IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 1 Ver. X. (Jan.- Feb .2018), PP 37-46
www.iosrjournals.org

The Effect of Implementing UrinaryCatheter Care Bundle on The Prevention of Catheter-Associated Urinary Tract Infections

Eglal Hassanein Abdel-Hakeim[1] andManar Fathy Hamza[2]

1. Lecturer at Adult Health Nursing – Maghrabi Mansour Nursing Faculty -British University in Egypt
2. Lecturer at Adult Health Nursing- Faculty of Nursing-Helwan University, Egypt
Corresponding Author: Eglal Hassanein Abdel-Hakeim

Abstract:
Background:*Catheter-associated urinary tract infections(CAUTIs)are the most common health-care associated infections(HAIs) in the world.Preventing (CAUTI) is a major quality measures and patient safety.*
The aim of the study:*to evaluate the effect of implementing urinary catheter care bundle (UCCB) on the prevention of CAUTIs.*
Methods:*A quasi-experimental research design was utilized in the current study. The study was conducted at different in-patientunits, affiliated to Cairo University Hospital.*
Subjects:*A convenience sample of one group of 30 nurses in both genders and,apurposefulsample of 150 patients. They divided into (75 patients in the baseline group) and (75 patients in the intervention group) including all adult patients in both genders connected with a urinary catheter over a period ofeight months.*
Tools of the study*: Four tools were used for data collection: 1) demographic characteristics (patient& nurse), 2) Self-administered questionnaire sheet, 3) urinary catheter care bundle maintenance checklist, and 4)infection assessment sheet. Results: revealed that, there wasa highly statistically significant difference improvement between the baseline and intervention groups regarding CAUTI rate (p<0.001).*
Conclusion and recommendations:*The current study concluded thatimplementation of UCCB maintenance for patient connected with a urinary catheter will have positive significant difference on the prevention of CAUTI. The study recommended thatthe application of UCCBmaintenance inthe different settings,continued staff developmentregarding the new evidence-based practice such as UCCBto improve quality of nursing careoffered.*
Key words:*Catheter-associated urinary tract infections, healthcare-associatedinfection,urinary catheter care bundle.*

Date of Submission: 14-02-2018 Date of acceptance: 03-03-2018

I. Introduction:

The Center for Disease Control and Prevention (CDC) mentioned that, catheter-associated urinary tractinfections(CAUTIs) were the most common (>560,000) healthcare-associated infections (HAIs) in the United States. Acute care hospitalsestimated that 30-40% of all HAIs.CAUTIs increase patient's mortality, morbidity length of hospital stays, and cause an economic burden to the healthcare system [1];[2], and [3].

The Department of Health and Human Services (HHS) has established a goal of decreasing preventable hospital-acquired infection by 40% by 2013, which concerns HAIs.Decreasing of HAIs through applying evidence-based practices has become a major priority for both patient safety and economic reasons [4].High rates of CAUTIs require strengthening infection control policyand applying updated evidence-based preventive measures[5], and[6].

The central issues of health care to provide high quality, cost effective, and mantain patient safety. Evidance-based practice(EBP) related to patient safety is very critical. The nurse shows a critical role in performing evidence into clinical practice[7].Nursing practice plays a vital role in CAUTI prevention.A review of the guidelines designedby standardized organizations regardingevidence-based. CAUTI Preventionrecommendations and theimportance of the nurse's role in implementation[8].

The Institute of Healthcare Improvement (IHI) has established the concept of "bundles" to improve quality of care and apply the evidence-based practice. The care bundles were applied to reorganize, structure, and arrange strategy of care in the department. Carebundles are developed for specific elements of the patient's

care and consists of three, five, or seven elements.These elements are evidence-based or supported by national or international guidelines. The strength of the care bundle is that all elements should be applied to all patients[9], and [10].Urinary Catheter Care Bundle (UCCB)is a set of standard measures when applied during the care of patients are established to decrease the incidence of HAIs.Bundle approach is confirmed to be effectively minimizing the CAUTI rate though applying the quality improvement approach with the multidisciplinary team approach. The benefit of the performance and check of the elements of a bundle is that it acts as a complete and regular reminder system for prevention of HAIs[11], and [12].

Significane Of The Study:

According to the CDC in the USA approximately 1.7 million patients gained HAIs, and about 100 000 patients die annully due to CAUTIs**.** More than 1 million CAUTIs per year occur in the United States hospitals. In 2007, it was calculated thatthe cost of treating CAUTIs was $400 million annaully. However, the complications of CAUTIs may elevate$1200-$4700 to each patient's cost **[13], and [14].**

Researches supported thatCAUTIs were the third incidence of HAIs in the ICU in Cairo, Egypt (3.1%)and excessive mortality was 48% for CAUTI**[6].**According to the CDC in USA (2014)the CAUTIs rate represented 3% from 2009 to 2012 and increased to 6% from 2009-2013.The estimated daily risk of developing CAUTIs is from 3% to 7%.The percentage increased with longer catheterization timeinsertion **[15].**

80% of UTIsthat occurduring the period of hospitalization are precipitated by the use of indwelling catheter this referred to CAUTIs**.** The risk of developing CAUTI is associated with long durations of indwelling catheter. The CAUTIs increase 5% per day for every time a catheter is inserted**[16], and [17].**

The aim of the study was to evaluate the effect of implementing urinary catheter care bundle (UCCB) on the prevention of CAUTIs through:

1. Assessing nurses' knowledge and practice regarding UCCB
2. Develop and implement teaching sessions for nurses regarding UCCB
3. Applying UCCB for patients connected with a urinary catheter
4. Evaluating the effect of implementing UCCB on the prevention of CAUTI

II. Subjects And Methods:

2.1Research Design: A quasi-experimental design was utilized in the current study.

