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Incidence of Catheter Associated Urinary Tract Infection in Admitted Patients in Tertiary Care Hospital in Central India

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ABSTRACT – CAUTI (catheter associated urinary tract infection) constitute a major problem in admitted patients. This is one of the problem that arises due to treatment related procedure and also it is preventable by proper precautions so it also reflects the quality of hospital care. In this study 116 patients admitted in medical wards were selected. Incidence of CAUTI was 49.1% , fever and dysuria were most symptoms. E.coli was most common organism found. Ampicillin resistance was most common among all organisms grown from samples of patients selected.

Keywords – CAUTI, HAUTI, Sepsis

I. INTRODUCTION

Hospital acquired infection/health care associated infections (HAI) are the leading cause of morbidity and mortality throughout the world.[1,2] Healthcare-associated infections arise as a complicating factor of healthcare. Apart from increasing the morbidity and emotional suffering among the patients, HAUTI escalates the medical care expenses in the form of prolonged hospital stay, lost work-days, laboratory costs, and the drug costs. A systematic review and meta-analysis published in 2011 has identified that data from developing countries are scarce.[3] Nevertheless, the meta-analysis has shown that in developing countries the healthcare-associated infection rate is 15.5% (CI: 12.6–18.8%).Frequency of HAUTIs among healthcare-associated infections is 12.9 (CI: 10.2–16%), 19.6 and 24% in the United States, Europe and developing countries, respectively.[3] In specific, HAUTI prevalence in countries ranges between 1.4 and 3.3%.[4-6]. Catheter associated urinary tract infections (CAUTIs) occur with high incidence if preventive protocols are not maintained.[7] The indwelling urinary catheter is an essential part of modern medical care and a variety of different indwelling urinary catheters are used for various purposes. Multiple risk factors can affect the occurrence of CAUTI.[8] These include quality of aseptic technique, duration of catheterization, appropriate hand hygiene and care of catheter. The urinary tract is considered one of the most important sources of health care–associated infections and the presence of a urinary catheter is a major risk factor, as it is associated with up to 80% of health care–associated UTIs. Catheter-associated UTIs (CAUTIs) are the most preventable type of health care–associated infection[9]. Therefore, appropriate prevention and management of CAUTIs are of utmost importance for every urologist and other health care personnel.

II. METHODS

It was hospital based, observational, cohort studies of Catheter associated urinary tract infection.The study was carried out at the Medical wards/ICCU/MICU in Dr BHIMRAO AMBEDKAR HOSPITAL, RAIPUR for duration of one year (April 2018 to March 2019). The total capacity of medical wards about 198 beds (include ward and Intensive care unit.) Diagnosis of CAUTI was done under the CDC guideline. Inclusion criteria were patients with an indwelling urinary catheter that had been in place for >2days on the date of event (day of device placement= DAY 1 and with either, Fever ($>38.0^0$ c), Supra-pubic tenderness, Costovertebral angle pain or tenderness, Urinary urgency, Urinary frequency, Dysuria.Patients with a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $>10^5$ CFU/ml. patients with following criteria were not included in study: Patients admitted with indwelling catheter in place for more than 2days, Patients with condom catheters, suprapubic catheters and percutaneous nephrostomy tubes.Those giving urinary culture positive at admission. After selecting case

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according to inclusion criteria and exclusion criteria, a baseline urine sample was collected for urine routine microscopy and culture from included patients, who admitted at medical wards in order to exclude those with a pre-existing urinary tract infection. These patients were followed daily till 48 hours after that second sample was collected by similar technique as above and sent for culture.The sample was cultured with Disc diffusion method and the microorganisms identified. During follow up the patients who developed symptoms suggestive of a UTI during the course, hence their urine sample collected and sent for culture, in order to diagnose catheter associated urinary tract infection according to the CDC guidelines. SPSS was used to perform the statistical analysis.

III. RESULTS

Age distribution in study subjects was noted. Maximum subjects were in age group </=30 years (35 subjects, 30.2%). Seventeen subjects (14.7%) were in age group 31- 40 years. Fifteen subjects were in fifth decade of their life (12.9%). In age group 51-60 years twenty subjects were present (17.2%) and >60 years age group had 29 subjects (25%).In our study 56 subjects were female (48.3%) and 60 (51.7%) others were male. Most common diagnosis in subjects presenting with symptoms of UTI was CVA in 33 subjects (28.4%) to be followed by poisoning in 14 subjects (12.1%). Nine subjects (7.8%) were diagnosed with chronic liver disease and respiratory tract infection. Meningitis was present in 8 (6.9%) and 7 subjects showed acute kidney injury (6%.) Six subjects (5.2%) each showed CAD and CCF while 4 subjects each were noted with Chronic kidney disease, Diabetes mellitus and diabetic ketoacidosis. 40 out of total 116 have received antibiotics for treatment of UTI previously while 78 subjects were not given history of any antibiotics use. Incidence of CAUTI was found to be 49.1% (n=57),32 out of 56(56.1%) in female and 24 out of 60(40%) in male subjects.

