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Health Care Associated Infections (HCAI) – A Prevalence Study

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ABSTRACT

Background: Health care-associated infection (HCAI) affects patients in setting where they receive health care and can also appear after discharge. Although HCAI is the most frequent adverse event in health care, its true global burden remains unknown because of the difficulty in gathering reliable data. The burden of HCAI is one of the key areas of work of Clean and Safer Care, hence this study was designed.

Methodology: The study involved patients with symptoms of infective pathology of different body systems with a recent history of hospitalization; patients who developed symptoms of infected pathology of various body symptoms, 2-3 days after admission, a health worker with such symptoms and being the index case in the family and neighborhood, and a person who has undergone clean or clean contaminated surgery. The data collected was analyzed and interpreted for significance.

Results: A total of 100 patients were enrolled in the study, 43 were males and 57 were females. The females were off slightly higher age group, the number of patients reporting with fever was more in case of females although not significant, while discharge was mostly reported by males. 2% patients demonstrated *Escherichia coli* in their report, whereas the other 3% showed mixed growth. Antimicrobial cover was used in all patients both during the pre-operative and post-operative period. 94% of patients were prescribed Ceftriaxone and 6% were prescribed ciprofloxacin with either amikacin / metronidazole.

Conclusion: Our study has shown that the nosocomial infection in our set up is 3%, with most of the patients reporting with either *E coli* and mixed infection.

INTRODUCTION

HCAI has a prevalence of 5.1% to 11.6% in developed countries with the same proportion of patients acquiring HCAI at least once during hospitalization between 1995 to 2008 [1-4]. Approximately 1.7 million patients are affected with HCAI in the United States, accounting to 9.3 infections per1000 patients days; with an incidence rate of 4.5% in 2002 [2-4]. A multicenter study conducted in Europe estimated that 51% patients in intensive care units are affected [1-4]. A survey conducted by the WHO First Global Patients Safety Challenge reported 15.6% of functioning national surveillance system in developing countries, though it is in place at the national/sub-national level in developing countries [1]. Hence, the contribution to HCAI data is very scanty in majority of low-income and middle-income countries [1]. HCAI in developing countries is higher than that reported from developed countries

with a prevalence rate between 5% to 19% in studies conducted in health-care settings [1,7,8]. The high risk population, such as adult housed in critical care and neonates have a much more severe overall infection rate and device associated infection rates as compared to developed countries [1,8]. Incidence densities are up to 19 times higher in device associated infection and 3-20 times higher in neonates in developing countries [1,9].

The most frequently surveyed infection in developing countries is surgical site infection (SSI) with an incidence ranging from 1.2 to 23.6 per 100 surgical procedures with the level of risk significantly higher than in developed countries [1].

HCAI affects the urinary system, respiratory system, skin, surgical sites, digestive system, bloodstream and almost any other part of the body [10,11]. Approximately 20-22% patients have urinary tract infection, pneumonia or gastrointestinal symptoms, followed by 10% coming with skin infection, 13.8% coming with SSI and approx. 7% with bacteremia or other infections [10,11]. A study undertaken in United Kingdom in 2006 suggested a prevalence of approximately 8% of patients in hospital with HCAI [11]. Out of the 14% patients with SSI, nearly 5% of patients had undergone surgical procedure and developed SSI. It was associated with considerable morbidity and a report of over one-third postoperative deaths [12]. SSI not only increases the cost of therapy, but also doubles the length of stay of patients in hospitals with additional cost attributable to type of surgery and severity of infections [13,14].

The data in developing country is scanty hence; our study was conducted to assess the prevalence rate of HCAI in patients admitted to our hospital for interventional and non-interventional treatment.

MATERIALS AND METHOD

Our aim was to identify the prevalence of HCAI in our set up with a focus also on the most frequent bacterial infections e.g. urinary-tract infection, surgical-site infection, bloodstream infection, hospital-acquired pneumonia, etc.

