



CODEN [USA]: IAJPBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF  
**PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.3697841>Available online at: <http://www.iajps.com>

Research Article

**RATE OF OCCURRENCE OF HOSPITAL ATTAINED  
PNEUMONIA AND ITS DIFFERENT ETIOLOGICAL  
ORGANISMS**Dr Maryam Iqbal, Dr Zamurd, Dr Fatima Iqbal  
Indus Hospital, MSSH, Bedian Road Lahore

Article Received: January 2020 Accepted: February 2020 Published: March 2020

**Abstract:**

**Objective:** The aim of this study is to evaluate the rate of occurrence of Hospital Attained Pneumonia among patients who got admission in ICU (Intensive Care Unit) and to assess the rate of occurrence of various etiological organisms in such patients.

**Methodology:** This study was transverse research work which was carried out in the ICU of Indus Hospital, Lahore from March 2018 to December 2019. A sum of total 1866 patients got admission in the Medicine Department including the Medical intensive care unit. All of these patients underwent evaluation for hospital attained pneumonia and then we cultured the contributory organisms from the patients. We performed the detection of the organisms by their standard biochemical profile.

**Results:** There were total 346 patients who got admission in medical intensive care unit. We diagnosed hospital attained pneumonia in 25.4% (n: 88) patients. Mean age of the patients who got admission in the medical intensive care unit was 48 years with a range of age from 16 to 82 years. There were total fifty-six males and thirty-two female patients. Total 47.7% (n: 42) patients died in medical intensive care unit suffering from hospital attained pneumonia. Microbiological assessment displayed that *Pseudomonas aeruginosa* were in 30.6% (n: 27), *Acinetobacter* spp. were in 13.6% (n: 12), *Candida albicans* were in 13.6% (n: 12), *Klebsiella pneumoniae* were also in 10.2% (n: 9), *Streptococcus* spp. were in 10.2% (n: 9), *Escherichia coli* were in 5.6% (n: 5), *Stenotrophomonas* spp. were in 4.5% (n: 4), Methicillin Resistant *S. Aureus* were in 4.5% (n: 4) and other remaining organisms in 6.8% (n: 6).

**Conclusion:** Rate of occurrence of hospital attained pneumonia in the medical intensive care unit of our institute 25.4% (n: 88). The most common detected organism was *P. aeruginosa* (30.6%) followed by *Acinetobacter* and *C. albicans* (13.6% each).

**KEY WORDS:** Hospital Attained Pneumonia, Microbiological, Assessment, Intensive Care Unit, Organisms.

**Corresponding author:**Dr. Maryam Iqbal,  
Indus Hospital, MSSH, Bedian Road Lahore

QR code



Please cite this article in press Maryam Iqbal et al, *Rate Of Occurrence Of Hospital Attained Pneumonia And Its Different Etiological Organisms.*, Indo Am. J. P. Sci, 2020; 07(03).

**INTRODUCTION:**

Hospital Attained Pneumonia is most common and very severe complication in the patients who are under treatment in ICUs. This complication normally develops in relation with the management of invasive airway as well as mechanical ventilation. hospital attained pneumonia is defined as the lung parenchyma's infection which develops two days after the admission in the hospital [1, 2]. hospital attained pneumonia is the main cause of morbidity as well as mortality in the patients who are getting treatment in intensive care units in severe conditions [1, 3-6]. The rate of prevalence of hospital attained pneumonia in the intensive care units varies from 9% to 24% because of the different diagnostic methods used in the intensive care units [7]. The range of prevalence of hospital attained pneumonia is 5 to greater than 20 per one thousand patients in the hospital admissions [1, 8]. Pneumonia associated with ventilator occurs in 9% to 40% intubated patients and it is the most common infection attained in ICU [9-11].

The range of pooled density of incidence of ventilator acquired pneumonia is 2 to sixteen episodes per one thousand days' ventilator [11, 12]. There is peak of VAP incidence in between day 5 and day 9 under mechanical ventilation and cumulative prevalence is directly proportional to the duration of the mechanical ventilation [13, 14]. The gathering of the bacteria in pharynx, enhanced gastric pH and contaminated apparatus are main resources of these complications [15]. The main purpose of this research work was to determine the rate of occurrence of hospital attained pneumonia in our public.

