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A Clinical, Bacteriological profile of uropathogensand their Antibiotic Sensitivity Pattern isolated from Catheter Associated Urinary Tract Infection (CAUTI) in a Tertiary Care Hospital, Bangalore

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ABSTRACT:
Introduction:Urinary tract infection attributed to the use of an indwelling urinary catheter and is oneof the most common infections acquired by patients in health care facilities.Catheter-associated urinary tract infection (CAUTI) ranks second among nosocomial infections in elderly patients after lung infections. Improper treatment can lead to death.
Objectives :Clinical, bacteriological profile, and antibiotic sensitivity pattern of Catheterassociated Urinary tract infection (CAUTI) and to calculate CAUTI rate.
Materials and Methods: The Patients admitted in intensive care unit (ICU), and different wards of Vydehi institute of medical sciences and research centre who were on urinary catheter insertion for >48 hours from September 2023 to August 2024 were included in the study. Under aseptic conditions urine samples were collected fromclinically suspected cases of CAUTI, the samples were processed in the department of Microbiology, asper standard protocols. Uropathogens were isolated, identified and subjected to antibiotic sensitivity test by using automated VITEK 2 compact system.CAUTI rate was calculated and results were noted.
Results: Among 2500 patients on catheter in ICUs and different wards, 13(0.52%) patients developed clinical signs or symptoms ofUTI. The incidence of CAUTI wassignificantly more in male population thanfemale. Out of 13 urine samples cultured, 9(69%) yielded growth of single organism and 4(31%) showed polymicrobial growth. E.coli was the most common uropathogen(45%). Total15290 catheter days were obtained of 2500 patients onindwelling catheter in ICU and different wards. Thus CAUTI rate was 0.85 per 1000 catheter days over a 12 months period.
Discussion and Conclusion: CAUTI remained a great burden to patient safety and a challenge to theinfection control team. Implementation of proper care bundles and continuous education to health careworkers plays a key role in reducing the CAUTI rates, thereby decreasing the morbidity and hospital stay to the patients.

keywords: CAUTI; Incidence; Antimicrobial sensitivity;Uropathogens;ICU

I. INTRODUCTION:

Hospital acquired infections (HAI) are the leading cause ofmorbidity and mortality throughout the world.[4]They directlyreflect on the quality care of the hospital. Catheter associated urinarytract infections (CAUTIs) occur with high incidence if preventiveprotocols are not maintained .The indwelling urinary catheter is an essential part of modernmedical care and a variety of different indwelling urinary catheters areused for various purposes. Urinary catheters are inserted to monitorthe various clinical parameters.[1]Catheter associated urinary tract infections constitute 40%-50% ofall hospital infections. Catheter associated Urinary tract infection (CAUTI) isthe most common among the device associated infectionsacquired from the hospital settings. Among hospitalacquired UTIs, approximately 75% are associated with aurinary catheters.[3] Between 15-25% of hospitalized patientsreceive urinary catheters during their hospital stay leadingto Catheter Associated Urinary Tract Infections (CAUTI)where care bundles are not practiced .Due to these infections there is increase inthe hospital stay of the patient along with increase in the use of higherantibiotics. The overall cost of health care also increases.Multiple risk factors can affect the occurrence of CAUTI .These include quality of aseptic technique, duration of catheterization,appropriate hand hygiene and care of catheter.The present study was undertaken to assess the incidenceof CAUTI in a tertiary care hospital, to identify theuropathogens associated with it and to detect their antibioticsensitivity pattern.

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Objectives: The present study was taken to identify the uropathogenscausing CAUTI, determining their susceptibility pattern andalso to calculate CAUTI rate.

Materials and Methods: The study was conducted in Microbiology Department of Vydehi Institute of medical sciences and research centre for theperiod of 12 months, from September 2023 to August 2024.All the Patients admitted in intensive care unit (ICU), and different wards of Vydehi Institute of medical sciences and research centre who were onurinary catheter insertion for >48 hours from September 2023 to August 2024were included in the study.The patients were screened for inclusion and exclusioncriteria. The criteria being considered are as follows:

Inclusion criteria: Patients on Foley's catheter for at least 48 hours will beincluded in the study.

