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RESEARCH ARTICLE

CATHETER ASSOCIATED URINARY TRACT INFECTION AT VASAVI HOSPITAL, BANGALORE, INDIA

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ABSTRACT

All healthcare urinary tract infections are caused by instrumentation of urinary tract. Catheter associated urinary tract infection (CAUTI) has been associated with increased morbidity, mortality, hospital cost and length of stay. It is usually caused by multidrug resistant strains; require higher antibiotics and these strains may spread to other patients. Duration of catheterization is directly related to the development of bacteriuria. Aim of the present study is to, identify CAUTI in relation to age, sex, department wise, days of catheterization, to isolate the aetiological agent and their antibiogram. To identify various risk factors in the causation of CAUTI and to bring down the incidence of CAUTI. Out of 384 catheterized patients (185 males, 199 females) majority of them belongs to the age of 61-70 (23.18%) followed by 19-30 (19.27%) years. CAUTI as per definition was found in 2 patients with rate of 1.56 /1000 catheterised days. The causative agents were Esch. Coli and Klebsiella pneumoniae which were multi drug resistant. Infection prevention policies are stringent in this institution, which helped infection control team to keep low incidence of CAUTI in the present study. This study provides baseline information in the context of incidence of CAUTI, to identify causative bacteria and their antibiogram for prophylactic and empiric therapy in these patients.

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INTRODUCTION

Indwelling intravascular and urinary catheters are essential components of modern medical care. Indwelling devices significantly increase the iatrogenic infection, particularly in an already fragile patient population (Sangamithra, 2017). Catheter associated urinary tract infection (CAUTI) is defined as infection occurring in patients with indwelling catheter for \geq to 48 hours with symptoms of UTI. Urinary tract infections are the most common type of health care associated infection, accounting for more than 30% of infections reported by acute care hospitals. All healthcare UTIs are caused by instrumentation of urinary tract. At the time of catheter insertion where organisms may be pushed into previously uninfected bladder. CAUTI has been associated with increased morbidity, mortality hospital cost and length of stay.

It is usually caused by multidrug resistant strains; require higher antibiotics and these strains may spread to other patients (Bagchi, 2015). Duration of catheterization is directly related to the development of bacteriuria. Aim of the present study is to find out, CAUTI in relation to age, sex, department wise, days of catheterization and associated co-morbidities. To Isolate the aetiological agent and their antibiogram, to identify various risk factors in the causation of CAUTI and to bring down the incidence of CAUTI.

MATERIALS AND METHODS

This is a prospective study from Feb 2019 Dec 2019. Ethical clearance was obtained from the institution. A total of 384 (males 185 and 199 females) catheterized patients admitted to hospital formed the study group. During daily rounds Infection control nurse takes all the details like name, age, sex, department wise, information regarding catheter days of each patient and were recorded. The selection criteria for inclusion in the study was patients above 18 years, of both gender and in whom an indwelling catheter was inserted in our hospital.

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Urine sample were collected from suspected cases of CAUTI, aseptically using a sterile needle and syringe from the distal end of catheter tube into sterile container and transported to the microbiology laboratory. Microscopy and culture using semi quantitative standard loop (0.01ml) method was used. Growth showing significant bacteriuria (10^5 bacteria/ml) was considered as CAUTI case. Bacterial identification was done by proteomic studies (MALDI TOF /MS-Biotyper). Antibigram was done using VITEK2-Compact.

RESULTS

Catheterized patients (384) age ranged from 19 to 97 years, 185 males and 199 were females. Two urine samples showed significant bacteriuria (10^5 bacteria/ml of urine).

Table 1 shows the age, sex and department wise distribution of catheterized patients. Table 2 shows days of catheterization and the microbe isolated. Table3: Month wise, catheter days and CAUTI rate in relation to catheterized days. Table4. Shows the antibiogram of isolates causing CAUTI. Figure1. Age, sex and section wise distribution of the catheterized patient.

DISCUSSION

In the present study catheterization was more in the age group of 61-70(23.18%) followed by 19-30(19.27%) years. CAUTI were found in the age group of ≥ 70 years and in male and female as reported by Sangamitra (Sangamithra, 2017). Several risk factors have been cited to be associated with CAUTI, advanced age, debilitation, underlying disease and prolonged catheterization (Sangamithra, 2017; Hooton, 2009; Tamegnon, 2016).

Table 1. Age, sex and section wise distribution of the catheterized patient

Age years	Surgery		Medicine		Total		Total	%
	Male	Female	Male	Female	Male	Female		
20-30	8	52	7	7	15	59	74	19.27
31-40	7	20	6	4	13	24	37	9.64
41-50	8	16	7	11	15	27	42	10.93
51-60	8	6	10	8	18	14	32	8.33
61-70	19	19	29	22	48	41	89	23.18
71-80	13	12	19	10	32	22	54	14.06
≥ 81	23	3	21	9	44	12	56	14.58
Total	86	128	99	71	185	199	384	
Total	214(55.73%)		170(44.21%)		48.18%		51.82 %	

Table 2. Month wise, catheter days and CAUTI rate in relation to catheterized days.

