



Nosocomial Infections In Patients Admitted In Intensive Care Unit – A Study of Their Prevalence And Microbiological Profile

KEYWORDS

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ABSTRACT *The aim of our study was to identify the pattern of nosocomial infections, their prevalence and microbiological profile in the six bedded ICU of TMC & Dr BRAM Teaching Hospital. The study involved a retrospective analysis of medical records of the ICU patients during the period from January 2015 to February 2016. Patients data were collected with reference to evidence of new infection after 48 hours of admission, site involved, isolated microorganisms if any, and their antibiotic sensitivity profile. The infection rate of our ICU was (16.13%) among which commonest was urinary tract infection (41.43%) followed by respiratory tract infection (31.43%) followed by dual infection of respiratory and urinary tract (17.13%). The rest were infections of surgical site and blood stream infection. The commonest organism isolated for urinary tract infection was E coli and for respiratory tract infection it was Klebsiella isolates. The relatively lesser rate of nosocomial infection in our ICU might be due better practice of antiseptic and aseptic precautions.*

Introduction:

Nosocomial infection is an important cause of both increased morbidity and mortality in health care set up. 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

It has been reported that the incidence of nosocomial infections in the intensive care unit (ICU) is about 2 to 5 times higher than in the general in-patient hospital population.² 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.

Patients admitted to the ICU are especially susceptible to nosocomial infections in view of significant risk factors such as central venous catheterisation, urinary catheterization, mechanical ventilation, stress ulcer prophylaxis and increasing length of ICU stay. Since ICU patients are frequently exposed to broad spectrum antimicrobials, they are susceptible to infections by multidrug-resistant microorganisms.^{4,6}

Our study is to identify the pattern of nosocomial infections, their prevalence and microbiological profile in the six bedded ICU of TMC & Dr BRAM Teaching Hospital.

Material and Methods:

The study involved a retrospective analysis of medical records of six bedded ICU of TMC & Dr BRAM Teaching Hospital, Agartala during the period from January 2015 to February 2016.

Patients data were collected with reference to evidence of new infection after 48 hours of admission, site involved, isolated microorganisms if any, and their antibiotic sensitivity profile.

Patients who developed infection within 48 hrs of admission to ICU were excluded from the study. For Statistical Analysis we used descriptive data as percentage, etc.

Results:

Total ICU patients with ICU stay more than 48 hrs were 434 over a period of 1 year. These 434 ICU patient-records were reviewed. The proportion of male patients(73.63%) were more. The average patient age was 65 years (20-90 years). Of the 434 patients, 64 patients were found to have developed 70 nosocomial infections (16.13% prevalence) (Table 1). Urinary tract infections were the commonest (41.43%), followed by Respiratory tract infections (31.43%), dual infections (17.14% each) and others (10%).

Urinary infections were most frequently caused by E. coli(40%), followed by Klebsiella pneumoniae (25.71%), Acinetobacter isolates (20%) and Pseudomonas aeruginosa(14.29%). E Coli isolates were sensitive to gentamycin, amikacin, ciprofloxacin, and nitrofurantoin. Acinetobacter isolates were sensitive to gentamycin, cefoperazone, tetracycline, levofloxacin, imipenem. Pseudomonas isolates were sensitive to imipenem, piperacillin, gentamycin and amikacin.

Respiratory infections were most frequently caused by Klebsiella pneumoniae (32.14%) followed by Pseudomonas aeruginosa(25%), Acinetobacter isolates(14.29%), E. coli (14.29%), Streptococcus pneumoniae (6.9%), Staphylococcus aureus(6.9%). Some of the Pseudomonas isolates were multidrug resistant; the others were sensitive to meropenem, imipenem, piperacillin, amikacin. Again few Acinetobacter species were multidrug resistant; the others were sensitive to imipenem, piperacillin, cefoperazone, amikacin, tetracycline. E Coli isolates were sensitive to gentamycin, amikacin and imipenem. Streptococcus isolates were sensitive to azithromycin, ceftriaxone, piperacillin,levofloxacin. Staphylococcus isolates were usually sensitive to ceftriaxone, cefoperazone, piperacillin, vancomycin.

