

Knowledge of Nurses toward Prevention for Catheter-Associated Urinary Tract Infection in Intensive Care Unit at Al Nasiriyah General Hospital

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Abstract

Background: Urinary catheterization is one of the most common procedures performed in hospitals especially in intensive care units. The urinary catheter is considered as a single biggest risk factor for acquired urinary tract infections (UTIs), and more than 80% of all acquired UTIs are attributable to catheter use. The purpose of this study was to assess nurses' knowledge toward prevention of CAUTI at Al Nasiriyah General Hospital. **Aim of the study:** To assess the nurse's knowledge toward the prevention of catheter-associated urinary tract infection in Al Nasiriyah General Hospital in Al Nasiriyah City. **Materials and method:** A cross-section, correlational study was conducted with a convenience sample of 50 nurses recruited from medical and intensive care units at Al Nasiriyah General Hospital in Al Nasiriyah City, Iraq. Knowledge and Practices Questionnaire was completed by participants. It included two parts: Part I: Socio-Demographic Questionnaire. Part II: Level of Knowledge and Extent of Practices Questionnaire. Data collection was carried out from November 2021 to January 2022. Data were analyzed using the SPSS version 22. **Result of the study:** The distribution of nurses' were male (70%), belonged to age group between (25 to <29 years) 43.0%. The level of education represented that most of them (54%) were from nursing college, (34%) between 1 - 5 years' experience as nurses. Knowledge regarding prevention of catheter-associated urinary tract infection was fair. There is no significant relationship between level of knowledge and demographic characteristics. **Recommendations of the study:** We recommended increasing the knowledge of nursing staff through the courses training, workshop, and curriculums

Keywords: Knowledge, Nurses, Prevention, Catheter, Urinary Tract Infection

1. Introduction

Urinary tract infections (UTIs) are the most common infections worldwide and are a major healthcare obstacle that impacts over 150 million people annually [1]. Catheter-associated UTI (CA-UTI) is the most common hospital-acquired UTI, accounting for more than 80% of cases and affecting more than 1 million patients each year [2]. Urinary catheter insertion considered as the most important predisposing factor for catheter-associated urinary tract infection (CAUTI). The other risk factors include the unnecessary prolonged usage of indwelling urinary catheter, which has been performed by unsterile technique, and by not taking adequate measures to maintain cleanliness of the catheter. [3]. The daily risk varies from 3-7% for an acquisition of bacteriuria when the urinary catheter remains in situ [4]. The Association for Professionals in Infection Control and Epidemiology (APIC) in the United States (US) also reported that CAUTI is accounting for 25.6 % of all HAIs. The National Healthcare Safety Network (NHSN) in 2013 reported that CAUTI pooled means were ranged from 1.2 to 4.1 per 1,000 urinary catheter days in medical-surgical and burn intensive care units (ICUs). While for Non-ICU rates ranged from 1.3 to 1.5 per 1,000 urinary catheter days in medical-surgical units.

A study on incidence and risk factors of UTI on catheterized patients admitted at tertiary care hospital of Nizamabad, Telangana, India, showed that incidence was maximum in

the age group of 51 to 70 years, especially in females (69.44%) and was directly proportional to duration of catheterization [5].

Indwelling Urinary Catheter (IUC) is necessary for large number of people as well as inpatients, including continuing care centers, also those with many urological or genitor-urinary diseases. IUCs are often used to manage such as perfect checking urine output of intensive conditions, improve the rest of severely ill patient, also catheterization helps to manage breakdown of skin caused by urinary incontinence, when it is useless of providing different ways and use for keep the constant voiding of urine for surgical patients, as it considered one of the important parts in during patient readiness, maintaining a uninterrupted steady flow of urine for patient with a void difficulty because of neurological diseases that lead to paralysis or failure in sense that disturbing urination, and providing urgent management of severe urinary retention [6].

Nurses are considered as the primary health care providers who are responsible for inserting and maintain urinary catheters, as well as the production of desired outcomes. Nurses are also accountable to acquire appropriate knowledge and practices of catheter care that will prevent UTI. Moreover, Nurses play a vital role in the diagnosis of catheter-associated urinary tract infection which is one of the largest part widespread health care acquired infections encounter in clinical practice 4, they often the first to notice a clinical change

or technical problem among catheterized patients [7]. This study aimed to assess the knowledge on prevention of CAUTI among staff nurses working at a selected tertiary care at Al Nasiriyah General Hospital in Al Nasiriyah City. It is very important that health care professionals are skillful and competent enough with their knowledge and skills to prevent UTI among the hospitalized patient under indwelling catheter and also give adequate knowledge to patients regarding the prevention of CAUTI.

