

ORIGINAL ARTICLE

Assessment of species distribution among cases of health-care associated infections

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ABSTRACT:

Background: Hospital associated infections (HAIs) have a dynamic process that varies in each center and over time. The present study evaluated species distribution of health-care associated infections. **Materials & Methods:** This study was conducted in the department of Microbiology on 158 cases of healthcare associated infections (HCAI) from medical intensive care unit (MICU). The demographical and clinical features of the patients suspected for HCAI were recorded. **Results:** Out of 158 patients, 80 were males and 78 were females. Out of 51 patients on central line, 22 developed catheter related blood stream infection (CR- BSI). Out of 82, 35 developed catheter associated urinary tract infection (CA- UTI) and out of 25 patients on central line, 8 developed ventilator associated pneumonia. The difference was significant ($P < 0.05$). Out of 22 cases of CR- BSI, pathogens isolated were *Klebsiella pneumoniae* in 7, *C. krusei* in 6, *E. coli* in 2 cases, *P. aeruginosa* in 3 cases, *C. albicans* in 4 cases. Out of 35 cases of CA- UTI, pathogens isolated were *E. coli* in 16 cases, *K. pneumoniae* in 10 cases, *C. tropicalis* in 1, *P. aeruginosa* in 1, *S. aureus* and *C. albicans* in 2 cases each and *C. krusei* in 3 cases. Out of 8 cases of VAP, pathogens found to be *K. pneumoniae* and *E. coli* in 3 cases each and *P. aeruginosa* in 2 cases. The difference was significant ($P < 0.05$). **Conclusion:** The maximum cases of UTI was seen among blood stream infections. Common pathogen isolated was *E. coli* and *Klebsiella pneumoniae*.

Keywords: *E. coli*, health-care associated infections, *Klebsiella pneumoniae*

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INTRODUCTION

Hospital associated infections (HAIs) have a dynamic process that varies in each center and over time. In many European multicenter studies, 4.6%–9.3% of hospitalized patients have been reported to develop NIs.¹ In another study, the frequency of HAIs was 5.9% (country range: 2.9%–10.0%).^{2,3} This rate was 7% in tertiary hospitals. Nearly 10% of all bloodstream infections (BSI) and 25% of all urinary tract infections (UTIs) in an intensive care unit (ICU) are caused by *Candida* spp. Overtaking all Gram-negative bacilli, *Candida* species are the third or fourth most common cause of health-care related infections (HCAI) in the US. Treatment-resistant nosocomial *Candida* infections are typically linked to longer hospital stays and higher medical expenses.⁴ In recent years, there has been a major evolution in the epidemiology of IC.⁵ Globally, there has been a noticeable shift in the most frequent cause of

infections from *Candida albicans* to non-*albicans Candida* spp. With new species showing resistance to several kinds of antifungal drugs, antifungal resistance is also becoming a more challenging issue for the application of successful empirical and preventative measures.^{6,7} The present study evaluated species distribution of health-care associated infections.

MATERIALS & METHODS

This study was conducted in the department of Microbiology on 158 cases of healthcare associated infections (HCAI) from medical intensive care unit (MICU).

The demographical and clinical features of the patients suspected for HCAI were recorded. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Table I Patients distribution

Total- 158		
Gender	Males	Females
Number	80	78

Table I shows that out of 158 patients, 80 were males and 78 were females.

Table II Health-care associated infections

Type of HCAI	Total patients of medical device	Patients developing infection	P value
CR- BSI	51	22	0.05

CA- UTI	82	35
VAP	25	8

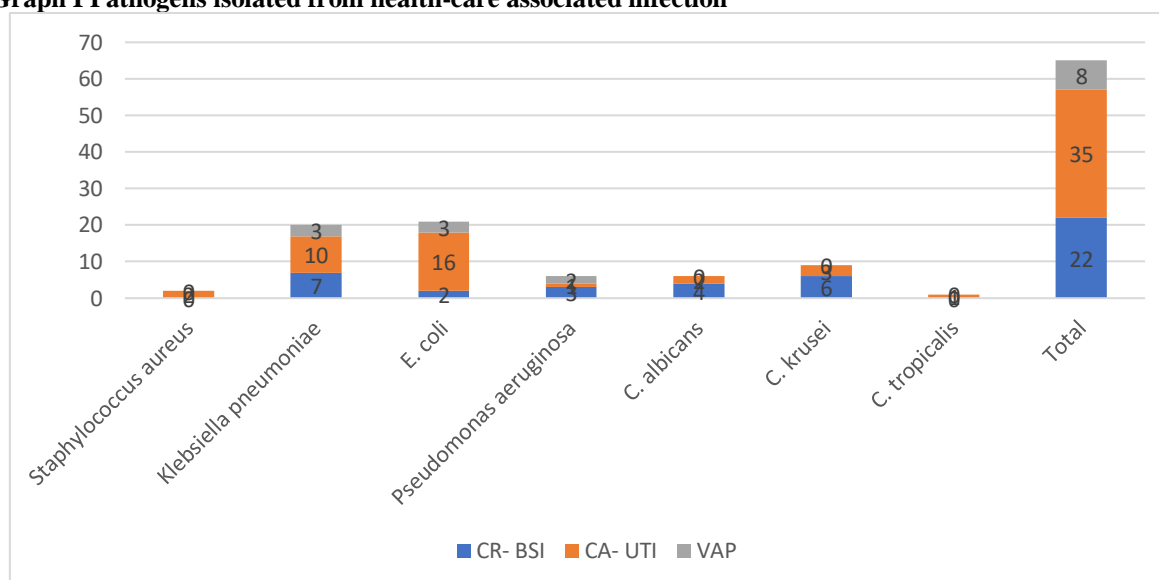
Table II shows that out of 51 patients on central line, 22 developed catheter related blood stream infection (CR-BSI). Out of 82, 35 developed catheter associated urinary tract infection (CA- UTI) and out of 25 patients on central line, 8 developed ventilator associated pneumonia. The difference was significant ($P < 0.05$).