2.2Research hypothesis:

H1.Implementation of UCCB teaching sessions will affect positively on the knowledge and practice of nurses.

H2.Implementation of UCCB for patient connected with urinary catheter will affect positively on controlling of the CAUTI

2.3. Setting: The study was conducted at different in-patient units affiliated toGovernmental Cairo University Hospital.

2.4. Subject: The subject divided into two parts:

A .Nurses: A conveniencesample of one group of(30) nurses from both genders.The nurses who participatedin the study were all the available nurses in 5 units in the hospital.

B. Patients: A purposeful sample of 150 patients. They were divided into (75patients in the baseline group) and (75 patients in the intervention group) including all adult patients of both genders connected with a urinary catheter over a period of eight months were included in the study. With the following inclusion criteria: Adult patients (≥ 18 years), of bothgenders, after 48 hours of connection with the urinary catheter; no signs and symptoms of systemic infection such as (Fever, increase inwhite blood cells(WBCs) in the blood, and urinary tract infection(UTI), such as burning sensation during micturition, pus in urine, turbid urine, increase WBC in urine.

Excluded criteria:Before 48 hours of connection with urinary catheter. Patients have UTIon admission, and diabetic patients.

2.5.Tools of data collection: Four tools were utilized to collect data in the current study.Three tools were designed by the investigators (demographiccharacteristics for patients, nurses, self-administered questionnaire sheet to assess nurses' knowledge (pre-post) and infection assessment sheet). Catheter care bundle maintenance checklist developed by the national institute of health and modified by the researchers'**.**

2.5.1.Demographic characteristics Sheet: designed by the investigators in Arabic language, after reviewing the related current national and international literature. ***The items onthis sheet were adopted from [18].***

It consisted of:

A. Demographic characteristics for patient: under study such as age, gender,marital status, diagnosis, length of hospital stays, and duration of catheter insertion.

B. Demographic characteristicsfor nurse:

It includes the characteristics of nurses under the study such as, age, gender, qualification, experience year, and attendance of previous training.

2.5.2. Self-administered questionnaire sheet: to assess nurses' level of knowledge (pre/ post test).

This questionnaire was developed by the researchers in an Arabic language based on the review of related literatures **[19]**to assess nurses' knowledge regarding urinary catheter care bundle maintenance. It included 10 multiple choicequestions. It includes the following, concept of bundle, element of UCCB, importance, relation between UCCB and CAUTIs.

Scoring system:

The assessment of nurses' knowledge consisted of 10 multiple choicequestions. The correct answer was given (1 grade), the incorrect answer was given (zero), the total grade for the knowledge questionnaire was (10 grades), and the satisfactory level was ≥60%.

5.2.3Urinary catheter carebundle maintenance checklist:

This checklist was used to assess nurses' practices regarding catheter care maintenance bundle before and after the teaching session's implementation. It was modified by the researchers and supported by **[20], and [21].**It consists of 8 steps related to catheter maintenance. It includes hand washing, wearing gloves, remove kinks in the catheter, secure it well,continuous catheter connected to a Uri-bag.Urinedrainage should be well andnot obstructed, drainage bag should be below the level of the bladder but mustn't touchthe floor, empty the Uri-bag regularly, perineal care should done at least once daily. It is also planned date for catheter replacement or removal.

Scoring system:

UCCB maintenance checklist requires assignment of 1of 3 responses "yes" response if the indicates the item is done, while "no" response means that items not done. If the response was "not applicable" is used when inadequate data are available or this item cannot be done for this patient. If the response was not applicable, the weight of this item should be submitted from the total scores. UCCB daily checklist was considered compliant if all 8 items were performed for the patient. Regarding item 8 the majority of nurse not applicable for them because the responsibility of changing urinary catheter is done by the physician.The final percentage of UCCB compliance for the patient shall be calculated based on the total percentage of nurses' compliance with all UCCB practice together throughout the urinary catheter connection days, and then the sample will be categorized based on the cumulative.

2.5.4.Infection assessment sheet was developed by the researchers in English language, after reviewing the related current national and international literature. [**22], [23], [24], and [25].**

It covers twomain parts; the first part is concerned with local infection such as turbid urine, pyuria, dysuria, nocturia, and an increase of WBCs in urine. The second part concerned with the systemic infection such as fever, chills, elevation of WBCs in the blood.