Significance of the Study

The burden of CAUTI affect the individual patients and the health care system as a whole. Nurses are responsible for providing assessment and management of patients in ICU including the responsibility for sterile insertion of urinary catheters, needed daily maintenance, and timely catheter removal to prevent catheter associated UTI. This research study assessed the nurses' KAP towards CAUTI prevention and the research results will contribute to nursing educational needs, practices, and further research contributing to an increase in the quality of care and improvement of the critical patient's outcomes via appropriate handling of Intensive Care unit at Al Nasiriyah General Hospital. Concerning management and administration, it is hoped that this study will serve to inform the development of context based and evidence based guidelines protocols and checklists for the prevention of CAUTI. A part from that in this research will play a role in education whereby the study hopes to inform context based content for nursing curriculum in the country especially clinical learning activities.

2. Research Questions

Do nurses have knowledge about prevention of catheter-associated urinary tract infection (CAUTI) at Al Nasiriyah General Hospital?

Are there a relation between sociodemographic characteristics and nurses' knowledge toward prevention of CAUTI at Al Nasiriyah General Hospital?

Study Design

A cross-sectional, correlational design was carried out through the present study in order to achieve the early stated objectives.

Study Setting

The study was conducted from March to April 2021 in public Al Nasiriyah General Hospital in Al Nasiriyah City-Iraq. Those hospital is referral for the most population in the region that were chosen by purposive sampling technique, which has (Intensive care units).

Sample Size Determination

Raosoft software was used for sample size calculation with response distribution 50 %, the margin of error 5%, and confidence level 95%.

Study Sample:

A nonprobable (purposeful) sample was selected from (50) nurses were voluntarily participated in the study. All e ICU nurses who had at one year working experience, including both males and females with different educational qualifications, who were involved directly in ICU patients

care, full-time employees and had agreed to participate were eligible to take part in this study.

Inclusion and Exclusion Criteria

The Inclusion Criteria Were Included

All nurses who have direct contact with patients in the previous settings in with various education levels.

All nurses who have a at least one-year experience of nursing in selected units.

The Exclusion Criteria Were Included

All Nurses who are not fulfilling the above inclusion criteria.

Ethical Considerations

Written informed consent was obtained after explanation of the aim of the study. Nurses were informed that participation in the study was voluntarily, and they have the decision to withdrawal from the study at any time. They were also told that they could refuse to answer a specific question. Emphasis was placed on creating a relaxed atmosphere during the interview by using good communication skills with the participants. Moreover, confidentiality and anonymity were ensured throughout the study. Each study participant had a code to ensure anonymity of collected data.

3. The Study Instrument

The researcher used Knowledge questionnaire to assess the level of knowledge nurses toward prevention of CAUTI It included two parts

Part I: Socio-Demographic Questionnaire: For the purpose of completing the study, this part was developed by the researcher based on a review of previous relevant literature and related studies. It consists of 6 questions aimed to gather information about study participants' background, which included (age, gender, level of education, years of the service in the field of the nursing profession, years of experience in the intensive care unit, attended any educational or training program on urinary catheter procedures, and number of attended).

Part II: Level of Knowledge Questionnaire This part developed by Opiña et al. [8] to examine the level of knowledge of nurses toward prevention of catheter-associated urinary tract infection. The questionnaire consisted of 21 items, measured by the correct response to the items through using of two options for answering (where 1= Incorrect answer, 2=Correct answer).

Scoring System

The researchers were classifying the level of knowledge as follows: level percentages good knowledge (1.67-2), fair knowledge (1.34-1.67) and poor knowledge (1-1.34). Each correct response to the items in the questionnaire were given (1 score), and (0 scores) was given to either wrong response. The total score of knowledge is 21scores.

