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A STUDY OF RISK FACTORS, PREVALENCE, BACTERIOLOGICAL PROFILE OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS AND ITS ANTIMICROBIAL SUSCEPTIBILITY PATTERN IN INTENSIVE CARE UNITS AT TERTIARY CARE HOSPITAL IN RAJSATHAN

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ABSTRACT

Background: -

Catheter-associated urinary tract infections (CAUTIs) contribute significantly to increased morbidity, mortality, prolonged hospital stays, and frequent antimicrobial use, potentially leading to development of multidrug-resistant pathogens. This study aimed to determine the risk factors, prevalence, bacteriological profile and its antimicrobial susceptibility pattern.

Methodology: -

A hospital based observational cross-sectional study was conducted over a period of one year at a tertiary care centre in eastern Rajasthan. 207 catheterized patients admitted to different ICUs who had an indwelling urinary catheter for ≥48 hours were included. Their urine samples were processed using standard microbiological techniques. Bacterial isolates were identified by Gram staining and conventional biochemical tests. Antimicrobial susceptibility testing was performed using disc diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) 2025 guidelines.

Results: -

Overall prevalence of CAUTI was found to be 8.21%. Average CAUTI rate was 2.41 per 1000 catheter days. *Enterococcus* spp. was the predominant pathogen, accounting for 10 isolates (58.8%), followed by *Escherichia coli* with 5 isolates (29.41%). The Susceptibility pattern revealed extensive resistance across multiple drug classes. Vancomycin, teicoplanin, and linezolid showed 100% susceptibility in Enterococcus species, while nitrofurantoin and fosfomycin remained the most effective agents overall, against 76% and 80% of isolates, respectively. Type 2 Diabetes Mellitus was found to be significantly higher among CAUTI patients than those without it (p-value =0.008910).

Conclusion: -

CAUTI is a preventable healthcare-associated infection. Strict adherence to bundle care and antimicrobial stewardship practices are essential to reduce its occurrence and improve patient safety.

Keywords: -

Antimicrobial susceptibility pattern, Bacteriological profile, Catheter associated urinary tract infections (CAUTI), Intensive Care Units (ICUs), Prevalence, Risk factors.

INTRODUCTION

HAI (Healthcare-associated infections) is one of the leading causes of morbidity and mortality in hospitals globally, especially in various Intensive Care Units. (1) According to World Health Organisation, approximately 1.4 million patients all over the world suffer from HAIs, with prevalence rates ranging between 7% -12%. (2)

Urinary tract infections (UTIs) are among the most common healthcare-associated infections accounting for up to 40% of all healthcare-associated infections (HAIs). (3) About 70% of healthcare-associated UTIs are associated with indwelling urinary catheters, while the association is even stronger in Intensive care units (around 95% of UTI cases which occur in Intensive care units are related with use of catheter). (4)

CAUTI is the most common among the device associated infections acquired from hospital settings. (5) CDC defines CAUTI as UTI where an indwelling urinary catheter (IUC) was in place for more than two calendar days. (6)

Among 20% of patients hospitalised and 45-79% critically ill ICU patients undergo urinary catheterization which in itself poses a risk for developing CAUTI. (7) Each day an indwelling urinary catheter remains in situ it increases the risk of acquiring CAUTI by 3–7%. (8)

Acute care hospitals in 2023 documented more than 17,000 CAUTI events occurring over 23 million urinary catheter device-days. (9) National healthcare safety network (NHSN) reported pooled mean CAUTI rate to be about 0-4.4 per 1000 catheter days in USA. (10)

Escherichia coli is the predominant pathogen causing catheter associated UTI, followed by other enterobacterales, non-fermenters and gram-positive bacteria including Enterococcus. (11)

Numerous uropathogens have shown resistance to commonly used antibiotics, making the treatment of Urinary Tract Infections (UTIs) caused by catheter-associated, biofilm-producing, multidrug-resistant (MDR) organisms a particularly difficult challenge in ICUs which is further complicated by risk factors including uncontrolled diabetes, advanced age, immunocompromised status and prolonged hospitalization (12-13)

Due to the threat of emerging drug-resistant pathogens, it becomes important to routinely monitor local trends in microbial profile and drug resistance patterns in CAUTI to help the clinicians making informed decision while managing these infections. The sufficient data regarding CAUTI and associated factors is not available from this particular healthcare setting. With this goal, this study aimed to know prevalence, bacteriological profile, risk factors and antimicrobial susceptibility pattern of CAUTI at our healthcare setting in eastern part of Rajasthan.

