

Original Article

# To Assess Knowledge and Practice among Nurses Regarding Prevention of Catheter-Associated Urinary Tract Infection

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## ABSTRACT

**Background:** Catheter-associated urinary tract infections (CAUTIs) are a common healthcare-associated infection among patients with indwelling urinary catheters. The role of nursing staff is crucial in preventing these infections through proper knowledge and practices.

**Objective:** To assess the knowledge and practices among nurses regarding the prevention of catheter-associated urinary tract infections in a tertiary hospital in Lahore, Pakistan.

**Methods:** This descriptive cross-sectional study was conducted among 164 nurses from various departments, including medical, surgical, and gynecological units. Nurses with more than one year of experience were included, while student nurses and head nurses not directly involved in patient care were excluded. Data were collected through a survey assessing knowledge and practices related to CAUTIs. The sample size was determined using Solvin's formula. Ethical approval was obtained, and participants gave informed consent. The data were analyzed using IBM SPSS Statistics Version 25.0 for descriptive statistics, including frequencies and percentages.

**Results:** The majority of participants were female (85.4%), and most were aged between 31 and 35 years (50%). About 51.2% of the nurses had 6 to 10 years of experience, and 46.2% had received prior information or training on catheter-related urinary tract infections. The majority of participants (92.8%) knew that CAUTIs result from prolonged catheter use, and 95.7% were aware that aseptic technique with sterile equipment is crucial for catheter insertion. However, only 67.4% used a sterile technique for insertion, and 79.3% did not perform daily catheter care. The overall knowledge level was low for 29.3% of participants, moderate for 43.5%, and high for 16.3%, while the practice level was poor for 52.2% and good for 37%.

**Conclusion:** Nurses demonstrated moderate knowledge but poor practices in preventing catheter-related urinary tract infections, indicating the need for targeted interventions and educational programs to bridge the gap and enhance patient care.

**Keywords:** catheter-associated urinary tract infection, CAUTI, nurses, prevention, knowledge, practices, urinary catheters, healthcare-associated infections, patient safety, nursing education.

## INTRODUCTION

Catheter-associated urinary tract infections (CAUTIs) are a common healthcare-associated infection, affecting patients with indwelling urinary catheters or those who have recently had them removed (1). In healthcare settings, the use of urinary catheters is prevalent, with an estimated 15% to 25% of hospitalized patients requiring one during their stay (2). The risk of acquiring bacteriuria increases daily, ranging from 3% to 7% while the catheter remains in place (3). CAUTIs are particularly common among individuals aged 50 to 71, with a higher incidence in females (4). In Pakistan, CAUTI cases are on the rise, contributing to a global estimate of approximately 150 million cases annually (5). The condition is associated with significant morbidity and mortality, accounting for over 13,000 deaths each year (6). In a Pakistani study, 31 out of 60 patients tested positive for CAUTI (7). The pathogens commonly associated with CAUTIs include *Escherichia coli* (24%), *Candida* (24%), *Enterococcus* (14%), *Pseudomonas* (10%), *Klebsiella* (10%), and other organisms (8).

Nurses play a crucial role as primary healthcare providers in the prevention and management of CAUTIs. They are responsible for ensuring asepsis during urinary catheterization, maintaining the drainage bag below the bladder level, and managing the duration of catheterization (3). Nurses are also accountable for removing unnecessary catheters promptly (9). The Centers for Disease Control and Prevention (CDC) recommends removing indwelling catheters within 24 hours postoperatively unless there is a specific indication for continued catheterization (10). Appropriate nursing practices, such as hand hygiene before and after catheter insertion or manipulation, are vital in preventing CAUTIs (11). Wearing gloves during catheter care and maintaining a closed catheterization system are essential measures (12). Regular emptying of the urine collection bag and using a clean urine collection jug for each patient are recommended practices (13). Monitoring the duration of catheterization and identifying risk factors are crucial components of nursing care (14). However, in some healthcare settings, nurses may be unaware of patients' catheter status, delay emptying urine bags, or allow them to contact contaminated surfaces (15). Continued use of unnecessary urinary catheters and poor catheter care practices contribute to increased CAUTI rates (16). Given that CAUTIs are preventable (17), it is essential to assess nurses' knowledge and practices regarding CAUTI prevention.

This study aims to evaluate the knowledge and practices of nurses in preventing catheter-associated urinary tract infections. By conducting this research, valuable information can be gathered to develop targeted interventions and educational programs, enhancing patient care quality and reducing CAUTI incidence. The research question focuses on understanding the knowledge and practices of nurses in preventing catheter-related urinary tract infections.