Scoring System:

If any signs and symptoms of infections appear, it considered presence of infection. The calculation of catheter associated urinary tract infections (CAUTIs) rate/1000 urinary catheter days= urinary catheter days,n/1000= x, CAUTI,n/x.

Tools validity and reliability:

Tools developed by the researchers (tool 1,2&3) were revised by a panel of five experts in the field of Medical-Surgical Nursing to determine the included items are clear and suitable, applicability, and appropriateness to achieve the aim of the study.

Testing of the reliability of the purposed data collecting tools was done by alpha Cronbach test which was 0.82 for the knowledge tool, and 0.85 for the infection assessment tools.

Pilot study:

A pilot study was carried out on 10% randomly selected patients(10%) to test clarity, feasibility, objectivity and internal consistency of the study tools, and estimate the need time to complete each tool. Needed modifications were done in data collection tools and subjects included in the pilot study were excluded from the main study subject.

Ethical Consecration:

An official permission letter was **o**btained before conduction of the study from the Medical and Nursing Director of inpatient units at Cairo university hospital. Participants in the current study were voluntary. Oral

consents were obtained from patients who met the inclusion criteria. The participants have the right to withdraw from the study at any time without giving any reasons.

Procedure:

The procedure included three phases: *preparatory phase, implementation phase andevaluation phase*.Based on the needs assessment of nurses' knowledge and practice, the content of teaching session was developed.

The Preparatory phase:

The preparatory phase involved extensive reviewing of the recent related literatures to develop tools for data collection and prepare some posterrelated to UCCB. The aim and purpose of the study was explained by the researchers to the study subjects prior to data collection, as well as their approval to participate in the study was obtained. It include two main subject:

Nurse:

The previous questionnaires were distributed to the nurses to answer it by themselves in the presence of the researchers in order to assess nurses' knowledge regarding urinary catheter care bundle to identify the nurses' learning needs. It took 15 minutes to fill this questionnaire. Then the observation checklists were used to observe every nurse one time by the researchers before implementation of the teaching sessions. It took 10 minutes during morning and afternoon shifts to fill in these checklists. The researchers developed the teaching sessions about UCCB which were revised for content validity by a group of five expertise in the field of Medical-Surgical Nursing to determine the included items are clear and suitable to achieve the aim of the study, and the final modifications was done based on the opinions of the expertise.

Patient:

The researchers assess the present of infection by using the infection assessment sheet for each patient connected to urinary catheter, before the implementation of the teaching sessions to detect the baseline assessment regarding the infection rate.

The implementation phase:

Nurses:

The teaching sessions were conducted for nurses at their units at the Governmental Cairo University Hospital. The teaching sessions contents were explained over 3 sessions with 30 minutes for every session using the prepared poster. Nurses group were divided into 5 groups and each group received the three sessions separately to minimize interruption of nurses' work. The first teaching sessions included: pre test of knowledge and the theoretical part related to UCCBmaintenance guideline. Then the researchers' explained the aim of the teaching session, give introduction regarding CAUTIs incidence, and how to minimize it, (theoretical part). The second session the researchers' explained the concept of the bundle, importance, elements of UCCB, and how to apply it. The researchers' gave the chance to nurses to ask any questions or clarifying part related to practice. The third session include open discussion and the post test for the nurse' knowledge. Data collection and teaching sessions were conducted over a period of eight months starting at July 2016 till the end of February 2017 in the morning and afternoon shifts. For (30) nurses, and 150 patients divided into (75 patients in the baseline group) and (75 patients in the intervention group) including all adult patients in both genders connected with a urinary catheter. The assessment and teaching sessions took the first four months, and the implementation took the rest of the four months.

Patient:

The patient was observed for 10 days (the average number of days of urinary catheter insertion).During the care received from the nurse, if the signs of infection appear during this period the patient was excluded from the study and recorded as an infected case (as seen in the results of the research).

The evaluation phase:

Nurse:

Post implementation of the teaching sessions, all tools were filled in again immediately. Evaluations of the effect of the training was done by comparing the results of nurses' knowledge and practice pre and post the implementation of teaching sessions by using the same data collection tools.

Regarding practical part, the nurses observed three times during application of UCCB maintenance checklist. The first it was before teaching sessions as baseline data as routine care (within the 1st four months), the second was after implementing the teaching sessions immediately, and the 3rd time was at the end of the 8th month of the research as a follow-up observation. The investigators observe the nurse during UCCB procedure which contains 8 items.The researchers attended for two days weekly in the unitsin the morning and afternoon shift to meet approximately 2-3 nurses each visitand observe the nurse during implementing UCCB for about 3-4 patients.

Patient:

Regarding to patients, the investigators' compare the occurrence of UTIs for patient connected with urinary catheter pre (baseline group) and post (intervention group) implementation of the teaching sessions by UCCB**.**

Statistical analysis:

The data was analyzed using a statistical package for social science software (SPSS) version 20 for Windows; mean, standard deviation, t- test, Probability level was set at $P \leq 0.05$ for all tests.

