Original Article
DOI: https://doi.org/10.70749/ijbr.v3i5.1421

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Assessment of Knowledge and Practices of Undergraduate Nursing Students Regarding Catheter Associated Urinary Tract Infections

Izen Fernandus[1], Razia Bano[1]

[1]Lahore University of Biological and Applied Sciences, Lahore, Pakistan

ARTICLE INFO

Keywords: Knowledge, Practice, Nursing students, Catheter associated urinary tract infections, Standard precautions, Hospital acquired infection

Correspondence to: Izen Fernandus, Post RN BsN, Faculty of Nursing & Midwifery, Lahore University of Biological and Applied Sciences, Lahore, Pakistan.
Email: izenfernandus9341@gmail.com

Declaration
Authors' Contribution: IF: Original draft and Methodology, Data collection, Manuscript writing, Conceptualization, Visualization, Responsible for integrity of research.
RB: Conceptualization, Visualization, Supervision and Review, Final Review.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 21-02-2025 Revised: 02-05-2025
Accepted: 17-05-2025 Published: 30-05-2025

ABSTRACT

Background: Urinary Tract Infections (UTIs) refer to infections that occur within the urinary system due to the presence of beneficial bacteria that reside in the genitourinary region. These infections can be diagnosed through laboratory analysis of urine samples and the identification of symptoms such as lower abdominal pain, malodorous urine, and unexplained fever. **Objective:** The objective of this study was to identify the knowledge and practices of undergraduate nursing students regarding catheter associated urinary tract infections. **Methods:** A descriptive cross-sectional study was conducted among nursing students regarding catheter associated urinary tract infections. Simple random sampling technique was used for data collection. Data was collected from a sample size of 64 participants by using pre-structured demographics, knowledge and practice based questionnaire from nursing students. Data was analyzed by using the SPSS 21 software for descriptive statistics. **Results:** The findings of this study revealed that majority of the participants 62.5% had excellent knowledge regarding catheter associated urinary tract infections while 32.8% participants had average knowledge regarding catheter associated urinary tract infections and 4.7% participants had poor knowledge. Similarly, 48.4% participants had average practice regarding catheter associated urinary tract infections and 35.9% participants had good practice while only 15.6% had poor practice regarding catheter associated urinary tract infections. **Conclusion:** The findings of this research indicate that nursing students enrolled in tertiary care hospitals possess a moderate degree of expertise and practical experience. Nevertheless, the results indicate that further efforts are required to guarantee that pupils have a comprehensive understanding of hospital-acquired infections and rigorously observe the prescribed precautions in order to mitigate catheter-associated infections in hospital environments.

INTRODUCTION

Urinary Tract Infections (UTIs) refer to infections that occur within the urinary system due to the presence of beneficial bacteria that reside in the genitourinary region. These infections can be diagnosed through laboratory analysis of urine samples and the identification of symptoms such as lower abdominal pain, malodorous urine, and unexplained fever. Additional symptoms encompass inadequate emptying of the bladder, frequent urination, and the involuntary release of urine in small amounts. Escherichia coli is the most prevalent pathogen responsible for urinary tract infections (UTIs) in pregnant women, accounting for around 80-90% of cases. Following Escherichia coli, Klebsiella and Enterobacter are also commonly identified as causative agents of UTIs in this population (Obaid et al., 2021).

In hospitals and other medical facilities, UTIs are extremely common. Around 25% of hospitalized patients had a urinary catheter placed (Algarni et al., 2019), and this is commonly acknowledged as a key contributing factor to the development of catheter-associated urinary tract infections (CAUTI). Microorganisms such as Escherichia coli (21.4% of all CAUTIs), Enterococcus (14.9% of all CAUTIs), Pseudomonas aeruginosa (10% of all CAUTIs), Klebsiella pneumonia (77.5% of all CAUTIs), and Enterobacter 4.15% of all CAUTIs. (Cutinho & Sheilini 2018).

Healthcare workers are required to possess a high degree of competence and knowledge in order to effectively decrease the development of infections in the urinary tract (UTIs) among hospitalized patients with catheters that are implanted. In addition, it is essential for healthcare providers to offer patients with a thorough education on how to avoid developing CAUTIs (Benny et al.,2020).

According to Rashmi and Dhakal (2021), the implementation of various strategies can effectively mitigate catheter-related complications. These strategies include minimizing the time spent catheterized, the

elimination of needless catheterization, the use of conventional infection prevention practices, and the use of strict hygienic practices during the placement and upkeep of indwelling urinary catheters. Over 70% of all UTIs are contracted because of the misuse of urinary catheters that are inserted and other unnecessary medical devices. (Atkins et al.,2020).