Conducting Pilot Study

In order to find out the reliability instruments, selected a convenient sample of [8] ICU nurses who had at one year working experience,. The study was conducted at Al Nasiriyah General Hospital during the period 2nd January, 2021to2, July, 2021. The sample of the pilot study was excluded from the original

study. In addition, Table (1). Showed determining the reliability of the experimental study, and these results showed that the internal examiner (test - retest), and

the internal examiners scored high and sufficient reliability already.

Table (1): Reliability coefficients for the internal examiner and the internal examiner		
Groups	Coefficients Reliability	Actual values%
Students	Inter Examiners	94.4 (11:210)
	Intra Examiner	93 (15:210)
The reliability coefficient of the experimental study was calculated by the following formula [*]:		

$$\text{Actual value} = \left\{ 1 - \frac{(\text{no. of non coincidences items})}{(\text{no. of all items} \times \text{sample size of pilot study})} \times 100\% \right\}$$

The pilot study found that the study questionnaire was a very reliable and valid measure. After experimental study, all these purposes are achieved. Nieswidomy (2002) mentioned a pilot study can be used to test a new tool or to evaluate an existing tool; it can also be used to determine how long data collection takes, and to assess the topic's response to data collection method.

Validity of the Questionnaire

Through a list of experts, the validity of the study tools was validated through its ability to collect data that was

intended to collect them. The content validity of the early study tools was determined through the use of a team of experts (who have more than 5 years of experience in their careers field). An initial version of the questionnaire was designed and presented to [7] experts.

Tool Reliability

The reliability of the questionnaire was used to determine the accuracy of the questionnaire, and the results also showed a very high level of coherence and internal consistency of the main parts with respect to item responses. "For the questionnaire, each of these elements was calculated using the main statistical parameter: Alpha Cronbach, as shown in the table [2] By calculating the results, the questionnaire submitted to be successful and Meaningful, as well as the designed questionnaire, are valid for studying the phenomenon.

Table (2): Reliability coefficients in the studied questionnaire related to internal consistency (Alpha Kronbach			
Reliability Coefficients of the studied Questionnaire	Standard lower boun	Actual values	Assessment
alpha (Cronbach α)	0.80	0.83	Pass
Alpha Kronbach (α) for questionnaire reliability (internal consistency).			

Data Collection Procedures

A permission had been obtained from authors to use the questionnaire on measuring level of nurse's knowledge toward prevention of catheter-associated urinary tract infection with needed modifications to suit the purpose of the study. The study questionnaires were given to nurses who agreed to participate and met the inclusion criteria, and each interview takes approximately 20-25 minutes. The best time for the data collection for each unit was in the morning shift. Meetings with nurses were held in the break time for nurses. The researcher was presented during filling the questionnaire to answer

any question or concerns regarding study questionnaire. The meetings were directed in Arabic, the national language of Iraq. All data collected from the interview is recognized in hard copy. No electronic device was allowed to use during filling the questionnaires such as computer or cell phone. Data were collected from November 2021 to January 2021.

4. Data Processing and Statistical Analysis

The data was analyzed by using SPSS package which include descriptive statistical approach (frequency, percentage and mean of score) and inferential statistical approach (standard deviation and One way ANOVA).

Table 3: Sociodemographic Characteristics (n=50 nurses)				
SDCv.	Classes	F	%	
Age Groups	20-29 Years	30	60.0	60.0
	30-39 Years	13	26.0	86.0
	40-49Years	4	8.0	94.0
	50-59Years	3	6.0	100.0
	Mean age	60.5 ± 13.6 years		
Sex	Male	15	(30.0)	(70.0)
	Female	35	(70.0)	(100.0)
	Total	50	100	
Level of Education	Secondary nursing	6	(12.0)	(12.0)
	Medical Institute	17	(34.0)	(46.0)

	Nursing College	27	(54.0)	(100.0)
	Total	50	100	
Years of experience in ICU	Less than 1Years	17	(34.0)	(34.0)
	1-5 Years	16	(32.0)	(66.0)
	6-10 Years	11	(22.0)	(88.0)
	11-15 Years	6	(12.0)	(100.0)
	Total	50	100	
Years of experience in nursing	1-5 Years	29	(58.0)	(58.0)
	6-10 Years	11	(22.0)	(80.0)
	11-15 Years	2	(9.7)	(84.0)
	16-20 Years	1	(17.5)	(100.0)
	Total	50	100	
No. of session in theprevention of CAUT	No Session	9	(18.0)	(18.0)
	1-3 Session	34	(68.0)	(68.0)
	4-6 Session	7	(14.0)	(100.0)
	Total	50	100	