MATERIALS & METHODS

Study design, setting and duration: A hospital-based observational cross-sectional study was conducted at bacteriology laboratory within the department of Microbiology at Jaipur National University Institute for Medical Sciences and Research Centre (JNUIMSRC), Jaipur, Rajasthan from June 2024 to May 2025, after approval from Institutional Ethics Committee.

Sample size and sampling technique: Sample size was calculated using Cochran's formula taking estimated prevalence in adult inpatients with indwelling urinary catheter during their hospitalization as 16%, and the margin of error 5% at 95% confidence interval. (9) Thus, total of 207 consecutive patients from different ICUs with an indwelling urinary catheter for more than or equal to 48 hours were included in the study after taking written informed consent.

Inclusion Criteria: - Adult patients admitted to Intensive Care Units (ICUs) who were catheterized with an indwelling urinary catheter for ≥48 hours.

Exclusion Criteria: -

1. Patients, whose sample taken at the time of catheterization showing culture positivity.

2. Patients catheterized prior to admission in ICU.

3. Patients who showed signs and symptoms of UTI within two calendar days of catheterization.

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4. Patients with renal anomalies.

5. Patients with condom catheters, suprapubic catheters and percutaneous nephrostomy tubes.

Surveillance of catheterized patients and sample collection:

Site-specific prospective active surveillance was carried out on daily basis in different ICUs and detailed history on each patient fulfilling the inclusion criteria was collected on standardized data collection forms as well as denominator data was also collected daily on denominator reporting form as per CDC NHSN guidelines. (9) Urine samples were obtained aseptically through the catheter sampling port, or when required, by carefully puncturing the catheter tubing using a sterile needle and syringe while following all standard precautions. (14)

Laboratory Procedure: -

Macroscopic examination included color, quantity, presence of blood and turbidity. Microscopic examination of uncentrifuged urine was performed using the wet mount technique and even a few pus cells per high power field (≥1 pus cell per 7 high power fields) were considered indicative of significant pyuria. (15)

Urine samples were immediately cultured by semi-quantitative technique onto Hi Crome UTI agar by using calibrated platinum loop, holding 1µl of urine. It was then incubated overnight at 37°C. A colony count of ≥105 CFU/ml was taken significant for processing. Presence of three or more types of colonies was reported as mixed growth. Further identification of isolated bacteria was done using gram staining, colony characteristics and a set of biochemical reactions according to the gram's reaction of the organism. (14)

Antimicrobial susceptibility testing was performed using the Kirby-Bauer disc diffusion method and zones of inhibition were interpreted according to the established breakpoints given by CLSI 2025 guidelines. (16)

Calculation of CAUTI prevalence and CAUTI rate: - (9)

Percentage of catheterized patients developing CAUTI in study duration was represented as CAUTI prevalence.

The CAUTI rate was calculated by dividing the number of CAUTI cases by the number of catheter days and multiplying the result by 1000.

$$\textbf{CAUTI RATE} = \frac{\textbf{Number of CAUTI cases}}{} \times \mathbf{1000}$$

Number of urinary catheter days

Statistical analysis: After collecting data, data was arranged in tabular form or presented in graphical form. Descriptive statistics like minimum, maximum, mean, SD etc. were calculated for quantitative variables and proportion and percentage were calculated for qualitative variables. OpenEpi website was used to find and analyze the association of risk factors. Level of significance was set at 5%, and p-value less than 0.05 was considered as statistically significant. All statistical analysis was performed in Microsoft Excel software.

RESULTS

Out of the total 207 catheterized patients studied, a total of 17 patients developed culture positive catheter-associated urinary tract infections (CAUTI), giving an overall prevalence of 8.21%.

As shown in Table 1, majority of catheterized patients were aged between 60–69 years, accounting for 41 cases(19.8%). Patients above 69 years also formed a substantial proportion (18.8%) with 39 patients. In contrast, younger age groups (<30 years) contributed relatively fewer cases, with only 39 patients (18.9%) combined. However, maximum CAUTI prevalence was seen in 20-29 years age group i.e. 21%.