The available research suggests that various factors, including resource availability and the presence of guidelines within healthcare facilities, have a favorable influence on nurses' knowledge and adherence to practices aimed at preventing catheter related urinary tract infections (CAUTIs) (Zegeye et al., 2022).

Catheter-related urinary tract infection is a prevalent nosocomial illness, frequently encountered in healthcare settings, with an annual incidence of approximately 200,000 reported cases. Furthermore, it has been shown that a significant proportion, ranging from 15% to 25%, of female patients who are hospitalized to a medical facility undergo catheterization. According to research conducted by the World Health Organization, there is evidence to suggest that women who have catheterization experience a 5% increase in the likelihood of developing a urinary tract infection for each day that they remain catheterized. Within a span of one month, the probability of contracting the virus escalates to 100%. The utilization of indwelling urine catheters is a common practice observed in diverse hospital settings globally. However, scholarly investigations have demonstrated a higher prevalence of indwelling urinary catheter usage specifically inside critical care facilities (Pietrzak et al., 2020).

Therefore, nurses do have a significant impact on the process of installing urinary catheters that are implanted and play an important part in lowering risk of CAUTIs. Strategies that aim to reduce the insertion of catheters when they are not needed and to shorten the duration of catheter use can help reduce the prevalence of urinary tract infections caused by catheters (CAUTIs), particularly among immunocompromised women. The use of alternative catheters, strict adherence to hand hygiene protocols, implementing aseptic techniques during catheter insertion, adhering to closed drainage systems, promoting unobstructed urine flow, and providing comprehensive training to nurses are recognized evidence-based strategies for preventing Catheter-related urinary tract infections (Alqarni, 2021).

A disconnection between the implanted urinary catheter and the drainage bag is a serious problem that can be avoided if nurses are properly trained in the aseptic method for catheter placement. The utilization of pre-connected catheter systems has the potential to mitigate the occurrence of disconnections. It is imperative to provide comprehensive education to staff nurses regarding the importance of minimizing urethral trauma during catheter insertion, which can be achieved through the utilization of ample quantities of sterile lubricant. When inserting a catheter, it is important to ensure that ladies are positioned correctly in order to obtain a clear vision of the urethral meatus. To mitigate the risk of urethral damage and bacterial invasion, it is recommended to tie the indwelling urine catheter to the upper thigh in the women following insertion. This practice helps to reduce putting too much strain on the catheter, which might potentially result in rips and subsequent bacterial infiltration (Pamela, 2020).

Catheter-associated infections of the urinary tract (CAUTIs) are preventable, but only if nurses, who are in charge of urinary catheterization procedures, do a good job of implementing, managing, and monitoring them (Tyson et al., 2020). Nurses, in order to properly provide care to patients, must be in possession of up-to-date familiarity with the prevention of Catheter-Associated infections of the urinary tract (CAUTIs) (Polat & Aslan 2022).

Objectives

- To assess the knowledge of nursing students regarding catheter associated urinary tract infection.
- To determine the practices of nursing students regarding catheter associated urinary tract infection.

Research Questions

- What is the level of knowledge of nursing students regarding catheter associated urinary tract infection?
- What are the practices level of nursing students regarding catheter associated urinary tract infection?

Operational Definition

Knowledge: Knowledge in this study was measured through an adopted knowledge based questionnaire by using Nominal scale. Every Yes answer was ranked as 2 and No was ranked as 1. The maximum score of knowledge was 20 and minimum score was 10. Based on the scale from the questionnaire excellent knowledge was considered as >80% (>16 out of 20), average knowledge was considered as 60% to 80% (12 to 16 out of 20), and poor knowledge was considered as <60% (<12 out of 20).

Practice: The questionnaire was used a Likert scale to assess practices. So, always was ranked as a 5, most of the time was ranked as a 4, sometimes was ranked as a 3, rarely was ranked as a 2, and never was ranked as a 1. In terms of percentage, >80% (>40 out of 50) was considered as good practice, 60% to 80% (30 to 50 out of 50) was considered as an average practice and <60% (<30 out of 50) was considered as poor practice.

LITERATURE REVIEW

CAUTI, or catheter-associated urinary tract infection, is a highly widespread health-care–associated infection. One contributing factor is the prolonged retention of urinary catheters in hospitalized patients beyond the appropriate duration of their usage. The primary preventive measure for minimizing the incidence of Catheter-Associated Urinary Tract Infections (CAUTI) is to restrict the utilization of catheters. Evaluating the level of awareness among health care workers, with a specific focus on nurses, regarding catheterization and urinary tract infections (UTIs), may be beneficial for effectively addressing issues associated with catheter-associated UTIs (CAUTIs) and inappropriate catheterization practices (Benny et al., 2020).

