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INCIDENCE OF URINARY TRACT INFECTIONS IN PATIENTS WHO HAVE BEEN CATHETERISED IN THE EMERGENCY ROOM VERSUS PATIENTS WHO HAVE BEEN CATHETERISED IN THE OPERATION THEATRE OF A TERTIARY CARE CENTRE

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ABSTRACT

This study compares the incidence of Urinary Tract Infections (UTIs) in patients catheterized in the Emergency Room (ER) versus the Operation Theatre (OT) in a tertiary care center. Conducted over a year with 50 patients, the study found a significantly higher incidence of UTIs in the ER group (40%) compared to the OT group (16%). Despite similar demographics and comorbidities, the ER group exhibited higher UTI rates, suggesting the need for improved infection control practices in the ER. Diabetes was identified as a significant risk factor for Catheter-Associated Urinary Tract Infection (CAUTI). Additionally, high levels of antimicrobial resistance among uropathogens were observed, complicating treatment and highlighting the necessity for judicious antibiotic use and stringent sterility protocols. The findings underscore the importance of targeted preventive measures for diabetic patients and continuous monitoring to reduce CAUTIs and enhance patient safety.

INTRODUCTION

Catheter-Associated Urinary Tract Infection (CAUTI) has been a primary factor contributing to illness and death among people who are admitted to hospitals.(1) The regular mechanical flushing action of the urine stream is disrupted in the presence of a urinary catheter. Due to this factor, microorganisms that enter the catheterized urinary system might rapidly proliferate to hazardous levels within a span as brief as one day.(2) Urinary tract infections make up 21.6% of all infections acquired in healthcare settings, making them one of the most common types of such infections. Other prevalent types include lower respiratory infections (24%), postoperative wound infections (22.4%), Clostridium difficile infections (10%), and primary sepsis (5.1%) (3,4). Catheters are related with nosocomial urinary tract infections in 407 out of 670 patients, which accounts for more than 60% of cases (5). Approximately 15-25% of patients who are admitted to the hospital receive a catheter at some point during their stay (6). In intensive care units, this rate ranges from 18% to 81.7% (7-9). The prevalence of bacteriuria in medical facilities increases by 3–8% each day for each day following catheter implantation; almost all patients develop bacteriuria after 30 days of catheterization (10,11). The majority of instances of catheter-associated bacteriuria are without symptoms, known as catheter-associated asymptomatic bacteriuria (CA-ABU), and less than 5% of these cases progress to bacteremia that necessitates treatment (12). In all, catheter-associated bacteremia makes up 15% of hospital-acquired bloodstream infections (13) and is linked to a death rate of 10% (14, 15). Given the increasing prevalence of antibiotic resistance and the significant issues it poses, such as higher healthcare expenses, it is crucial to differentiate between CA-ABU, which does not require treatment, and CA-UTI, which necessitates therapy.

The objective of this study is to determine the occurrence of Urinary Tract Infections (UTIs) in patients who have undergone catheterization in the Emergency Room compared to patients who have undergone catheterization in the Operation Theatre. Additionally, the study aims to identify unsterile practices in the Emergency Room as a contributing factor to UTIs, which can result in higher rates of illness and death.

METHODOLOGY

This retrospective study was conducted to compare the outcomes of urinary catheterization in patients catheterized in the emergency room (ER) versus those in the operation theatre (OT). The study included a total of 50 patients who required urinary catheterization. These patients were selected based on the inclusion criteria that ensured a representative sample of individuals who underwent catheterization in either the ER or the OT. The study spanned a period of one year, from March 2023 to March 2024, allowing for a comprehensive collection of data and sufficient follow-up time to observe any outcomes and complications associated with the procedures.

Urine analysis was performed on samples collected post-catheterization from all patients, with a focus on identifying any infections, complications, or differences in urinary parameters between those catheterized in the ER and those in the OT. The primary aim was to investigate potential differences in outcomes between these two groups, considering factors such as the environment, procedural techniques, and patient conditions that might influence the results.