**MATERIAL AND METHODS:**

A sum of total 1866 patients got admission in Indus Hospital Lahore from March 2018 to December 2019 for various reasons. We evaluated these patients for hospital attained pneumonia and then we cultured the causative organisms from these patients. Total 88 patients among 346 admissions

fulfilled the standard of hospital attained pneumonia infection. We discussed the causative organisms influencing these patients in this research work. We added equal sputa sol's volume to sample and digested the sputum by mingling on vortex mixer for 20 to 30 seconds. We incubated the mixture at 370 centigrade for complete 15 minutes. When there was completion of digestion, it was diluted 100.0 $\mu$ l of digested sputum into 9.9 ml of 1/4 sterile ringer's solution and then mixed it properly. From this well-mixed sputum, we transferred 10 $\mu$ l in every plate of SBA (Sheep Blood Agar), chocolate agar and MAC (MacConkey Agar). We used the SDA (Sabouraud Dextrose Agar). Every colony of the organism was equal to 10000 cfu/mL.

We considered the count of equal or greater to 105 as significant. So, we identified and stated the growth of five or more than five colonies. After 24 to 48 hours of growth was under observation and we used gram staining for identification of morphology. We performed biochemical tests further for the identification of the organisms [16]. We identified the hospital attained pneumonia with utilization of the CDC (Centers for Disease Control and Prevention) [17]. SPSS V. 20 was in use for the statistical analysis of the collected information. We presented the categorical variables in frequencies and percentages. Ethical committee of the hospital gave the permission to conduct this research work. We took the written permission from the patients or their kin after explaining them the rationale of this research work.

**RESULTS:**

Among them, 346 patients shifted to medical intensive care unit. Among these ICU admissions, 188 patients got admission because of infection in the lower respiratory tract. 88 patients in the medical intensive care unit completed the hospital attained pneumonia criteria (25.4%) as presented in Table-1. Mean age of the patients who got admission in medical intensive care unit was 48 years with a range of age from 16 to 82 years.

**Table-I: Summary of Patients**

Subdivision	No
Total admissions in Medical OPD	1866
Total admissions in Medical ICU	346
Total number of patients admitted in medical ICU with lower respiratory tract infection	188
Patients fulfilling criteria of Hospital Attained Pneumonia in Medical ICU	88
Medical ICU admissions with Hospital Attained Pneumonia (%)	25.4%

There were 56 male and 32 female patients. 47.7% (n: 42) patients died in medical intensive care unit suffering from hospital attained pneumonia. Microbiological examination revealed that *P. aeruginosa* were present in 30.6% (n: 27), *A. spp.* were in 13.6% (n: 12), *C. albicans* were also in 13.6% (n: 12), *K. pneumonia* were in 10.2% (n: 9), *S. spp.* were also in 10.2% (n: 9), *E. coli* were in 5.6% (n: 5), *S. spp.* were present in 4.5% (n: 4), MRSA were also in 4.5% (n: 4). There were some other organisms with low ratio in some patients.

**DISCUSSION:**

This research work displays that overall rate of occurrence of patients who got admission with hospital attained pneumonia medical intensive care units was 25.4%. Most common isolated organism was *P. aeruginosa* (30.6%) followed by *Acinetobacter* and *C. albicans* present in 13.6% each, *K. pneumonia* and *Streptococcus* were present in 10.2% each. Risk of the infections acquired in hospital intensive care units was 5 to 10 times higher than the infections acquired in other departments of hospital [18]. Hospital attained pneumonia is responsible for about 15% of all hospital acquired infections in USA. It has association with the 11% infection acquired in hospital other than ICUs and 26% of infections acquired in hospital in intensive care units [19, 20]. Among a sum of 10000 patients in 1500 ICUs in European countries, the rate of prevalence of hospital attained pneumonia was 9.6% [18]. On other research work conducted in USA in year of 2005, total 4543 patients underwent analysis. Among analyzed patients, 835 patients were present with hospital attained pneumonia (18.4%) and 500 patients with VAP (1.1%). In the group of hospital attained pneumonia patients, *S. aureus* was most common (47.1%) followed by *P. Spp* (18.4%) and in the non-group, *Streptococcus* was most common (13.9%) [21].

