

Original Article

PREVALENCE OF HOSPITAL ACQUIRED INFECTIONS IN A TERTIARY CARE HOSPITAL; A PILOT STUDY

Yeshavanth G¹, Yashwanth Sagar², Edwin Joy²

¹Associate Professor, ^{2,3}Tutor, Department of General Medicine, S. S. Institute of Medical Sciences and Research Centre, NH-4, Bypass Road, Davangere-577005, Karnataka, INDIA

Received: 22/04/2020 Revised: 16/05/2020 Accepted: 05/06/2020

ABSTRACT:

Background: Healthcare associated infections are more common in intensive care units which may lead to prolongation of hospital stay, increase in out of pocket expenditure along with a rise in morbidity and mortality. Nosocomial infection occurs as a localized or systemic condition that results from adverse reaction to the presence of an infectious agent (s) or its toxin (s) that was not present or incubating at the time of admission to the hospital.

Objectives The aim of the study was to evaluate the distribution of nosocomial infections among patients admitted in intensive care unit. **Materials and methods:** The study was undertaken in the department of general medicine, SSIMS & RC over a period of 6 months. The study was a prospective observational cohort study. Distribution of patients admitted in intensive care unit were categorized according to diagnostic criteria for nosocomial infection.

Results: Among 50 subjects included in the study during the period of 6 months, the mean age was 56 years. 8 out of 50 admitted to the MICU suffered from nosocomial infection. The mean duration of stay of the patient in the hospital was 8 days. **Conclusion:** This study concluded that bloodstream infection and UTI are the common nosocomial infections among patients in ICU. In our study the incidence of infections increases with the use of invasive devices and with age. Early recognition of infections and short term use of invasive devices along with proper infection control procedures can significantly decrease the incidence of nosocomial infections in geriatric patients.

Keywords; Blood stream infection, Nosocomial infection, UTI .

INTRODUCTION

A healthcare-associated infection (HAI) is a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that was not present on admission to the acute care facility.

Address of Correspondence:

Dr. Yeshwanth Sagar

Department of General Medicine, SSIMS&RC
Davangere-577005, Karnataka, India

Email: yashwanthsagar@gmail.com

Mobile: 9632816509

According to definition given by WHO, Healthcare associated infection is an infection acquired in hospital by a patient who was admitted for a reason other than that infection. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility. Data included in a report given by WHO ¹ showed that pooled HAI prevalence in mixed patient populations was 7.6% in high-income countries.

Only very scanty information was available from some regions and no data at all for several countries (66%).

Many studies conducted in health-care settings with limited resources reported HAI rates higher than in developed countries. Hospital-wide prevalence of HAI varied from 5.7% to 19.1% with a pooled prevalence of 10.1%. The risk of acquiring HAI is significantly higher in intensive care units (ICUs), with approximately 30% of patients affected by at least one episode of HAI with substantial associated morbidity and mortality.

The economic costs of HAI are considerable. The impact of HAI implies prolonged hospital stay, long-term disability, and increased resistance of microorganisms to antimicrobials, a massive additional financial burden for health systems, high costs for patients and their families, and excess deaths. In the USA, approximately 99,000 deaths were attributed to HAI in 2002 and the annual economic impact was estimated at approximately US\$ 6.5 billion in 2004.² HAI surveillance is complex and requires the use of standardized criteria, availability of diagnostic facilities and expertise to conduct it and interpret the results. Surveillance systems for HAI exist in several high-income countries but are virtually non-existent in most low and middle-income countries. The WHO report clearly suggested that there was an urgent need to establish reliable systems to gather data on the actual burden of HAI on a regular basis. It has been established that intensive care units (ICUs) consume a large proportion of hospital resources and that more than 20% of all healthcare associated infections occur in ICUs³⁻⁵. A study evaluating the impact of HAIs on average length of stay of patients in ICUs is necessary to provide a useful reference data for policy makers to formulate appropriate policies for controlling this menace and ensuring efficient utilization of scarce hospital beds.

