

SUMMER TRAINING REPORT

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KEY ABBREVIATIONS

ICU - Intensive Care Unit

HOI – Hospital Acquired Infections

MICU- Medical Intensive Care Unit

MRSA- Methicillin resistant s. Aureus

UTI- Urinary Tract Infection

STUDY ON PREVALENCE OF NOSOCOMIAL INFECTION ON INTENSIVE CARE UNIT PATIENTS IN INDIA

ABSTRACT

Background : patients suffers from nosocomial infections all over the world both in developed (7%) and developing (10%) countries .Patients in intensive care unit are more vulnerable to nosocomial infections.

Aim : To study the prevalence of nosocomial infection on intensive care unit in tertiary care patients in India.

Research question :What is the prevalence of nosocomial infection on intensive care unit in tertiary care patients in India.

Methodology :Secondary data is collected from different sources like articles , journals, papers and websites. The design used is descriptive cross sectional method .

Conclusion : The study attempt to analyse prevalence of nosocomial infection. The analysis of the study results signifies that these infections are common in India.

INTRODUCTION

Hospital acquired infection (HAI) or Nosocomial infection are absent during admission appears later in patients under medical care. These infections may occur during health care delivery and even after discharge. It also includes occupational infections among health care providers(1). Invasive devices (catheters and ventilators) used during medical procedure also responsible for HOI (2). 10 of every 100 patients can suffer from one of these infections(3). 51% of patients receiving treatment in ICU are infected by nosocomial infections (4). These infections lead to prolonged hospital stay , morbidity, antimicrobial resistance, decrease in socioeconomic status and increase in mortality rate . Very less information is available on nosocomial infection because of which surveillance and control methods are difficult. For example, many patients get infected with respiratory infections while undergoing treatment for other diseases(5) .no country could claim that how much they have found solution for this problem(6).

CLASSIFICATION OF HOSPITAL AQUIRED INFECTION

➤ Central venous catheter related -

These are fatal type of nosocomial infection with death rate of 12 % -25% (7). These catheters are employed in patient's central line to supply medicine and fluids, but long term use of these catheter can lead to infections in blood stream (8)

➤ Urinary tract infection caused by Catheter-

These are Most common type of HOI worldwide (9). According to reported cases Urinary Tract infection are more than 12% (10) . Catheter helps for the entry of bacteria whereas, inadequate drainage provides favourable condition for growth (9) . These kinds of infections can lead to complications like cystitis , meningitis, orchitis prostritis in males etc

➤ Infections of surgical sites-

2-5% of surgical patients suffer from nosocomial infections of surgical site. Surgical site infections are second most common type of infections particularly caused by staphylococcus aureus which results in long term hospital stay and increased risk of death(11). The microbes responsible for these infections are from endogenous microflora of patient.(12)

➤ **Ventilator associated pneumonia -**

9-27% of patients on mechanical ventilation suffers from HOI . Pneumonia occurs in mechanically intubated patients within 48 hours after endotracheal intubation(13). 86 out of 100 patients with nosocomial pneumonia are due to endotracheal intubation(14) .symptoms of nosocomial pneumonia includes fever, leukopenia and branchial sounds (15).

PATHOGENS

➤ **Bacteria**

Most common pathogens causing HOI are bacteria. Acetobacter is the bacteria found in soil and water is responsible for 80% of reported cases (16). Bacteroides fragilis is a type of commensal bacteria which resides in colon and intestinal tract combines with other bacteria and cause infection(17). Improper washing of hands can transmit clostridium difficile from infected patients to others (17) . Methicillin resistant s. Aureus (MRSA) spread through direct contact , unwashed hands and exposed wounds . These infections are resistant to antibiotics(18) .

➤ **Viruses**

Viruses also cause nosocomial infections . 5 % of nosocomial infection are caused by viruses (19). They can spread by contaminated hand , mouth , feaco-oral and respiratory route . Hepatitis is one of the chronic liver diseases caused by viruses (20).

