

INCIDENCE OF NOSOCOMIAL INFECTION IN INTENSIVE CARE UNIT: AN EXPERIENCE AT A TEACHING HOSPITALShanti Prakash Kujur¹, Devpriya Lakra²**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: OBJECTIVE: The present study was done to evaluate the prevalence of nosocomial infections (NI) among the patients admitted in the intensive care unit (ICU) in a medical teaching Institute. **METHODS:** The total study participants were 363 including male and females. A proforma was designed to collect data in which complete history of patients was taken along with the clinical examination. All the study subjects were examined on daily basis to assess the treatment outcome and to detect the confirmation of any new infection. Patient's body temperature was also monitored regularly. All the routine investigations such as complete blood picture, blood sugar level, urine analysis and chest radiograph were also done. The incidence of nosocomial infections was assessed by Student's T-test and ANOVA test at p value <0.05. **RESULTS:** The percentage of subjects with nosocomial infection was 12.7%. Significant differences of NI were found with age, socioeconomic status and duration of stay. The urinary tract infection (UTI) was seen among most of the cases (26.4%). Acinetobacter (30.3%) was the most commonly seen organism which followed Pseudomonas aeruginosa (25.5%) as the causative factors. **CONCLUSION:** The results of the study revealed incidence rate of NI as 12.7% which is a comparatively low. Still hospital administration should maintain proper measures regarding infection control procedures.

KEYWORDS: Intensive care unit; Nosocomial infection; teaching hospital

INTRODUCTION: Nosocomial infections are considered as complications of patient care in the hospitals, which broke through for the first time in the fourteenth century following inauguration of the first hospitals in Europe. After then, presence of intensive care units (ICUs) and development of therapeutic methods caused to save life of the patients.^[1]

Nosocomial infections have existed since the organization of first hospitals and despite marvelous scientific and technological advances; patients still get infected with infections.^[2] These infections develop after 48 hours of hospital admission or within 48 hours after being discharged.^[3]

Patients admitted in to the ICU have been revealed to be at particular danger of acquiring nosocomial infection at a prevalence rate of 30%. Its threat in ICU is 5–10 times superior than those acquired in surgical wards.^[4]

The nosocomial infections are caused by bacterial, viral and fungal pathogens. The most common pathogens are staphylococci, pseudomonas, E-coli, mycobacterium tuberculi, candida, aspergillus, fusarium, trichosporon and malassezia all of these pathogens leads to increased risk of morbidity and mortality. It may be due to surgical drains, poor health status, lack of using gloves, irregular and inappropriate debridement and wound bandage.^[5]

In a study carried out in 27 hospitals of Mediterranean and the results showed that rate of nosocomial infection was 10.5%.^[6] In another study of United States in 1999 on 181,993 patients of ICU showed that the prevalence of nosocomial infections as 18% and the most common infection was

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of UTI in a rate of 31%. The text also suggested that the total expenses for controlling the nosocomial infections too less costs of the therapy.^[7]

Precautions to prevent nosocomial infection in ICU include use of hand hygiene before and after contact with patient and respiratory devices, and aseptic technique during catheter insertion.^[5]

The present study aimed to investigate the prevalence of nosocomial infections among the patients admitted in the intensive care unit (ICU) in a medical teaching Institute.

METHODS: This descriptive epidemiological study was conducted among patients in the Intensive care unit (ICU) of a medical teaching hospital. The total study participants were 363 and age of the subjects was above 20 years.

Inclusion criteria of selection was that subjects above 20 years of age and admitted in the ICU for more than 48 hours with different complaints and developed clinical evidence of infection that did not originate from patient's original diagnosis at the time of admission to hospital. Patients admitted in the ICU ward less that a period of 48 hours was excluded.

These critical patients were referred for monitoring, observation and management from different departments, e.g., general surgery, neurosurgery, medicine, gynaecology/obstetric, nephrology/urology and accident/emergency departments.

A proforma was designed to collect data in which complete history of patients was taken along with the clinical examination.

All the study subjects were examined on daily basis to assess the treatment outcome and to detect the confirmation of any new infection. Patient's body temperature was also monitored regularly. All the routine investigations such as complete blood picture, urine analysis and chest radiograph were also done. The relevant investigations were performed according to the clinical presentation of patients and also after taking opinion from consultants of relevant departments.

DATA ANALYSIS: The data was analyzed with Statistical Package for Social Science 16.0 software. The incidence of nosocomial infections was assessed by Student's T-test and ANOVA test at p value <0.05.

RESULTS: The total numbers of admissions to ICU were 446 during the study. Patients admitted for more than 48 hours were 363 of which 209 were males and 154 were females. The percentage of subjects with nosocomial infection was 12.7%.

There was no significant difference ($p = 0.375$) in the incidence of NI among males and females as mentioned in Table 1. The incidence of nosocomial infections was significantly higher among the older patients as 31.7% among ≥ 51 years and 2.9% among 20-30 years (Table 2).

