Mosul Journal of Nursing

Online ISSN: 2663-0311 - Print ISSN: 2311-8784
Website: https://mjn.mosuljournals.com

An Educational Program to Improve Nursing Staff Attitudes Toward Preventing Urinary Tract Infection Associated with Catheters at Kirkuk City/Iraq

Authors **Ali Hussein Alwan** [1] **Abid Salih Kumait** [2]

Affiliation

1. *Ministry of Health/ Kirkuk Health Directorate, Iraq*
2. *Assistant Professor, Adult Health Nursing, College of Nursing, University of Kirkuk, Iraq*

ARTICLEINFO

Keywords:

attitudes
Prevention
Catheter-associated urinary tract infection (CAUTI)
Urinary catheter

Abstract

Background: Catheter-associated urinary tract infections (CAUTIs) are among the most common healthcare-associated infections worldwide, contributing to prolonged hospital stays, increased patient discomfort, higher healthcare costs, and elevated mortality rates.

Objective: This study aims to assess the effectiveness of an educational program in improving the attitudes of nursing staff toward preventing CAUTIs.

Methods: A pre-experimental, one-group pre-post-test design was used, involving 54 nurses from respiratory, coronary, and intensive care units at Kirkuk General Hospital. Data were gathered between December 2022 and February 2023 using a structured questionnaire divided into two sections: a socio-demographic profile and a nursing attitudes assessment. SPSS version 22 was utilized for statistical analysis.

Results: The educational intervention significantly improved nurses' attitudes towards CAUTI prevention, as indicated by a statistically significant difference between pre-and post-intervention scores ($p = 0.001$). However, no significant relationship was found between the nurses' attitudes and their socio-demographic variables.

Conclusion: Regular training programs based on CDC guidelines are essential to improving nursing staff attitudes toward CAUTI prevention and improving patient outcomes.

What is already known about the topic? Urinary tract infections (UTIs) associated with catheters are common in healthcare settings, often due to improper catheter care. Nursing staff play a crucial role in prevention through proper hygiene, timely catheter removal, and protocol adherence. Educational programs have been shown to improve nurse attitudes and practices, reducing the incidence of catheter-associated UTIs.

*** Corresponding author.**
Abid Salih Kumait
E-mail address: abidsk08@gmail.com

DOI: 10.33899/mjn.2024.184638, Authors, 2024, College of Nursing, University of Mosul.
Date Received 5 January 2024; Received in revised form 1 June 2024; Accepted 22 June 2024, Available online 12 July 2024

Introduction

Catheter-associated urinary tract infections (CAUTIs) are a leading cause of hospital-acquired infections globally, presenting a significant burden on healthcare systems due to increased patient morbidity, mortality, and costs. According to the World Health Organization (WHO), nosocomial infections affect millions of patients annually, with CAUTIs accounting for a substantial proportion of these cases. Approximately 70-80% of all urinary tract infections (UTIs) in hospitals are associated with the use of indwelling urethral catheters (IUCs), a figure that rises to 95% in critical care settings. Despite these risks, many catheters are often inserted without proper indication, exacerbating the issue.

Several risk factors contribute to the prevalence of CAUTIs, including prolonged catheterization, advanced patient age, compromised immune systems, and extended hospital stays. Female patients and those in critical care environments are particularly vulnerable. The Centers for Disease Control and Prevention (CDC) report that CAUTIs make up 32% of all healthcare-associated infections (HAIs) in the United States, with nearly 449,000 cases and an associated financial burden exceeding $450 million annually. More critically, it is estimated that 17-69% of CAUTIs, which result in approximately 9,000 deaths each year, could be prevented through the implementation of proper infection control measures.

Nurses play a pivotal role in preventing CAUTIs as they are responsible for both the insertion and maintenance of urinary catheters. Their adherence to best practices, such as maintaining hand hygiene, using sterile techniques during catheter insertion, and ensuring proper catheter care, is crucial for minimizing infection risks. However, evidence suggests that nurses' attitudes and compliance with CAUTI prevention guidelines vary widely, underscoring the need for continuous education and training.