➤ **Fungal**

Parasites are opportunistic in nature can cause nosocomial infections in immune deficient patients aspergillus species and cryptococcus neoformans cause infection during hospital stay . Aspergillus infection are spread by fungal spores contaminated by air (21) .

LITERATURE REVIEW

AUTHOR	YEAR	TITLE	FINDINGS
H. Mythri And Kr Kashinath	Sep 2014	Nosocomial infection in patients admitted in ICU of a tertiary care center, India(22)	23 out of 130 patients(17.7%)admitted to ICU suffered from nosocomial infections. There were 18 males and 5 females . Age ranged 43 to 72 years.
Suman.S Majumdar Alexander.A Padiglione	May 2012	Nosocomial infections in the intensive care unit(23)	The commonest type of nosocomial infections is ventilator-associated pneumonia (VAP), central line-associated bloodstream infection (CLABSI), urinary catheter-related infection and surgical site infection. The common pathogens include Staphylococcus aureus, Pseudomonas aeruginosa, Candida, Escherichia coli and Klebsiella species. Prevention of infection is fundamental and can be achieved through good antimicrobial use and infection control, including hand hygiene.
Pramil Tiwari PhD Manisha Rohit MPharm	May 2013	Assessment of Costs Associated with Hospital-Acquired Infections in a Private Tertiary Care Hospital in India(24)	Study was carried on 216 patients Study shown that the highest proportion of HAIs occurred in the age group of 60 to 69 years (27%) followed by those in the age group of 70 to 79 years (23%). It was also found that patients with a head injury or those who had undergone neurosurgeries were more prone to develop HAI followed by patients having diseases related to renal failure (28.7% and 20.4%, respectively;
	March 2014	Preventing hospital acquired infections: A	hospital-acquired infection (HAI) rates have ranged from 1% in parts of Europe

Prashant Saxena and Raj Kumar Mani		challenge we must accept(25)	and North America to more than 40% in certain parts of Asia, Latin America and sub-Saharan Africa.
Velu Nair, A.K. Sahni,Dinesh Sharma,Naveen Grover, S. Shankar, A. Chakravarty, Seema Patrikar, Kailas Methe, S.S Jaiswal, S.S. Dalal, Anupam Kapur, Rajesh Verma, Jyoti Prakash, Ashutosh Gupta, Anvita Bhansali, Deepak Batura, G. Gopal Rao D.P. Joshi,and B.K. Chopra	June 2017	Point prevalence & risk factor assessment for hospital-acquired infections in a tertiary care hospital in Pune, India(26)	Study shown Overall prevalence of HAI was 3.76% whereas Surgical Intensive Care Unit (ICU) (25%), medical ICU (20%), burns ward (20%) and paediatric ward (12.17%) were identified to have significant association with HAI. Prolonged hospital stays [odds ratio, mechanical ventilation , use of urinary catheter and exposure to central air-conditioning had higher odds of acquiring HAI

RESEARCH QUESTION

- What is the prevalence of nosocomial infection on intensive care unit patients in India?

SPECIFIC OBJECTIVES

- To study distribution of nosocomial infections.
- To study the current status of nosocomial infections.
- To recommend prevention methods for nosocomial infections .

METHODOLOGY

- **Study design** :Descriptive cross sectional study
- **Type of research method**: Quantitative method.
- **Study population**: intensive care patient in India
- **Data collection type** : secondary data
- **Data collection procedure** : The data is collected from different sources like articles ,journals ,papers and websites and detailed analysis is done .Data collected from different sources are show below.

TABLE-1

Nosocomial infection seen in patients admitted in MICU

Nosocomial infections	Number of patients	Percentage
Urinary tract infections	8	34.78
Pneumonia	5	21.73
Soft tissue infections	4	17.39
Gastroenteritis	3	13.04
Blood stream infections	2	8.69
Meningitis	1	4.34
Total	23/130	17.69

This study was carried out on 130 patients admitted in ICU of a hospital. Out of 130 ,23 Patients that is 17.7% were infected with nosocomial pathogens . Among 23 patients 18 male and 5 were females. Patients age was ranged between 43 to 72 years. 8.1 days was the mean duration of hospital stay.

