

A STUDY TO ASSESS THE PREVALENCE OF CATHETER ASSOCIATED URINARY TRACT INFECTION (CAUTI) AMONG PATIENTS ADMITTED IN ICU SETTINGS AT TERTIARY CARE HOSPITAL, WESTERN U.P

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ABSTRACT

Background: Among the health care associated infections, Catheter Associated Urinary Tract Infection (CAUTI) represents a large portion globally, comprising up to 35%-40% of all nosocomial infections. In Indian Intensive Care Unit (ICU) settings, reported prevalence rates typically vary from 8.8% to 11.35%, contributing to prolonged hospital days and an increase in the number of patient morbidity. CAUTI stands as a largely preventable complication demanding dedicated adherence to standardized protocols and care bundles.

Objective: To assess the prevalence of Catheter Associated Urinary Tract Infection (CAUTI) among patients admitted in ICU settings at Tertiary Care Hospital, Western U.P.

Methods: A quantitative research approach with a cross-sectional research design was adopted. The study was conducted at Sardar Vallabh Bhai Patel (SVBP) Hospital in Meerut among 100 patients admitted to the ICU settings through Non-probability convenience sampling technique. Urine samples were collected under strict aseptic technique and were sent for microbiological examination. Data was collected using a structured questionnaire and was analyzed using descriptive and inferential statistics.

Results: In this study, 8% of the catheterized patients developed CAUTI. The majority of patients were 58-68 years old (38%), with male predominance (56%). Among the infected cases (n=8), *Escherichia coli* was the most common pathogen at 37.5% (n=3), followed by *Klebsiella* species at 25% (n=2), *Pseudomonas* at 12.5% (n=1), *Enterococcus* at 12.5% (n=1), *Candida* at 12.5% (n=1). CAUTI incidence increased with the corresponding increase in the clinical signs and symptoms. Data analysis indicated a highly significant association between gender with the occurrence of CAUTI.

Conclusion: There was a notable prevalence of CAUTI among the study population. This shows that there is a need for more strict adherence to care bundles, sequential monitoring of patients for signs and symptoms of CAUTI and timely removal of catheters are necessary to reduce the burden of health care associated infections.

KEYWORDS: CAUTI, Health care associated infection, Prevalence, Urine culture.

INTRODUCTION

Globally, Healthcare-Associated Infections (HAIs) pose a serious and growing risk to patient safety and clinical results. Urinary Tract Infections (UTI's) are one of the most common kinds of these, making up as much as 35% to 40% of all hospital-acquired infections globally. Between 15% and 25% of hospitalized patients obtain an indwelling urine catheter at some point during their stay in Intensive Care Units (ICUs), where patient acuity is extremely high. In critical care settings, when perfect fluid balance and precise hemodynamic monitoring are essential, this frequency sharply increases. According to clinical statistics, the daily risk of acquiring bacteriuria is between 3% and 7% for every day a catheter is left in place; after 30 days of continuous instrumentation, this risk approaches 100%. In the end, an indwelling device is directly responsible for over 97% of ICU-acquired UTI's, creating the serious nosocomial problem known as Catheter-Associated Urinary Tract Infection (CAUTI).

The clinical and economical burden of CAUTI in critical care settings is significantly greater in poor countries than in industrialized ones, especially in India. Systemic issues such as high patient-to-nurse ratios, variable training on aseptic maintenance, and varying baseline institutional compliance with device-associated infection bundling are the main causes

of this disparity. CAUTI prevalence rates in medical and surgical intensive care units typically range from 8.8% to 11.35%, according to epidemiological data from tertiary care settings in India. By lengthening critical care stays by an average of six days, increasing healthcare costs, raising the risk of subsequent bacteremia by over twenty percent, and contributing to institutional mortality rates of almost ten percent, these infections significantly impair patient prognoses. Furthermore, Indian ICUs face a compounding challenge with the rapid emergence of Multidrug-resistant (MDR) alert pathogens within uropathogenic profiles, turning catheterized patients into potential reservoirs for hard-to-treat nosocomial outbreaks.

Twelve studies on the prevalence, risk factors, microbiology, and prevention of CAUTI among adult patients that were published within the last ten years were examined in a narrative review by Lalia et al. (2025). According to the review, the prevalence of CAUTI varied from 12.5% to 49.1%, with ICU patients and those with extended catheterization showing higher rates. In order to lessen the burden of CAUTI in healthcare settings, the results emphasized the ongoing need for surveillance and preventive measures.

