



Frequency of Urinary Tract Infection in Patients with Indwelling Catheters

Ifrah Amjad Mir¹, Muhammad Arslan²

¹Department of Internal Medicine, Shaukat Khanum Memorial Cancer Hospital & Research Centre, Pakistan.

²Infectious Diseases and Internal Medicine, Mujahid Hospital, Pakistan.

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Correspondence to: Ifrah Amjad Mir, Department of Internal Medicine, Shaukat Khanum Memorial Cancer Hospital & Research Centre, Pakistan.

Email: ifrahmir.22@gmail.com

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ABSTRACT

Objective: "To determine the frequency of urinary tract infection in patients with indwelling catheters". **Study design:** Cross Sectional study. **Study place and duration:** Department of Medicine, Shaukat Khanum Memorial Cancer Hospital & Research Center Lahore from 24-1-2024 to 24-5-2024. **Methodology:** Patients were included from medical wards. Demographic details, medical history duration of hospital admission, were also noted. Then fresh urine sample was taken for culture examination. Reports were obtained and if bacterium detected, then urinary tract infection was labeled. All the data was recorded in a Performa and analysed in SPSS. **Results:** The mean age of patients was 51.20 ± 12.45 years. There were 73 (58.4%) males and 52 (41.6%) females. Urinary tract infection was positive in 95 (76%) patients who were admitted in hospital and received indwelling catheterization. The most common pathogen detected in urine samples was *Escherichia coli* [56 (44.8%)], followed by *Pseudomonas aeruginosa* [18 (14.4%)], *Klebsiella pneumoniae* [12 (9.6%)], *Enterococcus* species [11 (8.8%)], *Candida albicans* [9 (7.2%)], *Candida tropicalis* [8 (6.4%)], *Trichosporon asahii* [5 (4.0%)], *Staphylococcus aureus* [4 (3.2%)]. **Conclusion:** Thus, the chances of Urinary tract infection in hospital admitted patients are high who received indwelling catheterization.

INTRODUCTION

In addition to being inserted for convenience, urinary catheters are also used for therapeutic and diagnostic purposes. The risk of bacteriuria, which can be clinically benign or develop into a dangerous illness, is increased when a catheter is present. Apart from removing catheters when they are no longer required, there is generally disagreement over the best course of action for treating catheter-associated UTIs. ¹ Catheter-associated urinary tract infections are those in which a positive culture was obtained more than two calendar days after an indwelling urinary catheter was placed. Urinary tract infections and bacteriuria are more common in patients with indwelling bladder catheters. The symptoms could indicate sepsis or be ambiguous.^{2,3}

Extended usage of the urinary catheter is the primary risk factor for catheter-associated infections.⁴ As a result, catheters should only be used when absolutely essential and removed as soon as they are no longer needed. Infection control systems in healthcare facilities must develop and monitor strategies to prevent catheter-acquired urinary infections, including monitoring catheter use, appropriateness of catheter indications, and

consequences.⁵ The daily rate of bacteriuria following catheter implantation is 3–10%. Asymptomatic bacteriuria develops in 10–30% of people who have short-term catheterization (2-4 days). Bacteriuria develops in 90–100% of individuals who have long-term catheterization. Only 5–10% of nosocomial UTIs are linked to genitourinary manipulation, whereas 80% are connected to urethral catheterization.^{6,7} New preventative measures, including as immunization, bacterial interference, and catheter coatings and materials, are being researched and developed. The pipeline of antibiotics is still lacking, thus novel methods for finding new antibiotic families and logically creating substitutes for small molecule inhibitors are being developed to treat CAUTI.⁸⁻¹⁰

The purpose of this study is to ascertain the prevalence of UTIs in individuals who have indwelling catheters. Urinary tract infections are common in individuals with indwelling catheters, according to published research, and risk increases with increase in duration of hospital stays and catheter use. But there is no study conducted before in local population, which could help us to determine the extent of problem in local

population. Therefore, there is a need to conduct study and get evidence for local population, Because of inadequate resources and high-risk individuals, urinary tract infections are already common and dangerous in Pakistan. In order to gather evidence for the local people and for future research, we wish to perform this study, we can be able to implement screening of patients for urinary tract infection and make every possible option to deter the chances of urinary tract infection. This will improve our practice and we can plan strategies to prevent patients from developing urinary tract infection due to indwelling catheter.

METHODOLOGY

This Cross Sectional study was conducted at Department of Medicine, Shaukat Khanum Memorial Cancer Hospital & Research Center Lahore from 24-1-2024 to 24-5-2024. Sample size of 125 cases is calculated with 95% confidence level, 8% margin of error and percentage of urinary tract infection i.e. 21% in patients with indwelling catheter.¹¹ Patients who fulfilled following selection criteria were enrolled by applying Non-probability, consecutive sampling technique.