In one research work conducted in Beirut, most common detected organism was the *A. anitratus* followed by *P. aeruginosa* and various species of *Klebsiella* [22]. Trivedi stated a rate of prevalence of hospital attained pneumonia as 9.39% and 38% patients were present with the pneumonia associated with the ventilator [23]. The most common isolated organisms were *pseudomonas* present in 55%, *Acinetobacter* in 20%, *S. aureus* in 14.5% and *K. pneumonia* in 75%. One research work conducted in Hyderabad, Pakistan stated that among total fifty patients suffering from nosocomial infections, 18% patients were identified with the hospital attained pneumonia [24], whereas one other research work discovered it as 30.1% [25].

Findings of one other research work conducted in Combined Military Hospital, Rawalpindi in 2005, confirmed the most common isolated organisms as *P. aeruginosa* in 26%, *S. aureus* in 20% and *Acinetobacter spp* present in 9% [26]. This research work shows the same rate of occurrence and pattern of organisms as presented by different international as well as local research works. The findings of this research work cannot be generalize n whole population because this is a research work conducted in a single center.

**CONCLUSION:**

Rate of occurrence of hospital attained pneumonia in our medical intensive care unit was 25.4% (n: 88). The rate of mortality because of hospital attained pneumonia is 47.7% in this research work. Most common organism detected in patients was *P. aeruginosa* (30.6%). The findings of this research work are consistent with the findings of other research works present locally or on international level. There is need of other research works on larger scale to consolidate the findings of this research study to authenticate the utilization of antimicrobials.

**REFERENCES:**

1. American Thoracic Society–Infectious Diseases Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and health care associated pneumonia. *Am J Respir Crit Care Med.* 2005; 171:388–416.
2. Anand N, Kollef MH. The alphabet soup of pneumonia: CAP, Hospital Attained Pneumonia, HCAP, N Hospital Attained Pneumonia, and VAP. *Semin Respir Crit Care Med.* 2009; 30:3–9. doi: 10.1055/s-0028-1119803.
3. Agrafiotis M, Siempos II, Ntaidou TK, Falagas ME. Attributable mortality of ventilator-associated pneumonia: a meta-analysis. *Int J Tuberc Lung Dis.* 2011; 15:1154– 1163. doi: 10.5588/ijtld.10.0498.
4. Melsen WG, Rovers MM, Koeman M, Bonten MJ. Estimating the attributable mortality of ventilator-associated pneumonia from randomized prevention studies. *Crit Care Med.* 2011; 39:2736–2742. doi: 10.1186/cc13775
5. Chastre J, Fagon JY. Ventilator-associated pneumonia. *Am J Respir Crit Care Med.* 2002; 165:867–903. doi: 10.1164/ajrccm.165.7.2105078
6. Kollef MH, Hamilton CW, Ernst FR. Economic impact of ventilator-associated pneumonia in a large matched cohort. *Infect Cont Hosp Epidemiol.* 2012; 33:250–256.
7. Vincent JL. Nosocomial Pneumonia. *Indian J Crit Care Med.* 2001; 5:148–156.
8. Chawla R. Epidemiology, etiology, and diagnosis of hospitalacquired pneumonia and ventilator-associated pneumonia in Asian countries. *Am J Infect Cont.* 2008;36: S93–S100.
9. Vincent JL, Rello J, Marshall J, Silva E, Anzueto A, Martin CD, et al. International study of the prevalence and outcomes of infection in intensive care units. *JAMA.* 2009;302(21):2323– 2329. doi: 10.1001/jama.2009.1754.