Infections in critical care unit are high, and of serious hospital problems. Infections acquired during the hospital stay are generally called nosocomial infections, initially known as infections arising after 48 hr of hospital admission.^{1,2} National

Nosocomial Infections Surveillance system defines a nosocomial infection as a localized or systemic condition that results from adverse reaction to the presence of an infectious agent (s) or its toxin (s) that was not present or incubating at the time of admission to the hospital.¹

The risk factors for nosocomial infections include; Diabetes mellitus, intubation, surgical drains, poor health status, lack of using gloves, irregular and inappropriate debridement and wound bandage. Although the Intensive Care Units (ICUs) account for fewer than 10% of total beds in most hospitals, more than 20% of all nosocomial infections are acquired in ICUs⁴. According to published literature the most prevalent nosocomial infections among patients in ICU are urinary tract infection (UTI), pneumonia, bloodstream infections, skin and soft tissue infections, gastroenteritis, hepatitis and central nervous system infections like meningitis.⁵⁻⁸

The magnitude of HAI in a developing country like India is even more serious since there is no available established statistics. The aim of the study was to evaluate the distribution of nosocomial infections among patients admitted in intensive care unit

MATERIAL AND METHODS

Study design; the study was a prospective observational cohort study.

Study setting:

The study involved collection of data of nosocomial infections from patient records, analysis of infections, and their causes.

A total of 50 records of patients admitted to ICU of a tertiary health center, Davanagere, Karnataka during October 2019 to March 2020 were considered.

All the patients admitted during this period with intravascular access through CVP catheter/dialysis catheter, foley's catheter were included in the study

Detailed history and physical examination notes were reviewed in all patients' records. A diagnostic criteria for nosocomial infection by Mukherjee et al.⁹ [Table 1] was used for categorizing the cases. Descriptive statistics was used for analysis. Prior permission was obtained from the principal and ethical clearance was obtained from Ethical Clearance Committee of S.S. Institute of Medical Science and Research Center.

Table 1

Diagnostic criteria for nosocomial infections.

Nosocomial Infections	Clinical Features	Laboratory features
UTI	Fever Lower abdominal pain, change in urine characteristics	Leukocytosis Positive urine culture 5
Blood stream Infections	Unexplained fever with chills and rigor pain, tenderness or purulent drainage at the site of insertion of IV access or CVP catheter	Leukocytosis Positive blood culture Positive CVP catheter culture(after catheter removal)

RESULTS

This study was conducted on 50 patients in hospital Medical Intensive Care Unit (MICU) admitted during the study period of 6 months.

The age ranged from 42 to 71 years, mean age being 56 years.

The mean duration of stay of the patient in the hospital was 8 days.

Eight out of 50 (8/50=16%) admitted to the MICU suffered from nosocomial infection.

Table 2

Distribution of nosocomial infections among patients admitted in intensive care unit

Nosocomial infections	Number of patients	Percentage
Urinary tract infections	3	6
Blood stream infections	5	10
Total	8	16

In our study, it was observed that distribution of nosocomial infections in MICU were UTI (6% - 3/50), blood stream infections (10% - 5/50).

DISCUSSION

The incidence of Nosocomial infections in our study was 16% similar to hospital record statement of NM hospital and heart center and their own study, mentioned in Pratham et al.⁵ Vincent et al.,¹⁰ but less compared to 33.5% by Beaujean et al.¹¹ This may be due to the relative small sample size of the present study. The general distribution pattern of the nosocomial infections in our study showed bloodstream infections to be the most common, followed by UTI.

Overall mean age was 56 years in our study. The increase incidence in geriatric age group may be due to their defective host defence mechanism. Similarly with respect to the role played by invasive devices in contributing to nosocomial infections, present study showed that 62.5% of UTI occurred in catheterized patients and 100% of bloodstream infections with catheters could be attributed to the use of invasive devices. The findings were similar to Richards et al.² Pratham et al.,⁵ Suman¹².

Intensive care unit acquired infections account for substantial morbidity, mortality, and expensive. Nosocomial infections increase the cost of healthcare in the countries least able to afford them through increased length of hospitalization, treatment with expensive medications (e.g.

antibiotics); and use of other services (e.g. laboratory tests, X-rays and transfusions).¹³

In a study conducted by Dror M and Keith K showed that major infections found in ICU were due to *Acinetobacter baumannii*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Streptococcus pyogenes*. The infection rate was maximum in the urinary tract (44.4%) followed by wound infections (29.4%), pneumonia (10.7%) and bronchitis (7.4%). *A. baumannii* was found to be associated with UTIs, respiratory tract infections, septicemia, bacteremia, meningitis and wound infections. *A. Baumannii* displayed higher resistance to more number of antibiotics than other nosocomial pathogens from ICU.¹³

Main problems in developing countries are understaffing, poor infrastructure in ICU and poor maintenance of records making situation difficult to get clarity on the incidence of these infections. Although it is difficult to solve some problems associated with financial hardship in developing countries, most solutions are simple and not resource demanding. Infection control strategies such as hand hygiene and wearing gloves; paying attention to well established processes for decontamination and cleaning of soiled instruments and other items, followed by either sterilization or high-level disinfection; and improving safety in operating rooms and other high-risk areas where the most serious and frequent injuries and exposures to infectious agents can resolve the problem to a major extent.