Urinary tract infections (UTIs) are the prevailing hospital-acquired disease, with an ongoing upward trend in reported incidence. Annually, a significant number of over

560,000 women experience the onset of urinary tract infections (UTIs), resulting in prolonged hospitalization, escalated healthcare expenses, and heightened he rates of illness and death among women. The prevalence of infections in the urinary tract in several regions of Egypt has been documented. In Ismailia city, the prevalence is approximately 29%. In the Suez governorate, it is reported to be 30.29%. In Zagazige, the prevalence ranges from 22% to 35% (Abd Elfatah et al., 2021).

Nurses, as healthcare professionals, play a important role in the implementation, provision of treatment, and monitoring of urinary catheterization practices. Their involvement can serve as a substantial catalyst in reducing rates of Catheter-Associated Urinary Tract Infections (CAUTIs) (Tyson et al., 2020). Maintaining successful patient care requires that nurses have current information on how to refrain from catheter-associated urinary tract infections (CAUTIs) (Polat & Aslan, 2022).

In contrast, Mong et al. (2021) observed that nurses exhibited a high level of knowledge, a positive attitude, and effective thought-out practice in relation to the the cessation of catheter-associated urinary tract infections (CAUTIs). Our findings are inconsistent with those of Balu et al. (2021), who reported that approximately 28.4% of healthcare personnel possessed moderately adequate knowledge regarding CAUTI. Furthermore, this finding is inconsistent with the research conducted by Algarni et al. (2019), which reported that a majority of nurses (62.77%) had a poor level of expertise.

One potential rationale for the observed similarities could be attributed to the positive correlation between work experience and nurses' knowledge on the prevention of Catheter-Associated Urinary Tract Infections (CAUTIs). This suggests that nurses have the potential to acquire knowledge through their experiential learning when they remain in a certain unit for an extended duration. This study has determined that socio-demographic features and institutional factors do not have a significant influence on nurses' knowledge and practice in relation to the taking precautions of Catheter-associated Urinary Tract Infections (CAUTIs), with the exception of professional experience (Teshager et al., 2022).

A separate investigation carried out in Ethiopia unveiled that among a total of 408 individuals surveyed, 63.5% exhibited sufficient knowledge, although just 34.6% of the study participants demonstrated commendable adherence to preventive measures for Catheter-related urinary tract infections. Working in the intensive care unit, getting in-service training on infection prevention, and having the availability of prevention of infections guidelines were all strongly linked to nurses knowing enough about how to avoid urinary tract infections caused by catheters and doing an excellent job of it. There were, however, strong links between nurses' excellent efforts to stop urinary tract infections caused by catheters and things like age and years of experience (Nure et al., 2022).

A cross-sectional investigation was done with 137 nurses from the medical and critical care units at King Abdulaziz University Hospital (KAAUH) in Jeddah, Saudi Arabia. They were chosen at random. The study results showed that most of the nurses (62.77%) did not know much and 83.94% did not follow good practices. About 16.1% of the polled nurses showed a high professional behavior worth noticing. When it came to preventing Catheter-Associated Urinary Tract Infections (CAUTI), there was no statistically significant link between the amount of understanding nurses had and the actions they took. A strong link was found between the nurses' understanding and their age. There was also a strong link between the nurses' practices and the unit they are currently working (Algarni et al., 2019).

In a separate study involving 485 participants, 358 (74%) were physicians and 127 (26%) were nurses; this indicated that physicians possessed a greater breadth of knowledge than nurses. The nurses were more knowledgeable than the physicians regarding CAUTI preventive measures, and both groups exhibited a reasonable level of knowledge and attitude (Ghauri et al., 2019).

A survey of Swiss doctors and nurses indicated that the insertion, maintenance, and removal of catheters fall under the purview of both professions. Nurses had a more positive outlook on the current policies and attitudes about IUC use within their institution than doctors did (mean scale scores = 5.4 for nurses versus 5.1 for doctors, P 0.001). Practices to prevent needless IUC installation, the existence of similar principles and attitudes supporting restrictive catheter use, and the leadership commitment of the other group were all sources of contention between the two professional organizations (Niederhauser el al., 2020).

MATERIAL AND METHODS

Study Design

A cross-sectional descriptive study design was used in this study.

Study Variables

- Knowledge and practice were dependent variables of this study.
- Age, gender and year of study were independent variables of this study.

Study Setting

The study setting for conducting this research was a private institute in Lahore, Pakistan.