All the patients admitted in the hospital for a period of 60 days from 1st August, 2013 to 30th September, 2013 were recruited in the study after they signed in the written informed consent. The study was undertaken after the approval from Institutional Ethics Committee (IEC). A total of 100 patients were enrolled in the study, the care takers of the patients were also enrolled after taking informed consent. This snap shot research was conducted by questionnaire and investigating the patients admitted under various specialties in the hospital, and the study was voluntary and anonymous.

In majority of cases HCAIs becomes evident 48 hours or more following admission or surgical intervention which is the typical incubation period for the same. Patients were also contacted after they were discharged and were examined in the follow up visit in the specialty concerned as infection could have been present post discharge and patients become colonized or infected post-discharge as it is quite evident in SSI.

The use of standardized definitions is crucial to the reliability of HCAI (i.e., according to the US Centers for Disease Control and Prevention National Nosocomial Infection Surveillance [NNIS]/National Healthcare Safety Network [NHSN] system): This allow to establish that the infection was acquired during a hospital stay, to ascertain that the condition is a true infection and not a colonization, i.e., the presence of microorganisms on skin or mucous membranes, in open wounds, or in excretions / secretions, but without any overt adverse clinical signs or symptoms or contamination (i.e., the exceptional and accidental presence of microorganisms in normally sterile body sites or fluids that does not reflect the actual infection status), and to define the type of infection according to the body site [15].

For the precise diagnosis of HCAI required the evaluation of clinical evidence collected from a review of the patient chart or other clinical records and also required the performance of microbiology tests and/or direct observation of the infection site, e.g. surgical wound, catheter insertion site, etc.

The data was presented as Mean ± SE (Standard Error) and percentage. The Results were analyzed using parametric tests (two tailed student t- test). A $p < 0.05$ was considered statistically significant.

RESULTS

A total of 100 patients were enrolled in the study, the characteristics are described in **Table 1.** The mean age of the patients was 37.68 ± 15.24 years, out of the total 100 patients 43 were males and 57 were females. A total of 62% patients enrolled had come to the Otorhinolaryngology department. 15% patients reported with fever, 8% patients had complaints of discharge (6% had discharge of pus and 2% had discharge which was of serosanginous type) and 2% patients had complaint of diarrhoea, there were no patients who had either redness or cough.

Table 1. Characteristic of the patients.

Characteristic	Number of Patients	Percentage (%)
Age (years) (Mean ± SD)	37.68 ± 15.24	
Sex: Males	43	43
Females	57	57
Department visited		

Obstetrics and Gynaecology	26	26
Surgery	9	9
Orthopaedics	3	3
Otorhinolaryngology	62	62
Complaint		
Fever	15	15
Discharge	8	8
Diarrhea	2	2

Table 2 demonstrates the gender wise distribution of symptoms. The females were off slightly higher age group, although it was not statistically significant (39.84 ± 13.08 vs. 34.81 ± 17.45), the otorhinolaryngology was the department that was consulted by maximum number of patients, followed by Obstetrics and Gynaecology department consulted by 26 females. The number of patients reporting with fever was more in case of females although not significant (8 vs. 7), while discharge was mostly reported by males (5 vs. 3), one male and female patient reported of serosanginous discharge. Similarly, one male and female patient reported of Diarrhea.

Table 2. Characteristic of patients in both sexes.

Characteristic	Male (n=43)	Female (n=57)
Age	**34.81 ± 17.45**	**39.84 ± 13.08**
Department visited		
Obstetrics & Gynaecology	0	26
Surgery	9	0
Orthopaedics	2	1
Otorhinolaryngology	32	30
Complaint		
Fever	7	8
Discharge	5	3
Diarrhea	1	1
p > 0.05 as compared to other group		

CULTURE REPORT

The culture report of patients is represented in **Table 3.** All the samples sent for culture and sensitivity were received and the report demonstrated that 95% of the culture was sterile. 2% patients demonstrated *Escherichia coli* in their report, whereas the other 3% showed mixed growth.