Limitation

Even though the sample size was very less, unequal distribution of samples according to gender and age due to which exact prevalence of nosocomial infections was not calculated for independent variables, nosocomial infections mere presence among the present study cases cannot be ruled out. Hence, further systematic and standardized large

scale studies are suggested in government sectors for prevention and management of these nosocomial infections.

CONCLUSION

This study showed bloodstream infection and UTI are the common nosocomial infections among patients in ICU. Our study also revealed that the incidence of infections increases with the use of invasive devices and the geriatric population is highly vulnerable to nosocomial infections. Early recognition of infections and short term use of invasive devices along with proper infection control procedures can significantly decrease the incidence of nosocomial infections in geriatric patients.

REFERENCES

1. Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections, 1988. *Am J Infect Control.* 1988;16:128–40.
2. Richards MJ, Edwards JR, Culver DH, Gaynes RP. Nosocomial infections in medical intensive care units in the United States. National Nosocomial Infections Surveillance System. *Crit Care Med.* 1999;27:887–92.
3. Rahim B, Peyman M, Davood N, Hamid RK. An epidemiological study of nosocomial infections in the patients admitted in the intensive care unit of Urmia Imam Reza Hospital: An etiological investigation. *Ann Biol Res.* 2011;2:172–8.
4. Ulu-Kilic A, Ahmed SS, Alp E, Doğanay M. Challenge of intensive care unit-acquired infections and *Acinetobacter baumannii* in developing countries. *OA Crit Care.* 2013;1:2.
5. Pratham R, Manmohan S, Vipin R. A retrospective study of nosocomial infections in patients admitted in M.I.C.U. *Indian J Pharm Pract.* 2011;4:62–5.

6. Crossley KB, Peterson PK. 5th ed. Philadelphia: 2000. *Infection in Elderly, Principles and Practice of Infectious Diseases*; pp. 3164–9.
7. Emori TG, Banerjee SN, Culver DH, Gaynes RP, Horan TC, Edwards JR, et al. Nosocomial infections in elderly patients in the United States, 1986-1990. National Nosocomial Infections Surveillance System. *Am J Med.* 1991;91:289S–93.
8. Richards MJ, Edwards JR, Culver DH, Gaynes RP. Nosocomial infections in combined medical-surgical intensive care units in the United States. *Infect Control Hosp Epidemiol.* 2000;21:510–5.
9. Mukherjee T, Pramod K, Srinivasan G, Rao MY. Nosocomial infections in geriatric patients admitted in ICU. *J Indian Acad Geriatric.* 2005;2:61–4.
10. 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;274:639–44.
11. Beaujean DJ, Blok HE, Vandenbroucke-Grauls CM, Weersink AJ, Raymakers JA, Verhoef J. Surveillance of nosocomial infections in geriatric patients. *J Hosp Infect.* 1997;36:275–
12. Suman SM, Alexander AP. Nosocomial infections in the intensive care unit. *Anaesth Intensive Care Med.* 2012;13:204–8.
13. Dror M, Keith K. Epidemiology and prevention of infections and antimicrobial resistance in the intensive care unit. [Last cited on 2013 Nov 10]. Patwardhan RB, Dhakephalkar PK, Niphadkar KB, Chopade BA. A study on nosocomial pathogens in ICU with special reference to multiresistant *Acinetobacter baumannii* harbouring multiple plasmids. *Indian J Med Res.* 2008;128:178–87.

How to Cite this article :

Yeshavanth G, Yashwanth Sagar, Edwin Joy. Prevalence of hospital acquired infections in a tertiary care hospital; a pilot study. *J Pub Health Med Res* 2020;8(2):6-10

Funding: Declared none

Conflict of interest: Declared none