Table 1: Age Distribution of Catheterized Patients and CAUTI cases

Age Group (years)	Number Of Catheterized Patients (%)	CAUTI cases (Prevalence)
<10	13 (6.3%)	0 (0%)
10-19	7 (3.4%)	1 (14.3%)
20-29	19 (9.2%)	4 (21.0%)
30-39	25 (12.0%)	2 (8.0%)
40-49	26 (12.6%)	0 (0%)
50-59	37 (17.9%)	2 (5.4%)
60-69	41 (19.8%)	4 (9.8%)
>69	39 (18.8%)	4 (10.3%)
Total	207 (100%)	17 (8.21%)

Table 2 depicts that males constituted the majority of catheterized patients (70.04%) than females (29.96%) with a M/F ratio of 2.3:1. Among 17 CAUTI cases 11 (64.71%) cases were

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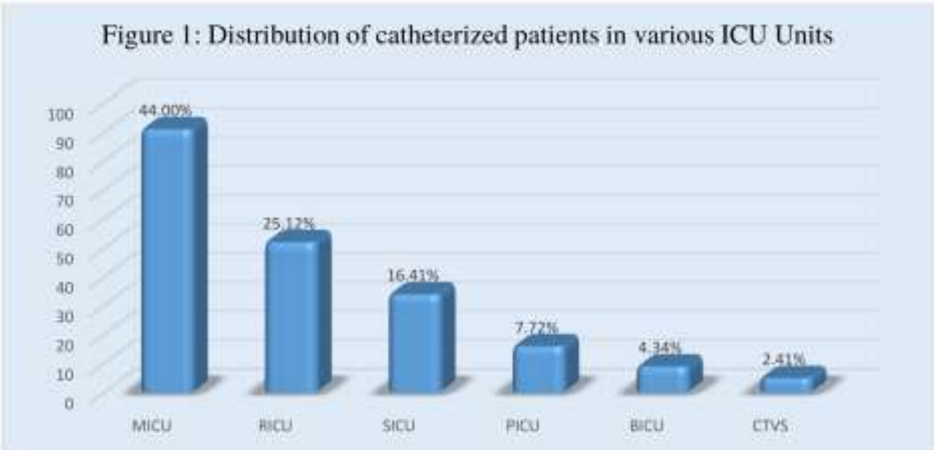
seen in males, while 6 (35.29%) cases in females. However, prevalence of CAUTI was higher in females than males i.e. 9.7%>7.6%.

Table 2 : Gender wise distribution in catheterized patients and CAUTI cases

Gender	Number	CAUTI Prevalence
Male	145 (70.04%)	11 (7.6%)
Female	62 (29.96%)	6 (9.7%)
Total	207 (100%)	17 (8.21%)

The largest proportion of catheterized patients were admitted to the medical ICU (MICU), comprising 91 cases (44%) followed by respiratory ICU (RICU) with 52 patients (25.12%), while cardiothoracic & vascular surgery unit (CTVS) constituted smallest proportion with 5 patients (2.41%). [Figure 1]



In total, 7046 urinary catheter days were recorded during the study period and a total of 17 CAUTI were identified, yielding an overall rate of 2.41 per 1000 catheter days. Month-wise distribution showed variation in prevalence, with the highest number of cases as well as maximum CAUTI rate were seen in August i.e. 4 cases and 4.10 per 1000 catheter days respectively. [Figure 2]

