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MICROBIOLOGICAL PROFILE OF HEALTHCARE-ASSOCIATED INFECTIONS IN INTENSIVE CARE UNITS OF A TERTIARY-CARE HOSPITAL IN WEST BENGAL

Clinical Microbiology

Dr. Reshmi Biswas Junior Resident, Department of Microbiology IQ City Medical College & Hospital, Durgapur.

Dr. Avinash Kumar* Assistant Professor, Department of Microbiology, IQ City Medical College & Hospital , Durgapur. *Corresponding Author

Dr. Biswaroop Chatterjee Professor and Head, Department of Microbiology, IQ City Medical College & Hospital, Durgapur.

ABSTRACT

Introduction: HAIs manifest 48 hrs after hospitalization or later, but no more than 30 days after receiving healthcare. Major HAIs include Catheter-associated urinary tract infections (CAUTI), Ventilator-associated pneumonia (VAP), Central line-associated blood stream infections (CLABSI), and Surgical-site infections (SSI). **Material & Methods:** This retrospective study covered diagnostic specimens collected as a part of routine care of ICU patients in a tertiary-care hospital over 12 months from April 2022 to March 2023. All specimens were processed by standard methods. **Results:** Out of 2,300 patients admitted to ICU, 220(9.6%) developed a microbiologically confirmed HAI, of which, 91(41%) were CAUTI, 68(31%) were VAP, 35(16%) were SSI, and 26(12%) were CLABSI. Out of 91 patients of CAUTI, 45(49.4%) had Klebsiella pneumoniae, 27(29.6%) had Escherichia coli, 10(10.9%) had Acinetobacter calcoaceticus-baumannii complex (ACBC), while 9(9.89%) had Pseudomonas aeruginosa. Out of 68 patients of VAP, 35(51.4%) had ACBC, 20(29.4%) had Klebsiella pneumoniae, 13(19%) had Pseudomonas aeruginosa. Out of 35 patients of SSI, 20(57%) had Escherichia coli, 10(28.5%) had Staphylococcus aureus, and 5(14.2%) had Klebsiella pneumoniae. Out of 26 patients of CLABSI, 24(92.3%) had Staphylococcus aureus, and 2(7.69%) had Escherichia coli. **Conclusion:** From my study it shows, all the organisms mentioned above are from ESKAPE group.

KEYWORDS

Healthcare-associated infections (HAI), Catheter associated urinary tract infection (CAUTI), Surgical site infection(SSI), Ventilator associated pneumonia(VAP), Central line associated blood stream infection(CLABSI), Intensive care unit(ICU).

INRODUCTION

Healthcare-associated infections (HAI) are acquired while receiving healthcare in a timeframe spanning 48 hrs after admission to 30 days after discharge [1]. HAIs not only contribute to morbidity and mortality but also increase the financial cost associated with treatment [2]. Therefore, they are an increasingly important global health problem posing a great threat to patient safety and wellbeing [3]. Some of the most important HAIs include catheter-associated urinary tract infections (CAUTI), ventilator-associated pneumonia (VAP), central line-associated blood stream infections (CLABSI) and surgical-site infections (SSI) [4]. HAIs contribute to increased morbidity and mortality [5], excess healthcare cost [6] and prolonged hospital stay [7]. HAIs are also important drivers of the emergence and dissemination of multidrug resistant pathogens worldwide [8,9].

In developed countries, HAIs affect about one in 10 patients in normal wards and at least half of all patients receiving intensive care (ICU) [10]. The magnitude of the problem in developing countries remains unknown and, in most cases, is underestimated due to difficulties in diagnosis, and lack of proper surveillance [11]. Studies conducted in low-income settings have shown that the hospital-wide prevalence of HAI is about 15.5 per 100 patients [11] which is much higher than what is seen in reports from Europe (4.6% - 9.3%) and North America (3.2%) [12,13].

METHODS

This retrospective study was conducted in ICUs of our tertiary-care hospital over a one-year period from April 2022 to March 2023. Specimens were collected for culture from total 283 patients, among them 220 were clinically & microbiologically significant isolates. Clinical specimens included urine (80), blood (50), ET aspirations (50), sputum (19), pus and body fluids (84) (Table 1). Identification was carried out according to standard tests.

Table 1: Total Clinical Specimens Collected For HAI

TOTAL SPECIMEN	URINE	BLOOD	ET ASPIRATIONS	SPUTUM	PUS & BODY FLUIDS
283	80	50	50	19	84

RESULTS

Out of a total 2300 patients admitted to ICU, 220 (9.6%) had HAI confirmed clinically and by microbiological methods. Out of them, 91 patients (41%) had CAUTI, 68 patients (31%) had VAP, 35 (16%) had SSI, and 26 (12%) had CLABSI (Figure 1).