Table 1: Incidence of CAUTI

PATIENTS	No.	CAUTI	%
MALE	60	24	40
FEMALE	56	32	56.1
TOTAL	116	57	49.1

Total 13 subjects (11.2%) were found to be febrile in this study subjects showing symptoms of UTI. Out of other symptoms except fever, Most common symptom was dysuria in 5 subjects (4.3%) and suprapubic tenderness in 4 subjects(3.4%).41 (35.3%) subjects urine sample showed growth after 48 hours. And 14 other showed growth on follow up (12.1%). In urine culture in CAUTI subjects most common organisms to be identified was E. coli (18 subjects, 32.1% to be followed by Klebsiella (10 subjects, 17.8%). Candida albicans and Non fermenter species were identified in 4 subjects each (7.1%) Enterococcus species was detected in 9 subjects (16.1%). Maximum resistance was found to be for Ampicillin (43 subjects, 77 %) to be followed by ciprofloxacin (34 subjects, 59%) and norfloxacin (33 subjects, 59%). Cephazolin was found to be ineffective in 10 subjects (18%). Resistance to Nitrofurantoin and cefixime was noted in 13 subjects each (23%).

IV. DISCUSSION

One of the most common causes of healthcare associated infections is (Healthcare associated urinary tract infections) HAUTIs. HAUTI prevalence in countries ranges between 1.4 and 3.3%. They directly reflect on the quality care of the hospital. Catheter associated urinary tract infections (CAUTIs) occur with high incidence if preventive protocols are not maintained. The indwelling urinary catheter is an essential part of modern medical care and a variety of different indwelling urinary catheters are used for various purposes.

In a study by Bhayani et al[10], Out of 56 patients who developed CAUTI, there were 36 male (64%) and 20 female (36%). Twenty five percent of the patients were in the age group of 18–30 years. Thirty-two percent of the patients were in the age group of 31–59 years and 43% of the patients were 60 years and above. Age of subjects with CAUTI was 53.03 ± 17.45. This finding was similar to the study by Isikgoz Tasbakan et al. (Isikogaz et al. 2011).

Unlike in our study, Bhayani et al noted that out of 28 patients who developed non-CAUTI, there were 17 males (61%) and 11 females (39%). Thus Incidence was higher in male compared to female subjects in their study. Our finding was similar to the study by Morris et al[11] where number of male patients was more. Reason for this can be the number of male patients enrolled in the study was more as compared to the females.

Most common symptoms in our study was noted to be Fever, other common symptom was dysuria in 5 subjects (4.3%) and suprapubic tenderness in 4 subjects(3.4%).In urine culture in CAUTI subjects most common organisms to be identified was E. coli (18 subjects, 32.1% to be followed by Klebsiella (10 subjects, 17.8%). Candida albicans and Non fermenter species were identified in 4 subjects each (7.1%) Enterococcus species was detected in 9 subject (16.1%). A study by Chatterjee et al[12]. sampled 150 catheters from patients with no history of UTIs and found that 130 of the catheters had pathogens present both on the catheter and in accompanying urine samples. The most common microorganisms found during the study by Chatterjee et al. was Pseudomonas aeruginosa, Staphylococcus aureus, Staphylococcus epidermidis, Klebsiella pneumoniae, Proteus mirabilis, Proteus vulgaris, Escherichia coli, Citrobacter freundii, Providentia rettgeri, and Candida albicans. In long term catheterization that is by the end of 30 days CAUTI develops in 100% patients usually with 2 or more symptoms or clinical sign of haematuria, fever, suprapubic or loin pain, visible biofilm in character or catheter tube and acute confusion all state. B Hayano P[13] et al in their study noted that , Patient had the following signs and symptoms fever >38°C, suprapubic tenderness, urinary urgency, urinary frequency, and dysuria and patient had urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml. Also E. coli was the most common organism causing catheter and non-CAUTI. The increasing antimicrobial resistance against different antimicrobials is a common problem with urinary pathogens. Chronic indwelling catheters are an important reservoir of different multi resistant gram-negative organisms, such as extended spectrum beta-lactamase (ESBL) producing Enterobacteriaceae or carbapenem-resistant Enterobacteriaceae (CRE).Therefore multi resistant organisms are often causes of CAUTIs[14]. (Arnold L. 2013). In their study of metanalysis Peng et al[15] noted that for Escherichia spp, high rates of resistance to Ampicillin (87.3%), Levofloxacin(81.5%), and Nalidixic acid (79.5%) were observed. In contrast, low resistant rates to Ertapenem (6.2%), Meropenem (6.0%), and Imipenem (5.8%) were observed. The rate of resistance of Pseudomonas species was high to Ampicillin (88.3%) but low to Tobramycin (21.4%). Enterococcus species was highly resistant to Erythromycin (83.9%) and Ceftriaxone (81.8%) but presented a low rate of resistance to Vancomycin (3.4%). These studies are in strong coherence with our study findings.

V. CONCLUSION

HAUTIs are almost exclusively complicated UTI andmainly catheter associated. Healthcare-associated asymptomatic bacteriuria should not be treated with antimicrobials. except before traumatizing interventions of the urinarytract and in pregnant women. Besides of an adequateantibiotic therapy, the complicating factors need to be treated effectively. For initial empiric therapy, the localsusceptibility profile of common uro-pathogens such asE. coli must be known to choose the most appropriateantibiotic. In case of UTI with severe bacteraemia, it has beenshown that an inadequate initial antibiotic regimen has anelevated mortality. Before initiation of antibiotic therapy, aurine specimen for culture must be obtained to be able toadapt the antibiotic regimen to the susceptibility profile.Increasing antibiotic resistance requires a more prudent useof antimicrobial drugs also in the treatment of HAUTI.

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