TABLE -2

Distribution of prevalence of HOI depending upon their Characteristics:

Study was carried on 1886 patients (eligible for the study according to inclusion criteria) who had spent total of 40610 days in the hospital . Among 1886 patients 77.3% patients were males and 22.7 % were females. 35 years was the median age of patients. The below table shows the data of population under study distributed according to age ,sex and consultant specialties.

Characteristics	Prevalence of HAI (%)	Unadjusted		Adjusted	
		OR (95% CI)	P	OR (95% CI)	P
Sex					
Male	3.5	1 (0.43-1.30)	0.23	1.00 (reference)	
Female	4.65	0.74		1.28 (0.62-2.66)	0.495
Age (yr)					
Neonates	4.54	1.00 (0.06-17.02)	0.18	0.13 (0.005-3.46)	0.22
Infants	15.62	3.44 (0.38-31.48)		0.41 (0.05-3.43)	0.41
1-13	7.40	1.63 (0.19-14.26)		0.34 (0.04-2.56)	0.30
14-19	16.27	3.58 (0.41-30.97)		3.37 (0.90-12.63)	0.07
20-29	2.46	0.54 (0.07-4.44)		0.93 (0.35-2.44)	0.88
30-39	1.90	0.42 (0.05-3.45)		0.62 (0.23-1.62)	0.33
40-49	1.88	0.42 (0.05-3.71)		0.62 (0.19-1.99)	0.42
50-59	5.34	1.18 (0.15-9.42)		1.16 (0.46-2.87)	0.74
≥60	5.97	1.31 (0.17-10.43)		1.00 (reference)	
Consultant speciality					
Paediatrics	12.17	4.17 (2.14-8.01)	0.001	8.77 (0.94-81.59)	0.056
Medicine and allied	2.57	0.52 (0.30-0.88)	0.009	0.95 (0.38-2.39)	0.922
Obstetrics and gynaecology	3.06	0.80 (0.20-2.69)	0.710	0.82 (0.15-4.31)	0.814
Orthopaedics	0	0.00	-	0.00	0.998
Dental	0	0.00	-	0.00	0.999
Surgery and allied	4.23	1.23 (0.74-2.04)	0.390	1.00 (reference)	
Ventilation					
Central AC	22.72	8.59 (3.78-19.10)	0.001	3.14 (0.96-10.27)	0.058
Split AC	11.43	4.20 (2.35-7.44)	0.001	1.41 (0.41-4.87)	0.581
Air cooler	0.82	0.19 (0.03-0.79)	0.009	0.79 (0.17-3.70)	0.772
Windows AC	0	0.00	-	0.00	-
Windows and fans	3.7	0.41 (0.25-0.68)	0.001	1.00 (reference)	
Hospital stay (days)					
<3	3.4	1	0.001	1.54 (0.17-13.84)	0.699
3-7	1.5	0.43		0.68 (0.26-1.76)	0.436
15-21	4.6	1.36		1.78 (0.72-4.43)	0.209
22-30	7.3	2.22		2.96 (1.10-7.97)	0.031
>30	9.1	2.81		2.31 (0.96-5.54)	0.061
8-14	2.5	0.71		1.00 (reference)	
Device use					
Mechanical ventilation	36.4	18.57 (9.01-38.07)	0.001	2.18 (0.75-6.27)	0.148
Urinary catheter	16.3	7.89 (4.65-13.37)	0.001	2.69 (1.22-5.95)	0.014
Drains and tubes	17.8	7.84 (4.47-13.69)	0.001	2.03 (0.93-4.44)	0.073
Central iv catheter	18.1	6.67 (3.28-13.36)	0.001	1.05 (0.04-2.76)	0.909
Peripheral iv catheter	8.1	6.63 (3.66-12.15)	0.001	2.42 (1.16-5.05)	0.018
Bladder instrumentation	11.1	3.23 (0.46-19.18)	0.240	0.46 (0.02-9.53)	0.620
Settings surgery performed					
Elective open	7.24	0.49 (0.22-1.12)	0.06	1.63 (0.14-18.04)	0.687
Elective laparoscopy	4.55	0.56 (0.03-4.08)	0.56	1.01 (0.10-9.67)	0.988
Emergency laparoscopic	0	0.00	-	0.00	-
Emergency open	22.22	3.44 (1.45-8.02)	0.001	1.00 (reference)	
Degree of contamination					