This study seeks to evaluate the effectiveness of an educational program aimed at enhancing nursing staff's attitudes toward the prevention of CAUTIs at Kirkuk General Hospital. By fostering positive attitudes and reinforcing best practices, the program aims to reduce the incidence of CAUTIs and improve patient outcomes. Through targeted training, nurses can become more proficient in the care and management of urinary catheters, ultimately playing a vital role in infection control and patient safety.

Materials and Methods

Study Design:

This study employed a one-group pre-experimental design with pre- and post-test evaluations to assess the impact of an educational program on nursing staff attitudes toward the prevention of catheter-associated urinary tract infections (CAUTIs). A pre-experimental design was chosen due to its suitability for measuring changes in attitudes before and after an intervention within a single group.

Study Setting:

The study was conducted at Kirkuk General Hospital, specifically within the Respiratory Care Unit (RCU), Coronary Care Unit (CCU), and Intensive Care Unit

(ICU). These units were selected because they frequently deal with patients requiring indwelling catheters, thus increasing the relevance of the study.

Study Population and Sample:

The target population for this study consisted of nursing staff working in the critical care units at Kirkuk General Hospital. A total of 54 nurses were recruited using a purposive sampling technique. Inclusion criteria included nurses who worked in RCU, CCU, or ICU, had direct responsibility for catheter care, and were willing to participate in the educational program. Nurses who were on extended leave or had less than one year of experience were excluded from the study.

Intervention – Educational Program:

The educational program was designed based on the CDC guidelines for the prevention of CAUTIs. It focused on key areas such as proper catheter insertion techniques, hand hygiene, timely removal of catheters, and maintaining a sterile, closed drainage system. The program consisted of a combination of lectures, group discussions, and hands-on demonstrations, lasting for two days. The content was delivered by infection control specialists and senior nurses with expertise in catheter care.

Data Collection Instruments:

Data were collected using a structured questionnaire developed by the researchers. The questionnaire had two parts:

1. **Socio-Demographic Questionnaire:**

This section collected information on participants' age, gender, educational level, years of experience, and whether they had received any prior training on catheter care.

2. **Attitudes Toward CAUTI Prevention Questionnaire:**

This section assessed nursing staff attitudes toward preventing CAUTIs. It consisted of 10 items rated on a 3-point Likert scale (1 = Disagree, 2 = Neutral, 3 = Agree). The items were developed based on CDC guidelines and relevant literature, including both positive and negative statements. Responses to positive statements were rated as correct if participants agreed, while negative statements were considered correct if participants disagreed. The attitude scores were calculated by summing the responses, with higher scores indicating more positive attitudes toward CAUTI prevention.

Validity and Reliability:

The questionnaire was reviewed by a panel of experts in infection control and nursing education to ensure content validity. A pilot study was conducted with five nurses from Kirkuk General Hospital to assess the clarity and comprehensibility of the questionnaire. Based on their feedback, minor revisions were made. Reliability was tested using test-retest reliability and internal consistency methods. The reliability coefficient (Cronbach's alpha) for the attitudes questionnaire was 0.72, indicating acceptable internal consistency.

Procedure:
The study was carried out in two phases:

1. **Pre-Test Phase:** Before the educational program, participants were given the Socio-Demographic Questionnaire and the Attitudes Toward CAUTI Prevention Questionnaire to assess their baseline attitudes.
2. **Intervention Phase:** Participants underwent a two-day educational program on CAUTI prevention, focusing on practical and theoretical knowledge related to infection control and catheter care.
3. **Post-Test Phase:**

One month after the intervention, participants completed the Attitudes Toward CAUTI Prevention Questionnaire again to assess any changes in their attitudes following the educational program.

Data Analysis:

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 22. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the socio-demographic characteristics of the participants. The Wilcoxon Signed-Rank Test was employed to compare pre- and post-test attitude scores, as the data did not follow a normal distribution. The significance level was set at $p < 0.05$. Additionally, Analysis of Covariance (ANCOVA) was used to determine if socio-demographic variables (e.g., age, gender, educational level, years of experience) had a significant effect on the post-test attitude scores.