Study Population

The study population of this study was third and final year nursing students of bachelor's degree of that institute.

Sampling Technique

In order to choose the sampling technique for this research study, the simple random sampling technique was applied.

Sample Size

The sample size was determined by using Slovin's formula.

$n=N/1+N(e)^2$

N=population size (160)

n=sample size?

e= Margin of error (7%)

$n=160/1+160(7\%)^2$

n=64.64

n=64

So, the sample size was 64 participants for this study. (Li & Tong, 2021).

Inclusion Criteria

- Undergraduate Nursing students of 3rd and 4th year.
- Those students who were willing to participate.
- Both male and female nursing students.

Exclusion Criteria

- Students who were absent at the time of data collection.
- Nursing students of Post RN and MSN were excluded.
- Internees and staff nurses were excluded.

Data Collection Method

For the purpose of data collection with Nominal scale based questionnaire regarding Knowledge consisting of 10 questions, and questionnaires based on Likert scale regarding Practice consisting of 10 questions were used having a consent attached with each questionnaire. Participants were requested to first read and sign the consent form before solving questions. The data was collected in the institute among nursing students present at the time and meeting the inclusion criteria of this study. A time of at least 20 minutes was given to each participant to fill the questionnaire after that data was collected and put for analysis.

Data Analysis

The collected data was analyzed by using statistical package for social sciences SPSS version 21. The quantitative variables like age, gender and year of study were measured in terms of frequency and percentage. Descriptive statistics was used for result analysis.

Ethical Considerations

While conducting the study, the ethical committee of the institute followed the norms and regulations, and the rights of the research participants were protected.

- All participants were provided written informed consent (attached).
- All gathered information and data was kept private.
- Throughout the study, participants were remain anonymous.
- The volunteers were informed that there was no danger or drawbacks to the research method.
- Participants were notified that they could withdraw at any moment during the research procedure.
- All data was kept under lock and key. It was password-protected on the laptop.

RESULTS

The questionnaire was divided into three parts: the demographic data, 10 questions of knowledge with Yes and No options and 10 questions of practice with always, most of the time, sometimes, rarely and never options regarding knowledge and practice of nursing students regarding catheter associated urinary tract infections.

The participants in this study were both males and females. Of the 64 questionnaires were given to participants along with the consent forms to participate in this study with the close ended questionnaire.

Demographic Data

Table 1 represents the demographic data of the participants. A total of 64 students participated in the study. The section 1 of the questionnaire was used to collect data regarding the demographic characteristics of participants. It contained three questions, i.e. age in years, gender and year of study. Among them 37.5% were males and 62.5% were females. The participants were of age from 20-22 (23.4%) years; however, more than 54.7% respondents' age was between 23-25 years. The 24 students were from 3rd year (37.5%), 40 students were from 4th year (62.5%). The demographic characteristics of the participants are presented in the (Table 1).

Table 1

Demographic Data of the Respondents

Variable	Category	Frequency n= 64	Percentage (%) n= 64
Age	20-22 Years	15	23.4 %
	23-25 Years	35	54.7 %
	25 Years or Above	14	21.9 %
Gender	Male	24	37.5 %
	Female	40	62.5 %
Year of Study	3rd Year	24	37.5 %
	4th Year	40	62.5 %

Note: Knowledge of Nursing Students Regarding Catheter Associated Urinary Tract Infections

The question 1 explained that "Routine use of antiseptic lubricants decreases the risk of infection during urinary catheterization" the 51.6% of the participants said yes and 48.4% said no. The question 2 was 'Maintaining Urinary catheters is important to use Closed Drainage System' and the participants had different opinions 67.2% participants said yes and 32.8% said no. The question 3 described that "Hand hygiene before handling catheterization is important to prevent catheter-related infection", and the responses were positive 70.3% participants said yes and 29.7% said no. The overall response for this question was positive. Another question that "Hygiene of the urethral meatus is important before inserting catheterization" and negative responses with no 31.3% and yes 68.8%.

Figure 1

Overall Knowledge of the Nursing Students.

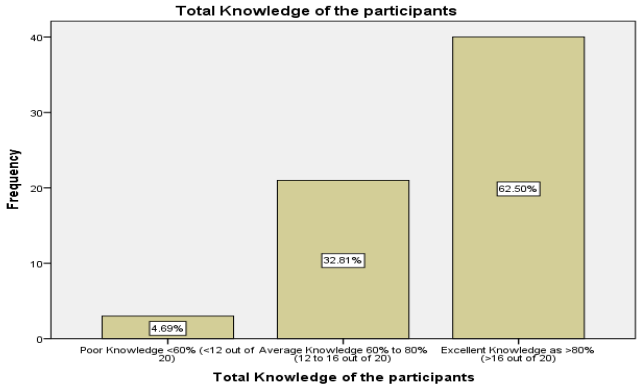


Table 2

Overall Knowledge of the Nursing Students.