Table (3): presents the frequency distribution of sociodemographic characteristic of the ICU nurses. The mean age of the nurses' was 60.5 ± 13.6 belonged age group between 25 to <29 years old (60%). The most (70%) of nurses were male. Fifty four percent of nurses had a bachelor's degree in nursing, 34% had diploma, and only 12% had Secondary nursing. Nearly one-third of nurses (34%) for less than one years were had experience years in the intensive care unit, followed by the major it of nurses (58%) were had experience years in nursing between (1 - 5 years). Whereas, slightly more than half (68%) of them were had (1 - 3), and only 18% had (4 - 6) training courses in the prevention catheter-associated urinary tract infection.

SDCv.	Responses	F	%	M.S	Severity
Antimicrobial prophylaxis offers greater benefit in reducing the incidence of CAUTI.	Correct	36	72.0	1.72	Good
	Incorrect	14	28.0		
Removing catheters as early as possible.	Correct	36	72.0	1.72	Good
	Incorrect	14	28.0		
Using alcohol hand sanitizer is comparable to hand washing in preventing CAUTI incidence	Correct	25	50.0	1.50	Fair
	Incorrect	25	50.0		
Routine use of antiseptic lubricants to decrease the risk of infection is necessary for urinary catheter insertion.	Correct	24	48.0	1.48	Fair
	Incorrect	26	52.0		
Silicone is preferable to Teflon-coated and latex catheter materials in reducing the risk of encrustation for long-term catheterized patients who have frequent obstruction.	Correct	29	58.0	1.58	Fair
	Incorrect	21	42.0		
Antiseptic metal cleaning before catheter insertion is necessary for reducing the incidence of catheter-associated urinary tract infection.	Correct	15	30.0	1.70	Fair
	Incorrect	35	70.0		
Prophylactic antimicrobials should be given for 3 days when the catheter is inserted.	Correct	13	26.0	1.26	Inadequate
	Incorrect	37	74.0		
Effective use of Amikacin Sulfate bladder washes as prophylaxis before catheter removal.	Correct	18	36.0	1.36	Poor
	Incorrect	32	64.0		
Hand washing should be done immediately before and after any manipulation of the catheter site or apparatus.	Correct	21	42.0	1.42	Fair
	Incorrect	29	58.0		
As small a catheter as possible should be used to minimize urethral trauma.	Correct	13	26.0	1.26	Poor
	Incorrect	37	74.0		
It should be inserted only when necessary and removed as soon as possible.	Correct	33	66.0	1.36	Poor
	Incorrect	17	34.0		
Use of other methods of urinary drainage such as condom catheter drainage, suprapubic or intermittent catheterization for selected patients.	Correct	29	58.0	1.58	Fair
	Incorrect	21	42.0		
Avoid kinking of the catheter to maintain an unobstructed flow of urine.	Correct	37	74.0	1.74	Fair
	Incorrect	13	26.0		
Irrigation of the bladder with antimicrobial solution/iodine solution at least once daily.	Correct	32	64.0	1.64	Fair
	Incorrect	18	36.0		
Twice daily meatal care with an antiseptic solution	Correct	23	46.0	1.44	Fair
	Incorrect	27	54.0		
The collecting bag should be emptied regularly.	Correct	28	56.0	1.52	Fair
	Incorrect	22	44.0		
The collecting bag should be kept below the level of the bladder.	Correct	29	58.0	1.58	Fair
	Incorrect	21	42.0		
Regular bacteriological monitoring of catheterized patients	Correct	23	46.0	1.44	Fair
	Incorrect	27	54.0		
The catheter should be inserted only by personnel proficient in the technique of aseptic insertion	Correct	16	32.0	1.36	Fair
	Incorrect	34	68.0		
Isolation of patients known to have UTI from other non-infected patients.	Correct	21	42.0	1.44	Fair
	Incorrect	29	58.0		
Regular educational training regarding basic urinary catheter care.	Correct	9	18.0	1.20	Poor
	Incorrect	41	82.0		
Total	Correct	530		1.49	Fair
	Incorrect	520			

