Nurses' Knowledge and practices regarding Care Bundle of Infection Associated with Indwelling Urinary Catheterization for Children

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Abstract

Background: Catheter Associated Urinary tract infection is one of the most common complications among pediatric intensive care patients. The best preventive measures involve avoiding unnecessary catheterization and removing catheters as soon as possible. **Aim:** The present study aimed to assess nurses' knowledge and practices regarding care bundle of infection associated with indwelling urinary catheterization for children. **Design:** A descriptive exploratory research design was utilized. **Setting:** The study was conducted at Pediatric Intensive Care Unit and pediatric medical department of Tanta Main University Hospital. **Subject:** Purposive sampling composed of 60 nurses and children associated with indwelling urinary catheterization. **Tools:** Three tools were used, Tool (1): Structured Interviewing Questionnaire to assess the Knowledge of nurses regarding care bundle of urinary tract infection. Tool (2): Observational Checklist of nursing practices regarding care bundle of urinary tract infection associated with indwelling urinary catheterization for children. **Results:** Most of studied nurses had low level of knowledge regarding care bundle of infection associated with indwelling urinary catheterization for children. All studied nurses had unsatisfactory total practices level regarding care bundle of infection associated with indwelling urinary catheterization for children. **Conclusion:** The total level of knowledge and practices of the studied nurses were unsatisfactory regarding urinary tract infection associated with indwelling urinary catheterization for children. **Recommendation:** Applying an educational program for nurses at pediatric Intensive Care Units for improving nurses' knowledge and practices regarding urinary tract infection associated with indwelling urinary catheterization for children.

Keywords: Catheter-related urinary tract infections, Care bundle, Nurses' Knowledge, Practices, and Pediatric Intensive Care Units.

Introduction

In the Pediatric Intensive Care Unit (PICU), urinary catheterization is a routine procedure. It is used in many contexts for both therapeutic and diagnostic objectives. The presence of catheter is the greatest predictor for infections of the urinary system in the hospital setting, resulting in 70-80% of infections of the urinary tract. Infections of the urinary tract account for 32% of all Hospital Associated Infections (HAIs) and 13% of all HAI related deaths, making it a significant contributor to hospital-associated morbidity **(Siegel, et al, 2018).**

Catheter-Associated Urinary Tract Infections (CAUTIs) in pediatric Patient must meet 3 criteria: 1- Patient had an indwelling urinary catheter that had been in place for > 2 days on the date of event (day of device placement = day 1) or Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection and at least one of the following signs or symptoms with no other recognized cause. 2- Patient has at least one of the following signs or symptoms: fever (>38^{o}c), suprabupic tenderness, costovertebral angle pain or tenderness, urinary urgency, urine frequency or dysuria. 3- Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ ml **(CDC, 2017)**.

The Healthcare Infection Control Practices Advisory Committee guidelines for prevention of catheter-associated urinary tract infection has estimated that between 17% and 69% of hospital acquired CAUTI can be prevented by implementation of evidence based prevention program. Evidence suggests that certain nursing interventions can reduce the incidence of this infection include: Selecting of optimal catheter and drainage system, proper and sterile catheter insertion technique. In addition to, maintenance catheter care, shorten the duration of indwelling urinary catheterization and using of alternative methods for bladder drainage and remove catheters in a timely manner proper catheter management to prevent risk of urinary tract infection **(Abdelmoaty, et al, 2020).** Medical treatment aimed to treat and prevent complications of it. It is based on its location either in the upper or the lower tract and on pediatric patient characteristics. Antibiotics given for pediatric patients with clinical signs of septic shock or neutropenic fever, it initiation should not be delayed and for pediatric patients with an

isolated fever, it should generally be withheld pending additional investigation (fever isn't an indication for antibiotics) **(Rubi, Mudey, & Kunjalwar, 2022).**

The routine administration of systemic antibiotics at the time of catheter insertion or removal is not recommended. Routine prophylactic antibiotics while the catheter is in situ must not be used as this does not prevent CAUTI; it leads to resistant bacteria. The antibiotic treatment of CAUTI in the presence of long – term indwelling catheter may not successful because the causative bacteria are often embedded in biofilm on the surface of the catheter and protect from the action of antibiotics **(WHO, 2023).**

