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Surveillance of Catheter-Associated Urinary Tract Infection (Cauti) in Intensive Medical Care Unit at a Tertiary Care Hospital

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ABSTRACT

Background and objectives: Urinary tract infections (UTI) are the most common infections acquired in hospitals and long-term care facilities (LTCF). The major predisposing factor for healthcare associated UTI is the presence of an indwelling urethral catheter. The present study was carried out to measure the incidence rate of catheter-associated urinary tract infections (CAUTIs) in IMCU of a tertiary care hospital and to identify the risk factors, the etiologic agents and antibiotic resistance patterns associated with CAUTI.**Materials and Methods**: Prospective active surveillance of CAUTI was conducted in IMCU during a 1-month period from September 1, 2013 to September 31, 2013 in Tirunelveli Medical college Hospital using the standard Centers for Disease Control National Nosocomial Infection Surveillance (NNIS) case definitions. Rates were expressed as the number of infections per 1000 catheter days. **Results**: During the study period, 40 patients who have got catheters inserted after IMCU admission were monitored for a total of 94 patient catheter days. A total of 3 episodes of infection were diagnosed, for an overall rate of 31.91 CAUTIs per 1000 catheter days. Patients with Diabetes mellitus, patients above 35 years, patients with prolonged duration of catheterization, prolonged hospital and IMCU stay had a significantly higher risk of acquiring CAUTIs. The pathogens identified were Candida species and gram negative bacilli (Escherichia coli and Klebsiella pneumoniae). Both the gram negative bacilli were sensitive to Ofloxacin and were resistant to Aminoglycosides. **Conclusion**: Despite infection control policies and procedures, CAUTI rates remain a significant problem in Tirunelveli medical college hospital. Using the identified risk factors, tailored intervention strategies are now being implemented to reduce the rates of CAUTIs in the IMCUs.

KEYWORDS: Urinary tract infections (UTI), Catheter-Associated Urinary Tract Infections (CAUTIs), Catheter days, IMCU

Introduction

Urinary tract infections (UTIs) are commonly acquired in hospitals, with an estimated prevalence of1%-10%, representing 30%-40% of all nosocomial infections.1 The most important risk factor for the development of nosocomial UTIs, especially in the intensive care setting, is the presence of a urinary catheter.(UC)[1,2]Guidelines from the Centers for Disease Control (CDC) and the Society for Healthcare Epidemiology of America/Infectious Diseases Society of America describe various interventions for preventing catheter associated UTIs (CAUTIs) in intensive care units (ICUs).[3,4] Each of these recommendations is categorized on the basis of existing scientific evidence, theoretical rationale, applicability, and potential economic impact.

As part of the 5 Million Lives campaign endorsed by leading US agencies and professional societies, the Institute for Healthcare Improvement recommends that all intensive care units (ICUs) implement a bladder bundle aimed at reducing the incidence of CAUTI to zero.[5]However, in ICUs, UCs might be needed for extended periods, and the duration of catheterization is the most important risk factor for the development of a CAUTI.[6] In addition, ICU patients may be colonized with hospital-acquired organisms, and sometimes a UC must be inserted in urgent situations when optimal attention to aseptic technique might not be feasible.

Recent data suggest that non-ICU medical wards have considerably lower device utilization rates than medical ICUs.Unfortunately, however, there are little data regarding the prevention of CAUTIs in step-down units (SDUs). The types of organisms that most commonly cause hospital-acquired UTI change over time, but gram-negative organisms principally enteric gram-negative bacilli are responsible for the great majority of CAUTI cases.[6]

The present study was carried out to measure the incidence rate of catheter-associated urinary tract infections (CAUTIs) in IMCU of a tertiary care hospital and to identify the risk factors, the etiologic agents and antibiotic resistance patterns associated with CAUTI.

Materials and Methods

Study population

This cross sectional and prospective study was conducted after obtaining approval from institutional ethical committee during the month of September 2013.All the cases based upon the inclusion and exclusion criteria, admitted in the IMCU were included in this study. These patients when transferred to medical wards were followed up for two days to measure the incidence of CAUTI.Oral consent was obtained and a thorough clinical history taking, including history regarding any risk factors and a complete physical examination was done in each case.