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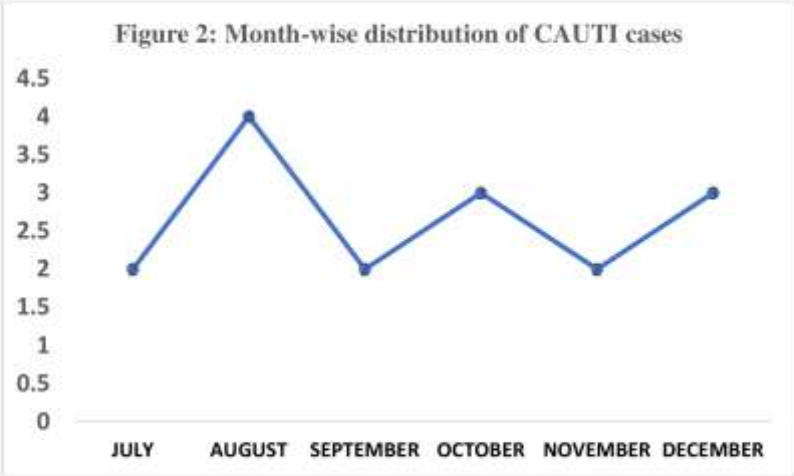
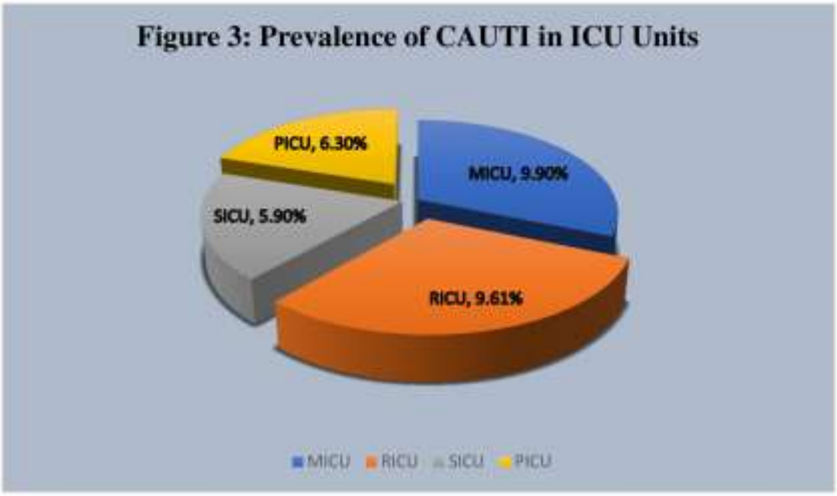


The maximum prevalence of CAUTI was observed in medical ICU (MICU) at 9.9% followed by the respiratory ICU (RICU) at 9.61% while the minimum prevalence was observed in the surgical ICU (SICU) at 5.9%. [Figure 3]



Among 17 culture positive CAUTI cases, *Enterococcus* spp. was the predominant pathogen, accounting for 10 isolates (58.8%) followed by *Escherichia coli* with 5 isolates (29.41%). [Figure 4]

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0 isolates (58.8%) followed by *Escherichia coli* with 5 isolates (29.41%). [Figure 4]