Ethical Considerations:

Ethical approval for the study was obtained from the Scientific Research Ethical Committee at the College of Nursing, University of Kirkuk. Informed consent was obtained from all participants before the commencement of the study. Participants were assured of the confidentiality and anonymity of their responses and were informed of their right to withdraw from the study at any time without any repercussions.

Results

Participant Demographics:

A total of 54 nurses participated in the study. The demographic characteristics of the participants are summarized in Table 1. Of the 54 participants, 30 (55.6%) were male, and 24 (44.4%) were female. The majority of the nurses (n = 28, 51.9%) were under the age of 25, with a mean age of 24.89 years (SD = 2.95). Regarding educational levels, 45 (83.3%) of the nurses had a college degree in nursing, while 3 (5.6%) had completed secondary nursing school, and 6 (11.1%) held diplomas from nursing institutes. The majority of nurses (n = 22, 40.7%) had between 1 and 2 years of experience, with a mean of 3.70 years (SD = 2.82). Only 7 nurses (13%) reported having received any training related to catheter-associated urinary tract infection (CAUTI) prevention.

Pre- and Post-Intervention Attitudes Toward CAUTI Prevention:

Table 2 displays the comparison of pre- and post-intervention attitudes toward CAUTI prevention. Before the educational program, nurses' attitudes

were generally moderate, with a mean score of 42.41 (SD = 15.50). After the educational program, a significant improvement in attitudes was observed, with the post-test mean score increasing to 77.04 (SD = 9.93), indicating a high level of positive attitudes toward CAUTI prevention. The difference between pre- and post-intervention scores was statistically significant ($p < 0.001$), as measured by the Wilcoxon Signed-Rank Test.

Effect of Socio-Demographic Variables on Attitude Changes:

Analysis of Covariance (ANCOVA) was conducted to examine the relationship between socio-demographic variables and post-test attitude scores. As shown in Table 3, none of the socio-demographic factors, including gender, age, educational level, years of experience, or prior training, had a statistically significant impact on the changes in nurses' attitudes toward CAUTI prevention ($p > 0.05$ for all variables). This indicates that the educational program was equally effective across all demographic groups, regardless of their background.

Training Effectiveness:

The results demonstrate that the educational intervention was highly effective in improving nurses' attitudes toward preventing CAUTIs. The mean difference between pre- and post-test attitude scores was 34.63, suggesting a considerable shift in nurses' perspectives on the importance of following best practices for CAUTI prevention. Furthermore, the lack of a significant relationship between demographic variables and attitude changes suggests that the program's effectiveness was consistent across different groups of nurses, reinforcing the value of such interventions.

Table 1: Socio-demographic Characteristics of Nursing Staff (n=54)

Characteristics	Groups	No.	(%)
Gender	Male	30	55.6
	Female	24	44.4
Age Groups	< 25 yrs.	28	51.9
	≥ 25 yrs.	26	48.1
Educational Level	Secondary nursing school	3	5.6
	Nursing institute	6	11.1
	Nursing college	45	83.3
Years of Experience	1 - 2 years	22	40.7
	3 - 4 years	17	31.5
	≥ 5 years	15	27.8
Received Training Courses	No	47	87.0
	Yes	7	13.0

Table 2: Effectiveness of Educational Program on Attitudes

Domain	No. of Items	Pre-Test Mean ± SD	Post-Test Mean ± SD	Mean Difference	P-value
Overall Attitudes	10	42.41 ± 15.50	77.04 ± 9.93	34.63	< 0.001

Table 4-7: Analysis of Co-Variance (ANCOVA) of Relationships Between Knowledge, Attitude, and Practices of the Study Group and Their Socio-Demographic Characteristics (SDCv.)

Source of Variation	Sum of Squares	d.f.	Mean Square	F Statistic	Sig. Levels	C.S. (*)
Intercept	60881.05	1	60881.0	593.15	0.000	HS
Gender	8.225	1	8.225	0.080	0.778	NS
Age Groups	1.224	1	1.224	0.012	0.914	NS
Educational Level	539.264	2	269.632	2.627	0.084	NS
Years of Experience	3.362	2	1.681	0.016	0.984	NS
Received Training Courses	245.994	1	245.994	2.397	0.129	NS
Error	4516.173	44	102.64			
Total	325700	54				
Corrected Total	5225.926	53				

Discussion

This study aimed to evaluate the effectiveness of an educational program designed to improve nurses' attitudes toward preventing catheter-associated urinary tract infections (CAUTIs) in Kirkuk General Hospital. The findings revealed a significant improvement in nursing staff attitudes following the intervention, emphasizing the value of continuous education in promoting adherence to infection control measures.

