCU whichever occurred first. On IMCU admission name, age, sex, address, date of admission, diagnosis on admission, underlying illness, presence of immuno-compromised state (Diabetes, Malignancies and AIDS), history of smoking and alcoholism were recorded. A thorough general & systemic examination of the patient was also done.

When HAP occurred, the time of onset from hospital admission, temperature, chest radio graphical involvement and leukocyte count were recorded. Intervention-related variables including need for supplemented O_2 & device used, need for mechanical ventilation, suctioning devices used, naso gastric tube placement, stress ulcer prophylaxis, steroids, sedatives and antibiotics actually given for at least 48 hours were also recorded. The data on the hospitalization outcome including length of hospital stay and discharged versus mortality was also determined. The specimens collected were sputum, bronchoscopic aspirate (BAL) and endotracheal aspirate (ETA). Microbiological confirmation was done using standard laboratory techniques.[9,10]

RESULTS

During the one-year study period, among 2658 patients admitted to the IMCU, only 2454 cases were followed and included in this study. The remaining 204 cases were excluded (118 died within 48 hrs of admission, 86 were discharged or went home against advice). Among 2454 patients, 64% of patients (n=1570) were males and 36% (n=884) were females. The mean age was 59.96 with the range of 15 to 89 years old. 35% of the patients were more than 60yrs of age. Out of 2454 cases, 253(10.3%) patients developed HAP. The highest incidence of HAP (55.73%) was observed in the age group more than 60 years (Table 1, 2).

Table 1: Age-wise distribution of patients.

Age (years)	Total patients	Patients with HAP (n) (%)
0-15	10	0 (0)
16-30	349	7 (2.77)
31-40	414	13 (5.14)
41-60	882	92 (36.36)
>60	859	141 (55.73)
Total	2454	253

Table 2: Age and sex-wise distribution of patients.

Age (yrs)	Male		Female	
	Total	With HAP	Total	With HAP
<15	6	-	4	-
16-30	223	5	126	2
31-40	288	9	126	4
41-60	551	59	271	33
>60	502	102	357	39
Total	1570	175	884	78

The primary reason for IMCU admission was due to neurological events (31.1%), cardiac and pulmonary emergencies (26.0%), acute infections (12.5%), poisoning (5.3%), envenomation (0.5%), etc. and the incidence of HAP was greater in patients with diseases requiring prolonged mechanical ventilation and in patients with those diseases that predispose to pulmonary infection such as sepsis and prolonged stay in IMCU. Out of 1352 patients on mechanical ventilation, 62.0% of patients (n=157) developed HAP and only 38.0% of patients (n=96) developed HAP out of 1102 non ventilated patients (Table 3).

Table 3: Influence of mechanical ventilation on HAP.

Ventilator	Total	Patients with HAP (n) (%)
Yes	1352	157 (62.0)
No	1102	96 (38.0)
Total	2454	253

DISCUSSION

The present study showed that the incidence of HAP was 10.3% (n=253) out of 2454 cases admitted in IMCU, Coimbatore Medical College Hospital over a period of one year. This incidence was lower than the study by Mukhopadhyay et al from Lucknow (53.9%),[11] Rakshit et al from Mumbai (47%)[12], Vincent et al from Europe (46.9%),[13] Dey et al from Manipal (45.4%)[14], Sopena et al from Spain (36.4%)[15], Berba et al from Philadelphia (28.2%)[16] and Merchant et al from Mumbai (16.7%).[7] This was higher than the incidence reported by Chevret et al from France (8.9%),[17] Alp et al from Netherlands (6.8%),[18] Trivedi et al from Mumbai (9.38%)[19] and Pawar et al from New Delhi (2.6%)[20]. It is possible that our incidence rate may be an over estimate of the HAP in the hospital because of the nature of the clinical criteria used. Studies based solely on clinical criteria alone are criticized because of the non-specificity of parameters like fever, leukocytosis and infiltrates on the chest radiographs. However, the stringent steps followed to make a diagnosis of HAP in this study and the close monitoring before and after the diagnosis of HAP occurred should make our estimate very close to the true HAP incidence. It is unlikely that a true HAP case would have been missed because we did quantitative culture of all specimens (BAL, Sputum and ETA) to discriminate between the true pathogen and the contaminant using the diagnostic threshold for each specimen.

High occurrence (55.73%) of HAP among the age group more than 60 years was observed in the present study. This could be due to the bulk of the study population in this study was more 60 years of age group. This was in accordance with an earlier study by Berba et al.[16] Age more than 60 years is one of the known risk factor for the development of HAP as reported in previous studies.[1,21] But Muhammad et al reported that highest incidence was among 41 to 60 years of age group.[22] The present study showed that the incidence of HAP was high among male patients than females. This finding was similar to the study by Mukhopadhyay et al from Lucknow.[11] But Berba et al showed that the male sex had a protective effect against the development of HAP.[16] Dey et al reported that gender had no significant role in the development of HAP.[14]

In the present study the incidence of HAP was greater in patients with diseases requiring prolonged mechanical ventilation like OPC poisoning (15.0%) and considerably low in patients with diseases which presumably, had unaffected lungs before admission to IMCU like snake bite (0.4%). These findings were similar to the previous studies.[12,14]

HAP developed in 157 out of the 1352 patients (62.0%) receiving mechanical ventilation but in only 96 out of 1102 patients (38.0%) with no mechanical ventilation. This incidence of VAP (62.0%) was higher than the study by Muhammad et al (30.7%) 22 and lower than the study by Alp et al who showed that 75.5% of all patients with HAP were VAP.[18] Mechanical ventilation is a definitive risk factor for developing HAP that has been shown previously by many studies[11,14] and this study also shows the significance of that risk factor causing HAP.

CONCLUSION

Taken together, our data provides an insight into the incidence of HAP with the occurrence being most in the age group more than 60 years. Our study also highlights that mechanical ventilation was an important risk factor for the development of HAP.

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