Sex	Nosocomial Infections		p-value
	No	Yes	
Males	181 (86.6%)	28 (13.4%)	0.375**
Females	136 (88.3%)	18 (11.7%)	
Total	317 (87.3%)	46 (12.7%)	

Table 1: Prevalence of Nosocomial Infections according to gender

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Age (years)	Nosocomial Infections		p-value
	No	Yes	
20-30	136 (97.1%)	4 (2.9%)	0.000*
31-40	53 (84.1%)	10 (15.9%)	
41-50	85 (87.6%)	12 (12.4%)	
≥51	43 (68.3%)	20 (31.7%)	
Total	317 (87.3%)	46 (12.7%)	

Table 2: Prevalence of Nosocomial Infections according to age

Results were non-significant in terms of infections related to educational status of patients in which least number of NI was seen among a group who have done secondary level of education (Table 3). It was found that the incidence of NI was increasing with the duration of stay in the Intensive care unit i.e. from 8.2% during 2-4 days to 19.7% in 6-8 days (Table 4).

Educational Level	Nosocomial Infections		p-value
	No	Yes	
Primary	110 (82.7%)	23 (17.3%)	0.151**
Secondary	140 (90.9%)	14 (9.1%)	
Graduation	67 (88.2%)	9 (11.8%)	
Total	317 (87.3%)	46 (12.7%)	

Table 3: Prevalence of Nosocomial Infections according to educational status

Length of stay	Nosocomial Infections		Total
	No	Yes	
0-3 days	89 (91.8%)	8 (8.2%)	0.009*
4-6 days	130 (90.3%)	14 (9.7%)	
7-9 days	98 (80.3%)	24 (19.7%)	
Total	317 (87.3%)	46 (12.7%)	

Table 4: Prevalence of Nosocomial Infections according to Duration of Stay in ICU

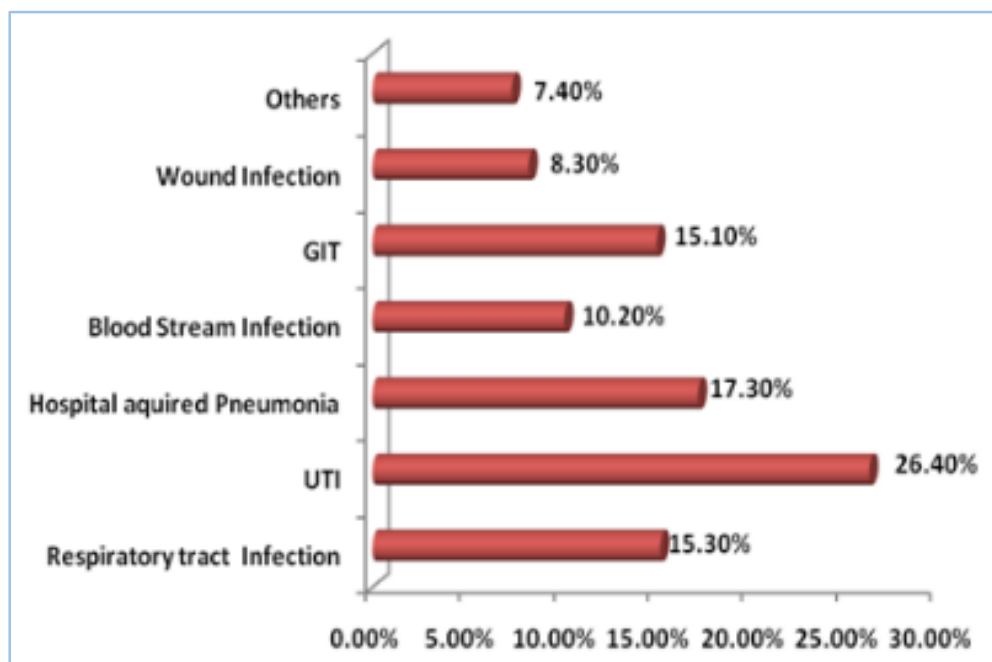
The incidence of NI was significantly higher among lower class patients (21.1%) and it gradually decreased to 8.1 in middle class and 6.9% in upper class (Table 5).

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Socioeconomic Status	Nosocomial Infections		p-value
	No	Yes	
Lower class	105 (78.9%)	28 (21.1%)	0.001*
Middle class	158 (91.1%)	14 (8.1%)	
Upper class	54 (93.1%)	4 (6.9%)	
Total	317 (87.3%)	46 (12.7%)	