III. Results:

Part I- Patient:

Table 1: Comparison between two studied groups regarding demographic data(n 75 in each group):

Items	BaselineGroup (n=75)		Intervention Group (n=75)		Test of the sig.	p-value
	No.	%	No.	%		
Age						
<40	18	24.0	24	32.0		
40-<50	35	46.7	33	44.0	0.44	>0.05
50- <60	16	21.3	13	17.3		
60+	6	8.0	5	6.7		
Mean ±SD	46±10.72		53±14.20			
Sex:						
Male	29	38.6 %	41	54.6%		
Female	46	61.4 %	34	45.4%		

(NS) Statistically not significant at p>0.05

Table (1) shows thatthe patients in both groups have close mean age (46±10.72& 53±14.20), respectively. There is no statistically significant difference between baseline & intervention group (p>0.05). Also it is clear from the previous table that, that the majority (61.4%) of patients in the baseline group were females. While the minority (38.4%) of patients in the baseline group were males. In addition than half (45.4%) of patients in the intervention group were females. While more than half (54.6 %) of patients in the intervention group were males.

Table 2: Catheter-associated urinary tract infection rates, and device use in the two studied groups:

Patient outcomes	BaselineGroup	Intervention Group	p. value
Patients, No.	75	75	
Patient- hospitalization days, No.	1001	1555	
UC days, No.	930	888	
UC use, mean± SD	12.41±2.1	11.84±1.9	0.000 **
CAUTI, No.	17	9	
CAUTI rate per 1,000 UC-days	18.28	10.14	0.000 **

CAUTI, catheter-associated urinary tract infection: UC, urinary catheter

***(HS) statistically highly significant at p<0.001*

Table(2): shows thatthe patient number in thebaseline group were 75 patients who spent 1001 days total at the hospital and were connected with a urinary catheter for 930 days with mean 12.4 days for each patient. Comparable to intervention group, 75 patients spend 1555 days at the hospital and they were connected witha urinary catheter for 888 days with a mean of 11.8 days for each patient. In addition, there were 17 patients who acquired CAUTI in the baseline group while, only 9 patientswho acquired CAUTI in the study group. Regarding urinary catheter use, the patients in both groups have mean days of connection with a urinary catheter (12.41±2.1&11.84±1.9), respectively. There was a high statistically significant difference between baseline & intervention groups (p<0.001).Also, there was a high statistically significant difference between baseline& intervention groups regarding CAUTI rate per 1.000 urinary catheter connection days(p<0.001).

Part II:Nurses:

Table (3): Demographic characteristics of studied nurses (n= 30):

Items	No.	%	Range/ mean±SD
Age (years):			
<30	20	66.7	28.5±5.6
≥30	10	33.3	
Gender:			
Male	7	23.3	

Female	23	76.6	
Nurses qualification:			
Nursing school diploma	16	53.3	
Technical institute	10	33.3	
Bachelor degree	4	13.3	
Experience (years):			6.5±3.7
<10	15	50.0	
≥ 10	15	50.0	
Attended training course about infection control	30	100.0	
Attended training regarding bundle care	0	0	
Number of courses attended			1-3/ 1.4±0.6
Time since last course (years):			<1-8/ 1.4±2.2

Table (3)clarifies that**,** The characteristics of studiednurses,shows that 66.7% of nurses were less than 30 years, with a mean age of 28.5±5.6. Concerning gender (76.6%) of nurses were females. As regards nurses'qualification, 53.3% of them were diploma, and only (13.4%) were bachelor degree holders and 50% of nurses had experience of 10 years or more, with a mean experience of 6.5±3.7 years. Also 100.0% of studied nurses attended infection control courses, with a mean number of courses attended of 1.4±0.6 and mean time since last course of 1.4±2.2 years. In addition to, all nurses 0% not attended any course regarding UCCB.

Table 4: Comparison of studied nurse'stotal means scores level of knowledge related to urinary catheter maintenance care bundle pre/post teaching sessions(n=30):

Nurses' Knowledge	**Pre**		**Post**		**t-test**	**p-value**
	No.	**%**	**No.**	**%**		
Satisfactory Unsatisfactory	1 29	3.3 96.7	25 5	83.3 16.7	16.37	<0.0001****

***(HS) statistically highly significant at p<0.001*

Table(4) shows that, there were highly statistically significant differences between pre and post test mean scores of nurses' knowledge regarding the catheter maintenance bundle of care (t- test = 16.37 at p<0.0001).

Table 5: Comparison of studied nurse's practice related to urinary catheter maintenance care bundle:

Items of bundle	**Baseline Group(Pre)**		**Intervention group (Post)**			
	1st time		**2nd time**		**3rd time**	
	No.	%	No.	%	No.	%
Hand washing & wearing gloves	10	33.3	25	83.3	26	86.6
Free kinked catheter, well secured	23	76.6	29	96.6	25	83.3
Catheter continuous connected with a Uri-bag	30	100	30	100	30	100
Urine is drainage well no obstructive	23	76.6	29	96.6	25	83.3
Drainage bag below level of the bladder not touch floor	7	23.3	25	83.3	25	83.3
Uri- bag emptied regularly	30	100	30	100	30	100
Perineal care at least once daily	5	16.6	17	56.6	20	66.6
Is planned catheter replacement	0	0.0	8	26.6	5	16.6

Table (5) revealed that 100% of nurses in the baseline group keep the catheter connected with the Uri-bag and emptied it regularly, while no one made a planned catheter replacement. While in the intervention group there was improvement in all steps.