Table (4) shows frequency distribution of nurses' levels knowledge toward prevention o CAUTI. The current study showed that the preventive measures of the catheter-associated urinary tract infection showed that (72%) of the nurses knew that antimicrobial prophylaxis offers greater benefit in reducing the incidence of catheter-associated urinary tract infection. In addition, half of the nurses (50%) in this study did not know that using alcohol hand sanitizer is comparable to hand washing in

preventing CAUTI incidence. In this study, more than half of nurses (52) did not know that the routine use of antiseptic lubricants to decrease the risk of infection is not necessary for urinary catheter insertion. Regarding different approaches to catheterization and specimens collecting methods, nearly two-thirds of nurses(70%) declare did not know that meatal cleansing with antiseptic solution post-catheterization does not offer a greater advantage in preventing the incidence of CAUTI

and 72% of them said that removing catheters as early as possible., 50 % of nurses answering that using alcohol hand sanitizer is comparable to hand washing in preventing CAUTI incidence, 48% only of nurse’s said routine use of antiseptic lubricants to decrease the risk of infection is necessary for urinary catheter insertion. 58% of them answer silicone is preferable to Teflon-coated and latex catheter materials in reducing the risk of encrustation for long-term catheterized patients who

have frequent obstruction, 70% of them declare that the antiseptic metal cleaning before catheter insertion is necessary for reducing the incidence of catheter-associated urinary tract infection. 66% of nurses said prophylactic antimicrobials should be given for 3 days when the catheter is inserted. , 43.33% of nurses said about effective use of Antimicrobial prophylaxis. effective use of Amikacin Sulfate bladder washes as prophylaxis before catheter removal

.. Table 5: The relationship between nurses’ knowledge and selected sociodemographic variables.

SDCv.	Classes	Sum of squares	Df	Mean Square	F	Sig.
Age Groups	Between Groups	848	(2)	(.424)	(.536)	(.558)
	Within Groups	37.152	(47)	(.790)		
	Total	438.000	(49)			
Sex	Between Groups	.507	(2)	(.254)	(1.193)	(.312)
	Within Groups	9.993	(47)	(.213)		
	Total	10.500	(49)			
Level of Education	Between Groups	.557	(2)	(.278)	(.554)	(.578)
	Within Groups	23.623	(47)	(.503)		
	Total	24.180	(49)			
Years of experience in ICU	Between Groups	2.476	(2)	(1.238)	(1.192)	(.313)
	Within Groups	48.804	(47)	(1.038)		
	Total	51.280	(49)			
Years of experience in nursing	Between Groups	1.305	(2)	(.652)	(.517)	(.600)
	Within Groups	59.275	(47)	(1.261)		
	Total	59.275	(49)			
No. of session in the prevention of CAUT	Between Groups	.275	(2)	(.38)	(.413)	(.664)
	Within Groups	15.645	(47)	(.333)		
	Total	15.920	(49)			

Sum of squares, Degree of freedom, Mean squares, Significant

Table (4) shows the result revealed that there was no significant relationship between nurses’ levels of knowledge and demographic characteristics except training course.

5. Discussion

Sociodemographic Characteristics of Nurses

The results of this study were based on the primary data gathered from fifty nurses to assess the knowledge. The prevention of CAUTI is primarily the responsibility of the nurse whose knowledge and practice influence the health outcome of patients. Nurses are considered as the primary health care providers who are responsible for inserting and maintain urinary catheters, as well as the production of desired outcomes.

Regarding the gender, female nurses predominated and accounted for more than half of all nurses, as opposed to male nurses, who account for (70%) of the total number of participants. our finding agrees with a study was conducted by [Algarni et al. \[7\]](#).who found that more than two-thirds of nurses were female (68.6%), belonged on the age group between 20 to less than 29 years old (60%). Because of the nature of their duties, intensive care unit (ICU) require young nurses. This age group is capable of offering nursing interventions swiftly and effectively. This finding agrees with a study was conducted in India by [Balu et al. \[9\]](#) who reported that ranged between 21 to more. Regarding The level of education show that More than half of nurses had a bachelor degree, (34%) in this study.