Table III Pathogens isolated from health-care associated infection

Pathogens	CR- BSI	CA- UTI	VAP	P value
Staphylococcus aureus	0	2	0	0.64
Klebsiella pneumoniae	7	10	3	0.02
E. coli	2	16	3	0.05
Pseudomonas aeruginosa	3	1	2	0.32
C. albicans	4	2	0	0.16
C. krusei	6	3	0	0.05
C. tropicalis	0	1	0	0.87
Total	22	35	8	

Table III, graph I shows that out of 22 cases of CR- BSI, pathogens isolated were Klebsiella pneumoniae in 7, C. krusei in 6, E. coli in 2 cases, P. aeruginosa in 3 cases, C. albicans in 4 cases. Out of 35 cases of CA- UTI, pathogens isolated were E. coli in 16 cases, K. pneumoniae in 10 cases, C. tropicalis in 1, P. aeruginosa in 1, S. aureus and C. albicans in 2 cases each and C. krusei in 3 cases. Out of 8 cases of VAP, pathogens found to be K. pneumoniae and E. coli in 3 cases each and P. aeruginosa in 2 cases. The difference was significant ($P < 0.05$).

Graph I Pathogens isolated from health-care associated infection



DISCUSSION

Health care-associated infections (HCAIs) are those infections that patients acquire while receiving health care.^{8,9} The term HCAIs initially referred to those infections linked with admission to an acute-care hospital (earlier called nosocomial infections), but the term now includes infections developed in various settings where patients obtain health care (eg, long-term care, family medicine clinics, home care, and ambulatory care).¹⁰ HCAIs are infections that first appear 48 hours or more after hospitalization or within 30 days after having received health care.^{11,12} The present study evaluated species distribution of health-care associated infections.

We found that out of 158 patients, 80 were males and 78 were females. In a study by Coco et al¹³, it was suggested that coexistence of mixed species could

aggravate the clinical condition that further complicate the treatment. Babin et al¹⁴ also reported the higher rate of fluconazole resistance among oral C. albicans isolates.

We found that out of 51 patients on central line, 22 developed catheter related blood stream infection (CR- BSI). Out of 82, 35 developed catheter associated urinary tract infection (CA- UTI) and out of 25 patients on central line, 8 developed ventilator associated pneumonia. Zerr et al¹⁵ implemented a hand hygiene program with the hopes of improving hand hygiene and decreasing hospital-associated rotavirus infection rates. A multidisciplinary group developed a hospital supported, house-wide campaign. Opportunities for hand hygiene were observed during 5 periods. The frequency of hospital-associated rotavirus infection was tracked over time by review of

laboratory records. Correlates of hand hygiene were investigated with the use of multivariate logistic regression. Overall hand hygiene compliance improved from 62% in period 1 to 81% in period 5 ($P < 0.001$). Soap and water was the most common method for practicing hand hygiene, and alcohol hand gel use increased from 4% to 29% between the first and last observation periods ($P < 0.001$). The rate of hospital-associated rotavirus infection decreased from 5.9 episodes per 1000 discharged patients in 2001 to 2.2 episodes per 1000 discharged patients in 2004 ($P = 0.01$). Period of observation, hospital ward, type of care provider and type of care performed were all independently associated with hand hygiene (adjusted $P < \text{or} = 0.02$ for all).

We found that out of 22 cases of CR- BSI, pathogens isolated were *Klebsiella pneumoniae* in 7, *C. krusei* in 6, *E. coli* in 2 cases, *P. aeruginosa* in 3 cases, *C. albicans* in 4 cases. Out of 35 cases of CA- UTI, pathogens isolated were *E. coli* in 16 cases, *K. pneumoniae* in 10 cases, *C. tropicalis* in 1, *P. aeruginosa* in 1, *S. aureus* and *C. albicans* in 2 cases each and *C. krusei* in 3 cases. Out of 8 cases of VAP, pathogens found to be *K. pneumoniae* and *E. coli* in 3 cases each and *P. aeruginosa* in 2 cases. Eriksen HM et al¹⁶ in their study, The Norwegian Institute of Public Health initiated a national surveillance system for nosocomial infections in 2002. The system was based on two annual one-day prevalence surveys recording the four most common types of nosocomial infection: urinary tract infections; lower respiratory tract infections; surgical site infections and septicaemia. All acute care hospitals in Norway ($N=76$) were invited to participate in the four surveys in 2002 and 2003. The total prevalence of the four recorded nosocomial infections varied between 5.1% and 5.4% in the four surveys. In all surveys, nosocomial infections were located most frequently in the urinary tract (34%), followed by the lower respiratory tract (29%), surgical sites (28%) and septicaemia (8%). The prevalence surveys give a brief overview of the burden and distribution of nosocomial infections. The results can be used to prioritize further infection control measures and more detailed incidence surveillance of nosocomial infections.

CONCLUSION

Authors found that maximum cases of UTI was seen among blood stream infections. Common pathogen isolated was *E. coli* and *Klebsiella pneumoniae*.

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