Variables	Frequency (f)	Percentage
Excellent Knowledge (> 80%)	40	62.5%
Average Knowledge (60% to 80%)	21	32.8%
Poor Knowledge (<60%)	3	4.7%
Total	64	100%

The figure 1 indicates the total knowledge of the nursing students regarding catheter associated urinary tract

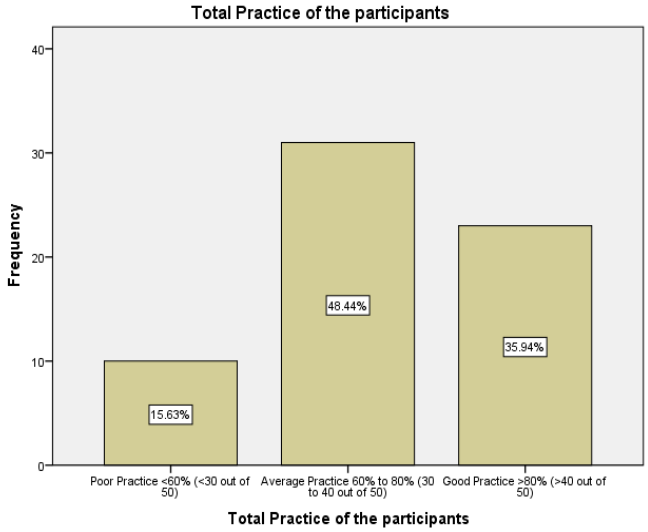
infections. As the part 1 of the questionnaire was used to collect data regarding the questions based to assess the knowledge of the participants and the responses were similar in some way from each other due its characteristics. It contained ten questions that described the knowledge of the participants. 62.5% participants had excellent knowledge regarding catheter associated urinary tract infections while 32.8% participants had average knowledge regarding catheter associated urinary tract infections and 4.7% participants had poor knowledge. The result shows that students have excellent knowledge regarding catheter associated urinary tract infections.

Note: Practice of Nursing Students Regarding Catheter Associated Urinary Tract Infections

The third section contained questions regarding practices, question 1 that what are the participants opinion about the "Washing hands before inserting a urinary catheter" and the responses were different 34.4% said always while 7.8% said that they wash their hands rarely before inserting the urinary catheter and that mean that participants have average practice towards catheter associated urinary tract infections. Another question "Keep the urine collecting bag out off the floor" responses with 46.9% said always and 31.3% said most of the time while 15.6% said sometimes they keep the urine collecting bag out of the floor.

Figure 2

Indicates the Overall Practice of the Nursing Students.



The figure 2 indicates the overall practice of nursing students regarding standard precautions. The part 3 of the questionnaire was used to collect data regarding the questions based to assess the practice of the participants and the responses were similar in some way from each other due its characteristics. It contained ten questions that described the practice of the participants. 48.4% participants had average practice regarding catheter associated urinary tract infections and 35.9% participants had good practice while only 15.6% had poor practice regarding catheter associated urinary tract infections. The result shows that students have average practice regarding catheter associated urinary tract infections. The sample characteristics are present in the 4.6 Table 3.

Table 3

Overall Practice of the Nursing Students.

Variables	Frequency (f)	Percentage
Good practice (>80%)	23	35.9%
Average practice (60% to 80%)	31	48.4%
Poor practice (<60%)	10	15.6%
Total	64	100%

DISCUSSION

This analysis is a cross-sectional study. Data was collected through questionnaire from the nursing students. A total of 64 students participated in the study. The section 1 of the questionnaire was used to collect data regarding the demographic characteristics of participants. It contained three questions, i.e. age in years, gender and year of study. Among them 37.5% were males and 62.5% were females. The participants were of age from 20-22 (23.4%) years; however, more than 54.7% respondents' age was between 23-25 years. The 24 students were from 3rd year (37.5%), 40 students were from 4th year (62.5%).

In a separate study involving 485 participants, 358 (74%) were physicians and 127 (26%) were nurses; this indicated that physicians possessed a greater breadth of knowledge than nurses. The nurses were more knowledgeable than the physicians regarding CAUTI preventive measures, and both groups exhibited a reasonable level of knowledge and attitude (Ghauri et al., 2019).