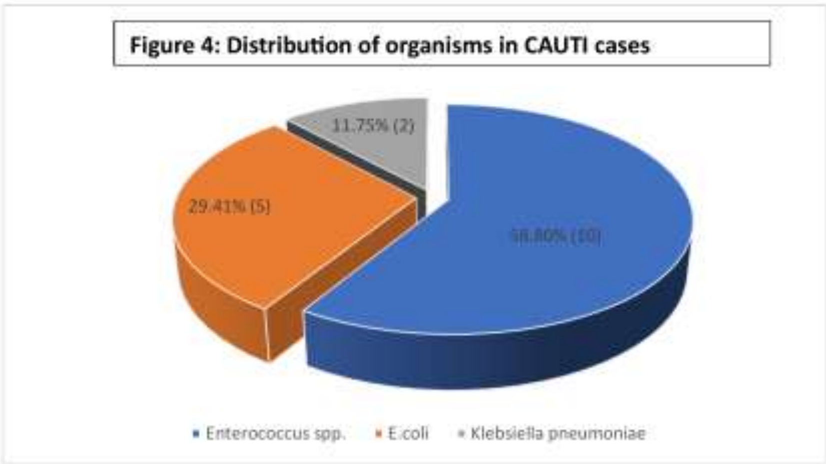

Figure 4: Distribution of organisms in CAUTI cases

Figure 5 shows overall antibiotic susceptibility pattern of CAUTI isolates (n=17). The Susceptibility pattern revealed extensive resistance across multiple drug classes, with only a few agents retaining notable activity. Penicillin and ampicillin showed 20% sensitivity. Most of the cephalosporins demonstrated poor effectiveness, with cefazolin, cefuroxime, ceftriaxone, cefotaxime and cefepime, showing resistance in all of the tested isolates, while ceftazidime retained partial activity (29% sensitive). Among beta-lactam/beta-lactamase inhibitor (BL/BLI) combinations, amoxicillin/clavulanic acid and piperacillin/tazobactam depicted resistance in 100% isolates while ceftazidime-avibactam showed slight activity (29% sensitive). Carbapenems showed variable results: meropenem and imipenem had 43% sensitivity each, whereas ertapenem was highly ineffective (14% sensitivity). All tested isolates were resistant to fluoroquinolones (ciprofloxacin and levofloxacin). Aminoglycosides showed poor susceptibility, with amikacin, gentamicin being active in only 29% isolates while high-level aminoglycosides depicted mixed activity with HLG showing high resistance rate of 90%, but HLS retained better activity (80% sensitivity). Tetracyclines showed moderate activity, with tetracycline being sensitive in 41% and doxycycline in 50% isolates. Among glycopeptides and oxazolidinones, vancomycin, teicoplanin and linezolid demonstrated complete sensitivity (100%), highlighting their strong efficacy against Gram-positive isolates. Cotrimoxazole showed limited efficacy being sensitive in 29% isolates. Urinary antibiotics performed better: nitrofurantoin was effective in 76%, and fosfomycin in 80% of the tested isolates. Overall, the resistance profile underscores high resistance to β-lactams, fluoroquinolones, and aminoglycosides, with fosfomycin, nitrofurantoin, and glycopeptidess remaining as the most effective agents, while carbapenems and tetracyclines retained partial utility.

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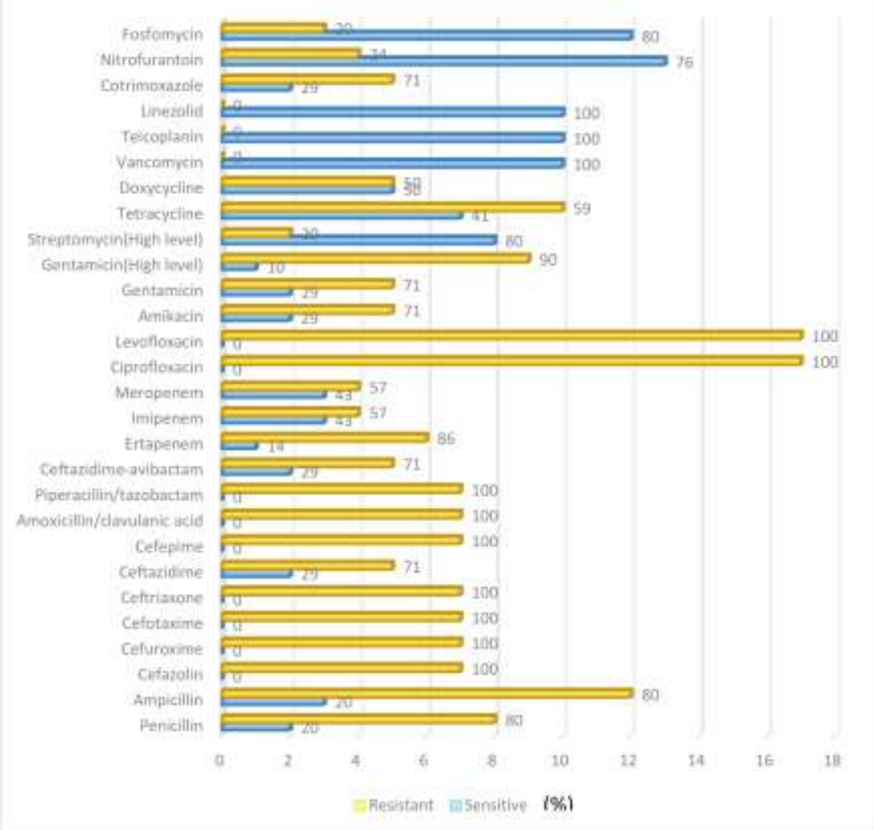

Figure 5: Overall Antibiotic Susceptibility pattern of CAUTI isolates

Table 3: Co-morbidities in patients with or without CAUTI

Co-morbidities	Patients with CAUTI (n=17)	Patients without CAUTI (n=190)	p-value (by mid-p exact/corrected chi square
Type 2 Diabetes Mellitus	4	10	0.008910
Hypertension	1	22	0.2678
Chronic Liver Disease	1	2	0.1230
Tuberculosis	1	15	0.4271

Out of the total 207 patients studied, 46 (22.2%) were identified with co-morbid conditions, and within this subgroup, several patients presented with overlapping illnesses. The most common co-morbidity was hypertension, observed in 23 patients (11.11%), followed by tuberculosis in 16 patients (7.72%) and type 2 diabetes mellitus in 14 patients (6.76%), while chronic liver disease was noted in 3 patients (1.44%). Importantly, multiple co-morbidities were present in some individuals: 2 (1%) patients had both chronic liver disease and hypertension, and 8 (3.86%) patients had both hypertension and type 2 diabetes mellitus.