Inclusion Criteria

Patients of age 16-75 years of either gender admitted in intensive care unit and have indwelling catheter (placement of catheter in urinary bladder to pass the urine through duct in a collection bag in hospital admitted critical patients >2 days) were enrolled in the study.

Exclusion Criteria

Patients with recurrent episode of urinary tract infection or already taking antibiotics for urinary tract infection, or infection before admission or before placing catheter (on medical record) or renal failure (serum creatinine >1.8 mg/dl, or on dialysis) were excluded from the study.

Patients were included from medical wards. Demographic details, and duration of hospital admission were also noted. Then fresh urine sample was taken in a sterile container from catheter bag and was sent to the laboratory of the hospital for culture examination. Reports were obtained and findings will be recorded. If there was presence of two or more following symptoms compatible with UTI without other identifiable source in a patient with indwelling urethral, indwelling suprapubic or intermittent catheterization. Compatible symptoms included fever (>100°F temperature), suprapubic or costovertebral angle tenderness, hypotension (<90/60 mmHg), altered mental state (GCS<15), and detection of bacterium $\geq 10^3$ colony forming units detected on urine culture, then urinary tract infection was labeled.¹² Patients with urinary tract infection were managed as per standard protocol. All the data was recorded in a Performa.

Data was entered and analyzed by using SPSS 25. Urinary tract infection was presented as frequency and percentage. Data was stratified for age, gender, BMI, and duration of admission. Post-stratification, chi-square test was applied to compare urinary tract infection in stratified group, keeping P-value ≤ 0.05 as significant.

RESULTS

In this study, we recruited 125 hospital admitted critical patients with the mean age of 51.20 ± 12.45 years. There

were 73 (58.4%) male patients who received indwelling catheter during hospital stay, while 52 (41.6%) were females. Out of 125 patients, 36 (28.8%) patients received Percutaneous nephrostomy, out of which 23 (18.4%) had unilateral catheterization while 13 (10.4%) had bilateral catheterization and 89 (71.2%) patients received Urinary Catheterization, out of which 85 (68.0%) had Foley's insertion while 4 (3.2%) had silicon tube. The mean duration of catheterization was 2.41 ± 0.70 days. Table-I

In this study, we observed urinary tract infection was positive in 95 (76%) patients who were admitted in hospital and received indwelling catheterization. Figure-I

The most common pathogen detected in urine samples was Escherichia coli [56 (44.8%)], followed by Pseudomonas aeruginosa [18 (14.4%)], Klebsiella pneumonia [12 (9.6%)], Enterococcus species [11 (8.8%)], Candida albicans [9 (7.2%)], Candida tropicalis [8 (6.4%)], Trichosporon asahii [5 (4.0%)], Staphylococcus aureus [4 (3.2%)]. Some rare species were also detected including Burkholderia cepacia, Corynebacterium striatum, Morganella morganii, Proteus mirabilis, Providencia stuartii, Serratia marcescens, Staphylococcus epidermidis and Stenotrophomonas maltophilia [1 (0.8%) each]. Table-II

Data was stratified to check the effect of age, gender, duration and type of catheterization used on occurrence of urinary tract infection in critically ill admitted patients and found no association of urinary tract infection with age, gender, duration and type of catheterization used (p-value > 0.05). Table-III

Table I

Basic characteristics of patients enrolled in the study (n = 125)

Parameter	Mean \pm SD, f (%)
Ag, in years	51.20 \pm 12.45
Gender	
Male	73 (58.4%)
Female	52 (41.6%)
Type of catheterization	
Percutaneous nephrostomy - Unilateral / Bilateral	23 (18.4%) / 13 (10.4%)
Urinary Catheterization - Foley / Silicon	85 (68.0%) / 4 (3.2%)
Duration of catheterization (days)	2.41 \pm 0.70

Figure 1

Presence of urinary tract infection (n = 125)

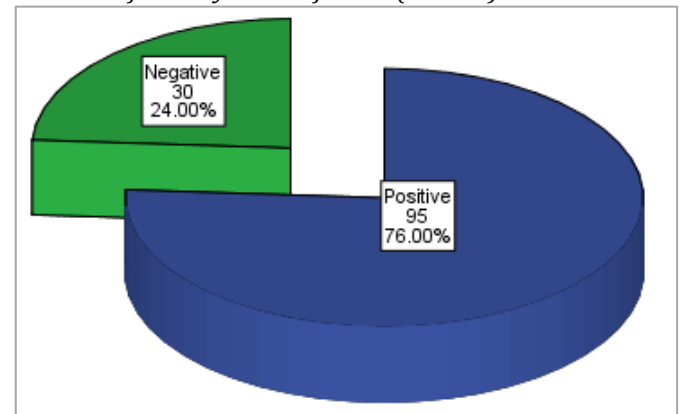


Table II

Pathogen detected in urine sample

Pathogen	F (%)
Escherichia coli	56 (44.8%)