## MATERIAL AND METHODS

In this descriptive cross-sectional study, nurses were recruited from various departments, including medical, surgical, gynecological, and other specialties, at a public tertiary hospital in Lahore, Pakistan. The study was conducted over a six-month period using a convenience sampling technique. The target population consisted of nurses with more than one year of experience, while student nurses and head nurses not directly involved in patient care were excluded from the study. The sample size was determined using Solvin's formula  $N = N_1 + Ne_2N = 1 + Ne_2N$ .

Data were collected through a survey that assessed nurses' knowledge and practices related to the prevention of catheter-associated urinary tract infections. Prior to data collection, permission was obtained from the hospital administration. Consent was obtained from the participants, who were assured of the confidentiality of their information and informed that their participation was voluntary. Ethical considerations were aligned with the guidelines set by the Nursing Department of Superior University, and the study adhered to the principles of the Declaration of Helsinki.

The data collected were analyzed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY). Descriptive statistics, including frequency and percentages, were calculated. The normality of the data distribution was assessed, and appropriate statistical tests were applied. Participants were ensured of data privacy throughout the study, and their confidentiality was maintained (18). The study posed no harm to the participants and aimed to contribute valuable insights into the prevention of catheter-associated urinary tract infections.

## RESULTS

The study focused on assessing the socio-demographic characteristics, knowledge, and practices of nursing staff regarding the prevention of catheter-associated urinary tract infections (CAUTIs) at a tertiary hospital in Lahore. Among the 164 nurses who participated in the study, a substantial portion of the respondents were aged between 31 and 35 years (50%), followed by those in the age group of 25 to 30 years (31.7%) as shown in Table 1. The majority of the participants were female, accounting for 85.4%, while males constituted 14.6%. Regarding marital status, 76.8% of the respondents were married, and 23.2% were single.

Table 1: Socio-Demographic Characteristics of Nursing Staff (n=164)

Demographic Variables	Frequency	Percent
<b>Age</b>		
25-30	52	31.7%
31-35	82	50.0%
36-40	25	15.2%
41-45	5	3.0%
<b>Gender</b>		
Male	24	14.6%

Demographic Variables	Frequency	Percent
Female	140	85.4%
Marital Status		
Single	38	23.2%
Married	126	76.8%
Qualification		
Diploma	114	69.5%
Post RN	42	25.6%
BSN	8	4.9%
Current Unit		
Medical	46	28.0%
Surgical	42	25.6%
Gynaecology	32	19.5%
Other	44	26.8%
Duration of Working Experience		
1-5 years	48	29.3%
6-10 years	84	51.2%
11-15 years	32	19.5%
Previous Information or Training on Catheter-related UTIs		
Yes	85	51.8%
No	79	48.2%

Table 2: Nursing Staff's Level of Knowledge about the Prevention of Catheter-related Urinary Tract Infections

Statement	Yes (%)	No (%)
A Catheter-related urinary tract infection is a urinary tract infection that occurs as a result of having a urinary catheter in place for an extended period of time.	161 (92.8%)	3 (1.8%)
Escherichia coli is the most common pathogen causing catheter-related urinary tract infections.	121 (73.8%)	43 (26.2%)
The correct technique for inserting an indwelling urinary catheter is an aseptic technique using sterile equipment.	157 (95.7%)	7 (4.3%)
Placing a drainage bag over the bladder always increases the risk of catheter-related urinary tract infections.	130 (79.3%)	34 (20.7%)

Table 3: Practice Level of Nurses in the Prevention of Catheter-related Urinary Tract Infections

Statement	Do (%)	Do not (%)
Do you use a sterile technique for catheter insertion?	124 (67.4%)	40 (21.7%)
Daily perform catheter care	28 (15.2%)	136 (79.3%)
Do you avoid contact of the drainage tube outlet with the collection container or other foreign objects?	96 (52.2%)	68 (37.0%)
Do you use a separate collection container to empty the collection bag for each patient?	82 (44.6%)	82 (44.6%)

Table 4: Knowledge and Practice Levels

Level of Knowledge	Frequency	Percent
Low Knowledge	54	29.3%
Moderate Knowledge	80	43.5%
High Knowledge	30	16.3%
Level of Practice		
Poor Practice	96	52.2%
Good Practice	68	37.0%

In terms of educational qualifications, the largest proportion of the participants, 69.5%, held a diploma in nursing, followed by those who had completed a Post-RN program (22.6%), and a smaller percentage held a BSN degree (4.9%). The nurses were distributed across different units, with 28% working in medical units, 25.6% in surgical units, 19.5% in gynecological units, and 26.8% in other departments. The majority of the nurses had 6 to 10 years of experience (51.2%), while 29.3% had 1 to 5 years of experience, and 19.5% had 11 to 15 years of experience. When asked about previous information or training on catheter-related urinary tract infections, 51.8% of the respondents reported having prior knowledge, while 48.2% did not (Table 1).