Table 6: Significance of practice of nurses at three times observation:

Compared items	**t**	**Sig.**
1st – 2nd time	3.97	0.000*
2nd – 3rd time	-1.00	0.326

**(HS) statistically highly significant at p<0.001*
(NS) Statistically not significant at p>0.05

Table(6): revealed that there was highly statistically significant difference and improvement between 1st and 2nd time of nurses'observation, while there was no statistically significant difference between 2nd and 3rd time of nurses'observation.

IV. Discussion:

The current study aimed to evaluate the effect of implementing urinary catheter care bundle (UCCB) on the prevention of CAUTIs.Discussion of the findings in the current study will cover the main areas;**A.**

Patient:demographic characteristics of the patient under the study, catheter–associated urinary tract infection rate**B .Nurses**:demographic characteristics of studied nurses, nurses' knowledge, and nurses' practice

A.Patient:

Regarding the demographic characteristicof the patients in both groups; the two groups were quite similar. The finding of this study showed thatthe mean age of the baseline group was 46±10.72years and the intervention group was53±14.20years. There was no statistically significant difference between baseline andintervention groups regarding age.

The previous findings were in agreement with **Underwood(2015)[16],** in her study of the effect of implementing a comprehensive unit-based safety program on the urinary catheter use, she found thatthe mean age of patients in the baseline group was 65.2 ±19.6 years and in the intervention group was 62.8 ± 15.5, respectively. There was no statistically significant difference between baseline andpost-intervention groups regarding age.

Concerning the gender, the majority of patients in the baseline group were females. While themajority of patients in the intervention group were male.The previous finding was in agreement with **Leblebicioglu(2013)[26]** in his study of the impact of a multidimensional infection control approach on catheter-associated urinary tract infection rates in adult intensive care units in 10 cities of Turkey: He found thatthe majority of patients in the baseline group were females, while the majority of patients in the intervention group were male.

Concerningcatheter–associated urinary tract infection rate, device;As regards to urinary catheter use, the current study showed that, the patients in both group have a mean of days of connection with a urinary catheter (12.41±2.1&11.84±1.9), respectively with high statistically significant difference between baseline & intervention groups($p<0.001$).

The previous finding was in agreement with **Leblebicioglu (2013[26]** in his study, he revealed that, the patients in both group have means days of connection with urinary catheter (8.1±11.5& 10.2±18.0) respectively, with highly statistically significant difference between baseline& intervention groups group ($p<0.001$).

Regarding CAUTI mean rate per 1000 urinary catheter days, the findings of the current study showed that the rate was18.09 in the baseline group and 10.14 in the intervention group, with high statistically significant difference between baseline & intervention regarding CAUTI rate per 1.000 urinary catheter connection days ($p<0.001$).

From the investigators' point of view, the rationale of decreasing the CAUTI rate, because of the effect of the education sessions regarding implementation of UCCB. Also, may because the steps of the bundle are very easy, applicable, and specific. This rationale was supported **by Pittet, et al(2009)[27],**as he mentioned that, education is a foundation for the improvement of urinary catheter care bundle practices. Issues that are covered by educational programs.Nurses should include the scientific facts of the definitive impact of improved catheter bundle on CAUTIs.

The previous finding was in agreement with**Talaat, et al. (2010)[28]**in his study Surveillance of catheter-associated urinary tract infection in four intensive care units at Alexandria university hospitals in Egypt, He revealed that CAUTI rate was 15.7 per 1000 catheter-days.

The finding of the current study was in agreement with**Prakash, et al.(2017)[29]**in his study of care bundle approach to reducedevice‑associated infections in atertiary care teaching hospital,South India.He observed a statistically significant drop in the CAUTIfrom 4.86 in pre-implementation to 2.36per 1000 catheter days in post-implementation phase. He also added that the importance of monitoring thebundle compliance in achieving a greater reduction ofCAUTI.

From the investigators' point of view, both researches applied in Egypt or abroad have a reduction in the percentage of CAUTI.However, in Egypt the percentage is still high. The rationale of why the percentage is still high in Egypt, this may due to the data collection in a Government Teaching hospital.It has limited resources and high patient to nurse ratio.The previous results were in disagreement with **Raslaan,(2012)[30].**In his study about the device-associated infection rate in adult intensive care units of hospitals in Egypt, he found that the CAUTI rate was 34.2 per 1000 catheter days.

B. Nurses:

Regarding demographic characteristics of the studied nurses,the study subject of one group of nurses', it was obvious that, the highest percent of the total subject their age was more than thirty years**,** while the minority of the total subject their age was less than thirty years. As Regards to gender, the present study

stated that, the majority of studied nurses were, female. In relation to the qualification of the studied nurses', this studymentioned that, about half of nurses had a diploma in nursing.

