



Research Article

STUDY OF CATHETER ASSOCIATED URINARY TRACT INFECTION RATE AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF ISOLATED ORGANISMS AT THE SPINE SUPER SPECIALITY INSTITUTE-GOVERNMENT HOSPITAL IN WESTERN INDIA

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Abstract- Background: Indwelling urinary catheters are commonly used for bladder drainage during hospital care. The most common complication is infection. Urinary tract infections account for about 40% of hospital-acquired (nosocomial) infections, and about 66-86% of these are associated with urinary catheters. The growing antibiotic resistance amongst the uropathogen isolated from CAUTI making difficult for its management. The study was aimed to find out rate of CAUTI and its antimicrobial susceptibility pattern. Methods: During daily rounds infection control nurse collects all the demographic data from the catheterized patients. It is scrutinized for the signs and symptoms as per CDC criteria for confirmation as CAUTI and urine samples are sent. Results: The rate of CAUTI was 4.9 per 1000 catheterized days in the present study. The most common uropathogen was *E. coli* followed by *K. pneumoniae*, followed by *Pseudomonas aeruginosa* and *Acinetobacter* species in the present study. Conclusion: The present study showed that if strict infection control practices are observed it is possible to reduce the rates of CAUTI. This study showed moderate to high resistance in uropathogens which is a concern for all. The CAUTI care bundle implementation helps in reducing the rates remarkably.

Keywords- Catheter Associated Urinary Tract Infections -CAUTIs, Health Care Associated Infection HAI, Multidrug Resistant Organism-MDRO

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Introduction

CAUTI is most common nosocomial infection; 80% of infection are associated with the use of an indwelling bladder catheter. Urinary Infections are associated with less morbidity than other nosocomial infections, but can occasionally lead to bacteremia and death. An infection of the urinary is involves any of the organs or structures of the urinary tract, including the kidneys, ureters, bladder, and urethra. Burning or pain in the lower abdomen, fever, burning during urination, or an increase in the frequency of urination are some of the common symptoms of a urinary tract infection are. HAI is most often caused by the placement or presence of a catheter in the urinary tract. Catheter Associated Urinary Tract Infections are the most common type of healthcare-associated infection. Catheter Associated Urinary Tract Infections (CAUTIs) that are hospital acquired. The Centers for Disease Control and Prevention (CDC) describes a urinary tract infection (UTI) as "an infection involving any part of the urinary system including urethra, bladder, ureters, and kidney". The National Healthcare Safety Network (NHSN) asserts that UTIs are the most common type of healthcare associated infection reported and that among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter. NHSN estimates that between 15-25% of all hospitalized patients receive urinary catheters during their hospital stay. Therefore, catheters should only be used for appropriate indications and should be removed as soon as they are no longer needed [1].

Materials and Methods

This was a prospective study undertaken in the tertiary care hospital.

Total 103 catheterized patients were included from January 2019 to September 2019. 898 catheter days was there in the study period. In the daily rounds the Infection control nurse collected all the details as per the HAI surveillance forms and the catheter care bundle forms. The laboratory reports were also discussed during daily rounds [2]. With the calibrated loop urine was cultured on blood agar media for quantitative analysis to assess the microbial counts. MacConkey agar media was also plated. The significant bacteriuria was 10⁵ cfu/ml was taken into consideration while confirmation as CAUTI. The identification and antimicrobial susceptibility were done by the disc diffusion test as recommended by CLSI guidelines [3-5]. The CAUTI care bundle implementation helps in reducing the rates which included reason for catheterization, explain the procedure, performed hand hygiene before and after Foley's catheterization, pericare Cleaning, Strict aseptic precautions, use a securement device, proper position urinary system to drain, use a dedicated container for measuring and emptying urine, maintained collection bag etc.

