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Urinary Tract Infection in Indoor Patients with Indwelling Foley's Catheterisation

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Abstract: CAUTI is the most prevalent nosocomial infections, especially in patients with medical ICU. The purpose of this study is to determine the independent risk factors for catheter-associated bacteria in the medical ICU such as age, sex, period of catheterization, length of stay in the hospital and antibiotic exposure during hospitalization. The 25% of hospitalized patients undergo urinary catheterisation and the incidence of infection is approximately 5-7% for each day of catheterisation. Out of the 196 patients 30 (15.30 %) patients were detected to have CAUTI. Catheterisation period was established as the most important independent risk factor for CAB and prior antibiotic exposure was not found to be a protective factor.

INTRODUCTION

Urinary tract is the most prevalent source of nosocomial infection (Richards *et al*., 2002; Laupland *et al*., 2002, 2005) and most of these infections are triggered by urinary tract instrumentation, primarily urinary catheterization. Most ICU patients require an indwelling urinary catheter to monitor urine output, a practice which increases infectious risk. The reality that 25-50% of nosocomial infections are attributed to the cumulative impact of the patient's own flora and such intrusive tools highlights the value of enhancing the usage and functionality of these products (Kasper *et al*., 2005). At least 10-15% of patients with indwelling urethral catheters, bacteriuria occurs. The chance of catheterization is approximately 3-10% a day. The bacteria usually causing such diseases are *E. coli*, *Proteus*, *Pseudomonas*, *Klebsiella*, *Serratia*, *Staphylococci*, *Enterococci* and *Candida* (Stamm, 1991). Clinically, the majority of catheter-associated infections cause minimal symptoms and no fever and are often resolved after the catheter is removed. Gram-negative bacteria, following CAUTI in 1-2% of cases is the most important known complication of catheter-induced UTIs. Bacteriuria associated with catheter is defined as a quantitative culture with >105 organisms/mL with no more than two distinct organism species. The present study was under taken to assess the incidence of CAUTI in a large tertiary care hospital, to assess the independent risk factors that aggravate catheter associated UTI, to identify the specific species associated with it and identify the trend of antibiotic susceptibility in isolated organisms from CAUTI cases and ideally decrease infection levels by enhancing asepsis in the handling and quicker removal of invasive products.

Aims and objectives: To determine the probability of catheter related to urinary tract infection. Assess risk factors for catheter-related UTI such as age, sex, catheterization period and comorbid illness. To determine the organism which causes urinary tract infection associated with the catheter. To determine their sensitivity to antibiotics.

Literature review: Around 40% of nosocomial infections arise in the urinary tract and >80% of such infections are due to an inhabiting catheter. CAUTI happens with a catheterization frequency of 3-10% a day (Warren, 2001; Maki and Tambyah, 2001). Bacteremia follows the infection in 2-4% (Stamm, 1991) and Septic shock and mortality in a number of cases. Bacteremia resulting from CAUTI has been three times as high as non-bacteriuric patients associated with case fatality rate.

Bladder drainage can be achieved by inserting a Foley catheter into the normal urethral route (termed transurethral catheterization) or by constructing an artificial corridor through the lower abdominal wall and the bladder (suprapubic catheterization). The faster and more efficient solution is transurethral catheterisation. The female urethra is small and has a length of 40 mm is rigid and smooth. The male urethra is 160 mm long, more sensitive and curved with complications that can result. A catheter's movement may be uncomfortable and the curvature of the urethra in the male may inflict harm to its end (Willette and Coffield, 2012). Some catheter designs are curved to reduce that risk. The biggest issue with suprapubiccatheterisation is the possibility of perforation of the intestine as the direction cannula is implanted (Ahluwalia *et al*., 2006). Guidelines for reducing morbidity connected with the use of suprapubic catheters have been published by the British Association of Urological Surgeons (Harrison *et al*., 2011). Catheter size is usually expressed in French gauge (Fr or FG ¼ circumference in mm). The normal practice is to use the smallest catheter compatible with good drainage (McGill, 1982): 12-16 Fr is usually adequate and only rarely is a catheter larger than 18 Fr necessary.

E. coli, s. *Epidermidis*, s. *Saprophytus* is the major pathogen for most urinary tract infections occurring after *Enterococcus*, *Proteus*, *Pseudomonas*, *Klebsiella*, Errata, *Staphylococci*, *Enterococci* and *Candida*. Some of these microorganisms are part of the natural bowel flora of the patient, although they may also be obtained by cross-contamination by certain patients or workers in hospitals or by access to contaminated solutions or non-sterile products. Pathogens in the urinary tract such as serratiamarcescens and pseudomonas cepacia are of specific epidemiological importance. Since, these microorganisms generally do not typically present in the gastrointestinal tract, their exclusion from catheterized patients indicates an exogenous means of acquisition.