Although international organizations like the Centers for Disease Control and Prevention (CDC) strongly advocate for standardized catheter care bundles, Western Uttar Pradesh's tertiary care facilities still lack localized epidemiological surveillance about precise prevalence rates, particular regional microbial distributions, and modifiable clinical risk factors. Clinical procedures that differ between hospitals, such the frequency of catheter re-insertion from the time of admission, are important areas where nursing actions can directly affect patient outcomes. Nursing administrators must comprehend these regional trends in order to create focused, data-driven infection control procedures and enhance bedside nursing care. In order to systematically evaluate the prevalence, microbial distribution, and related clinical and demographic risk factors of CAUTI in the intensive care unit of Sardar Vallabh Bhai Patel (SVBP) Hospital, a renowned tertiary care facility connected to LLRM Medical College in Meerut, Uttar Pradesh.

OBJECTIVES OF THE STUDY WERE:

- 1.To assess the prevalence of catheter associated urinary tract infection among patients admitted in ICU settings.
- 2.To identify the common type of microorganisms causing CAUTI among patients admitted in ICU settings.
- 3.To correlate the signs and symptoms and occurrence of CAUTI among patients admitted in ICU settings.
- 4.To find out the association between the occurrence of CAUTI among patients admitted in ICU settings and their selected demographic variables.

METHODOLOGY

To ascertain the prevalence, microbiological profile, and related risk factors of Catheter-Associated Urinary Tract Infections (CAUTI), a quantitative research approach with a descriptive, cross-sectional research design was used. Using a non-probability convenience sampling technique, the study was carried out among 100 catheterized patients admitted to the Intensive Care Unit (ICU) settings of Sardar Vallabh Bhai Patel (SVBP) Hospital, LLRM Medical College, Meerut, Uttar Pradesh. To ensure eligibility, specific criteria were applied:

Inclusion Criteria: Adult patient with 18 years of age or above, Patient with urinary catheter in place at least 48 hr on the day of data collection, Patient admitted to ICU, Patient willing to participate in the study.

Exclusion Criteria: Patients who had urological procedures, A urinary tract infection was present when the patient was admitted.

Patients who met the inclusion criteria were chosen whereas patients with exclusion criteria were not chosen. A self-structured questionnaire was used to collect baseline clinical and demographic information in addition to clinical signs and symptoms. Following strict aseptic procedures, urine samples were taken from the catheter and sent right away to the institutional Department of Microbiology for quantitative culture. Descriptive and inferential statistics were used for data analysis.

RESULTS

The findings of the study are presented according to the objectives of the study. The data is prepared under subsequent sections

Table 1: Description of demographic and clinical characteristics of patients. N=100

Demographic variables	Frequency (f)	Frequency Percentage (%)
Age group		
18-37 years	30	30
38-57 years	32	32
Above 58 years	38	38
Gender		
Male	56	56
Female	44	44
Location prior to hospital admission		
Primary health center/Community health center	0	0
Any other hospital	0	0
Inpatient department of same hospital	12	12
Direct ICU admission after emergency care	88	88
Presently admitted unit		

Trauma ICU	21	21
Tele ICU	68	68
Neuro ICU	3	3
Surgical ICU	8	8
Provisional medical/surgical diagnosis		
General surgery	20	20
General medical	71	71
Obstetrics	6	6
Orthopedic	3	3
Indication for catheterization		
Monitor intake and output	52	52
Post-operative care	5	5
Urinary retention	37	37
Urinary incontinence	6	6
Total days of catheter used		
48-72 hrs	16	16
73-96 hrs	51	51
>96 hrs	33	33
Catheter re-insertion from the time of admission		
Yes	1	1
No	99	99
Comorbid illness		
Diabetes mellitus	14	14
Hypertension	17	17
No comorbid illness	69	69
History of previous urinary tract infection		
Yes	4	4
No	96	96

**Table 2: Frequency and percentage distribution on prevalence of CAUTI among patients admitted in ICU
N=100**

UTI (diagnosed through culture)	Frequency (f)	Frequency Percentage (%)
Positive	8	8
Negative	92	92