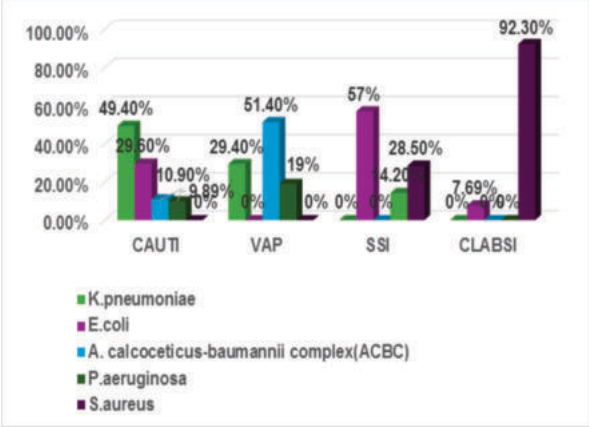

Fig 1: Distribution Of Isolated Microorganism In Different HAIs

Out of 91 patients of CAUTI, 45 (49.4%) had Klebsiella pneumoniae, 27 (29.6%) had Escherichia coli, 10 (10.9%) had Acinetobacter calcoceticus-baumannii complex (ACBC), while 9 (9.89%) had Pseudomonas aeruginosa. Out of 68 patients of VAP, 35 (51.4%) had Acinetobacter calcoceticus-baumannii complex (ACBC), 20 (29.4%) had Klebsiella pneumoniae, and 13 (19%) had Pseudomonas aeruginosa. Out of 35 patients of SSI, 20 (57%) had Escherichia coli, 10 (28.5%) had Staphylococcus aureus, and 5 (14.2%) had Klebsiella pneumoniae. Out of 26 patients of CLABSI, 24 (92.3%) had Staphylococcus aureus, and 2 (7.69%) had Escherichia coli (Table2 –5).

Table 2: Distribution Of Etiological Organisms In CAUTI

Microorganism	n=91	Percentage (%)
Klebsiella pneumoniae	45	49.4
Escherichia coli	27	29.6
Acinetobacter calcoceticus-baumannii complex (ACBC)	10	10.9
Pseudomonas aeruginosa	9	9.89

Table 3: Distribution Of Etiological Organisms In VAP

Microorganism	n=68	Percentage (%)
Acinetobacter calcoceticus-baumannii complex(ACBC)	35	51.4

Klebsiella pneumoniae	20	29.4
Pseudomonas aeruginosa	13	19

The most common isolated organisms were Klebsiella pneumoniae 80 (36.6%), Escherichia coli 50 (22.7%), Acinetobacter calcoceticus-baumannii complex (ACBC) 45 (20.4%), Staphylococcus aureus 24 (10.9%), and Pseudomonas aeruginosa 21 (9.54%) (Figure 2).

Table 4: Distribution Of Etiological Organisms In SSI

Microorganism	n=35	Percentage(%)
Escherichia coli	20	57
Staphylococcus aureus	10	28.5
Klebsiella pneumoniae	5	14.2

Table 5: Distribution Of Etiological Organisms In CLABSI

Microorganism	n=26	Percentage(%)
Staphylococcus aureus	24	92.3
Escherichia coli	2	7.69

DISCUSSION

In a study from India in 2019, Purva Mathur reported a pooled CLABSI rate of 4·3 per 1000 central line-days, but the corresponding figure was 6.5 in our study. In another study by Manoj et al, CLABSI rate was 6.3 per 1000 central line-days which is similar to our findings [14,15]. In one Indian study, SSIs were found to be the commonest HAI (23.94%), followed by CAUTI (16.9 per 1000 catheter days), (CLABSI) (16.9 per 1000 central line-days), and (VAP) (9.85 per 1000 mechanical ventilation days) [16]. However, in our study CAUTI was (37 per 1000 catheter days) the commonest, followed by VAP (26.6 per 1000 mechanical ventilation days), SSI (11.6%), and CLABSI (6.5 per 1000 central line days). The predominant microorganism isolated in SSI were Klebsiella pneumoniae and Escherichia coli and all of them were from patient operated for gastrointestinal surgery (Appendicitis, Cholelithiasis, and laparotomy).

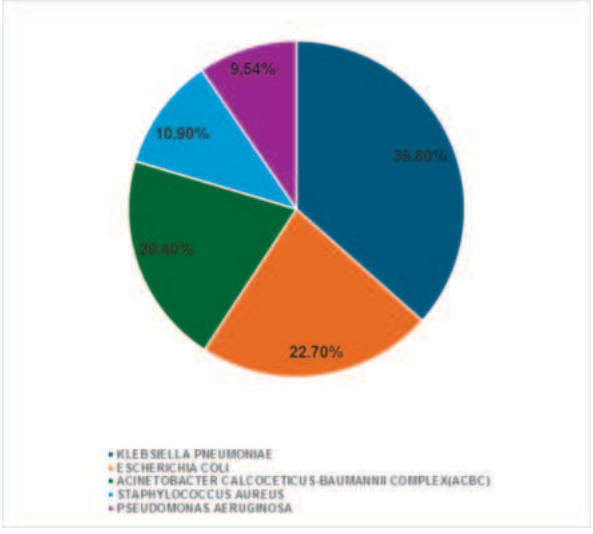

Fig: Commonly Isolated Organisms In HAI

CONCLUSION

The HAIs rate of our study was comparable with other Indian studies. The measures such as patient-nurse ratio and practice of following standard infection control guidelines will reduce the HAIs in ICU settings. Hospital burden of all HAIs in ICU should strictly be assessed with the help of microbiology laboratory in all aspects for the management of HAIs as well.

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