The previous study's goals included assessing Allied Health Professionals' knowledge, attitudes, and practices surrounding Universal Precautions; this data would be used to highlight areas that could benefit from additional emphasis in the continuing education of Allied Health Students; and finally, the study's participants would receive feedback on how to further enhance their safety in the workplace in that study 64% of the participants were male while 35% were the females (Sarika et al., 2020).

The questionnaire was divided into three parts: the demographic data, 10 questions of knowledge with Yes and No options and 10 questions of practice with always, most of the time, sometimes, rarely and never options related to knowledge and practice of nursing students regarding catheter associated urinary tract infections. The participants in this study were both males and females. Of the 64 questionnaires were given to participants along with the consent forms to participate in this study with the close ended questionnaire.

The question 1 explained that "Routine use of antiseptic lubricants decreases the risk of infection during urinary catheterization" the 51.6% of the participants said yes and 48.4% said no. The question 2 was 'Maintaining Urinary catheters is important to use Closed Drainage System' and the participants had different opinions 67.2% participants said yes and 32.8% said no. The question 3 described that "Hand hygiene before handling catheterization is important to prevent catheter-related infection", and the responses were positive 70.3% participants said yes and 29.7% said no. The overall response for this question was positive. Another question that "Hygiene of the urethral meatus is important before inserting catheterization" and negative responses with no 31.3% and yes 68.8%.

A separate investigation carried out in Ethiopia unveiled

that among a total of 408 individuals surveyed, 63.5% exhibited sufficient knowledge, although just 34.6% of the study participants demonstrated commendable adherence to preventive measures for Catheter-related urinary tract infections. Working in the intensive care unit, getting in-service training on infection prevention, and having the availability of prevention of infections guidelines were all strongly linked to nurses knowing enough about how to avoid urinary tract infections caused by catheters and doing an excellent job of it. There were, however, strong links between nurses' excellent efforts to stop urinary tract infections caused by catheters and things like age and years of experience (Nure et al., 2022).

In another study conducted on standard precautions indicates that 63.8% and 84.8% of students correctly answered knowledge-based questions on universal precautions linked to illness and infective state of the patient. The response rate for patient isolation was 91.5%, while equipment decontamination was 65%. Universal procedures and immunization replied correctly by 67.1% and 58 % respectively. 87.2% and 88.8% of students correctly identified the technique for trash disposal throughout the cleaning process. (Sarika et al., 2020).

The third section contained questions regarding practices, question 1 that what are the participants opinion about the "Washing hands before inserting a urinary catheter" and the responses were different 34.4% said always while 7.8% said that they wash their hands rarely before inserting the urinary catheter and that mean that participants have average practice towards catheter associated urinary tract infections. Another question "Keep the urine collecting bag out off the floor" responses with 46.9% said always and 31.3% said most of the time while 15.6% said sometimes they keep the urine collecting bag out of the floor.

In this study the total knowledge of the nursing students regarding catheter associated urinary tract infections. As the part 1 of the questionnaire was used to collect data regarding the questions based to assess the knowledge of the participants and the responses were similar in some way from each other due its characteristics. It contained ten questions that described the knowledge of the participants. 62.5% participants had excellent knowledge regarding catheter associated urinary tract infections while 32.8% participants had average knowledge regarding catheter associated urinary tract infections and 4.7% participants had poor knowledge. The result shows that students have excellent knowledge regarding catheter associated urinary tract infections.

In contrast, Mong et al. (2021) observed that nurses exhibited a high level of knowledge, a positive attitude, and effective thought-out practice in relation to the the cessation of catheter-associated urinary tract infections (CAUTIs). Our findings are inconsistent with those of Balu et al. (2021), who reported that approximately 28.4% of healthcare personnel possessed moderately adequate knowledge regarding CAUTI. Furthermore, this finding is inconsistent with the research conducted by Algarni et al. (2019), which reported that a majority of nurses (62.77%) had a poor level of expertise.

In this study the overall practice of nursing students regarding standard precautions. The part 3 of the questionnaire was used to collect data regarding the questions based to assess the practice of the participants and the responses were similar in some way from each other due its characteristics. It contained ten questions that described the practice of the participants. 48.4% participants had average practice regarding catheter associated urinary tract infections and 35.9% participants had good practice while only 15.6% had poor practice regarding catheter associated urinary tract infections. The result shows that students have average practice regarding catheter associated urinary tract infections.

A survey of Swiss doctors and nurses indicated that the insertion, maintenance, and removal of catheters fall under the purview of both professions. Nurses had a more positive outlook on the current policies and attitudes about IUC use within their institution than doctors did (mean scale scores = 5.4 for nurses versus 5.1 for doctors, P 0.001). Practices to prevent needless IUC installation, the existence of similar principles and attitudes supporting restrictive catheter use, and the leadership commitment of the other group were all sources of contention between the two professional organizations (Niederhauser el al., 2020).