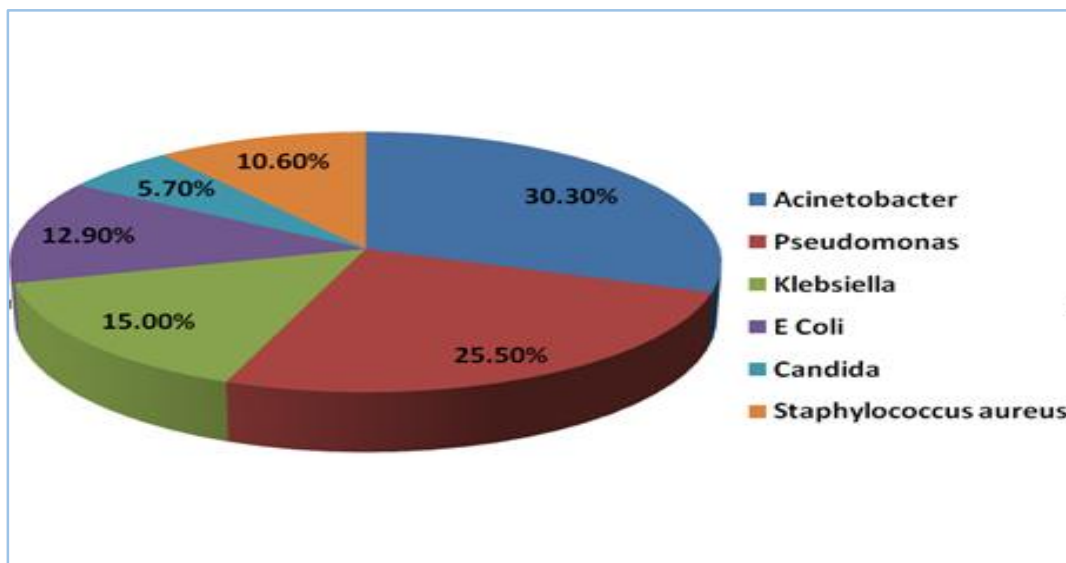
Table 5: Prevalence of Nosocomial Infections according to Socio Economic status

The urinary tract infection (UTI) was seen among most of the cases (26.4%). After doing urine culture and sensitivity (C/S), the pathogens detected were: E-coli, lebsiella, pseudomonas, staphylococcus aureus, candida albicans etc. The hospital acquired pneumonia was diagnosed among 17.3% of the subjects. Around fifteen percent of the patients were observed with Respiratory tract and Gasterointestinal infections (GIT), Blood stream infection was noticed in 10.2% of the cases and 8.3% found with wound infection (Graph 1).



Graph 1: Frequency of nosocomial infections in different parts

Graph 2 showed that the Acinetobacter (30.3%) was the most commonly seen organism which followed Pseudomonous aeruginosa (25.5%), Klebsiella (15.0%), Escherichia coli (12.9%), Staphylococcus aureus (10.6%), and candida (5.7%).



Graph 1: Frequency of Different types of causative organisms

DISCUSSION: Patients who are critically ill in intensive care unit are at a higher risk of getting nosocomial infection due to multiple causes including disruption of barriers. The incidence of nosocomial infection in the present study was 12.7%. Farzianpour et al also showed the same prevalence as 12.5%.^[8] The present findings are also comparable with the study done in Iran.^[9] and Taiwan.^[10]

However a study by Luzzati et al in their study reported higher prevalence rate (30.4%). Similarly many other studies reported by Dereli et al during a three-year period which were 53%, 29.15%, and 16.62% respectively.^[11] A study in a hospital of North India observed an incidence rate of 33.5% in their respiratory ICU.^[12] The infection rate observed in present teaching hospital indicates a relatively low prevalence of nosocomial infections, suggestive of good aseptic practices, hand hygiene principles and good ventilatory and urinary catheter care.

The most commonly observed nosocomial infection in ICU is urinary tract infection (UTI), followed by hospital acquired pneumonia and RTI.^[3] Urinary tract infection (UTI) is the most common and frequent nosocomial infection seen in critically ill patients.^[13,14] Nosocomial pneumonia is the second most frequent nosocomial infection in critically ill patients and represents the leading cause of death from infection acquired in hospital.^[15] Whereas Pradhan et al found respiratory infections as the mostly frequently observed in their study.^[16]

The frequency of different types of causative organisms in the study was mainly of Acinetobacter (30.3%) followed by pseudomonas and Klebsiella. Another study by Sharma et al found Acinetobacter (83.2%) was the most common organism found followed by Pseudomonous aeruginosa (73.5%), Escherichia coli (72.5%), Staphylococcus aureus (53.3%), and Eterococcus faecalis (22.2%).^[5]

There were no significant findings of NI according to gender in the present study and it was supported by the findings of Serrano et al.^[17]

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According to the duration of stay in the Intensive care unit the incidence rate was advancing and the results agreed with the study conducted in Iran in a tertiary hospital.^[9] The results of this study were in agreement with the results of Mostafa Khomeini Hospital in Teheran, which reported that more than three weeks is a risk factor for nosocomial infections.^[18] It is also in agreement with the results of study done in Japan.^[19]

A significant relationship was found in the incidence of NI with age of the patients seen in present study. Similar significant results were shown by Lusatia ^[18], and Serrano.^[17] Whereas non-significant relation was found in a study of Pailaud et al.^[20]

The incidence of NI was significantly less among patients with higher education in the present data and these results were comparable with Sharma et al study in an ICU in Rajasthan. It could be due to low knowledge of proper diet in the lower educational group.^[5]

CONCLUSION: The results of the study revealed incidence rate of NI as 12.7% which is a comparatively low. UTI infections were commonly observed and Acinetobacter was the commonest causative factor. Nosocomial infections in the ICU of teaching hospital showed a significant relation with age, socioeconomic status and duration of stay in the ICU.

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