MONTH	NO. CASES	NO.DAYS	CAUTI	RATE/1000
Feb	29	130	0	
March	39	66	0	
April	32	76	0	
May	39	121	0	
June	44	63	0	
July	32	121	0	
Aug	28	68	0	
Sep	33	150	1	6.6
Oct	37	161	0	
Nov	36	156	1	6.4
Dec	35	163	0	0
Total	384	1275	2	1.56

Table 3. Age, sex, department, days of catheterisation and the organism isolated in two CAUTI case

Sl no	Age-yrs	Sex	Dept	No. days catheterized	Bacteria isolated
1	74	Male	Surgery CA liver with metastasis	8	Klebsiella spp
2	70	Female	Medicine-hypertensive Metabolic encephalopathy	11	Esch.coli

Table 4. Shows the antibiogram of isolates causing CAUTI.

Bacteria	Klebsiella spp (n=1)		Esch. Coli (n=1)	
	S	R	S	R
AK	S		S	
G	S			R
Cf		R		R
I	S		S	
M	S		S	
Cefepime		R		R
CFT		R		R
Cep/Sul	S			R
N		R	S	
CO		R		R
PIT	S			R

A-Amikacin, G-Gentamycin, Cf-Ciprofloxacin, I-Imipenem, M-meropenem, CP-Cefepime, CFT-Ceftrioxone, Cep/Sul-Cefoperazone/sulbactam, N-Nitrofurantoin, CO- Cotrimoxazole, PIT-Piperacillin-Tazobactam

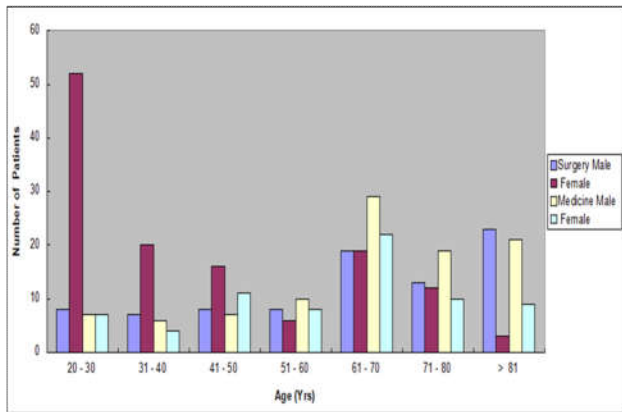


Figure 1. Age, sex and section wise distribution of the catheterized patient

Among catheterized patients females (51.87%) were more than the males (48.18%), is in correlation with the study of Kakaria et al, Graves et al, where as Raminder et al has reported more in males (60.24%) (Kakaria, 2018; Graves, 2017; Raminder, 2018). Males are prone to obstructive urinary lesion due to prostate hypertrophy, CA prostate and stricture associated with advanced age (Sangamithra, 2017). Females are more in our study among catheterized category due to caesarian section. Prolonged catheterization is one of the significant factors for the development of CAUTI as in the present study and others study (Hooton, 2010; Chanda, 2015). Catheter may serve as portal for the pathogen if not aseptically inserted (Graves & Barbera) CAUTI is most common cause of nosocomial infection (Graves, 2007; Barbara, 2004; Naveen, 2016). The majority of the patients belongs to surgical department (55.73%) compared to medicine (44.21%) where as Raminder reports more in medicine. In surgical department where complete hygiene is maintained during catheterization. Data from India representing CAUTI as per CDC guidelines are very low (Areena, 2017). The rate of CAUTI in the present is 1.56 /1000 catheterised days is in correlation with the study of Areena et al, where as others have reported more (Areena, 2017; Mohammad, 2015; Taneja, 2013; Karkee, 2017). Rate vary in other studies from India (Mehta et al., 2016). This was achieved by active Infection control nurse, continuous monitoring of compliance about hygiene practice, maintenance of bundle care, daily visit to all catheterized patients, regular catheter care and educating nurses regularly. In this study CAUTI found in one male and one female who were ≥ 70 years with chronic diseases may be due to weak immune status and underlying disease (Tamegnon, 2016).

CAUTI is usually caused by bacteria that are resistant to multiple drugs. In the present study Esch.coli and Klebsiella pneumoniae are the causative agents of CAUTI as reported by others (Sangamithra, 2017; Chanda, 2015; Areena, 2017; Karkee, 2017; Shiva, 2017). Previous report from this hospital on UTI, Esch.coli was the predominant pathogen in the causation of UTI (Vijaya, 2019). Esch.coli plays an important role as this bacteria possess some pili capable of binding to the urinary epithelium and preventing their elimination by urine (Tamegnon, 2016). CAUTI could be either due to endogenous or exogenous organisms. Also with the use of higher end antibiotics, there is change in flora and harboring of resistant pathogens. These patients could be a source of multidrug resistant organism. Antibigram of the isolates in the present study showed drug resistance to various antibiotics as shown in table 4 similar to others study (Areena, 2017; Shiva et al., 2017).

If there is breach in aseptic technique by a healthcare worker the most important being hand hygiene, it could spread to other patient or environment (Hooton, 2009). Most effective way to reduce the incidence of CAUTI is to avoid indwelling catheterization if at all possible, or at least to reduce the length of time the catheter remains in the bladder. Infection control plays a major part, training, education, creating awareness for hand hygiene practice among healthcare workers. Data collection and analysis form an integral part of surveillance. Monthly infection rate to be documented, so that measures are taken in case there is increase in rate.

Conclusion

This study provides baseline data on incidence of CAUTI in our set up, gives information of microbial flora along with susceptibility and resistance patterns of the isolates, which will help the clinician to select the appropriate antibiotics. The present study reports low incidence of CAUTI (1.56/1000) was achieved by frequent visits of infection control nurse and infection control officer regularly to catheterized patients to monitor the preventive bundle care, like hand hygiene, aseptic technique, close drainage system and catheter care etc.

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