CONCLUSION

In summary, the findings of this research indicate that nursing students enrolled in tertiary care hospitals possess a moderate degree of expertise and practical experience. Nevertheless, the results indicate that further efforts are required to guarantee that pupils have a comprehensive understanding of hospital-acquired infections and rigorously observe the prescribed precautions in order to mitigate catheter-associated infections in hospital environments. The implementation of established norms and rigorous monitoring should guide the observance of standard precautions, aided by well-designed interventions that promote awareness and encourage the adoption of safe practices. Furthermore, during various seminars, nursing educators may be required to create an environment that exemplifies and encourages the implementation of standard precautions.

Recommendations

Emphasizing the significance of providing written, up-to-date, evidence-based guidelines to promote urinary catheterization with adequate knowledge and high-safety nursing practice in order to reduce the CAUTI rate is suggested by the study. Age, the present working unit, in-service training on infection prevention, and the existence of guidelines ought to be correlated with nurses' knowledge and practice. Hospital administration and other relevant entities should ensure that nurses receive appropriate training and are provided with guidelines on infection prevention. Subsequent investigators ought to assemble evidence-based protocols for catheter care and CAUTI prevention that are tailored specifically for nurses.

REFERENCES

1. Abd Elfatah, S. E., Ramadan, S. A. E., Gonied, A. S., & Ali, F. K. (2021). Knowledge and Attitudes of Pregnant Women regarding Urinary Tract Infection. *Journal of Nursing Science Benha University*, *2*(1), 147-158. https://doi.org/10.21608/jnsbu.2021.159653
2. Abdullah Hamed, E., Ahmed Hassan Omran, A., Said, A. E. H., & Rabea Abd El-Mordy, Z. (2023). Maternity Nurses' Knowledge and Practices regarding Urinary Tract Infection among Women Undergoing Urinary Catheterization. *Journal of Nursing Science Benha University*, *4*(1), 605-616. https://doi.org/10.21608/jnsbu.2023.278840
3. Algarni, S. S., Sofar, S. S. S., & Wazqar, D. Y. (2019). Nurses' knowledge and practice toward prevention of catheter-associated urinary tract infection at king abdulaziz university hospital. *Journal of Health, Medicine and Nursing*, *4*(1), 50-73.
4. Ali, M., Shah, M., & Ayaz, M. (2020). Nurses' Knowledge Regarding Catheter Associated Urinary Tract Infections in Public Tertiary Care Hospitals Peshawar, Pakistan. *i-Manager's Journal on Nursing*, *10*(2), 52. https://doi.org/10.26634/jnur.10.2.17434
5. Alqarni, M. S. (2021). CATHETER-ASSOCIATED URINARY TRACT INFECTION (CAUTI) IN ICU PATIENTS. *Middle East Journal of Nursing*, *15*(1).
6. Atkins, L., Sallis, A., Chadborn, T., Shaw, K., Schneider, A., Hopkins, S., ... & Lorencatto, F. (2020). Reducing catheter-associated urinary tract infections: a systematic review of barriers and facilitators and strategic behavioural analysis of interventions. *Implementation science*, *15*, 1-22. https://doi.org/10.1186/s13012-020-01001-2
7. Balu, P., Ravikumar, D., Somasunder, V. M., Suga, S. S. D., Sivagananam, P., Jeyasheelan, V. P., & Mohan, S. K. (2021). Assessment of Knowledge, Attitude and Practice on Prevention of Catheter-associated Urinary Tract Infection (CAUTI) among Health Care Professionals Working in a Tertiary Care Teaching Hospital. *Journal of Pure & Applied Microbiology*, *15*(1). https://doi.org/10.22207/jpam.15.1.28
8. Benny, A. M., Idiculla, A. S., Kunjumon, A., George, A., & Sequera, S. K. (2020). Nurses' knowledge on prevention of catheter-associated urinary tract infection in a selected hospital https://doi.org/10.1055/s-0040-1716664
9. Crentsil, J. (2020). *Educational Program for Decreasing Catheter-Associated Urinary Tract Infections* (Doctoral dissertation, Walden University).