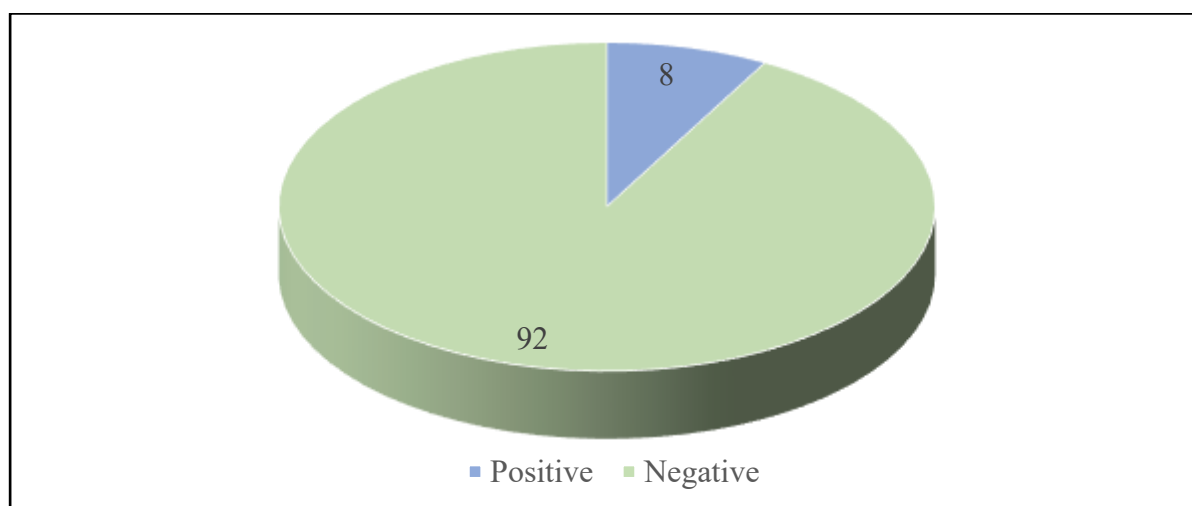


Figure 2: Percentage Distribution of Sample according to the UTI (diagnosed through culture)

Table 3: Frequency and percentage distribution on common causative microorganisms causing CAUTI as identified in urine culture n=8

Common causative microorganism causing CAUTI as identified in urine culture	Frequency (f)	Frequency Percentage (%)
Escherichia coli	3	37.5
Klebsiella Spp.	2	25

Pseudomonas Spp.	1	12.5
Enterococcus Species	1	12.5
Candida species	1	12.5

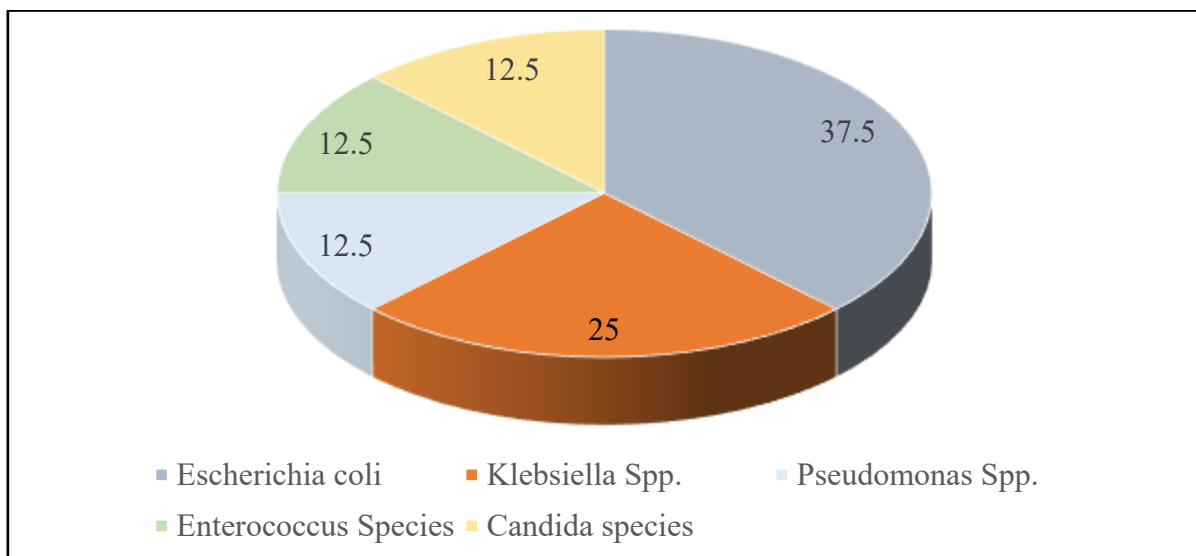


Figure 3: Percentage Distribution of Sample according to the Common causative microorganism causing CAUTI as identified in urine culture

Table 4: To find the correlation coefficient between the signs and symptoms and occurrence of CAUTI among patients admitted in ICU N=100

Variables	Mean	SD	Mean difference	Pearson's correlation coefficient (r)	Inference
Signs and symptoms (X)	2.15	1.610	2.07	0.386	Moderate positive correlation
Occurrence of CAUTI (Y)	0.08	0.272			