Contaminated	25.00	3.56 (1.20-10.06)	0.006	0.62 (0.12-3.12)	0.565
Clean-contaminated	14.61	2.25 (1.04-4.83)	0.020	0.27 (0.05-1.32)	0.106
Clean	4.36	0.26 (0.12-0.54)	0.001	0.09 (0.02-0.41)	0.002
Dirty	27.78	12.55 (3.81-38.93)	0.001	1.00 (reference)	
Additional risk factors					
Depressed consciousness (GCS <15) and prolonged use of neuromuscular agents or sedatives ⁸	62.5	18.43 (7.43-45.20)	0.001	1.61 (0.44-5.82)	0.467
Transport from the ICU for diagnostic or therapeutic procedures	50	13.87 (4.48-41.39)	0.001	4.20 (0.84-20.92)	0.080
Previous antibiotic exposure, particularly to third-generation cephalosporins within one month	23.07	6.35 (2.26-16.94)	0.001	1.80 (0.52-6.20)	0.350
Compromised immune status	15.38	4.31 (1.81-9.90)	0.001	2.43 (0.97-6.07)	0.057
Renal failure, acute as per AKIN criteria ⁹ and CKD as per KDOQI guidelines ¹⁰	13.23	3.73 (1.65-8.16)	0.001	2.97 (1.08-8.17)	0.035
Cytotoxic chemotherapy	8.75	2.49 (1.24-4.92)	0.001	4.35 (1.70-11.16)	0.002
Diabetes mellitus as per ADA criteria ¹¹	6.87	1.87 (0.85-3.99)	0.080	-	-
H2 blocker, PPI or antacid therapy >48 h	5.76	1.57 (0.79-3.07)	0.160	-	-
Malnutrition: BMI <18.5 kg/m ²	5.26	1.38 (0.53-3.39)	0.460	-	-
Malignant tumours	4.95	1.35 (0.74-2.43)	0.280		
HAI, hospital acquired infection; BMI, body mass index; OR, odds ratio; CI, confidence interval; ICU, Intensive Care Unit; GCS, Glasgow Coma Score; CKD, chronic kidney disease; AKIN, Acute Kidney Injury Network; ADA, American Diabetes Association; PPI, proton pump inhibitor; iv, intravenous; AC, air-conditioning					

HAI, hospital acquired infection; BMI, body mass index; OR, odds ratio; CI, confidence interval; ICU, Intensive Care Unit; GCS, Glasgow Coma Score; CKD, chronic kidney disease; AKIN, Acute Kidney Injury Network; ADA, American Diabetes Association; PPI, proton pump inhibitor; iv, intravenous; AC, air-conditioning

CONCLUSION

This study attempts to analyse prevalence of nosocomial infection ,the analysis of the study results in signifies that these infections are common in India. Nosocomial infections are affecting all commodities . Though health care professionals are taking measures to stop these infections, there is significant number of cases which is alarming. UTI and Pneumonia are the common nosocomial infections. Invasive devices tend to cause more infection . study also showed nosocomial infections are more common in males than females. Minimal use of invasive devises can reduce existence of nosocomial infection . Healthcare providers one of the priorities should me infection control. Short term use of devices like catheters can significantly reduce the disease burden. Surveys should be done in different healthcare to plan a response to reducing nosocomial infection.

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