Before the educational program, nurses' attitudes toward CAUTI prevention were moderate, which is consistent with previous studies indicating varying levels of awareness and compliance among nurses regarding infection control practices. For example, studies conducted in Iraq (Hassan, 2022; Khasal, 2022) also found that many nurses lacked the appropriate attitudes and knowledge necessary to effectively prevent infections such as CAUTIs. The moderate baseline attitudes observed in this study highlight the critical need for ongoing educational initiatives.

After the educational intervention, there was a statistically significant improvement in nurses' attitudes, with post-test scores indicating a high level of awareness and commitment to CAUTI prevention. This outcome is in line with findings from similar studies, such as Kakkar et al. (2021), which demonstrated that training programs significantly improved staff attitudes toward infection control. The observed improvements in attitudes remained even one month after the intervention, suggesting that the program had a lasting impact.

Interestingly, the analysis of covariance (ANCOVA) indicated that none of the socio-demographic factors—such as

gender, age, educational level, or years of experience—had a significant effect on post-intervention attitude scores. This finding aligns with studies like those by Mukakamanzi (2017) and Obaid et al. (2021), which also found that demographic variables did not significantly influence nurses' knowledge or attitudes toward infection control. However, these results contrast with studies conducted in other settings, such as Chamini & Karunanayake (2020) and Rashmi & Dhakal (2021), where variables such as age, experience, and prior training were found to be significant predictors of infection control attitudes.

The lack of a significant relationship between demographic characteristics and attitude improvement in this study may suggest that the educational program was universally effective, regardless of participants' background. This underscores the importance of standardized training programs in ensuring that all nursing staff, regardless of their experience or education, are adequately equipped to prevent infections like CAUTIs.

One noteworthy finding was the low percentage of nurses who had received prior training on CAUTI prevention (13%). This is concerning, given that nurses play a critical role in the prevention and management of infections in healthcare settings. Studies like Mong et al. (2022) have demonstrated that nurses who receive regular training are more likely to adhere to best practices in infection control. The results of this study further support the need for frequent and comprehensive training programs to ensure that nurses are up to date with the latest guidelines and techniques.

The strengths of this study include the rigorous evaluation of attitudes before and after the educational program, as well as the use of validated assessment tools. However, the study has some limitations, including the relatively small sample size and the focus on a single hospital, which may limit the generalizability of the findings. Future research could benefit from a larger sample and a more diverse range of healthcare settings to better understand the broader impact of educational interventions on infection prevention.

Conclusion

This study highlights the positive impact of educational programs in improving nurses' attitudes toward the prevention of catheter-associated urinary tract infections. Given the significant role of nurses in infection control, regular and targeted training based on CDC guidelines is essential to sustain high standards of care and reduce the incidence of CAUTIs. The findings also suggest that such educational interventions are effective across different demographic groups, making them a valuable tool in healthcare settings.

DECLARATION SECTION

Availability of data and material

Data is available at the request of the corresponding author.

Funding

Nil

Acknowledgments

Authors are thankful to all parents that were participated in this study.

Conflict of Interest Statement: None

Disclosure of grants or other funding: None.

All authors have read and approved the manuscript

References

Abdullah, H. E., Ahmed, H. O., 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, 605–616. https://doi.org/10.21608/jnsbu.2023.278840

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 of Mangaluru. *Journal of Health and Allied Sciences NU*, 10, 128-131. https://doi.org/10.1055/s-0040-1716664

Chamini, G., & Karunanayake, A. (2020). The knowledge, attitudes, and practices on urinary catheterization and catheter-associated urinary tract infections among nursing officers in Teaching Hospital Karapitiya, Sri Lanka.