Table 5: To find the association between the occurrence of CAUTI among patients admitted in ICU and their selected demographic variables N=100

selected demographic variables N = 100						
Demographic Variables	CAUTI Present(f)	CAUTI Absent(f)	χ^2	df	p-value	Inference
Age group						
18-37 years	5	25	5.845	2	0.054	NS
38-57 years	0	32				
Above 58 years	3	35				
Gender						
Male	0	56	11.067	1	0.001	S
Female	8	36				
Location prior to hospital admission						
Inpatient department of same hospital	1	11	0.02	1	0.62	NS
Direct ICU admission after emergency care	7	81				
Presently admitted unit						
Trauma ICU	1	20	1.742	3	0.628	NS
Tele ICU	7	61				
Neuro ICU	0	3				

Surgical ICU	0	8				
Provisional medical/surgical diagnosis						
General surgery	1	19	1.137	3	0.768	NS
General medical	6	65				
Obstetrics	1	5				
Orthopedic	0	3				
Indication for catheterization						
Monitor intake and output	3	49	4.247	3	0.236	NS
Post-operative care	1	4				
Urinary retention	4	33				
Urinary incontinence	0	6				
Total days of catheter used						
48-72 hrs	1	15	0.122	2	0.941	NS
73-96 hrs	4	47				
>96 hrs	3	30				
Catheter re-insertion from the time of admission						
Yes	1	0	11.616	1	0.08	NS
No	7	92				
Comorbid illness						
Diabetes mellitus	0	14	3.42	2	0.181	NS
Hypertension	3	14				
No comorbid illness	5	64				
History of previous urinary tract infection						
Yes	1	3	1.636	1	0.287	NS
No	7	89				

(p<0.05;Level of significance) NS - Non significant; S-Significant

The baseline demographic data of the 100 catheterized ICU patients monitored (N=100) showed a clear male predominance (56%, n=56) and a dominating age range of 58 to 68 years (38%, n=38). It was discovered that the overall prevalence rate of CAUTI, or catheter-associated urinary tract infection, was precisely 8% (n=8). *Escherichia coli* was the most prevalent uropathogen at 37.5% (n=3), followed by *Klebsiella* species at 25.0% (n=2), according to a thorough analysis of these 8 culture-positive isolates. *Pseudomonas*, *Enterococcus*, and *Candida* species accounted for 12.5% (n=1 each) of the positive cultures, while the remaining pathogens showed an equal distribution. Gender (p < 0.05) was the main clinical variable that showed a very significant statistical association with the development of CAUTI, according to inferential analysis utilizing Pearson's Chi-square (χ^2) test. On the other hand, there was no statistically significant correlation between the progression of infection and baseline characteristics such absolute age.

DISCUSSION

The microbiological patterns reported by Kaur et al. (2021) in Punjab, where *E. coli* similarly dominated the uropathogenic profile (47%), although their overall incidence rate was higher at 18%, are consistent with the current study's 8% CAUTI prevalence rate, with *Escherichia coli* identified as the primary causative microorganism (37.5%). Clinically, this study found that patients who tested positive for CAUTI consistently had at least two systemic or localized symptoms. This is similar to the diagnostic approach used by Shweta et al. (2024) in Bihar, who used a minimum threshold of two clinical characteristics in addition to positive cultures to confirm CAUTI diagnoses. Additionally, the observational results of Smriti Parihar (2023) in Northern India, who reported a 14.67% total CAUTI magnitude where female patients out-indexed males within the 51–70 age demographic, are supported by the inferential identification of gender as a major risk factor—with a notable burden among female patients. When taken as a whole, our comparative results support the crucial confluence of recognizable clinical signs, predictable distributions of Gram-negative pathogens, and demographic vulnerability in critical care settings.

NURSING IMPLICATIONS

Nursing Practice

-Maintaining complete adherence to stringent aseptic procedures for both baseline insertions and required re-insertions.
-Protocols for perineal hygiene and increased, gender-specific clinical monitoring should be implemented in critical care units.

Nursing Education

-The "CAUTI Bundle" of care, must be the focus of regular, evidence-based training sessions that hospital administrators implement for critical care staff.
-Early detection of systemic and localized symptoms that are favorably associated with positive uropathogenic cultures should be given top priority in academic and institutional training programs.

Nursing Research

Larger multi-center cohorts and longer longitudinal surveillance should be included in future research designs to assess the long-term effects of longer catheterization times on infection rates.

Nursing Management

-Regular, systematic infection control audits and stringent checklist verification.
-To guarantee that bedside nurses have the time to maintain perfect catheter care bundle compliance for high-risk demographics, such female patients, management must maximize nurse-to-patient ratios in critical care units.