MATERIALS AND METHODS

The study was conducted in a Tertiary Care Hospital in a period of 18 months, from 1 October, 2014 to 31 March, 2016. Study concept was an retrospective prospective analysis. Study set up a database during this time-frame that covers all adult patients needing an indwelling catheter for >48 h. Throughout their time in the unit these patients were catheterized and followed up from the date of entry until discharge or death. All patients of Age = 18 years who were admitted and catheterized for >48 h for various indication.

RESULTS AND DISCUSSION

As shown in Table 1, the total of 196 patients were examined in the study of which 118 (60.2%) were males and 78 (39.8%) were females.

Table 2 depicts that, out of 30 CAUTI patients, 24 were females and 6 were males. Mean age for male CAUTI patients was 48±20.99 and females was 53.76±19.25. Age range of male patients was 20-72 and female patients were 18-90.

Table 3 depicts that there were 43 type 2 diabetes mellitus and 153 non T2DM patients. Out of T2DM, 13 were CAUTI patients and 30 were non CAUTI patients. Proportion of T2DM patients was significantly high in CAUTI patients than in non CAUTI patients.

Table 4 depicts that out of 196 patients 17 had renal failure of which 11 had renal failure with CAUTI and 6 had renal failure without CAUTI. 179 patients had no renal failure. Proportion of renal failure was significantly high in CAUTI patients than in non CAUTI patients.

The incidence of CAUTI in various studies varied from 9-73.3%. Incidence was 15.30% in our study which is less than most of the above studies.

Table 1: Demographic data

Variables	Values
No of cases	196
Male	118
Female	78
Mean±SD age (years)	55.28±16.53
Age ranges	18-90 Years

Table 2: Mean age and sex wise distribution of CAUTI patients

Gender	No. (%)	Mean±SD age (Years)	Min age (Years)	Max age (Years)
Male	06 (20)	48 ± 20.99	20	72
Female	24 (80)	53.76 ± 19.25	18	90
Total	30	t = 0.611, p = 0.561		

Table 3: Distributions of cases according to type 2 diabetes mellitus

Variables	CAUTI	Non CAUTI	Total	χ^2 statistic	p-value
Diabetic	13(43.3)	30(18.1)	43	8.05	0.0046
Non diabetic	17(56.7)	136(91.9)	153		
Total	30	166	196		

Table 4: Incidence of CAUTI in renal failure

Variables	CAUTI	Non CAUTI	Total	χ^2	p-value
Renal failure	11 (36.7%)	6 (3.6%)	17 (8.7)	31.21	<0.0001
No renal failure	19 (63.3%)	160 (96.4%)	179 (91.3)		
<Total	30	166	196		

Kulkarni *et al*. (2014) observed that patients >40 years of age were more prone to experience CAUTI than those <40 years of age that had specific correlations of CAUTI with advanced age was seen by Bhatia *et al*. (2010), Lee *et al*. (2013) and Jaggi and Sissodia (2012).

Mulhall *et al*. (1998) observed, that age is not independently associated with the possibility of bacteriuria acquisition. Likewise, Johnson *et al*. (1990) noticed no correlation between UTI and advanced age. In the current study the isolated pathogens among bacteriuria patients were *E. coli*. (37.14%), *Klebsiella* (25.71%), Coagulase Positive Staphylococcus (17.14%), Acinetobacterbaumannii complex 11.42%), Pseudomonas Aruginosa (2.85%), *Staphylococcus* Haemolyticus (2.85%). In our study, the occurrence of Candida infection with an occurrence of 2.85 percent is also equivalent to other reports such as the Bhatia *et al*. (2010). CAUTI patients were most susceptible to Tigecycline, Colistin, Amikacin, Carbapenem, Nitrofurantoin, Cotrimoxazole and Fluroquinoles in our study (Kulkarni *et al*., 2014; Bhatia *et al*., 2010; Dimri *et al*., 2013; Taiwo and Aderounmu 2006).

CONCLUSION

The clinical importance of bacteriuria in ICU patients must be highlighted because the existence of bacteria in the bladder will contribute to urosepsis and extend hospital stays and is a source of multi-resistant bacteria. The occurrence of CAUTI was significantly high in females as compared to males. Patient with comorbidities like T2DM and renal failure found at increased risk of CAUTI. The duration of catheterisation is identified as the independent risk factor for CAUTI in this study. These results emphasize that a well-founded and limited period of catheterization will raising the incidence of CAB and are advised as preventive measures.

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