Results

Out of 103 catheterized patients, 16 developed CAUTI. The overall incidence was 17.82 per 1000 catheter days. The age and sex wise distribution of catheterized patients is shown in [Fig-1]. Male patients were more than the female patients for catheterization. Catheterization days ranged from 2 days to 21 days. The most common uropathogens were *Escherichia coli* (38.5%) and *Klebsiella pneumoniae* (32.5%) followed by *Pseudomonas aeruginosa* (17.6%) and *Acinetobacter* spp (11.4%) from the cases of CAUTI. The month wise rate of CAUTI [Table-1].

Table-1 Month-wise rate of catheter associated urinary tract infections (CAUTI)

Month	No of urinary catheter associated UTI s in a month	No of urinary catheter days in that month	Catheter Associated Urinary Tract Infection Rate
January	1	80	12.5
February	1	52	19.23
March	3	146	20.55
April	2	83	24.1
May	2	93	21.51
June	2	113	17.7
July	1	34	29.41
August	2	147	13.61
September	2	150	13.33
Total	16	898	17.82

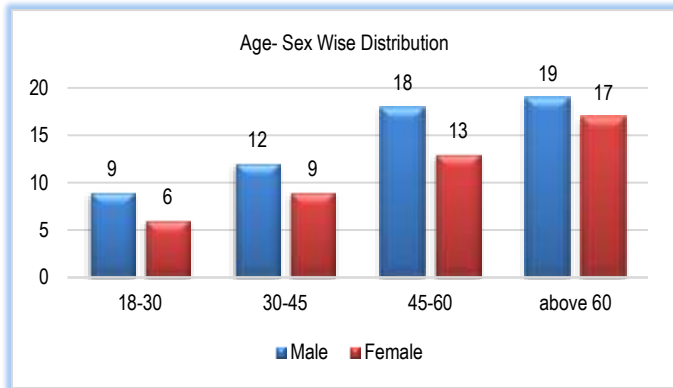
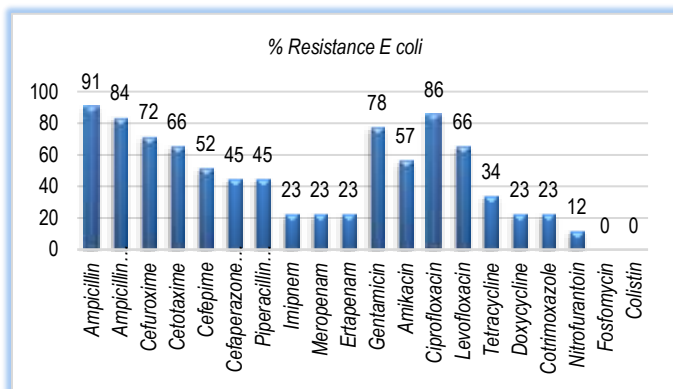
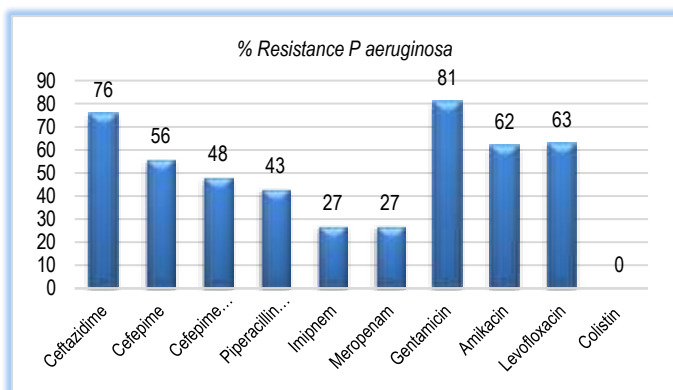


Fig-1 Age- Sex Wise Distribution

The multidrug resistant organisms especially the bacteria isolated from patients with CAUTI. Imipenem, Fosfomycin, Nitrofurantoin, Cotrimoxazole, tetracycline and Doxycycline were drug of choice

Fig-2 % Resistance pattern of *Escherichia coli*Fig-3 % Resistance pattern of *P aeruginosa*