The CAUTI care bundle includes both the insertion and maintenance bundles. Insertion Bundle which includes need verification before insertion, hand cleanliness, sterile catheter insertion, and urinary catheter management by authorized standards. The maintenance bundle includes avoiding unnecessary catheterization, bathing the perineum daily, removing catheters once not required, and keeping a closed system with unimpeded flow. Such evidence-based treatments are intended to improve patient outcomes when implemented in a systematic and consistent manner **(Lehane, et al 2022).**

Significance of the study

Indwelling catheterization associated with urinary tract infections are common nosocomial infections in children, which increase mortality, morbidity, bacterial resistance, length of hospital stay, and cost. It account for 40% to 60% of hospital infection **(Long, & Koyfman, 2018)**. National Nosocomial Infections Surveillance reported that 13% of nosocomial infections in urinary tract infections in 75 Pediatric Intensive Care Units from 1992 to 2003 were urinary tract infections, and the urinary infection rate was 4.3 per 1000 catheter days **(Abdelmoaty, 2020)**.

The National Healthcare Safety Network demonstrated that pooled mean CAUTI rates were similar in adults and children. The national pooled mean for pediatric intensive care units (PICUs) was 2.5 infections per 1000 catheter-days. In a recent study of 2015 CAUTI events in 10 hospitals, 83% of cases were reported in PICUs, as compared with 13% reported in pediatric inpatient units **(Siegel, et al, 2018).** Indwelling catheter-associated urinary tract infections however, are potentially preventable by using practices which promote judicious use of

urinary catheters and attention to aseptic insertion and proper catheter maintenance practices **(Abdel-Hakeim & Hamza 2018).**

The Aim of the Study The present study aimed to assess nurses' knowledge and practices regarding care bundle of infection associated with indwelling urinary catheterization for children.

Research questions.

1- What is nurses' knowledge regarding care bundle of infection associated with indwelling urinary catheterization for children.

2- What is nurses' practices regarding care bundle of infection associated with indwelling urinary catheterization for children.

Subjects and methods:

Research design:

A descriptive exploratory research design was utilized.

Subjects: Sample type and size

Inclusion criteria of Children: Children aged between 1 to 18 years, both sex and children who stay at pediatric intensive care unit or pediatric medical department for over 48hours and have no symptoms of urinary tract infection during first 48hours from admission.

Exclusion criteria

Children who stay less than 48 hours at pediatric intensive care unit stay and children who have positive urine culture during admission or within 48 hours of stay

Setting:

The study was conducted at Pediatric Intensive Care Unit and pediatric medical department of Tanta Main University Hospital, which are affiliated to Ministry of Higher Education and Scientific Research.

Subject:

A Purposive sampling of (60) nurses and children associated with indwelling urinary catheterization.

Tools of the study

Two tools were utilized as follows:

Tool (1): Structured Interviewing Questionnaire to assess the nurses' Knowledge of nurses regarding care bundle of urinary tract infection

It was prepared by the researcher after extensive reviewing of recent literatures to collect data. It was consisted of three parts:

Part (1): Socio demographic characteristics of studied nurses:

It was covered the characteristics of the nurses which include age, gender, level of education and attendance of clinical training courses about infection control.

Part (2): Socio demographic characteristic of studied children

It covered the characteristics of studied children which include Age, gender, medical diagnosis and

history of any previous infection.

Part (3): Nurses' knowledge regarding care bundle of urinary tract infection.

It was developed by the researcher after reviewing the related literature which includes: causes of hospital acquired infection, risk factors catheter associated urinary tract infection, care provided to child for prevention, preparation of insertion sites, and use of aseptic technique.

The total scores of Nurses' knowledge were calculated as follow:

Less than 60% was considered low level of knowledge. From 60- 80% was considered moderate level of knowledge. From 80% and more was considered high level of knowledge.

Tool (II): Observational checklists of nurses' practices care bundle regarding urinary tract infection associated with indwelling urinary catheterization for children

It was included nurses' practices regarding implementation of indwelling urinary catheter care bundle and was contained three actions, insertion action, after insertion action and maintenance care.

The total scores for nurses' practice will calculated as follows:

Less than 80 was considered unsatisfactory.

From 80-100 % was considered satisfactory

Methods:

The study was accomplished through the following steps:

1. Administrative Process

To carry out this study, an official permission for data collection was obtained from the Dean of the Faculty of Nursing, Tanta University directed to administrators responsible for the selected hospitals.

