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PREVALENCE OF NOSOCOMIAL INFECTIONS IN SURGICAL WARDS OF TERTIARY CARE HOSPITAL AT LUCKNOW

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ABSTRACT

The objective of this study was to estimate the prevalence and related risk factors of nosocomial infection among the patients admitted in various departments of surgical wards. It was a cross-sectional hospital based in which the patients without evidence of initial infection, admitted in the Department of General Surgery and Orthopedic Surgery, King George's Medical University UP, Lucknow for surgical procedures were included in the study. Out of the total 225 patients observed, 45 (20%) had nosocomial infection. The prevalence was almost similar among male (20.4%) and female (19.3%) patients. Older patients were significantly more effected than younger patients (<=35 years=17%, >35 years=23%, p=0.04, OR=0.65, 95%CI=0.43-0.99). the *Escherichia coli* (77.8%) was the most common organism observed among the patients of surgical wards followed by *Staphylococcus aureus* (57.8%), *Acinetobacter baumanii* (53.3%), *Pseudomonas aeruginosa* (37.8%), *Klebsiella pneumoniae* (28.9%), *Enterococcus faecalis* and *Coagulase negative Staphylococci* (24.4%). Based on this study, we found that surgical site infection is a more common nosocomial infection in general surgical ward than others. The studies with large sample are required to get more robust estimate of nosocomial infections in the surgical wards.

KEY WORDS: Prevalence, Nosocomial infections, surgical wards

Nosocomial infections (NI) constitute a major public health problem worldwide. They result in high morbidity and mortality, prolonged hospital stays, greater use of antibiotics, and increased costs (Bennet and Brachman, 1998). These nosocomial infections (NI) occur among 7-12% of the hospitalized patients globally with more than 1.4 million people suffering from the infectious complications acquired in the hospital (Ducel et al., 2002). The issue is further complicated by the emergence of poly-antimicrobial resistant strains of hospital pathogens. The microbes have developed the ability to elude the best antimicrobial agents and to counter-attack with new survival strategies that has made the spread of NI easier, and the control even more difficult. Evidence-based antimicrobial prescription policy could help curb the problem; however, surveillance of nosocomial infections is an essential pre-requisite. Differences in the hospital settings preclude the generlization of results from a hospital to the other hospitals (Prashanth and Badrinath, 2004).

Surgical-site infections (SSI) along with pneumonia, urinary tract infections, and bloodstream infections are the most common nosocomial infections (Mangram et al., 1999). Although SSIs are not associated with a high mortality rate, they are a significant source of morbidity among surgical patients. Approximately 5,00,000 episodes of SSI occur in the United States every year, accounting for an average of 7.3 excess hospital days and more than 1.6 billion dollars of extra hospital charges. Surveillance programs can lead to reduction of SSI rates of 35-50% (Martone et al., 1998).

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The present study investigated the prevalence of nosocomial infections among those admitted for various surgical procedures in the surgical wards of a tertiary care hospital.

METHODOLOGY

It was a cross-sectional hospital based in which the patients admitted in the Department of General Surgery and Orthopedic Surgery, King George's Medical University UP, Lucknow, for various surgical procedures, without evidence of initial infection, were included in the study. Patients who had no infection or they had not been in incubation period at the admission time and had positive culture after third day of admission, were defined as patients with nosocomial infections in the present study (Teresa et al, 2008).

Data Collection

Pus, blood, urine and swabs from various lesions if present among study patients was taken after 48 hour of admission and followed till discharge from the hospital.

Strain Identification

Bacterial strain was identified with the help of gram staining and biochemical tests. Mainly, facultative anaerobes and aerobic *bacteria such as Escherichia coli, Staphylococcus aureus, Acinetobacter baumanii, Pseudomonas aeruginosa, Klebsiella pneumoniae, Enterococcus faecalis and Coagulase negative Staphylococci was taken into consid*eration as per guidelines of CLSI, (2008).

Statistical Analysis

The data collected was entered in the Microsoft Excel computer program and checked for any inconsistency. The results are presented in proportions/percentages.

Ethical Consideration

Ethical clearance was taken from Institutional Ethical Committee of King George's Medical University UP, Lucknow. The consent was taken from each patients included in the study.

RESULTS

A total of 225 patients were included in the study. About one fourth (27.1%) of the patients were between age group 26-35 followed by 15-25 (21.8%), 36-45 (16.4%), >55 (15.1%), 46-55 (10.7%) and <15 (8.9%). More than half (63.1%) were males and belonged to Hindu community (86.7%) and scheduled caste (54.2%). Most (68.4%) of the patients were illiterate and 40% were housewife. Majority (71.1%) of the patients were in SES V (Table,1).

The blood specimen from 94.1% of the patients and pus/discharge was taken from 86.8%. However, urine was taken among 42.6% of the patients. The culture positivity rate in blood specimen was 57.8% and in pus/discharge was 54.2%. However, the positivity rate in urine specimen was 20.7% (Table-2).