With regards to years of experience, the current study revealed that, half of the nurses have experience years more than 10 years. As regards to attend previous training, this study showed that, all studied nurses had previous training regarding infection control, while none of the nurses had training regarding UCCB. From the researchers' point of view, the studied nurses were highly needs to UCCB, because according to the assessment they had lack of knowledge and training regarding the controlling of the infection rate that related to CAUTIs.

Concerning nurses' score of knowledge related to catheter maintenance care bundle:

The finding of the present study showed that, there is a highly statistically significant difference improvement between the nurse total scores of knowledge pre and post intervention regarding urinary UCCB maintenance. According to the researchers point of view, the previous findings, showed that, improvement in nurses' knowledge could be attributed to the effect of the teaching sessions implementation only, since the baseline knowledge preprogram implementation was the same(the same group). The program gave them the basic knowledge regarding UCCB.

As regards to nurses' practicethat related to steps of catheter maintenance care bundle, hand washing and wearing gloves in the present study clarifying that the minority(33.3%) of nurseswere performed hand washing and wore gloves when applying urinary catheter care bundle in the baseline group. While the majority(86.6%) of nurses washed their hands, and wore gloves in the intervention group. The previous finding is in agreement with **Rosenthal, et al. (2012)[31]**.Who found that hand hygiene compliance improved from 55.3% in the baseline group to 66.6% in the intervention group. The previous finding was contradicted **Rasslan et al. (2012)[30]** in his study of device-associated infection rates in adult and pediatric intensive care units of hospitals in Egypt. He found that the health care workers compliance ratewith hand hygiene were 47.1%.

Concerning freeing any kinks in the catheter and securing it well, almost all of the nurses in the both groups applied this step. As regards to continuous catheter connected with aUri-bag, all nurses either in the baseline or in the intervention group applied this step. The rationale for why all nurses continuouslyconnected urinary catheter with a Uri-bag because this is a very important step and the nurse applied onceat the time of connecting a patient with urinary catheter. Also, due to close observation from the researcher if the Uri-bag is empty that divert the nurse to check the connection if is it disconnected or not.

Regarding that the urine drainage is well and there aren't any obstructions, the majority of nurses in the both groups applied this step correctly. The rationale of this point it is very clear in the amount of urine in the Uri-bag. The nurseobserves this bag continuously while walking in the ward. Also,duringemptyingfrom the bagand if there is no urine the worker reports to nurse. So the nurse will check the connection.

Concerning, the drainage bag is below the level of the bladder but mustn't touch floor. The minority of nurses in the baseline group applied this point,while the majority of the nurses in the intervention group did that. The rationale of why the nurses in the intervention group apply drainage bag below the level of the bladder is due to the sessions where the nurses know the importance of this point to prevent infection. Also,explaining to thenurses in a simple and effective method the importance of supporting theUri- bag in the bed. The previous findings supported by, **Dailly, (2012)[32],**in her study of auditing urinary catheter care in England, she founded that, the majority of nurses' compliance of placing theUri-bag in a proper position including being kink-free, secured well, no obstructions, and support of theUri-bag below the level of the bladder.

As regards to the Uri-bag being emptied regularly,all nurses in both baseline and intervention groupsempty the Uri-bag regularly. The rationale of why the nurses in both groups emptied the Uri bag regularly is because the needs to document the amount of urine in the fluid balance chart.

Regarding, the perineal careit is done at least once daily, very minor nurses in the baseline group do this step. While more than half of the nurses in the intervention group apply this step correctly as the result of the educational sessions for nurses andthe importance of perineal care to prevent infection and clarifyingthat, thepatient connected with urinarycatheterliable to infection rather than the patient who isn't connected to it.

Concerning the planned catheter replacement or removal, the finding of the current study showed thatnurses'noncompliance to detect the standard day to change and remove the urinary catheter in the baseline group. But the minority of nurses in the intervention group apply this point. Fromthe researchers'point of view

the nurse is responsible about the caring of the urinary catheter, but the insertion is the role of the physician. The previous finding was supported by**Rosenthal, et al. (2012)[31]**, whomentioned that, the nurse and physician were responsible to write a daily reminder of change urinary catheter after 4 days of itsinsertion which was described as a key intervention of reducingthe duration of catheterization and infection.

Also, the previous finding was in agreement with**Dailly (2012)[32],**whomentioned in her study in theAuditing urinary catheter carein England that here was delayed removal of urinary catheter and confusion between the nurseand physician role.

Concerning significance practiceof the nurses for three times observations. The finding of this study clarified that, there were high statistically significant difference between the nurses'practice between the first time of observation and the second time (P<0.001).The rationale of this is that there is great change in nurses' performance pre-education sessions and after education sessions. The education of nurses increases theircompliance with the urinary catheter care bundle (UCCB). The previous finding is in agreement with**Amine, et.al (2014)[33]** in her study of evaluation of an intervention program to preventHospital-acquired catheter-associated urinary tract infections in an ICU in a rural Egypt hospital. As she found that, there was a statistically significant difference between the baseline group and intervention group in all elements of bundle (P< 0.05). She also mentioned that, The compliance rate of the ICU nurses to the bundle elements was raised to 100% during the last 2 months of the post intervention phase.