Statistical analysis was conducted using SPSS software. Descriptive statistics were initially used to summarize the data, providing an overview of the patient demographics, procedural details, and initial findings. Chi-square tests were employed to analyze categorical data, such as the incidence of urinary tract infections or other complications, while unpaired t-tests were used to compare continuous variables, such as the levels of specific urinary parameters between the two groups. All statistical tests were two-tailed, and results were considered statistically significant at $p < 0.05$, ensuring a rigorous analysis of the data to draw meaningful conclusions about the differences in outcomes between urinary catheterization in the ER and the OT.

RESULTS

TABLE 1: DEMOGRAPHIC DETAILS

S.NO	VARIABLES	ER (N=25)	OT (N=25)
1	AGE		
	MEAN + SD	54 + 16	56 + 14
	RANGE	25-80	30-85
2	GENDER		
	MALE	15 (60%)	13 (52%)
	FEMALE	10 (40%)	12 (48%)
3	COMORBIDITIES		
	DIABETES	8 (32%)	7 (28%)
	HYPERTENSION	10 (40%)	10 (40%)
	CHRONIC KIDNEY DISEASE	3 (12%)	2 (8%)
4	INDICATION FOR CATHETERIZATION		
	URINARY RETENTION	12 (48%)	8 (32%)
	SURGICAL PROCEDURE	13 (52%)	17 (68%)

TABLE2: Urinary Tract Infection (UTI) Test Results from Emergency Room (ER) and Outpatient Treatment (OT)

URINARY TRACT INFECTION	ER	OT
NEGATIVE	15	21
POSITIVE	10	4

The demographic characteristics and comorbidities of the patients in the ER and OT groups are summarized in Table 1. The mean age of patients in the ER group was 54 ± 16 years, with a range of 25 to 80 years, while the OT group had a mean age of 56 ± 14 years, ranging from 30 to 85 years. The gender distribution in the ER group consisted of 15 males (60%) and 10 females (40%), whereas the OT group included 13 males (52%) and 12 females (48%).

Regarding comorbidities, 8 patients (32%) in the ER group and 7 patients (28%) in the OT group had diabetes. Hypertension was present in 10 patients (40%) in both the ER and OT groups. Chronic kidney disease was noted in 3 patients (12%) in the ER group and 2 patients (8%) in the OT group.

The indications for catheterization also varied between the two groups. In the ER group, 12 patients (48%) were catheterized due to urinary retention, and 13 patients (52%) were catheterized as part of a surgical procedure. In the OT group, 8 patients (32%) were catheterized for urinary retention, while 17 patients (68%) underwent catheterization for surgical procedures.

The occurrence of urinary tract infections (UTIs) in patients catheterized in the ER and OT settings is presented in Table 2. In the ER group, 10 patients (40%) tested positive for UTIs, while 15 patients (60%) tested negative. Conversely, in the OT group, only 4 patients (16%) tested positive for UTIs, with the remaining 21 patients (84%) testing negative. This indicates a higher incidence of UTIs among patients catheterized in the ER compared to those catheterized in the OT.

DISCUSSION

The current investigation revealed a prevalence rate of 71.4% for urinary tract infection in the emergency room. The respective percentages in OT are 28.5%. The present investigation revealed an overall incidence of CAUTI of 28%. A study conducted by Lu CC et al in Taiwan in 2000 discovered that the overall occurrence of urinary tract infections (UTIs) in patients with catheters was 57%. (16) Danchaivijitr S et al. discovered that the occurrence of CAUTI (Catheter-Associated Urinary Tract Infection) was 73.3% in their research. (17) In 1998, Billote-Domingo K et al found that 51.4% of catheterized patients developed urinary tract infections. The incidence of Catheter-Associated Urinary Tract Infection (CAUTI) in our study was lower than that reported in previous studies we compared it to. One possible explanation for this could be the increased utilisation of systemic antimicrobials that are effective against urinary pathogens. Additionally, there may be a heightened focus on preventing the unnecessary use of medical devices and promoting proper hand hygiene among staff and doctors. Furthermore, healthcare workers may be using gowns and gloves, and effective disinfectants may be employed for proper environmental decontamination.