Exclusion criteria: All patients with clinicaland signs suggestive of pre-existing UTI,catheter put out side hospitals or othersource for fever on admission and evidencewith alternative diagnosis other than CAUTI,Patients with history of sexually transmitted diseaseswere excluded from the study.

Materials and methods: Study design: This was the prospectiveobservational noninterventional study ofCatheter associated urinary tract infection(CAUTI) cohort, conducted in medical ICUsof a tertiary care teaching hospital over aperiod of 12 months (from September 2023 to August 2024) This study was approved by the researchand ethics committee. IEC clearance certificate wasshown to the patients and their consent was obtained,

Clinical diagnosis: The diagnosis ofsymptomatic CAUTI is often a diagnosis ofexclusion. Fever without localizing findingsis the usual presentation of CAUTI.Localizing signs or symptoms such ascatheter obstruction, acute hematuria, recenttrauma, suprapubic pain, or costovertebralangle pain or tenderness are helpful toidentify a urinary source of fever, but arepresent in only a minority of episodes ofpresumed symptomatic infection. Iflocalizing genitourinary findings are notpresent, fever in bacteriuric patients shouldbe attributed to urinary infection only whenthere are no other potential sources.

Microbiological diagnosis: Urine specimens for culturecollected directly from the catheter ortubing, to maintain a closed drainagesystemThe urine samples were subjected to wet mount forevaluating the presence of pus cells, epithelial cells, RBCsand microorganisms. Semi-quantitative culture of urinesamples was done by calibrated loop method on CLED agar (cystine–lactose–electrolyte-deficient agar and incubated in aerobic conditions at 37◦Cfor24-48 hours. The urine cultures of colony count $>10^2$colony forming units (CFU)/ML with no more than twospecies of microorganisms were considered as positivefor CAUTI and cultures showing growth of more thanthree types of bacteria were considered contaminated.Positive cultures were identified by automated VITEL2 compact system. Antibiotic susceptibility testing wasalso done by Automated VITEK2 compact system. Theantibiotics tested were ampicillin, amikacin, nitrofurantoin,cotrimoxazole, ceftriaxone,piperacillintazobactam,meropenem, cefuroxime, ciprofloxacin, vancomycin, penicillin, linezolid,trimethoprime sulfamethoxazole and norfloxacin. The CAUTIrate per 1000 urinary catheter days is calculated by dividingthe number of CAUTIs by the number of catheter days andmultiplying the result by 1000

II. RESULTS:

A total 2500 patients underwent Foleycatheterisation during study period of 12months duration. Out of them 13(0.85%) were identified as CAUTI .Out of 13 urine samples 9 (69%)samples grew monomicrobial organisms and 4(31%) samples grew polymicrobial organisms. The incidence of CAUTI wassignificantly more in male(85%) population than female(15%)(male: female-11:2) E.coli was the most common uropathogen(45%)

