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Research Article

## OCCURRENCE OF HOSPITAL ACQUIRED PNEUMONIA IN ICU AND IDENTIFICATION OF CAUSATIVE ORGANISMS

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**Abstract:**

**Objective:** The aim of this research work is to examine the prevalence of HAP (Hospital acquired Pneumonia) in the patients getting treatment in ICU (Intensive care unit) and to assess the occurrence of causative agents of this disease.

**Methodology:** We carried out an observational study in intensive care unit of Jinnah Hospital, Lahore for the duration of one year, from January 2018 to January 2019. During this period 1,866 patients admitted in intensive care unit and medicine department. We analyzed these patients for HAP and cultured the disease-causing organisms from the patients. We carried out the microbiological etiology of these patients.

**Results:** Total 346 patients got admission in intensive care unit. We identified Hospital acquired Pneumonia in eighty-eight patients. The patients suffering with this disease were from the age of sixteen to eighty-two years, having the average age of forty-eight years. There were fifty-six male patients and thirty-two female patients. The death of forty-two patients occurred due to this infection.

Microbiological etiology indicated that there were 30.6% (27) *Pseudomonas aeruginosa*, 13.6% (12) *Acinetobacter* spp., 13.6% (12) *Candida albicans*, 10.2% (9) *Klebsiella-pneumonia*, 10.2% (9) *Streptococcus* spp., 5.6% (5) *Escherichia coli*, 4.5% (4) *Stenotrophomonas* spp., 4.5% (4) MRSA (Methicillin Resistant *Staphylococcus Aureus*) and 6.8% (6) other micro-organisms.

**Conclusion:** The occurrence of hospital acquired pneumonia was 25.40% (88 out of 346 patients). The most common causative organism of HAP was *Pseudomonas aeruginosa* (30.60%).

**KEY WORDS:** *Escherichia Coli*, Pneumonia, *Pseudomonas Aeruginosa*, Organisms, ICU, Infection, Specimen, Gram Stain.

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## INTRODUCTION:

HAP is one of those complications which severely affect the patients who admit in ICU. The development of HAP occurs in accordance with mechanical ventilation and IAM (invasive airway management). It is the infection of lung's parenchymal tissues which develops 2 days after hospitalization [1, 2]. Hospital acquired Pneumonia is the main reason of death, mostly in those hospitalized patients who have critical condition in intensive care unit [1, 3-6]. The occurrence of Hospital Acquired Pneumonia in intensive care unit ranges from 9 to 24 percent. It varies according to the intensive care, different characterization and by the use of different analytical methods [7]. Among the 1000 hospitalized patients, 5-20 patients become the victim of this complication [1, 8]. It is most common in patients who receive enteral feeding, have weak immune system or they underwent surgery. Almost ninety percent patients suffer from VAP (Ventilator Acquired Pneumonia). VAP occurs in nine to forty percent of patients who receive enteral feeding by nasogastric tube. It is the most common infection which develops in intensive care unit [9, 11]. The PID (pooled incidence density) of ventilator acquired pneumonia approaches from two to sixteen-time occurrence rate per thousand days on ventilator [11, 12]. The occurrence of ventilator acquired pneumonia increases between day five and day nine of mechanical process of ventilation and the additive occurrence increases with increase in the happening time of mechanical ventilation [13, 14]. The most frequent causative agents of hospital acquired pneumonia are *Pseudomonas Aeruginosa*, *Enterobacter*, *Klebsiella-pneumoniae*, *Escherichia Coli*, *Serratia-marcescens* and the species of *Proteus* [1]. The inhalation of particles of aerosol may cause origination and development of the disease. Polluted instruments, increase in PH of stomach and colonizing of bacteria in pharynx are the causes of occurrence of the disease [15]. The aim of this research is to analyze the occurrence of the disease and to identify its causative organisms. This research work also provides instructions for the use of antibiotics in ICU.

## METHODOLOGY:

We carried out an observational study in intensive care unit of Jinnah Hospital, Lahore for the duration of one year, from January 2018 to January 2019. During this period 1,866 patients admitted in intensive care unit and medicine department. We analyzed these patients

for HAP and cultured the disease-causing micro-organisms from the patients. We carried out the microbiological etiology of these patients.