10. Forel JM, Voillet F, Pulina D, Gacouin A, Perrin G, Barrau K, et al. Ventilator-associated pneumonia and ICU mortality in severe ARDS patients ventilated according to a lungprotective strategy. *Crit Care*. 2012;16(2): R65. doi: 10.1186/cc11312.
11. Rosenthal VD, Bijie H, Maki DG, Mehta Y, Apisarnthanarak A, Medeiros EA, et al. International Nosocomial Infection Control Consortium (INICC) report, data summary of 36 countries, for 2004–2009. *Am J Infect Cont*. 2012;40(5):396–407. doi: 10.1016/j.ajic.2011.05.020.
12. Lee GM, Kleinman K, Soumerai SB, Tse A, Cole D, Fridkin SK, et al. Effect of nonpayment for preventable infections in U.S. hospitals. *N Engl J Med*. 2012; 367:1428–1437. doi: 10.1056/NEJMsal202419
13. Cook DJ, Walter SD, Cook RJ. Incidence of and risk factors for ventilator-associated pneumonia in critically ill patients. *Ann Intern Med*. 1998; 129:433–440.
14. Bouadma L, Wolff M, Lucet JC. Ventilator-associated pneumonia and its prevention. *Curr Opin Infect Dis*. 2012; 25:395–404. doi: 10.1097/QCO.0b013e328355a835.
15. Shah AA, Hasan F, Hameed A. Study on the prevalence of enterobacteriaceae in hospital acquired and community acquired infections. *Pak J Med Res*. 2002; 41:1.
16. Henry D Isenberg. *Clinical Microbiology Procedure Handbook*, 2nd ed. Vol. 1 ASM press.
17. Horan T, Gaynes R. Surveillance of nosocomial infections. In: Mayhall C, editor. *Hospital epidemiology and infection control*. 3rd ed. Philadelphia: Lippincott Williams and Wilkins, 2004:1659-1702.
18. Vincent JL, Bihari DJ, Suter PM, Bruining HA, White J, Nicolas-Chanoin MH, et al. The prevalence of nosocomial infection in intensive care units in Europe. Results of The European Prevalence of Infection in Intensive Care (EPIC) Study. EPIC International Advisory Committee. *JAMA*. 1995;274(8):639–644.
19. Klevens RM, Edwards JR, Richards CL Jr. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. *Public Health Rep*. 2007; 122:160–166.
20. Tablan OC, Anderson LJ, Besser R, Bridges C, Hajjeh R, CDC; Healthcare Infection Control Practices Advisory Committee. Guidelines for preventing health-care— associated pneumonia, 2003: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. *MMWR Recomm Rep*. 2004;53(RR-3):1–36.
21. Kollef MH, Shorr A, Tabak YP, Gupta V, Liu LZ, Johannes RS. Epidemiology and outcomes of health-care-associated pneumonia: results from a large US database of culturepositive pneumonia *Chest*. 2005;128(6):3854–3862.
22. Kanafani ZA, Kara L, Hayek S, Kanj SS. Ventilator- Associated Pneumonia at a Tertiary-Care Center in a Developing Country: Incidence, Microbiology and Susceptibility Patterns of Isolated Microorganisms. *Infect Cont Hospital Epidemiol*. 2003;24(11):864-869.
23. Trivedi TH, Shejale SB, Yeolekar ME. Nosocomial pneumonia in medical intensive care unit. *J Assoc Physicians India*. 2000; 48:1070–1073.
24. Devrajani BR, Shah SZ, Devrajani T, Qureshi GA. Nosocomial Infections in Medical Ward (Four Months Descriptive Study in a Tertiary Care Hospital). *World J Med Sci*. 2009;4(1):13-17.
25. Shaikh JM, Devrajani BR, Shah SZA, Akhund T, Bibi I. Frequency, pattern and etiology of nosocomial infection in intensive care unit: an experience at a tertiary care hospital. *J Ayub Med Coll Abbottabad*. 2008;20(4):37-40.
26. Wahid F, Masood N, Jafri A. Nosocomial pneumonia in mechanically ventilated patients. *Pak Armed Forces Med J*. 2005;55(3):202-207.