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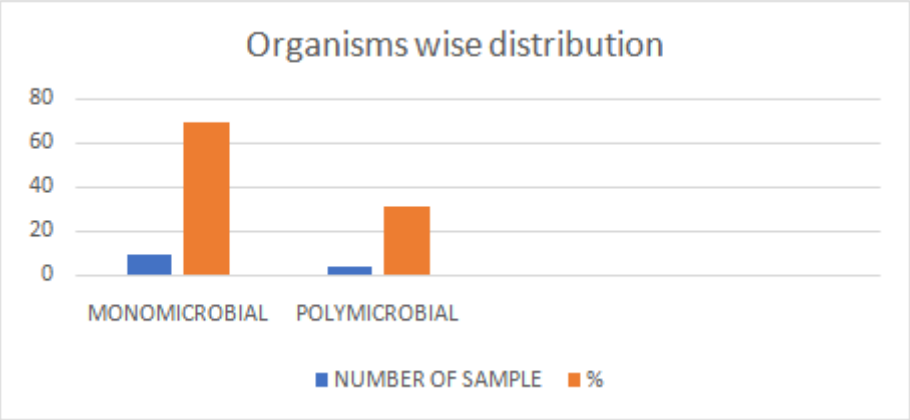
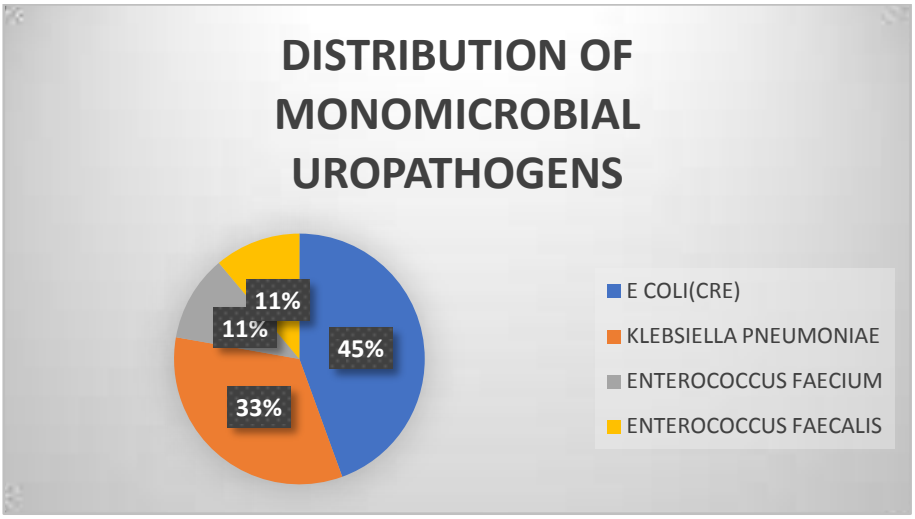
Table : Organisms wise distribution





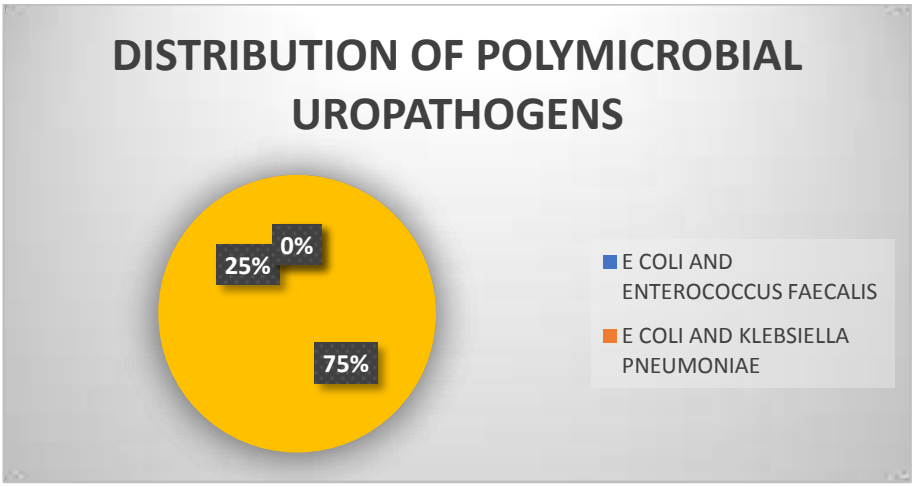


Figure: Sex distribution

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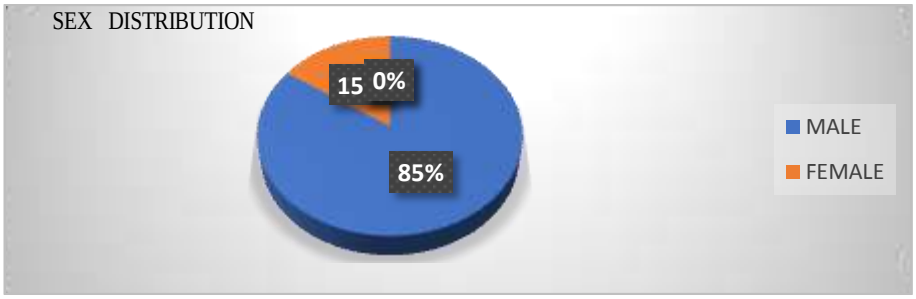

Antimicrobial sensitivity pattern for CAUTI bacterial isolates:

Isolates	PT	CFX	CEF	MRP	AK	CIP	TS	NIT	NF	P	VAN	L	HLG
E coli	2 (50%)	2 (50%)	2 (50%)	0 (0%)	3 (75%)	0 (0%)	3 (75%)	2 (50%)	2 (50%)	-	-	-	-
K.pneum	3 (100%)	3 (100%)	3 (100%)	2 (66%)	3 (100%)	0 (0%)	2 (66%)	2 (66%)	2 (66%)	-	-	-	-
Entero faecalis	-	-	-	-	-	1 (100%)	-	1 (100%)	1 (100%)	0 (0%)	1 (100%)	1 (100%)	0 (0%)
Entero faecium	-	-	-	-	-	1 (100%)	-	1 (100%)	1 (100%)	0 (0%)	1 (100%)	1 (100%)	1 (100%)

PT: piperacillin tazobactam, CFX: ceftriaxone,CEF:cefoperazonesulbactum, MRP: meropenem, AK: amikacin, CIP: ciprofloxacin, TS:trimethoprim sulfamethoxazole, NIT: nitrofurantoin, NF:norfloxacin, P: penicillin, VAN: vancomycin, L:linezolid, HLG: high level gentamycin

Calculation of CAUTI rate:

CAUTI rate = Number of catheter assosciated UTIs/ number of urinary catheter days X 1000

= 13/ 15290 X 1000

= 0.85

Hence CAUTI rate was 0.85 per 1000 catheter days over a 12 months period.

III. DISCUSSION:

CAUTIs pose a significant burden on patients, both in termsof morbidity and mortality. Catheter-associated urinarytract infections (CAUTI) continue to be among the mostcommon hospital acquired infections. Apart from increasedmorbidity and mortality there is a significant increasein length of stay in hospital and higher hospital costsfor patients and health systems. In our study, out of2500 patients on catheter in ICUs and different wards, 13(0.52%) patients developed clinical signs or symptoms ofUTI. The incidence of CAUTI wassignificantly more in male population than female. Out of 13 urine samples cultured, 9(69%) yielded growth of single organism and 4(31%) showed polymicrobial growth. 15290 catheter days were obtained of 2500 patients onindwelling catheter in ICU and different wards. Thus CAUTI rate was 0.85 per 1000 catheter days over a 12 monthsperiod.This is similar to the studydone by Nandini. M.S* et al,[4]Hanumantha S et al,[6]Sedor Jetal[5] ,Vishwajith et al.[7] Escherichia coli remain the commonbacterial isolate for patients who develop symptomsof UTI in a short course catheterization (3-5days).Enterobacteriaceae showed resistance to fluroquinolones,which is the commonly used drug for urinary tract infection.This is similar to the study done by nandini et al[4]. In this study lower rate of CAUTI wasdue to compliance towards adherence of infection controlpractices, hand hygiene and implementation of cathetercare bundle.This indicates measures like meticulousintervention in the form of avoiding unnecessary urinarycatheters, maintaining aseptic precautions at the time ofinsertion and removal of the catheters, appropriate cathetermaintenance practices, early catheter removal unless itis otherwise indicated, well defined antibiotic policy andproperly guided infection control programs can reduce theextent of multidrug-resistant pathogen not only in CAUTIpatients but also for the hospital in general.

IV. CONCLUSION:

To summarize, the findings from our study as wellas other studies indicate that CAUTI has become agreat threat to patient safety worldwide, remains as achallenge and emphasize the importance of active infectioncontrol programs to be implemented for surveillance ofinfection. Implementation of infection control practices isnecessary for prevention and control of CAUTI. Usage ofantimicrobial agents in suspected cases of CAUTI maybe withheld in ICUs and wards till

microbiology reports are madeavailable unless absolute need for empirical therapy isrequired in order to avoid emergence of resistant strains.So appropriate measures of educating the paramedicalstaff, strict infection control practices and an appropriateantibiotic policy, proper guided bundle care for bothprocedure and maintenance of catheter are the need of thehour to prevent the CAUTI which in turn can lessen theeconomic burden, work loss, and mental stress.

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Conflict of Interest: None.
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