Only 7 (15.2%) of the 46 patients with co-morbidities developed CAUTI, while 10 (6.21%) of the 161 patients without co-morbidities developed CAUTI. There was no statistically significant difference for hypertension, chronic liver diseases and tuberculosis among patients with/without CAUTI. However, Type 2 diabetes mellitus was found to be significantly higher among CAUTI patients than those without it. (p-value=0.008910)

DISCUSSION

CAUTI remains an important cause of concern in healthcare settings particularly in ICUs, where its impact is further accentuated by prevailing drug-resistant pathogens and debilitated patient population frequently susceptible to developing these infections.

It has been estimated that each year, more than 13,000 deaths are associated with these HAIs. (17)

Multiple variables were assessed in this study on CAUTI, including the prevalence across various ICUs, risk factors, gender and age distribution of patients, distribution of isolated organisms and their antimicrobial susceptibility pattern. During the study period, 207 catheterized patients admitted to various ICUs were included.

CAUTI prevalence and CAUTI rate

The overall prevalence of CAUTI in our study was found to be 8.21%. Similarly, Parihar S et al (6) in their study focusing on CAUTI in MICU recorded an overall magnitude as 14.67% while CAUTI prevalence recorded by Kaur S et al (18) and Hassan A et al (19) stood at higher levels i.e. 26% and 27.8% respectively.

Across the 7046 urinary catheter days recorded during the study period, a total of 17 CAUTI cases were reported, yielding an overall rate of 2.41 per 1000 catheter days. Similarly, Viknesh A et al (20) reported CAUTI rate as 3.55 per 1000 catheter days while Vishwajith et al (21) reported a rate of 1.74 per 1000 catheter days.

ICUs in low to middle income countries record an incidence of CAUTI from 5.5 to 8.8 per 1000 catheter days, however, pooled data from India report CAUTI incidence as 1.60 which is notably lower than the CD-NHSN benchmark of 2.09 and INICC benchmark of 6.5. (22)

The reported rate and prevalence of CAUTI vary across studies which can be attributed to differences in patient characteristics, duration and frequency of catheterization, adherence to infection prevention practices and healthcare settings. Variations in surveillance methods, diagnostic criteria, study design, local antimicrobial resistance patterns influence the reported rates and prevalence. Additionally, institutional resources, healthcare worker compliance with catheter care protocols and regional differences in healthcare infrastructure also contribute to the observed variability.

Gender and age-group distribution in CAUTI cases:

In the present study, 70.04% catheterized patients were males while 29.96% were females. Also, among culture positive 17 CAUTI cases, 64.71% were males and 35.29% were females. This higher number of males in CAUTI patients population was corroborated by many such as Sharma M et al (23) and Dey S et al (24) On the contrary, Venkataraman R et al (25) 12 recorded higher number of female patients among CAUTI population.

Gender distribution among CAUTI cases showed a male predominance which may be attributed to local patient population, gender ratio of that place and more healthcare seeking behaviour. However, relative prevalence and culture positivity rate in CAUTI cases confirmed the age-old evidence suggesting higher rate of urinary tract infections in females. In the current study CAUTI rate in females was reported to be 9.7% which was higher than that seen in males (7.6%). Comparable findings were observed by Sharma M et al (23) with a higher culture positivity rate in females (13.3%) than in males (10.6%), as also by Mohamed O A et al. (26)

The current study revealed that the highest proportion of cases occurred in the 20–29 years age group and above 60 years age group (23.52% each). Notably, no CAUTI cases were reported in children under 10 years or in the 40–49 years group. The following studies corroborated our findings viz. Sharma M et al (23) (45.45% cases in >61 years age group) and Parihar S et al (6) (34% cases in 51-70 years age group).

The presence of a substantial number of middle-aged and older adults suggests that age-related immune decline, comorbidities, and hospitalization risks may contribute to ICU admissions. Anggi A et al (27), however, observed that CAUTI was more common among patients ≤ 50 years old as compare to patients aged >50 years in their study.