10. Cutinho, M. C., & Sheilini, M. (2018). Knowledge on Practice of Urinary Catheter Care and Compliance to Urinary Catheter Care Guidelines-A Hospital based Study. *Indian Journal of Public Health Research & Development*, *9*(11). https://doi.org/10.5958/0976-5506.2018.01455.9
11. Ghauri, S. K., Javaeed, A., Abbasi, T., Khan, A. S., & Mustafa, K. J. (2019). Knowledge and attitude of health workers regarding catheter-associated urinary tract infection in tertiary care hospitals, Pakistan. *JPMA. The Journal of the Pakistan Medical Association*, *69*(12), 1843-1847. https://doi.org/10.5455/jpma.8096
12. Haza'a, A. A. (2021). Knowledge of nurses toward prevention for catheter-associated urinary tract infection in public hospitals at Amran City, Yemen. https://doi.org/10.4236/ojn.2021.1111076
13. M Abdelmoaty, A., A Sabry, H., M Kenawy, A., & H ElSebaie, E. (2020). Indwelling Urinary Catheter: Effect of Training on Nurses Knowledge and Skills. *The Egyptian Family Medicine Journal*, *4*(1), 144-157. https://doi.org/10.21608/efmj.2020.90206
14. Mong, I., Ramoo, V., Ponnampalavanar, S., Chong, M. C., & Wan Nawawi, W. N. F. (2022). Knowledge, attitude and practice in relation to catheter-associated urinary tract infection (CAUTI) prevention: A cross-sectional study. *Journal of clinical nursing*, *31*(1-2), 209-219. https://doi.org/10.1111/jocn.15899
15. Niederhauser, A., Züllig, S., Marschall, J., & Schwappach, D. L. (2020). Nurses' and physicians' perceptions of indwelling urinary catheter practices and culture in their institutions. *Journal of patient safety*, *16*(2), e82-e89. https://doi.org/10.1097/pts.0000000000000502
16. Nure, M., Dechasa, A., Ifa, M., & Bedane, J. (2022). Knowledge and Practice of Catheter-related urinary tract infection prevention and Associated factor among nurses in public hospitals, West Shoa, Oromia, Ethiopia. https://doi.org/10.21203/rs.3.rs-1983637/v1
17. Obaid, M., Salman, A., Abd Rabo, A., Khalil, A. A., & Hayek, M. (2021). Nurses'knowledge and practices toward prevention of catheter-associated urinary tract infection.
18. Pamela R. G., (2020). The Effects of Nursing Education on Decreasing Catheter Associated Urinary Tract Infection Rates – Follow this and additional works Walden Dissertations and Doctoral Studies at: http://scholarworks.waldenu.edu/dissertations Part of the Nursing Commons Walden University.
19. Pietrzak, M., Jara, I., Marcysiak, M., Idzik, A., Dziedzic, A., Knoff, B., & Lisicka, E. (2020). Nurses' knowledge about the catheter-associated urinary tract infection. *Pielęgniarstwo w Opiece Długoterminowej/Long-Term Care Nursing*, *4*(4), 24-32.
20. Polat, H. T., & Aslan, H. (2022). Determining the Knowledge and Attitudes of Nurses about Catheter Associated Urinary Tract Infections. *Acıbadem Üniversitesi Sağlık Bilimleri Dergisi*, *13*(2), 286-291. https://doi.org/10.31067/acusaglik.957326
21. Rashmi, K. C., & Dhakal, B. (2021). Knowledge, attitude and practice on prevention of catheter-associated UTI among nurses of a tertiary care hospital. *Journal of College of Medical Sciences-Nepal*, *17*(1), 61-68. https://doi.org/10.3126/jcmsn.v17i1.28543
22. Teshager, T., Hussien, H., Kefyalew, M., Wondimneh, F., Ketema, I., & Habte, S. (2022). Knowledge, practice and associated factors of nurses towards prevention of catheter-associated urinary tract infection in intensive care unit of public hospitals administered by Federal Government in Addis Ababa, Ethiopia: a cross-sectional institutional-based study. *BMC nursing*, *21*(1), 1-10. https://doi.org/10.1186/s12912-022-00968-1
23. Tyson, A. F., Campbell, E. F., Spangler, L. R., Ross, S. W., Reinke, C. E., Passaretti, C. L., & Sing, R. F. (2020). Implementation of a nurse-driven protocol for catheter removal to decrease catheter-associated urinary tract infection rate in a surgical trauma ICU. *Journal of intensive care medicine*, *35*(8), 738-744. https://doi.org/10.1177/0885066618781304
24. Zegeye, A. F., Kassahun, C. W., & Temechu, Y. Z. (2022). Knowledge, Practice and Associated Factors of Catheter-Associated Urinary Tract Infection Prevention Among Nurses Working at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2021.
25. https://doi.org/10.21203/rs.3.rs-1306083/v1