2. Ethical considerations

- Ethical approval was taken from the Scientific Research Ethics Committee of the Faculty of Nursing, Tanta University before conducting the study code No. 261/6/2023
- Confidentiality and privacy were taken into consideration regarding the data collection and was maintained by coding number
- Nature of the study didn't cause any harm or pain to the entire sample.
- Nurses' informed consents to participate in this study were obtained after explanation of the aim and benefits of the current study. The nurses had the right to withdraw from the study at any time.

3. Tools development

Three tools were developed by the researcher after reviewing of

recent literatures and under the supervision of the supervisors.

4. Content validity

A jury of five experts in the field of Pediatric Nursing to check content validity and clarity of the questionnaire. Modifications were carried out accordingly.

5. Pilot study:

A pilot study was carried out on 10% of nurses and children (6 nurses and children). It study was done to test the tool for its clarity, applicability, feasibility to determine any obstacles that my encountered the researcher during the period of data collection. Pilot study was excluded from the total sample.

6. Reliability test

Testing reliability of proposed tools was done by using Cronbach's alpha coefficient test. It was 0,813 for tool (I), 0.806 for tool (II) which indicates that the two tools were reliable to detect the objectives of the study.

7. Statistical analysis

Data was entered and analyzed by using SPSS statistical package version 30. Graphics were done using Excel program. Quantitative data were presented by mean ($\bar{X}$) and Standard Deviation (SD). Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square ($\chi 2$) test, ANOVA test (F). Level of significance was set as P value <0.05 for all significant tests **(Lisa, 2023).**

Result

Table (I): represents the percentage distribution of the studied nurses regarding their socio- demographic characteristics. It was observed that the age of studied nurses was ranged from 20-30 years**,** and more than three fourths (81.66%) of them were females. While about 60% of them had nursing bachelor. As regards to attendance of clinical training course about infection control, it was found that more than half (63.33%) of them attended clinical training course about infection control. Regarding their experience, nearly three quarters (73.33) of studied nurses had less than five years

Table (2): represents percentage the distribution of socio-demographic characteristics of the studied children with tract infection associated with indwelling urinary catheterization. It was observed that more than half (60%) of them were less than five years. Regarding their gender 58.33% were female, 41.66% were male. It was found that 43.33% of them had central nervous system disorder; also 85% of them not had previous infection.

Table (3): represents distribution of the studied nurses regarding their

total knowledge about care bundle of urinary tract infection associated with indwelling urinary catheterization. It was observed that 90% of studied nurses had low level of knowledge.

Table (4): represents distribution of the studied nurses regarding their practice about insertion standard element. Regarding hand hygiene, 20% of the studied nurses had done correctly. On other hand it was found that 63.33% of the studied nurses had an appropriate antiseptic or sterile solution for periurethral cleaning. The same table demonstrated that 20% of studied nurses use a single-use packet of lubricant jelly for insertion correctly.

Table (5): represents distribution of the studied nurses regarding their total practice level about care bundle regarding urinary tract infection associated with indwelling urinary catheterization for children. It was observed that all studied nurses were unsatisfactory regarding total practice level.

Table (1): percentage distribution of the studied nurses regarding their socio-demographic characteristics.

Characteristics	The studied nurses (n=60)	
	No.	%
Age (in years)		
(20-<30)	57	95.00
(30-<40)	3	5.00
Gender		
Male	11	18.33
Female	49	81.66
Level of education		
Technical health institute	27	40.00
Nursing bachelor	33	60.00
Attendance of clinical training course about infection control		
Yes	38	63.33
No	22	36.67
Experience (in years)		
(<5)	44	73.33
(5-<10)	14	23.33
(10-<15)	2	3.33

Table (2): percentage distribution of socio-demographic characteristics of the studied children with tract infection associated with indwelling urinary catheterization.

Socio demographic characteristics	The studied children (n=60)	
	NO	%
Age (in years)		
(<5)	36	60.00
(5-<10)	16	26.67
(10-<15)	6	10.00
(15-18)	2	3.33
Gender		
Male	25	41.66
Female	35	58.33
Diagnosis		
Central Nervous System disorder	26	43.33
cancer	6	10.00
cardiac failure	4	6.66
Diabetic Ketoacidosis	4	6.66
Respiratory disorder	12	20.00
renal failure	8	13.33
Previous infection		
Yes	9	15.00
No	51	85.00

Table (3): percentage distribution of the studied nurses regarding their total knowledge level about care bundle of urinary tract infection associated with indwelling urinary catheterization.