Although CAUTI is generally reported to be more common in elderly patients, the higher prevalence observed among young adults in above study may be attributed to increased exposure to risk factors such as prolonged catheterization, trauma-related admissions, postoperative care, and extended ICU stay. In many tertiary care settings, young adults

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constitute a significant proportion of critically ill patients, particularly in surgical and trauma units, which may explain the relatively higher prevalence in this age group.

Distribution of CAUTI cases in various ICU units

The majority of cases in our study were reported from the MICU with 52.94%, followed by the RICU with 29.41%. The CAUTI prevalence was also highest in MICU patients at 9.90%. Comparable results have been documented by Viknesh A et al (20) in their study with maximum CAUTI cases from MICU units (20.83%) as also by Kakaria B et al (28). This distribution probably reflects the highest prevalence of indwelling urinary catheter use in medical ICUs as seen in our study too, where 44% of catheterized patients were from MICU.

Microbiological profile of CAUTI cases in present study

Enterococcus spp. emerged as the predominant uropathogen causing CAUTI (58.8%), followed by *E. coli* (29.41%) and *Klebsiella pneumoniae* (11.75%).

Consistent findings have been reported by Shin R et al (29), (Kumar A et al and Deb J et al (30), who also observed Enterococcus species as the major pathogen in CAUTI cases i.e. 30.3%, 38.88% and 50% respectively.

Enterococci have emerged as one of the leading pathogens in CAUTI due to their ability to adhere to and persist on urinary catheters by producing biofilm. *Enterococcus faecalis* expresses endocarditis- and biofilm-associated (Ebp) pili, particularly the adhesin EbpA, which binds to fibrinogen deposited on catheters following catheter-induced bladder inflammation. Additionally, secretion of proteases (SprE and GelE) and efficient manganese acquisition systems enhance bacterial survival and persistence in the catheterized urinary tract. (31)

However, Singh A et al (32) (31%) and Birhman N et al (33) (51.31%) recorded *Escherichia coli* as the predominant agent.

Echerichia coli is the leading cause of all forms of UTI including CAUTI due to its intestinal origin and ability to colonize the periurethral area. In catheterized patients, it ascends along the catheter into the bladder. Uropathogenic *E. coli* possesses adhesins (type 1 and P fimbriae), forms biofilms on catheter surfaces, and produces virulence factors such as hemolysin, siderophores, and capsules, which enhances its persistence and survival in the urinary tract. (31)

This varied microbial distribution in CAUTI cases across regions, can be attributed to variable risk factors among hospitalized patients, previous and present antimicrobial usage and source of infection.

Antimicrobial Susceptibility Pattern of CAUTI isolates

The antimicrobial susceptibility profile demonstrated widespread resistance across different drug classes, with only a limited number of agents exhibiting notable activity.

Among glycopeptides and oxazolidinones, vancomycin, teicoplanin and linezolid demonstrated complete sensitivity (100%), highlighting their strong efficacy against Gram-positive isolates. These findings are consistent with Dey S et al (24) and Behera A et al (34) who reported 100% sensitivity to glycopeptides and oxazolidinones

In *Enterococcus* spp and enterobacterales, urinary antibiotics showed equally promising efficacy. Nitrofurantoin was effective in 76%, and fosfomycin in 80% of the tested isolates. Birhman N et al (33) in their study reported 89.7% sensitivity to nitrofurantoin, however Magrahi H et al (34) observed increased resistance to nitrofurantoin at 57.8%.

Carbapenems showed variable results in enterobacterales: meropenem and imipenem had sensitivity in 43% isolates, whereas ertapenem was highly ineffective (14% sensitivity). Also, Amiri H et al (19) reported imipenem sensitivity at 32% and meropenem at 36.3%.

In enterobacterales, among BL/BLIs (β-lactam/β-lactamase inhibitors), only ceftazidime-avibactam showed slightly preserved activity (29% sensitivity). On a similar note, Kadhim A et al (35) reported 83% resistance to amoxicillin/clavulanic acid and Chirag P et al (36) reported 100% resistance to piperacillin/tazobactam.

Among the tested cephalosporins only ceftazidime retained partial activity (29% sensitivity). Karyakarte A et al (37) also observed high resistance to cephalosporins (80%).