The prevalence of NI among the patients of surgical wards was 20% (45/225).

The prevalence of NI was significantly higher among the patients of age >35 years (23%) as compared to <=35 years (17%) (OR=0.65, 95%CI=0.43-0.99, p=0.04). The male (20.4%) patients had almost similar risk of infection than those of females (19.3%) (OR=0.70, 95%CI=0.47-1.05, p=0.08). The prevalence of NI was higher among Hindu community patients (21%) as compared to Muslims community patients (13.3%), however it was statistically not significant (OR=1.79, 95%CI= 0.88-3.60, p=0.11). No significant association was found between prevalence of NI and caste & SES status of the patients. The prevalence of NI was 46% lower among those who were educated upto high school to intermediate than illiterates (OR=0.54, 95%CI=0.28-0.88, p=0.02). Similarly, The prevalence was 70% lower among those who were educated upto graduate+ than illiterates (OR=0.30, 95%CI=0.09-0.99, p=0.04). The occupation of the patients was significantly associated with the prevalence of NI ($p<0.05$). The multivariate logistic regression analysis revealed that education and occupation of the patients were significantly associated with prevalence of NI (Table,3).

Out of the all culture positives, the *Escherichia coli* (77.8%) was the most common organism *observed among the patients of surgical wards followed by Staphylococcus aureus (57.8%), Acinetobacter baumanii* (53.3%), *Pseudomonas aeruginosa* (37.8%), *Klebsiella pneumoniae* (28.9%) and *Enterococcus faecalis* and *Coagulase negative Staphylococci* (24.4%) (Fig.,1).

Table 1: Distribution of patients by bio-social characteristics

Bio-social characteristics	No. (n=225)	%
Age		
<15	20	8.9
15-25	49	21.8
26-35	61	27.1
36-45	37	16.4
46-55	24	10.7
>55	34	15.1
Sex		
Male	142	63.1
Female	83	36.9
Religion		
Hindu	195	86.7
Muslim	30	13.3
Cast		
General	46	20.4
Backward	57	25.3
Scheduled	122	54.2
Education		
Illiterate	154	68.4
< High school	31	13.8
High school-Intermediate	30	13.3
Graduate+	10	4.4
Occupation		
Service	24	10.7
Professional	6	2.7
Agriculture	21	9.3
Housewife	90	40.0
Unemployed	43	19.1
Labor	41	18.2
SES		
II	22	9.8
III	22	9.8
IV	21	9.3
V	160	71.1

Table 2: Distribution of patients by specimen taken

Type of Specimen*	No. of patients with fever	Specimen taken		Positive	
		No.	%	No.	%
Blood	68	64	94.1	37	57.8
Pus/discharge	68	59	86.8	32	54.2
Urine	68	29	42.6	6	20.7

*Multiple response

Table 3: Association of NI with bio-social characteristics

Bio-social characteristics	No. screened	Prevalence of NI		Unadjusted OR (95%CI), p-value	Adjusted OR (95%CI), p-value
		No. with fever after 48 hrs	%		
Age in years					
<=35	112	19	17.0	0.65 (0.43-0.99), 0.04*	0.64 (0.41-0.99), 0.05
>35	113	26	23.0	1.00 (Ref.)	1.00 (Ref.)
Sex					
Male	142	29	20.4	0.70 (0.47-1.05), 0.08	0.51 (0.33-01.81), 0.09
Female	83	16	19.3	1.00 (Ref.)	1.00 (Ref.)
Religion					
Hindu	195	41	21.0	1.79 (0.88-3.60), 0.11	1.92 (0.92-4.00), 0.08
Muslim	30	4	13.3	1.00 (Ref.)	1.00 (Ref.)
Caste					
General	46	9	19.6	1.00 (Ref.)	1.00 (Ref.)
Backward	57	12	21.1	1.07 (0.61-1.91), 0.81	1.01 (0.54-1.87), 0.97
Scheduled	122	24	19.7	0.85 (0.51-1.41), 0.52	0.76 (0.44-1.33), 0.33
Education					
Illiterate	154	35	22.7	1.00 (Ref.)	1.00 (Ref.)
< High school	31	5	16.1	0.65 (0.35-1.19), 0.16	0.59 (0.30-1.14), 0.11
High school-intermediate	30	4	13.3	0.54 (0.28-0.88), 0.02*	0.46 (0.23-0.91), 0.03*
Graduate+	10	1	10.0	0.30 (0.09-0.99), 0.04*	0.21 (0.06-0.73), 0.02*
Occupation					
Service	24	1	4.2	1.00 (Ref.)	1.00 (Ref.)
Professional	6	3	50.0	0.20 (0.09-0.41), 0.21	14.93 (3.23-68.96), 0.001*
Agriculture	21	6	28.6	2.33 (0.62-8.76), 0.02*	1.61 (0.57-4.51), 0.36
Housewife	90	14	15.6	0.37 (0.15-0.87), 0.01*	1.49 (0.70-3.14), 0.30
Unemployed	43	8	18.6	0.36 (0.21-0.62), 0.003*	1.89 (0.85-4.22), 0.12
Labor	41	13	31.7	0.41 (0.22-0.75), 0.03*	5.54 (2.58-11.89), 0.001*
SES					
II	22	3	13.6	1.00 (Ref.)	1.00 (Ref.)
III	22	4	18.2	1.20 (0.40-3.60), 0.74	1.19 (0.37-3.84), 0.76
IV	21	4	19.0	1.54 (0.55-4.33), 0.42	1.71 (0.57-5.11), 0.34
V	160	34	21.3	2.00 (0.87-4.59), 0.10	2.17 (0.90-5.23), 0.08