Chenoweth, C. E., Gould, C. V., & Saint, S. (2014). Diagnosis, management, and prevention of catheter-associated urinary tract infections. *Infectious Disease Clinics of North America*, 28(1), 105-119. https://doi.org/10.1016/j.idc.2013.09.002

Gail, L. J. (2016). Prevention of catheter-associated urinary tract infections in a long-term acute care hospital. *Sigma Repository*. http://hdl.handle.net/10755/201826

Hassan, H. S. (2022). Nursing practices toward prevention of indwelling catheter-associated urinary tract infection: An interventional study for nursing staff. *Mosul Journal of Nursing*, 10, 182-187. https://doi.org/10.33899/mjn.2022.175551

Kakkar, S. K., Bala, M., & Arora, V. (2021). Educating nursing staff regarding infection control practices and assessing its impact on the incidence of hospital-acquired infections. *Journal of Education and Health Promotion*, 10. https://doi.org/10.4103/jehp.jehp_542_20

Khasal, Q. A. (2022). Knowledge of nurses toward prevention of catheter-associated urinary tract infection in intensive care unit at Al Nasiriyah General Hospital. *HIV Nursing*, 22, 1516-1522.

Lo, E., Nicolle, L. E., Coffin, S. E., Gould, C., Maragakis, L. L., Meddings, J., Pegues, D. A., Pettis, A. M., Saint, S., & Yokoe, D. S. (2014). Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. *Infection Control & Hospital Epidemiology*, 35(5), 464-479. https://doi.org/10.1086/675718

Methu, C., Mwenda, C., & Mbugua, R. (2019). Nurse factors influencing compliance with CDC guidelines for catheter-associated urinary tract infection prevention in a referral hospital in Kenya. *International Journal of Health*, 9, 70-76.

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

Mukakamanzi, J. (2017). Knowledge, attitude, and practices of nurses towards the prevention of catheter-associated urinary tract infection in selected referral hospitals in Rwanda. *University of Rwanda*.

Niederhauser, A., Züllig, S., Marschall, J., Schweiger, A., John, G., Kuster, S. P., & Schwappach, D. L. (2019). Change in staff perspectives on indwelling urinary catheter use after implementation of an intervention bundle in seven Swiss acute care hospitals: Results of a before/after survey study. *BMJ Open*, 9(1), e028740. https://doi.org/10.1136/bmjopen-2018-028740

Opina, M. L. F., & Oducado, R. M. F. (2014). Infection control in the use of urethral catheters: Knowledge and practices of nurses in a private hospital in Iloilo city. *Asia Pacific Journal of Education, Arts, and Sciences*, 1, 93-100.

Rashmi, K., & 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

Sahani, M. P., & Singh, M. L. (2019). Assess the knowledge regarding prevention of catheter-associated urinary tract infection among ICU staff nurses.

Shaver, B., Eyerly-Webb, S. A., Gibney, Z., Silverman, L., Pineda, C., & Solomon, R. J. (2018). Trauma and intensive care nursing knowledge and attitude of Foley catheter insertion and maintenance. *Journal of Trauma Nursing*, 25(2), 66-72. https://doi.org/10.1097/JTN.0000000000000344

Talaat, M., El-Shokry, M., El-Kholy, J., Ismail, G., Kotb, S., Hafez, S., Attia, E., & Lessa, F. C. (2016). National surveillance of healthcare-associated infections in Egypt: Developing a sustainable program in a resource-limited country. *American Journal of Infection Control*, 44(11), 1296-1301. https://doi.org/10.1016/j.ajic.2016.04.212

Tenke, P., Mezei, T., Bőde, I., & Köves, B. (2017). Catheter-associated urinary tract infections. *European Urology Supplements*, 16(9), 138-143. https://doi.org/10.1016/j.eursup.2016.10.001

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 the intensive care unit of public hospitals administered by the Federal Government in Addis Ababa, Ethiopia: A cross-sectional institutional-based study. *BMC Nursing*, 21, 1-10. https://doi.org/10.1186/s12912-022-00968-1

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 the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2021. *Research Square*. https://doi.org/10.21203/rs.3.rs-1306083/v1