<i>Pseudomonas aeruginosa</i>	18 (14.4%)
<i>Enterococcus species</i>	11 (8.8%)
<i>Candida tropicalis</i>	8 (6.4%)
<i>Candida albicans</i>	9 (7.2%)
<i>Burkholderia cepacia</i>	1 (0.8%)
<i>Corynebacterium striatum</i>	1 (0.8%)
<i>Klebsiella pneumonia</i>	12 (9.6%)
<i>Morganella morganii</i>	1 (0.8%)
<i>Proteus mirabilis</i>	1 (0.8%)
<i>Providencia stuartii</i>	1 (0.8%)
<i>Serratia marcescens</i>	1 (0.8%)
<i>Staphylococcus aureus</i>	4 (3.2%)
<i>Staphylococcus epidermidis</i>	1 (0.8%)
<i>Stenotrophomonas maltophilia</i>	1 (0.8%)
<i>Trichosporon asahii</i>	5 (4.0%)

Table III

Association of urinary tract infection with different age, gender and duration of cauterization (n = 125)

	Urinary Tract Infection		P-value
	Positive n = 95	Negative n = 30	
Age 25-50 years	45 (80.4%)	11 (19.6%)	0.304
Age 51-75 years	50 (72.5%)	19 (27.5%)	
Male	55 (75.3%)	18 (24.7%)	0.838
Female	40 (76.9%)	12 (23.1%)	
Percutaneous nephrostomy - Unilateral	20 (87.0%)	3 (13.0%)	
Percutaneous nephrostomy - Bilateral	9 (69.2%)	4 (30.8%)	0.571
Urinary Catheterization (Foley)	63 (74.1%)	22 (25.9%)	
Urinary Catheterization (Silicon)	3 (75.0%)	1 (25.0%)	
2-3 days of catheterization	93 (76.2%)	29 (23.8%)	0.702
>3 days of catheterization	2 (66.7%)	1 (33.3%)	

DISCUSSION

In our study, urinary tract infection was observed in 95 (76%) patients who were admitted in hospital for critical condition and received indwelling catheterization. In our study, the most common pathogen detected in urine samples was *Escherichia coli* (44.8%), followed by *Pseudomonas aeruginosa* (14.4%), *Klebsiella pneumonia* (9.6%), *Enterococcus species* (8.8%), *Candida albicans* (7.2%), *Candida tropicalis* (6.4%), *Trichosporon asahii* (4.0%), and *Staphylococcus aureus* (3.2%).

It has been reported in a study that urinary tract infection was detected in 21% in patients with indwelling catheter.¹¹ Urinary tract infections were shown to occur 23.3% of the time in hospitalized patients with indwelling

catheters, according to another study.¹³ The prevalence of urinary tract infection in this study was much higher than prevalence reported in other studies including Podkovik et al., (8.5%) and Getliffe et al., (4.76%).^{14, 15}

In an Indian study, Kaur et al., found that 18 percent of hospitalized patients had a urinary tract infection. 9.5% of them were men, and 8.5% were women. *Escherichia coli* (46.2%), *Klebsiella* (19.3%), *Enterobacter* (11.5%), *Pseudomonas* (9.6%), *Staph. aureus* (5.8%), *Enterococcus* (3.8%), *Candida* sps. (1.9%), and *proteus* (1.9%) were the most frequently detected pathogens.¹⁶ The association of urinary tract infection was insignificant in above stated study as we observed in our study.

Urinary tract infections that afflict people who have a catheter or have had one within the last 48 hours are known as catheter-related infections. These infections are the most common kind of infections linked to healthcare.¹⁷ Risk factors for urinary tract infections associated with catheter usage include age, female gender, diabetes, and length of catheterization. With a daily risk of 3–7%, the duration of catheterization is the most significant determinant in the development of bacteriuria.^{18, 19} Longer hospital stays, more medical expenses, and overuse of antibiotics are all experienced by patients admitted to the critical care unit with catheter-associated UTIs.^{20, 21}

Saleem et al., carried out a study and found that only 70 (6.5%) of the 1078 patients admitted to the critical care unit developed a catheter-related urinary tract infection. *Serratia* (3%) and *Providencia* (3%) species were the least common isolates in this study, whereas *Klebsiella pneumoniae* (20%) was the most common.²²

CONCLUSION

Thus, the chances of Urinary tract infection in hospital admitted patients are high who received indwelling catheterization. Through this study, we have attained magnitude for local population and found urinary tract infection very high in hospital admitted patients. Now, in future, we will implement the screening of patients for urinary tract infection and make every possible option to deter the chances of urinary tract infection. So that early diagnosis and treatment can be done as well as preventive measures can be taken to prevent urinary tract infection in high risk patients.

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