Among penicillins, penicillin showed poor activity against *Enterococcus* spp. isolates (20% sensitivity). Similarly, ampicillin which was tested against *Escherichia coli* and *Enterococcus* spp isolates exhibited poor activity (20% sensitivity). Comparable findings have been shown by Parihar S et al (6) who reported 21.42% sensitivity to ampicillin and Viknesh A et al (20) who reported 33.33% sensitivity to penicillin.

Tetracyclines showed average activity, with tetracycline being sensitive in 41% enterobacterales and doxycycline in 50% isolates in both enterobacterales and *Enterococcus* spp. Kirti M et al (38), showed poor sensitivity to doxycycline (<20%) while, Magrahi H et al (34) , in their research reported a slightly higher sensitivity at 63.1% to tetracycline.

Cotrimoxazole, once considered a drug of choice for UTI, showed limited efficacy being sensitive in 29% isolates of enterobacterales. Viknesh A et al (20) also reported reduced sensitivity to cotrimoxazole (25%).

All tested isolates were resistant to fluoroquinolones (ciprofloxacin and levofloxacin) in enterobacterales and *Enterococcus* spp. Karyakarte A et al (37) also recorded high resistance to Fluoroquinolones (80%).

In enterobacterales aminoglycosides showed poor susceptibility, with amikacin and gentamicin being active in only 29% isolates while in *Enterococcus* species high-level aminoglycosides depicted mixed activity with HLG showing high resistance rate of 90%, but HLS retained better activity (80% sensitivity). Kadhim A et al (35) observed 28.12% and 23.43% sensitivity to amikacin and gentamicin respectively. Ramakrishnan K et al (39) reported 87% resistance to high-level gentamicin in *Enterococcus* species.

The high antimicrobial resistance observed in CAUTI patients may be attributed to prolonged hospitalization, biofilm formation and frequent exposure to broad spectrum antibiotics which leads to colonization by drug-resistant pathogens prevailing in hospital environment. The varying resistance patterns across studies likely reflects differences in local pathogens, implementation of antibiotic policies, local antimicrobial prescribing practices and adherence to infection control practices.

Co-morbidities in CAUTI patients

Among the 207 patients evaluated, 46 (22.2%) were found to have comorbidities, with a proportion of these patients presenting with more than one concurrent condition. Among the study population, hypertension emerged as the predominant comorbidity, documented in 23 patients (11.11%), followed by tuberculosis in 16 patients (7.72%) and type 2 diabetes mellitus in 14 patients (6.76%). Notably, only 7 of the 46 patients with documented comorbidities subsequently developed CAUTI. Only, type 2 diabetes mellitus was found to be significantly higher among CAUTI patients than those without it. (p-value=0.0089) However, previous studies have documented association of certain comorbidities with CAUTI. Amri A et al (19) identified presence of comorbid conditions, notably Diabetes Mellitus, Hypertension, chronic kidney disease and cardiovascular disease as independent predictor of CAUTI. Also, Jha T et al (40) reported highest odds of CAUTI occurrence for patients with chronic kidney disease, HTN and diabetes mellitus.

In our study, the association between CAUTI and comorbidities could not be established well, which can be due to lesser number of CAUTI cases which made it difficult to form standard size comparison groups for accurate statistical analysis of risk factors.

CONCLUSION

Catheter-Associated Urinary Tract Infection (CAUTI) remains a major cause of concern in healthcare settings particularly in intensive care units leading to increased morbidity and mortality. In addition to clinical complications, CAUTI imposes a substantial economic burden on patients and healthcare systems. This includes prolonged hospital stays, increased laboratory investigations, higher drug costs, and loss of productive workdays. Recurrent and inappropriate use of antibiotics for suspected or confirmed CAUTI further accelerates the emergence of resistant pathogens, underscoring the critical need for evidence-based diagnosis of CAUTI guided by standardized criteria and microbiologically guided therapy in ICU settings.

The study highlights the importance of implementing antimicrobial stewardship programs in critical care settings to optimize antibiotic use and improve patient outcomes. Furthermore, appropriate health education, strict adherence to infection control practices, a well-defined antibiotic policy, and proper implementation of catheter care bundles are imperative to prevent CAUTI. Strengthening these measures is the need of the hour to reduce infection rates, curb antimicrobial resistance, and enhance overall quality of care in ICUs.

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