This may be explained by the fact that hospitals in Iraq recruit nurses with high educational qualifications in critical setting.This is consistent with a study conducted by [Opiña et al. \[8\]](#) who found that 76.7% of nurses in Philippines were holding a bachelor degree, and contradicted with another study conducted by [Sobeih et al. \[10\]](#) who reported that 75.5% of nurses in Egypt have a diploma in nursing. In addition, the present study revealed that more than half of nurses (58%) had one to five years of nursing experience. Regarding years of experience in ICU (34%) of nurses were had less than one years were experience in the intensive care unit. This is consistent with a study conducted by [Sharma et al. \[11\]](#) who found that stated Two-third of nursing personnel (66.67%) had less than one year of experience in ICU and rest 33.33% had 1-5years of experience in ICU. Most nurses(68%) in this study attended an educational or training session on urinary catheter procedures. The current results agree with the study was conducted by [Kose et al. \[12\]](#) who reported in his study that (53.2%) had training about CAUTI. Also, it agrees with the study reported by [Mukakamanzi \[13\]](#) who found that (79.2%) had training on infection control.

Nurses' Knowledge toward Prevention of CAUT:

The current study showed the knowledge level of nurses toward prevention of CAUTI was more than half of nurses were had fair knowledge might be due to the inadequacy of in-service refreshing training’ courses or because hospitals have not a clear and updated guideline protocol that nurses can access and adhere to at work. Our result conformity with study by [Rashmi et al. \[14\]](#) who found that, the most 59.37% of nurses had a moderate

level of knowledge and only 16.25% had an adequate level of knowledge towards the prevention of CAUTI. Furthermore, our result congruent with the finding of M Abdelmoaty et al. [15] who found that, more than half (54.2%) of nurses had moderate knowledge regarding prevention methods of CAUTI. Moreover, this finding is disagreement with the study was conducted in India by Zachariah [16] who reported that more than two third (73%) of the staff nurses in the pretest were had good knowledge regarding the prevention of urinary tract infections in patients with an indwelling catheter. Furthermore, our study was unaccepted with the study that was conducted by Mukakamanzi [13] who reported that the majority of ICU nurses (64.52%) have a low level of knowledge regarding CAUTI prevention. On the other hand, Mong et al. [17] who reported that, nurses were found to have good knowledge, a positive attitude and good perceived practice regarding CAUTI prevention. On the line, our result not com patible with Balu et al. [9] who mentioned that, more than one quarter (28.4%) of health care professionals had moderately adequate knowledge on CAUTI.

Relation between Nurses' Levels of Knowledge and Sociodemographic Characteristics:

In this study, the result revealed that there was no significant relationship between nurses' levels of knowledge and demographic characteristics except training course. This result is in agreement with Desta et al. [18] who found that there were significant relation between years of nursing experience, and training in the infection control, and the nurses' knowledge. Furthermore, our result congruent with the finding of Prasanna et al. [19], who found a significant positive relation between nurses' knowledge regarding catheter care and attended continuous nursing education program. While finding no significant relation between nurses' knowledge and gender. Also, the result of present study was in line with Mukakamanzi [13] and Anwar et al. [20], who found no significant relation between nurses' knowledge or practices with level of education and years of experience.

6. Conclusions

Based on the results, we conclude that

In this study, there were knowledge deficit about regarding prevention of catheter-associated urinary tract infection among staff nurses in Intensive care unit.

There is no significant relationship between nurses knowledge regarding prevention of catheter-associated urinary tract infection and nurse's demographic characteristics.

Recommendations

The findings of the current study provided a baseline direction to the studies aimed to assess nurses' knowledge toward prevention of catheter-associated urinary tract infection CAUTI. Further studies may be required to investigate the barrier affecting nurses' knowledge regarding CAUTI prevention. Another possible area of further study is required to examine the nurses'

knowledge, regarding CAUTI prevention in others setting at Al Nasiriyah City using different approaches and larger sample size to promote the credibility and generalize ability of the study findings. Nurses should be trained regularly in CAUTI prevention, also hospital administration in Iraq hospitals should make every effort to include CAUTI prevention in their high priority list. This study may be a guide for developing education and training programs on issues related to CAUTI in Iraq.

Shehab MS. Impact of Protocol of Care of Patients Undergoing Urinary Catheterization on Nurses' Knowledge.

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Table 4: The relationship between nurses' knowledge and selected sociodemographic variables. Shehab MS. Impact of Protocol of Care of Patients

Undergoing Urinary Catheterization on Nurses'

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