In terms of knowledge about CAUTIs, an overwhelming majority of the nursing staff (92.8%) correctly identified that catheter-related urinary tract infections result from prolonged catheter use, while only 1.8% did not (Table 2). The awareness of *Escherichia coli* as the most common pathogen causing CAUTIs was also high, with 73.8% of the nurses answering correctly. Notably, 95.7% of the nurses recognized the importance of using aseptic technique with sterile equipment for catheter insertion, highlighting a strong understanding of proper catheterization practices. Additionally, 79.3% of the nurses correctly stated that placing a drainage bag above the bladder increases the risk of CAUTIs.

When assessing the practice level among nurses regarding the prevention of catheter-related urinary tract infections, the majority of the respondents (67.4%) used a sterile technique for catheter insertion, while 21.7% did not (Table 3). However, only 15.2% of the nurses reported performing daily catheter care, indicating a substantial gap in routine catheter maintenance practices. Regarding avoiding contact of the drainage tube outlet with the collection container or other foreign objects, 52.2% of the nurses practiced this correctly, while 37% did not. The responses were evenly split on the use of separate collection containers to empty the collection bag for each patient, with 44.6% of the nurses doing so correctly.

The overall knowledge and practice levels among the nurses revealed that 29.3% of the participants had low knowledge, 43.5% had moderate knowledge, and 16.3% had high knowledge (Table 4). In terms of practice levels, a considerable portion of the nurses (52.2%) demonstrated poor practices, while 37% exhibited good practices. These findings highlight the need for enhanced training and education among nursing staff to improve their practices in preventing catheter-related urinary tract infections.

## DISCUSSION

The discussion of this study revealed that the socio-demographic characteristics of the nursing staff highlighted that most of the respondents belonged to the age group of 31 to 35 years, with the majority being women, constituting 85.4% of the participants. Most of the respondents were married, and a substantial number had a Diploma in General Nursing. The findings indicated that many of the participants worked in medical departments and had 6 to 10 years of working experience, with a considerable proportion having received prior information or training on catheter-related urinary tract infections.

Regarding knowledge, a high percentage of the nursing staff accurately identified that a catheter-related urinary tract infection results from the prolonged presence of an indwelling urinary catheter (92.8%). The majority also recognized *Escherichia coli* as a common pathogen associated with catheter-related infections and acknowledged the importance of aseptic technique and sterile equipment for catheter insertion (95.7%). However, there was a discrepancy in practice, with only 67.4% of the nurses using sterile techniques for catheter insertion and a significant proportion not performing daily catheter care (79.3%).

The study's findings align with previous research conducted by Khasal, which showed that the level of knowledge regarding the prevention of catheter-associated urinary tract infections was fair (18). Similarly, another study demonstrated poor practice among nurses in preventing catheter-related urinary tract infections (10). These consistent findings across various studies highlight a persistent issue in translating knowledge into effective practice (19).

The study concluded that, while nurses possessed moderate knowledge, their practice regarding the prevention of catheter-associated urinary tract infections was suboptimal. This discrepancy between knowledge and practice underscored the need for targeted interventions and educational programs to bridge this gap. By enhancing nurses' understanding of evidence-based guidelines and promoting adherence to best practices, the incidence of catheter-associated urinary tract infections could be effectively reduced, leading to improved patient outcomes.

However, the study had several limitations, including a small sample size, which may have limited the generalizability of the results, and the use of a cross-sectional study design, which is generally considered weaker than other research designs. Despite these limitations, the study highlighted important areas for improvement in nursing practice. Future researchers should focus on bridging the gap between knowledge and practice, emphasizing evidence-based guidelines and best practices. Additionally, future research should involve larger and more diverse samples to validate and expand upon these findings. Ongoing training, support, and monitoring should be provided to nurses to ensure consistent adherence to preventive measures (20).

## CONCLUSION

In conclusion, this study highlighted that while nurses possess moderate knowledge, their practice in preventing catheter-related urinary tract infections (CAUTIs) remains suboptimal. This discrepancy underscores the need for targeted interventions and continuous education to align nursing practice with established guidelines, ultimately improving patient outcomes. The implications for human healthcare are significant, as enhancing nurses' understanding and adherence to best practices can substantially reduce the incidence of CAUTIs, thereby improving patient safety, reducing healthcare costs, and enhancing the overall quality of care.

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