Total knowledge level	The studied nurses (n=60)	
	No	%
Low	54	90.00
Moderate	6	10.00
High	0	0.00
Range	**(12-27)**	
Mean ± SD	**17.17±3.35**	

Table (4): Percentage distribution of the studied nurses regarding their practice about insertion standard element.

Insertion standard element	The studied nurses (n=60)	
	No	%
- **Perform hand hygiene before insertion**		
Incorrect done/Not done	48	80.00
Complete correct done	12	20.00
- **Ensure that only properly trained persons who know the correct technique of aseptic catheter insertion**	60	100.00
Complete correct done		
- **Using aseptic technique and sterile equipment**		
A. Use sterile gloves		
Incorrect done/Not done	55	91.66
Complete correct done	5	8.33
B. Use sponges		
Complete correct done	60	100.00
C. an appropriate antiseptic or sterile solution for periurethral cleaning		
Incorrect done/Not done	22	36.67
Complete correct done	38	63.33
D. A single-use packet of lubricant jelly for insertion		
Incorrect done/Not done	48	80.00
Complete correct done	12	20.00
- **Using the smallest bore catheter, consistent with good drainage**		
Complete correct done	60	100.00
- **Properly secure indwelling catheters after insertion**		
Incorrect done/Not done	7	11.66
Complete correct done	53	88.33
Range	**(4-7)**	
Mean ± SD	**5.87±0.90**	

Table (5): Percentages distribution of the studied nurses regarding their total practice level about care bundle regarding urinary tract infection associated with indwelling urinary catheterization for children.

Total practices level	The studied nurses (n=60)	
	No	%
Unsatisfactory	60	100.00
Satisfactory	0	0.00
Range	**(7-15)**	
Mean ± SD	**11.17±1.73**	

Discussion

Urinary tract infections are the most common healthcare-associated infections, particularly in pediatric patients. Indwelling urinary catheterization, is often necessary for diagnostic or therapeutic reasons, significantly increases the risk of catheter-associated urinary tract infections (CAUTIs). In children, CAUTIs can lead to severe complications such as sepsis, prolonged hospital stays, and increased healthcare costs **Werneburg, (2022).**

The proper management and care of indwelling urinary catheters are critical in minimizing infection risks. Evidence-based practices highlight that adherence to standardized protocols can substantially reduce infection rates. Implementing a bundle of care tailored for urinary catheter management aims to standardize practices, improve nurses' adherence to infection prevention protocols, enhance patient safety, outcomes and ultimately reduce infection rates. This approach not only enhances patient safety but also positively influences nurses' performance by providing clear guidelines, fostering accountability, and promoting continuous quality improvement **Patel et al., (2023).**

Regarding the studied nurses' socio-demographic characteristics, the present study revealed vast majority of the studied nurses were in the age category 20-<30 years and most of them are female. Moreover, less than two thirds of them had nursing bachelor degree

and attended clinical training course about infection control. Also, less than three quarters of them had experience less than five years. the majority of the studied nurses were females and the rest were males. This might be related to the high ratio of female nurses comparing to male nurses.

This finding in the previous paragraph is consistent with **Abd Elbaky et al., (2023)** who conducted a study "Effect of blended training on nurses' performance regarding controlling catheter associated urinary tract infection" in Egypt, and concluded that majority of the study samples' ages ranged from 20 to 25 years old and 63.8% of them were female. In relation to experience's years, it was found that 83.8% had less than 5 years' experience.

Also, the findings were in line with a study done by **Algarni, et al., (2019)** in KSA, about "Effectiveness of nurse-targeted education interventions on clinical outcomes for patients with indwelling urinary catheters" and found that greater than half of the studied participants were female. While, far from **Crentsil, (2020)** in a study entitled "Educational Program for Decreasing Catheter-Associated Urinary Tract Infections" in USA**,** found that less than quarter of the nurses' were among the ages of twenty to thirty years old, and 32.2 percent had less than 5 years of experience.