V. Conclusion and Recommendations:

In the current study, the implementation of UCCB for patients connected with urinary catheter has positive significant difference improvement on the prevention of CAUTI. Also, there are significantly lower catheter-associated urinary tract infection rates. Through infection prevention, health education, and educating nurses; UCCB maintenance guidelines shall improve quality of nursing care offered. The current student recommended that, Application of **UCCB** in different settings to minimize infection rate.Apply continuous staff development courses for nurses to update their performance regarding new evidence-based practice such as UCCB to improve quality of the patient's care. Apply another study on a large probability sample to validate the result.Increase the awareness in CAUTI prevention to encourage staff to pursue for best practice and patient safety.

Acknowledgment:

The authors would like to express their sincere gratitude to all studied patients and nurses'for cooperation throughout the study period.The authors wouldlike to express their deepest gratitude and appreciation to the manager and nursing team at Cairo University Hospital for their effort and cooperation.

References:

[1]. Galicccczewski, J., and Shurpin,K.,(2017): An intervention to improve the catheter associated urinary tract infection rate in a medical intensive care: Direct observation of catheter insertion procedure, Intensive and critical care nursing, in press

[2]. Al Nasser, W., El-Saed,A., Al-Jardani,A., Althaqafi, A., (2016) Rates of catheter-associated urinary tract infection in tertiary care hospitals in 3 Arabian Gulf countries: A 6-year surveillance study, American Journal of Infection Control, 44 , 1589-94

[3]. Department of health and human services (HHS)(2012). HHS action plan to prevent healthcare-Associated infections, appendix. Available at: http://www.health.gov/haui/prevent_hai.asp#appendix_g accessed date Jan 2016

[4]. Gray, G., Nussle, R., Cruz, A., Kane, and Toomey, A., (2016)Effects of a catheter-associated urinary tract infection prevention campaign on infection rate, catheter utilization, and health care workers' perspective at a community safety net hospital, American Journal of Infection Control 44 ,115-6 available at:http://resolver.ebscohost.com/openurl?sid=EBSCO%3aedsgao&genre=article&issn=01966553&ISBN=&volume=44&issue=1&date=20160101&spage=115&pages=115-116&title=AJIC%3a+American+Journal+of+Infection+Control&atitle=Effects+of+a+catheterassociated+urinary+tract+infection+prevention+campaign+on+infection+rate%2c+catheter+utilization%2c+and+health+care+workers%27+perspective+at+a+community+safety+net+hospital&aulast=Gray%2c+Dorinne&id=DOI%3a10.1016%2fj.ajic.2015.08.011&site=ftf-live access date: December 20165-

[5]. Krein, S., Kawalski, C., Marred, M., and Forman, J.,(2013).Barriers to reducing urinary catheter use, A qualitative assessment of a statewide initiative, JAMA American medical association, Vol 173(N.10) May

[6]. El-Kholy, A., Saied, T., Gaber, M., Younan, Ma., Haleim, M., and El Sayed, H.,(2012): Device –associated nosocomial infection rates in intensive care units at Cairo university hospitals: First step toward initiating surveillance program in a resource-limited country, available at http://www.ajicjournal.org/article/S0196-6553(11)01331-9/pdf

[7]. McNeill, L. (2017). Back to basics: how evidence-based nursing practice can prevent catheter-associated urinary tract infections. Urologic Nursing, (4). 204. doi:10.7257/1053-816X.2017.37.4.204.http://41.33.243.106:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsgao&AN=edsgcl.503465387&site=eds-live

[8]. Connor, B. T. (2011). Exploring factors associated with nurses' adoption of an evidence-based practice to reduce catheter-associated urinary tract infections (Order No. 3468003). Available from ProQuest Dissertations & Theses Global. (887806381). Retrieved from https://search.proquest.com/docview/887806381?accountid=178282

[9]. Wu, S., Liu , S., Jiang ,Y., Wang , c., (2015), Evaluate the effect of education primary care giver the use of bundle care in prevention of catheter associated urinary tract infection , 7th International Congress of the Asia Pacific Society of Infection Control, Taipei, Taiwan, March 26-29,

[10]. Borgert, M., Goossens, A., and Dongelmans, D.,(2015):What are effective strategies for the implementation of care bundles on ICU: A systematic review, Implementation science, 10:119, pp1-11.

[11]. Institute of health for improvement(IHI) (2013), What is bundle? Improvement stories what is bundle: Available at:http://www.ihi.org/resources/Pages/ImprovementStories/WhatIsaBundle.aspx

[12]. Resar, R., Griffin, FA., and Haraden, C., (2012):Using care bundles to improve health care quality IHI innovation. Series white paper. Cambridge, Massachusetts for health care improvement, available at: http://www.jhiorg accessed Jan 2016

[13]. Clarke, K., Tong, D., Pan, Y., Easley, K.,(2013): Reduction in catheter- associated urinary tract infections by bundling interventions, International journal for quality in health care, vol. 25, (1), pp43-49

[14]. Umscheid, C Mitchell, M., and Doshi, J., (2011)Estimating proportion of health-care associated infections that are reasonably preventable and the related mortality and cost, Infection control Hosp Epidemiology, 32:101-14

[15]. Center for disease control and prevention. (CDC)(2014). National and state health care associated infection: progress report. Available from: http://www.cdc.gov/HAI/pdf/progress-report-2014pdf Accessed date Jan 2016

[16]. Underwood, L.,(2015): The effect of implementing a comprehensive unit-based safety program on urinary catheter use. Urologic nursing, 35(6), pp271- 279.