Inclusion Criteria
Catheterised IMCU patients having at least one of the symptoms like fever (>38°C), polyuria, dysuria, suprapubic tenderness and having $\geq 10^5$ CFU/ml of one or two types of bacteria or culture-negative patients having at least two of the above-mentioned symptoms and one of the seven criteria defined by Centers for Disease Control and Prevention like nitrite test positivity, pyuria were included in the study.[7]

Exclusion Criteria
The patients with a pre-existing UTI

Non catheterised IMCU patients

Sample collection and processing
Urine was collected from the catheter of patients coming under the inclusion criteria by aspiration under sterile precautions and sent to the microbiology lab immediately. The samples were inoculated onto Blood agar (BAP), MacConkey agar (MAC) and Sabourad dextrose agar (SDA) plates. All plates were incubated at 37°C aerobically for 24 hours after which growth were examined and isolates were identified by colony characteristics, Gram Stain and standard biochemical procedures according to Cowan and Steel. Disc diffusion method of antimicrobial susceptibility test was performed on all isolates (except Candida) as described by NCCLS.

Results
During the study period, 40 patients who have got catheters inserted after IMCU admission were monitored for a total of 94 patient catheter days. The age and sex distribution of the subjects were depicted in **Table-1**. Majority of the subjects were above the age of 50 years (57.5%) and were males (67.5%). A total of 3 episodes of infection were diagnosed, for an overall incidence rate of CAUTI in our study is 7.5% with the density rate of 31.91 CAUTIs per 1000 catheter days. The association of the risk factors with CAUTI is shown in **Table-2**. Patients with diabetes mellitus, patients above 30 years, patients with prolonged duration of catheterization, prolonged IMCU stay had a significantly higher risk of acquiring CAUTIs. The pathogens identified were ***Candida*** species and Gram negative bacilli. (***Escherichia coli*** and ***Klebsiella pneumoniae***). Both Gram negative bacilli were sensitive to Ofloxacin and were resistant to Aminoglycosides.

Discussion
The incidence rate of CAUTI among patients in IMCU in the present study is 7.5% which is lower than previous studies.[8, 9] The density of CAUTI was 31.9 per 1000 catheter days in this study which is higher than other studies .[10, 11] CAUTI rates vary considerably when stratified by location type and in some instances, by location bed size and type of medical school affiliation of the facility. According to the cited NHSN Report, CAUTI rates range from low of 0.0 per 1000 catheter days to high of 35.2 per 1000 catheter days.

Patients with Diabetes mellitus, patients above 30 years, patients with prolonged duration of catheterization, prolonged hospital and IMCU stay had a significantly higher risk of acquiring CAUTIs in our study. Rosser and colleagues retrospectively reviewed 126 trauma ICU patients with sepsis and found that increased length of stay, length of catheterization, and age (more than 60 years) were independent factors associated with the development of nosocomial UTI.[12, 13]

Due to the small sample size, other risk factors, such as gender, places of insertion of catheter, perineal care and change of urinary drainage bags could not be substantiated. The pathogens identified in our study were ***Candida*** species and gram negative bacilli. (***Escherichia coli*** and ***Klebsiella pneumoniae***) which is in concordance with other studies.[6,14]

Multidrug resistance is a significant problem in urinary pathogens. Both the gram negative bacilli were sensitive to Ofloxacin alone and were resistant to Aminoglycosides, cephalosporins. These uropathogens are more resistant to antimicrobials compared with community acquired ones. The results were similar to previous reports.[15-18]

General strategies for preventing CAUTI include measures such as adherence to hand hygiene. Targeted strategies for preventing CAUTI include limiting the use and duration of urinary catheters, using aseptic technique for catheter insertion, and adhering to proper catheter care. Anti-infective catheters may be considered in some settings. Successful implementation of these measures might decrease urinary catheter use and CAUTI. Reducing the inappropriate use of catheters and development of novel technologies targeted against these increasingly multidrug-resistant pathogens may be useful in the prevention of CAUTI in our vulnerable patients.

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Table 1: Age and sex distribution of subjects

Age group(years)	Male	Female
0-10	0	0
11-20	1	3
21-30	7	0
31-40	2	1
41-50	3	0
>50	14	9
Total	27	13

Table-2- Association of CAUTI with Risk Factors

Risk factors	Total	CAUTI
Diabetes mellitus	6	2
Age >35 yrs	29	3
>5 days duration of catheterisation	5	2
Prolonged IMCU stay	8	2

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