Regarding the socio-demographic characteristics of the studied children. The current study demonstrated that less than two thirds of the studied children were in the age group less than five years and more than half of them were female. Also, less than half of them had central nervous system disorder and most of them had no previous infection.

These findings were in agreement with **Abu Samra & Abd El Aziz , (2022)** who studied "Effectiveness of evidence-based guidelines on catheter associated urinary tract infection rate among pediatric intensive care children" and concluded that 70.6% of children were in the age group (1-<6) years. However, they contrasted with the current study in terms of gender and diagnosis in which 70.6 % of children were boys and most of them had renal problems.

In relation to the studied nurses' total knowledge level about care bundle of urinary tract infection associated with indwelling urinary catheterization. The present findings clarified that most of the studied nurses had low level of knowledge. According to the

researcher's point of view; this may be due to the majority of them not attended training course about infection control.

The result was on agreement with **(Mohamed & Abusaad, 2024)** who reported that nurses' total satisfactory level of knowledge about bundle of urinary catheter infection was 18.5%. Also, **(Abdelmoaty et al., 2020)** who concluded that knowledge score about prevention of catheter acquired urinary tract infections was low.

Concerning the studied nurses' total practice level about care bundle regarding urinary tract infection associated with indwelling urinary catheterization for children, this study revealed that all studied nurses were unsatisfactory regarding total practice level. These results may be due to the majority of them not attended training course about infection control and they have low level of experience.

The result of the current study was in the same line with **Mohamed & Abusaad. (2024)** who showed that more than three-quarters of studied nurses had incompetent practices. Likewise, these results were consistent with the findings of **Algarni et al. 2019** who revealed that almost all nurses performed insufficient CAUTI prevention practices. Also, these results were consistent with the findings of **Abd Elbaky. (2023)** showed that 77.5% of nurses had unsatisfactory practice level regarding catheter care. Contrary to the results of the present study, **Gaber et al. (2025)** who found that the percentage of studied nurses' practice was (73.1%) indicating an average level of practice and only 2% had incompetent level of practice.

Coclusion

The total level of knowledge and practice of the studied nurses were unsatisfactory regarding urinary tract infection associated with indwelling urinary catheterization for children.

Recommendations

Applying an educational program for nurses at pediatric Intensive Care Units for improving nurses' knowledge and practices regarding urinary tract infection associated with indwelling urinary catheterization for children.

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Behavioral-Based Nursing Interventions on E-Cigarette Dependence , Social Media Usage, and Perceived Stress among High School Students

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Abstract

Background: Electronic cigarette use, and excessive social media usage have increased exponentially in Egypt and all over the world. High school students facing simultaneous exposure to e-cigarette use and excessive social media engagement are at elevated risk for perceived stress and many psychological problems. **So, this study aimed** to evaluate the impact of behavioral-based nursing interventions in reducing e-cigarette dependence, social media usage, and the perceived stress level among high school students. **Subjects and method:** A quasi-experimental research design was utilized from March 2025 to July 2025. **Setting**: The study was conducted at the 4 secondary schools in Shebin El-Kom city, Menoufia Governorate, Egypt. **Subjects**: A purposive sample of 600 students was selected from the previously mentioned setting using stratified random sampling. **Tools of data collection**: four valid tools were used in data collection: **tool 1:** A structured interview questionnaire to assess socio demographic characteristics of the studied students, **tool 2:** electronic Fagerström test for nicotine dependence (eFTND) to assess degree of addiction to e-cigarettes, **tool 3:** social media usage scale (SMUS) to assess frequency and intensity of platform use, and **tool 4:** perceived stress scale (PSS) to assess psychological stress. Data was analyzed at two points: pre-intervention and post-intervention. **Results** showed no statistically significant differences between groups in the amount of e-cigarette dependence, social media usage, and the perceived stress level pre-intervention. But after the intervention, the study group exhibited significant reductions in e-cigarette dependence levels, social media usage, and perceived stress levels. **Conclusion:** Behavioral-based nursing interventions effectively reduce excessive e-cigarette dependence, social media usage, and perceived stress among high school students. **Recommendations:** The study recommends adding behavioral training modules to school curricula across the country, including modules on digital well-being, nicotine harm reduction, and managing stress.

Keywords: *E-cigarette dependence, social media usage, perceived stress, high-school students*