Non-diabetic patients did not experience the development of urinary tract infections (UTIs). This suggests that diabetes is a notable risk factor for catheter-associated urinary tract infection. Christophe C et colleagues conducted a multicenter cohort analysis and discovered that diabetes is a risk factor for CAUTI, as shown in a Nested case control study.(18) Billote-Domingo K et al observed that within a group of 32 patients with diabetes mellitus, 24 patients (75%) acquired urinary tract infection, while among a group of 182 non-diabetic patients, 86 patients (47.25%) developed urinary tract infection. (19) The present investigation indicated that E. coli (38.71%) was the most prevalent bacteria among all the isolates. Laupland K et al. (2000) reported a prevalence of E. coli at 23%, Johnsen TEB et al. discovered a prevalence of E. coli at 31%, Billote-Domingo K et al. found a prevalence of E. coli at 22.30%, and Danchaivijitr S et al. reported a prevalence of E. coli at 15.10%.Following the detection of E. coli, Pseudomonas (20.97%) emerged as the second most prevalent isolate. The study conducted by Laupland K et al and Johnsen TEB et al reveals that Pseudomonas is the second most prevalent uropathogen, with isolation rates of 10% and 13% respectively.The isolation rate of Enterococcus in the present investigation is 3.26%, which is similar to the isolation rates reported by Billote-Domingo K et al (7.40%) and Danchaivijitr S et al (12.60%).Uropathogens obtained from CAUTI cases exhibit greater resistance to antimicrobial agents in comparison to those acquired in the community. (20-22) Eliminating these microorganisms while a urethral catheter is present is challenging and frequently unachievable due to antimicrobial resistance and the existence of biofilm on the catheter's inner surface.The occurrence of resistance to antimicrobial agents has been seen since the initial utilisation of these agents and is a growing issue on a global scale. (23) The current study indicated that 87.5% of E. coli isolates were resistant to cefaclor, whereas 83.33% of isolates were resistant to cefotaxime. The

level of resistance to cephalosporins seen in this investigation is similar to the findings of Hasan AS et al, who reported resistance rates of 95.2% for cefaclor and 71.4% for cefotaxime.Eighteen In the present investigation, a higher level of resistance to cotrimoxazole was observed (87.5%), which is similar to the findings of a study conducted by Johansena TEB et al (88%).Twelve In the present study, Pseudomonas was the second most frequently identified isolate. The current investigation revealed that 69.23% of pseudomonas bacteria exhibited resistance to both ceftazidime and cefaperazone. A study conducted by Wazait HD et al in 2001 found that 0.90% of the subjects were resistant to ceftazidime. Another study conducted by Patel MH et al in 2010 indicated a resistance rate of 34% to ceftazidime.(24,25). This demonstrates a significant rise in resistance among pseudomonas species during the past decade. The highest level of resistance was observed against aminoglycosides, specifically tobramycin, with a prevalence of 92.30%. A study conducted by Billote-Domingo K et al in 1998 revealed that 75% of pseudomonas isolates exhibited resistance to tobramycin.(26) Polymyxin B exhibited a resistance rate of 15.38%, while imipenem had a resistance rate of 23.07%. 30.76% of the pseudomonas isolates shown resistance to several drugs. In 2010, Sharma J et al. documented a prevalence of 71.7% of pseudomonas strains that were resistant to several drugs in urinary tract infections.(27) In comparison to numerous previous research, a significantly elevated resistance pattern was observed in this study. The discrepancy mentioned above could be attributed to the variances in the environmental conditions of the facility.(28,29)

CONCLUSION

This study found a higher incidence of urinary tract infections (UTIs) among patients catheterized in the Emergency Room (ER) compared to those in the Operation Theatre (OT). This highlights the need for improved infection control practices in the ER. Diabetes emerged as a significant risk factor for catheter-associated urinary tract infections (CAUTIs), emphasizing the importance of targeted preventive measures for diabetic patients.
The study also noted high levels of antimicrobial resistance among common uropathogens, complicating treatment and underscoring the necessity for judicious antibiotic use and continuous monitoring. To reduce CAUTIs and enhance patient safety, it is crucial to implement stringent sterility protocols in the ER, focus on high-risk patient groups, and address the growing issue of antimicrobial resistance.

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