Infections in the surgical sites were usually caused by Staphylococcus, Pseudomonas, E coli isolates. Blood

stream infections were caused by *Staphylococcus*, *streptococcus*, *pseudomonas* isolates.

Table 1 : Types of nosocomial infections

Nosocomial Infections	Number	Percentage (%)
Urinary infections	29	41.43%
Respiratory infections	22	31.43%
Dual infections (Respiratory + urinary)	6 (12)	17.14%
Others (surgical site infection, blood stream infection)	7	10%

Table 2: Causative microorganisms for urinary tract infections

Urinary tract infection	
Organism	Percentage (%)
<i>E. coli</i>	40
<i>Klebsiella pneumoniae</i>	25.71
<i>Acinetobacter</i> isolates	20
<i>Pseudomonas aeruginosa</i>	14.29

Table 3 : Causative micro-organisms of respiratory tract infection

Respiratory infection	
Organism	Percentage(%)
<i>Klebsiella pneumoniae</i>	32.14
<i>Peudomonas aeruginosa</i>	25
<i>Acinetobacter</i> isolates	14.29
<i>E. coli</i>	14.29
<i>Streptococcus pneumoniae</i>	6.9
<i>Staphylococcus aureus</i>	6.9

Discussion:

In our ICU nosocomial infection rate was found to be 16.13%. The infection rate observed in our ICU indicates a relatively low prevalence of nosocomial infections in comparison to many other studies done. A study from North India observed an infection rate of 33.5% in their respiratory ICU.⁷ The EPIC study³ documented an infection rate of 20.6%. Some other studies have observed rates varying between 9.1% and 48.7%.⁹⁻¹⁴ Study done by Pradhan NP et al documented an infection rate of 9.6% in their ICU.⁸ The relatively low rate of infection in our study might be due to practice of good antiseptic and aseptic precautions, better care of ventilators, catheters, intra venous lines etc.

The most commonly observed nosocomial infections in our study were urinary (41.43%) in origin, followed by respiratory tract infections and dual infections (17.1% each). The EPIC study³, the EPIC II study¹⁵ and other studies^{7,9-13} found maximum incidence of respiratory infections; but studies from Brazil¹⁶ and USA¹⁷ which found higher frequency of urinary infections followed by respiratory and blood stream infections. The increased incidence of urinary nosocomial infections in our study might be due to poor hygiene of the patients, increased used of urinary catheters and presence of other co-morbidities.

Urinary infections were most frequently caused by *E. coli*(40%), followed by *Klebsiella pneumoniae* (25.71%), *Acinetobacter* isolates (20%) and *Pseudomonas aeruginosa*(14.29%). Respiratory infections were most frequently caused by *Klebsiella pneumoniae* (32.14%) followed by *Peudomonas aeruginosa*(25%), *Acinetobacter* isolates(14.29%), *E. coli* (14.29%), *Streptococcus pneumoniae* (6.9%), *Staphylococcus aureus*(6.9%). So overall gram negative organisms were predominantly responsible for nosocomial infections in our ICU and the finding is similar with

many other studies done.

The antibiotic sensitivity profile of the different causative organisms will guide in empirical antibiotic treatment in nosocomial infections in our ICU.

Conclusions:

The nosocomial infection rate in our ICU (16.13%) suggests a relatively low prevalence of ICU-acquired infections. Urinary tract infections were the commonest, followed by respiratory, dual (respiratory and urinary) infections and infections of surgical site, blood stream infections. The commonest urinary isolate was *E coli*, whereas *Klebsiella* was the commonest respiratory isolate. Few of the *Pseudomonas* and *Acinetobacter* species were multidrug resistant.

Limitations of Study:

The sample size of our study was relatively small. Similar studies with a larger sample size would be desirable for better evaluation.

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