We made the microbiological processing of TA (tracheal aspirate). It pointed out the presence of five or more colonies of bacteria. We vortexed the sample of Broncho-alveolar Lavage for the duration of thirty seconds and made a spot on glass slide for gram stain. Other vortexed specimen infused on SBA (sheep blood agar), CA (chocolate agar) & MCA (mac conkey agar) by the utilization of 0.0010 loops. We identified the growth of ten or more than ten colonies of bacteria.

After the duration of 24-48 hours, the process of culture examination carried out. By utilizing gram staining, we analyzed the growth and forms of bacterial colonies. Additional identification carried out by utilizing bio-chemical tests [16]. CDC (Centers for Disease Control and Prevention) presented the following standard definition for Hospital acquired Pneumonia [17]. The medical identification of this infection represents following radiological symptoms; more than two chest radiographs and at least one, among Progressive & Persistent Infiltrate, consolidation and cavitation. While it shows following medical symptoms; at least one, among fever, leukopenia, change in mental condition and two of the following; increase in respiratory secretion, worse state of cough, sound of breathing and worse respiration.

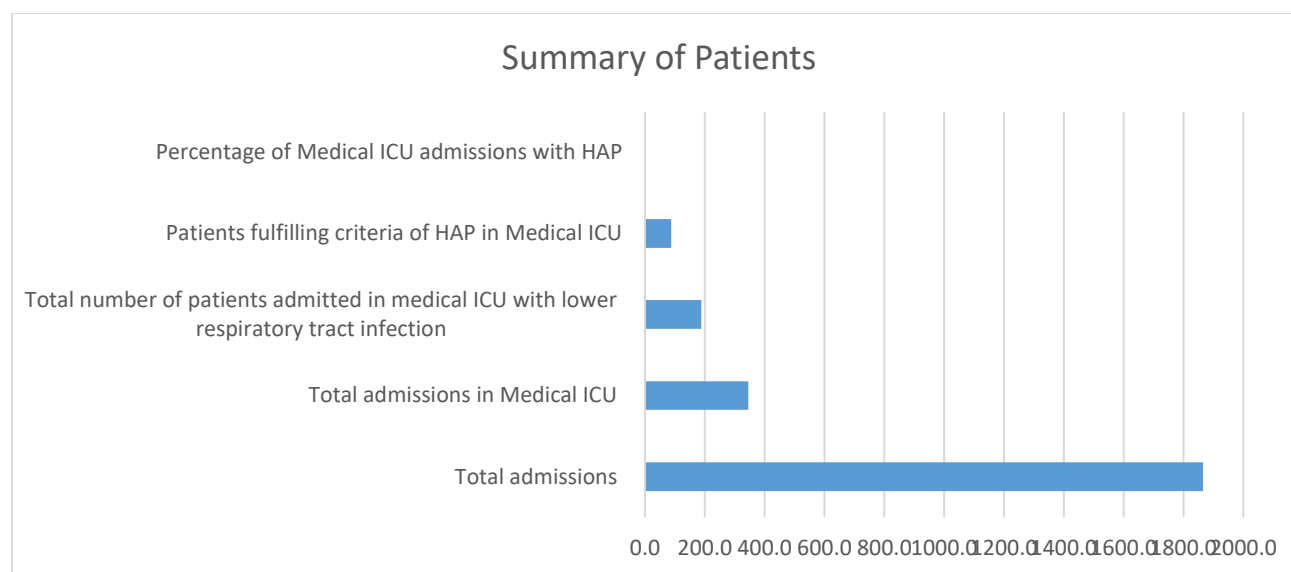
We carried out the statistical analysis by the utilization of version 17 of SPSS (statistical package for social sciences). We measured the occurrence and %ages to categorize the obtained data. The Ethical Committee of Jinnah Hospital, Lahore approved this research.