RECOMMENDATIONS

-Maintain internal databases tracking CAUTI rates and pathogens (e.g., E. coli, Klebsiella) for monthly unit feedback.
-Conduct a randomized controlled trial in Western U.P. comparing a "Nurse-Led Education Bundle" against standard care to lower CAUTI rates below the study's 8%.

LIMITATIONS

- 1)The study was conducted at a particular hospital in Western Uttar Pradesh.
- 2)The study is restricted to catheterized patients admitted to a tertiary care hospital.
- 3)The study will assess the prevalence of CAUTI's not to evaluate the effectiveness of specific interventions.
- 4)The study focuses on urinary tract infections associated with urinary catheters.

CONCLUSION

According to the study's findings, *Escherichia coli* is the main uropathogen responsible for the 8% prevalence of CAUTI in the SVBP Hospital intensive care unit. The results show that the female gender are important, statistically significant risk factors for the development of infections. In the end, these results highlight that patient vulnerability is determined by modifiable procedural parameters rather than basic biological determinants like age. To reduce nosocomial infection rates and improve critical care outcomes, institutions must employ focused clinical surveillance for high-risk groups, enforce rigorous adherence to catheter care bundles, and minimize needless device re-insertions.

REFERENCE

1. World Health Organization. (2022). Global report on infection prevention and control. <https://www.who.int/publications/i/item/9789240051164>
2. Centers for Disease Control and Prevention. (2026). Catheter-associated Urinary Tract Infections (CAUTI).
3. National Healthcare Safety Network. (2026). CDC/NHSN surveillance definitions for healthcare-associated infection. Centers for Disease Control and Prevention.
4. Gould, C. V., Umscheid, C. A., Agarwal, R. K., Kuntz, G., & Pegues, D. A. (2009). Guideline for prevention of catheter-associated urinary tract infections 2009. Healthcare Infection Control Practices Advisory Committee (HICPAC). <https://www.cdc.gov/infection-control/hcp/cauti/index.html>
5. Kaur, S., Dhaliwal, K. K., Singh, D. R., & Randhawa, R. K. (2021). A study to assess the prevalence of catheter-associated urinary tract infection among catheterized patients admitted in tertiary care hospital, Bathinda (Punjab). *International Journal of Medical Research & Health Sciences*, 10(7), 34–42. <https://www.ijmrhs.com/medical-research/a-study-to-assess-the-prevalence-of-catheter-associated-urinary-tract-infection-among-catheterized-patients-admitted-in-tertiary-ca-73711.html>
6. Shweta, Kumari, R., Kumar, A., & Prasad, R. (2024). Catheter associated urinary tract infections in a tertiary care hospital of north bihar. *International Journal of Academic Medicine and Pharmacy*, 6(4), 682–686. <https://doi.org/10.47009/jamp.2024.6.4.135>
7. Parihar, S., Sharma, R., Kinimi, S. V., & Choudhary, S. (2023). An observational study from Northern India to evaluate catheter-associated urinary tract infection in medical intensive care unit at a tertiary care center. *Indian Journal of Critical Care Medicine*, 27(9), 642–646. <https://doi.org/10.5005/jp-journals-10071-24519>
8. Thakur, A. K. (2025). Catheter-associated urinary tract infections in a trauma care facility in India: Trend over 10-years. *The Journal of Infection in Developing Countries*, 19(4), 590–596. <https://doi.org/10.3855/jidc.20371>

9. Chunilal, B., et al. (2025). A study on catheter-associated urinary tract infections in the medical ICU of a western Gujarat tertiary care hospital. *International Journal of Pharmaceutical Quality Assurance*, 16(1), 1–6. <https://doi.org/10.25258/ijpqa.16.1.1>
10. Mani, V. C., & Anitha, N. (2021). Effectiveness of nursing care bundle on prevention of catheter associated urinary tract infection(CAUTI) among patients with indwelling catheter at selected hospitals, Salem. *IJSET - International Journal of Innovative Science, Engineering & Technology*, 8(5), 77–83. https://ijset.com/vol8/v8s5/IJSET_V8_I05_08.pdf
11. P., L., & Rao B., K. (2018). A study of risk factors for catheter associated urinary tract infection. *International Journal of Advances in Medicine*, 5(2), 334–339. <https://doi.org/10.18203/2349-3933.ijam20180525>
12. Lalia, H., Kumar, R. S., & Negi, R. (2025). A narrative review: The risk factors and prevalence of CAUTI among patients admitted in intensive care unit. *International Journal of Innovative Science and Research Technology*, 10(11), 2800–2805. <https://doi.org/10.38124/ijisrt/25nov1549>