Discussion

Catheter associated urinary tract infections (CAUTIs) are serious health affecting

problems in hospitalized patient [6]. The most common bacteria causing CAUTIs in hospitalized patients includes *E. coli*, *K. pneumoniae*, *P. aeruginosa*, *E. faecalis*, and *Candida species* [7,8]. The overall rate of CAUTI was 17.82 per 1000 catheter days. Incidence is high as compared to other studies as the patients admitted in Spine Institute are mostly with hemiparesis or paraparesis and they need long term hospitalization and all of them are vulnerable. are except for the months of March, April May and July the rates were high but after implementation of the CAUTI care bundles and the vigorous training and on site monitoring the rates reduced [9-11]. The reason of the fluctuation in the rate e in few months might be due to the untrained staff without the proper knowledge and practice about the infection prevention practices. The other major reason includes prolonged catheterization as a major risk factor for the development of CAUTI. The rates of the HAI including the CAUTI is shared to all the concerned staff during the rounds, HICC team and committee meetings. The infection control team monitors the compliance to the hand hygiene and the CAUTI care bundles. There are many other studies which had shown very high incidence of CAUTI in catheterized patients [12-16].

The sex of patient, not adhering to the infection prevention and control policies, catheter care bundles, duration of catheterization etc. can be the reasons for high rate of CAUTI. To keep low incidence of CAUTI in catheterized patients strict infection prevention practices are needed also compliance to the CAUTI care bundles like reason for catheterization, explain the procedure, performed hand hygiene before and after Foley's catheterization, pericare Cleaning, Strict aseptic precautions, use a securement device, proper position urinary system to drain, use a dedicated container for measuring and emptying urine, maintained collection bag etc. which can be achieved by frequent visits by infection control team members at different timings to catheterized patients daily to monitor the preventive bundles meticulously [17]. The uropathogens isolated from CAUTI cases were found to be Multidrug Resistant Organisms -MDROs. These findings correlate with various other studies where multidrug resistant uropathogens were isolated [18]. In the present study the most resistant uropathogens were *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Acinetobacter species*. which showed the high resistance to multiple antibiotics including imipenem and meropenem. Increase in the antibiotic resistance amongst the uropathogens indicates that they are hospital acquired and thus difficult to treat. Imipenem, Fosfomycin, Nitrofurantoin, Cotrimoxazole, tetra and Doxycycline were drug of choice This will be alarming if infection prevention practices are not followed during care of the catheterized patients. The chances of transmission of these multi drug resistant are high if health care workers do not follow preventive practices meticulously.

Conclusion

The catheterized patients are highly susceptible to urinary tract infection. Almost half of these patients who undergo short-term catheterization acquire urinary tract infection in seven days. An important problem identified with this kind of infection is the change in microbiological and antibiotic sensitivity pattern of the pathogens. There is an emergence of Multidrug Resistant Organisms-MDRO. The incidence of CAUTI rate in the present study was high in the month initially but after implementation of CAUTI care bundles the CAUTI rate was reduced by 17.82 per 1000 catheter days. To keep low incidence of CAUTI in catheterized patient's strict infection prevention practices are needed also strict compliance to the CAUTI care bundles and the hand hygiene is recommended.

Application of research: This study helps to know the rate of CAUTI in a chronic health care setting and the implementation of the strict infection prevention and control practices and reduce the rate of CAUTI. It also enlightened us with the therapeutic option

Research Category: Medical Microbiology

Abbreviations:

CAUTI-Catheter Associated Urinary Tract Infections

HAI- Health Care Associated Infection

MDRO- Multidrug Resistant Organism

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Study area / Sample Collection: Government Spine Institute Ahmedabad

Conflict of Interest: None declared

Ethical approval: The study was approved by Ethics Committee of Government Spine Institute Ahmedabad and study number was GSI-EC-6-1-2019. Ethical Committee Approval Number: GSI-EC-6-1-2019.

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