## RESULTS:

In medicine department 1866 patients admitted. From these, 346 patients admitted in intensive care unit. Hospital acquired Pneumonia identified in eighty-eight (25.40%) patients while other patients had low respiratory infection (Table-1). The patients suffering with this disease were approaching from the age of sixteen to eighty-two years, having the average age of forty-eight years. There were fifty-six male patients and thirty-two female patients. The death of forty-two patients occurred due to this infection.

**Table-I: Summary of Patients According to the Number**

Subdivision of Patients Admitted in Medical Department	No
Total admissions	1866.0
Total admissions in Medical ICU	346.0
Total number of patients admitted in medical ICU with lower respiratory tract infection	188.0
Patients fulfilling criteria of HAP in Medical ICU	88.0
Percentage of Medical ICU admissions with HAP	25.40%



Microbiological etiology indicated that there were 30.6% (27) *Pseudomonas aeruginosa*, 13.6% (12) *Acinetobacter* spp., 13.6% (12) *Candida albicans*, 10.2% (9) *Klebsiella pneumoniae*, 10.2% (9) *Streptococcus* spp., 5.6% (5) *Escherichia coli*, 4.5% (4) *Stenotrophomonas* spp., 4.5% (4) MRSA (Methicillin Resistant *Staphylococcus Aureus*) and 6.8% (6) other organisms.

### DISCUSSION:

According to our research total occurrence of this infection in our patients of ICU was 25.40%. The most common microorganism was *Pseudomonas aeruginosa* (30.60%). The occurrence of *Acinetobacter* specie and *Candida Albicans* was 13.60% each while the occurrence of *Klebsiella pneumoniae* and *Streptococcus* was 10.20% each. There was a high occurrence rate of thirty percent for those patients who admitted in ICU. The occurrence rate of HAP in ICU was five to ten times more than those who admitted in other wards [18]. In United State of America, the prevalence rate of HAP is 15.0%. The occurrence of HAP in ICU is 26.0% while it is 11.0% for other wards [19, 20]. The prevalence of HAP changes from one hospital to another. The incidence of HAP varies from one hospital to another. The occurrence of Hospital Acquired Pneumonia in intensive care unit ranges from nine to twenty-four percent. It varies according to the intensive care,

different characterization and by the use of different analytical methods. In accordance with EPIC (European prevalence of infection in Intensive Care), there carried out a large scale study of HAP occurrence. In Europe the occurrence rate of Hospital Acquired Pneumonia was 9.60% among 10 thousand patients and 1,417 intensive care units [18].

In accordance to another research work, in 2005 in united states 4543 patients acquired these infections, 835 patients were suffering from Hospital Acquired Pneumonia and 499 patients were suffering from ventricle acquired Pneumonia. In the patients suffering from Hospital Acquired Pneumonia, *s. aureus* was 47.10%, *pseudomonas* sp. was 18.40%, and non-group *streptococcus* was 13.9% [21]. But in accordance to our research the most common causative micro-organisms were *pseudomonas aeruginosa* (30.60%) and *acinetobacter* specie. According to the research which carried out in Beirut,

the most frequent causative micro-organism was *A. anitratus*, succeeded by *P. aeruginosa* and *Klebsiella* species [22]. Trivedi [23] presented a report. According to this report the occurrence of Hospital Acquired Pneumonia was 9.380% and VAP was 38.0%. A research carried out in 2009 in Hyderabad, Pakistan. This research showed that out of fifty patients, nine patients were suffering with Hospital Acquired pneumonia [24]. But according to another research 15 patients were suffering with this infection [25]. A research carried out in CMH Rawalpindi in 2005. This research demonstrated that most common causative micro-organisms are *P. aeruginosa* (26.0%), *S. aureus* (20.0%), *Acinetobacter* (9.0%) [26]. The results of our research are same as of local and international studies.

### CONCLUSION:

The occurrence of hospital acquired pneumonia is 25.4% (88 out of 346 patients). The death rate is 47.70%. The most common causative organism of HAP is *Pseudomonas aeruginosa* (30.60%). Our findings are in accordance with standard data. We suggested that there is requisition of a broad research. There is need of regular updating of data to make possible the proper use of antibiotics.

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