OR=Odds Ratio, CI=Confidence Interval, *Significant

DISCUSSION

Nosocomial infections (NIs) are becoming increasing problems for hospitalized patients. They are major causes of death and disability worldwide. According to estimates reported by the World Health Organization, up to 15% of hospitalized patients suffer from infections associated with health care (Siempos et al., 2007). Moreover, hospitals worldwide are continuing to face the crisis of the upsurge and dissemination of antimicrobial-resistant bacteria, particularly those causing nosocomial infections in ICU patients (Hsueh et al., 2002).

Besides these, the present study showed a slightly higher prevalence of nosocomial infection (20%) than reports from different countries like Tunisia which was 13% (Dridi et al., 2006), Kosova 17.4% (Raka et al., 2006) and Morocco 17.8% (Jroundi et al., 2007). One reason for this higher prevalence may due to the method of sample analysis, which was dependent mainly on bacteriological agents. In most countries, 5-10% of the patients in hospitals at any time have acquired an infection. The National Prevalence Survey in the United Kingdom and Ireland showed a prevalence of hospital-acquired infection of 9% (range: 2-29 %) (Ayliffe et al., 2001). In our study, the infection was almost similar among male and females which is similar to the study conducted in Bangladesh

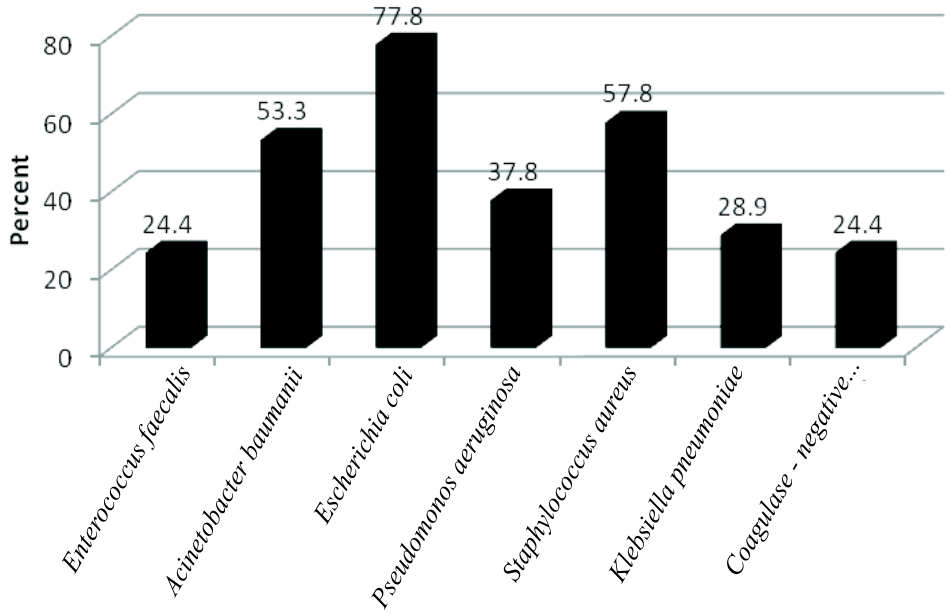

Fig.1: Different types of organism among patient's biological specimen
(Multiple Response)

(Faruquzzaman, 2011).

The common interventions done in the hospitals are mechanical ventilation, urinary catheterization, surgical procedures and insertion of central venous lines and not surprisingly, these are responsible for the nosocomial infections. Such invasive procedures are routinely done in the surgical wards and these wards are becoming reservoirs of multiple drug resistance bacteria.

Data presented in this study indicate that the Escherichia coli (77.8%) was the most common organism observed among the patients of surgical wards followed by Staphylococcus aureus (57.8%), Acinetobacter baumanii (53.3%), Pseudomonas aeruginosa (37.8%), Klebsiella pneumoniae (28.9%) and Enterococcus faecalis and Coagulase negative Staphylococci (24.4%). Similar finding have been seen in Philippines (Alora et al., 1990) and Turkey (Bayram and Balci, 2006).

CONCLUSIONS

Our findings demonstrate the widespread problem of antibiotic resistance among nosocomial infections in the northern part of the country. Continued surveillance is necessary to guide appropriate empirical therapy for these infections. It is imperative that all professionals take an active role in infection control within their establishments. More resources should be provided to encourage good antibiotic practice and good hygiene in hospitals.

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