[17]. Lo, E., Nicolle, I., Classen, D., (2008). Strategies to prevent catheter associated urinary tract Infections in acute care hospital, Infection control Hosp Epidemiology, 29, S41-S50

[18]. Institute of health for improvement (IHI) (2011).How- to guide prevent catheter- associated urinary tract infection, available at:http://www.ihi.org

[19]. Hanchett, M.,(2012) The infection prevention community must assure the ongoing CAUTI prevention programs are inclusive and effective, available at:https://apic.org/Resource_/TinyMceFileManager/epublications/CAUTI_feature_PS_fall_12.pdf

[20]. Saskatchewan Infection Control Program(2015)sample best practice checklist. Available at:https://www.ehealthsask.ca/services/resources/Resources/Sample%20Urinary%20Catheter%20Bundle%20Checklists.pdf(Accessed date August 2015).

[21]. National health services (NHS)(2014)bundle for preventing urinary tract infections in community sittings when inserting and maintaining a urinary catheter. Available at:http://www.documents.hps.scot.nhs.uk/hai/infection-control/bundles/cauti/uc-community-v1.pdf (accessed date May 2015)

[22]. Cooper, K., and Gosnell, K.,(2015):Adult health nursing, El Sevier, Canada, pp456-465

[23]. Lynn, P., (2015), Taylor's clinical nursing skills, 4th ed., Lippincott, New York.pp.674-691.

[24]. Craven , R., Hirnle, C. and Jensen,S.,2013. Fundamentals of Nursing, Human health and Function. 7th ed. New York: Lippincott. PP1018-1045

[25]. Healthcare Infection Control Practices Advisory Committee(HICPAC). Guideline for prevention of catheter-associated urinary tract infections (2009). Available from :http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf. Accessed May 5, 2016.

[26]. Leblebicioglu,H., Ersoz,G., Rosenthal, V., Yalcin, A.,Akan,O., Sirmatel,F., (2013) Impact of a multidimensional infection control approach on catheter-associated urinary tract infection rates in adult intensive care units in 10 cities of Turkey: International Nosocomial Infection Control Consortium findings (INICC), American Journal of Infection Control ,41 885-91

[27]. Pittet D, Allegranzi B, Boyce J; (2009) World Health Organization World Alliance for Patient Safety First Global Patient Safety Challenge Core Group of Experts. The World Health Organization Guidelines on Hand Hygiene in Health Care and their consensus recommendations. Infect Control Hosp Epidemiol. Jul;30(7):611-22. DOI: 10.1086/600379

[28]. Talaat M, Hafez S, Saied T, Elfeky R, El-Shoubary W, Pimentel G. Surveillance of catheter-associated urinary tract infection in 4 intensive care units at Alexandria university hospitals in Egypt. American Journal of InfectionControl 2010; 38:222—8

[29]. Prakash, S., Rajshekar, D., and Cherian, A.,(2017) Care bundle approach to reducedevice‐associated infections in atertiary care teaching hospital,South India, Journal of Laboratory Physicians, November 29, IP: 156.222.162.255], available from: http://www.jlponline.org/temp/JLabPhysicians94273-8087805_222758.pdf

[30]. Rasslan, O., Seliem,Z., Ghazi,I., Abdel Sabour,M., El Kholy,A., (2012)Device-associated infection rates in adult and pediatric intensive care units of hospitals inEgypt. International Nosocomial Infection Control Consortium (INICC) finding,, Journal of Infection and Public Health , 5, 394—402

[31]. Dailly, S. (2012). Auditing urinary catheter care. Nursing Standard, (20), 35.avilable from:http://41.33.243.106:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsgao&AN=edsgcl.280004376&site=eds-live

[32]. Rosenthal , V., Todi, S., Moreno, L., Pawar ,M., Karlekar, A.,and Zeggwagh,A., (2012) Impact of a multidimensional infection control strategy on catheter-associated urinary tract infection rates in the adult intensive care units of 15 developing countries: findings of the International Nosocomial Infection Control Consortium (INICC), Infection, 40:517-526

[33]. Amine, A., Helal, M., and Bakr, W.,(2014). Evaluation of an intervention program to prevent hospital –a acquired catheter-associated urinary tract infection in an ICU in a rural Egypt Hospital, GMG hygiene and infection control, Vol.9(2).pp.3-10. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4141633/

Eglal Hassanein Abdel-Hakeim"The Effect of Implementing urinary Catheter Care Bundle on The Prevention Of Catheter-Associated Urinary Tract Infections" IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.1 , 2018, pp. 37-46.