Antimicrobial use:

Antimicrobial cover was used in all patients both during the pre-operative and post-operative period. 94% of patients were prescribed Ceftriaxone and 6% were prescribed ciprofloxacin with either amikacin / metronidazole. The gender wise representation is shown in **Table 3.**

Table 3. Report of patients.

Characteristics	Males	Females
Culture Report		
Sterile	47	48
E coli	1	0
Mixed Infection	2	2
Antibiotic Used		
Ceftriaxone	40	55
Ciprofloxacin	5	5
p > 0.05 as compared to other group		

DISCUSSION

The aims of this survey were to determine the burden of HCAI in various specialties of our hospital and to identify priority areas for the future. This study describes the point study of its kind to our knowledge in our institution. Several surveys have investigated aspects of HCAI, but these were mostly from countries with more advanced healthcare infrastructure. The perceptions of risks of HCAI and associated outcomes are relatively poor, despite the regular ongoing education. It seems improvements are unlikely due to the staff turnover, as well as cultural perceptions of hospital, hygiene, including an emphasis on visual cleanliness. We also think of possibility of encouraging patient care takers to remind hospital staff to clean hands, although the cultural barriers in overcoming the status of healthcare professional may be too much hindrance. A 3 year retrospective study done in Nigerian hospital demonstrated that there was a lower prevalence of nosocomial infection, mostly from surgical site and *E coli* being commonly isolated organism. Our study established similar results as this study were most of patients enrolled were from the

department conducting surgery ,but we had only 1 patient who had an *E coli* in culture and the 3% patients had positive culture reports [16].

Another study to determine the hospital-acquired infections (HAI) prevalence, to ascertain risk factors, to describe the pathogens associated with HAI and their susceptibility profile to antibiotics demonstrated a high prevalence with Intensive care units being the most affected wards, urinary tract infection was the most common infected site and Staphylococcus was the organism most commonly isolated. The results of this study are different, as our study established that the most common presentation was fever, most of the patients were in Otorhinolaryngology and only 3% had culture positive report had the organism isolated was *E coli* [17].

A point-prevalence study of NI and antibiotic prescribing was conducted found a prevalence of 13.9%, with most common NIs were urinary tract infections, pneumonia, laboratory-confirmed bloodstream infections, deep surgical wound infections and clinical sepsis. *Pseudomonas aeruginosa*, MRSA, and MSSA were the most common pathogens. NI treatment accounted for 36% of antibiotic courses prescribed but 47% of antibiotic cost. The results are different as our study established that the most common presentation was fever, most of the patients were in Otorhinolaryngology and only 3% had culture positive report had the organism isolated was *E. coli* [18].

A survey of adult patients 19 years of age and older was conducted in February 2002 in hospitals across Canada to estimate the prevalence of healthcare-associated infections (HAIs) giving a prevalence of 10.5% infected patients and 11.6% HAIs. Urinary tract infections (UTI) were the most frequent HAI. The results are different as our study established that the most common presentation was fever, most of the patients were in Otorhinolaryngology and only 3% had culture positive report had the organism isolated was *E. coli* [19].

There are certain limitation in our study firstly the sample size could have been larger but, the duration of study was only two months hence we tried to include patients who fulfilled the eligibility criteria. Secondly, a comparison with the intervention arm could be done, but any intervention could have prolonged the duration of study and we would not have been able to complete the study in the allotted 2 months.

To conclude, our study established that the nosocomial infection in our set up is 3%, with most of the patients reporting with either *E. coli* and mixed infection. Most of the patients recruited in our study were from the Otorhinolaryngology department followed by Obstetrics and Gynaecology department, the use of ceftriaxone was preferred for both pre-operative and post-operative cover with antimicrobials. The most common complaint was fever followed by discharge and diarrhea but the culture report was positive in only 3 patients. None of the patients recruited in our study had redness, cough or any other symptom.

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