Effect of Betadine versus Normal Saline on Urinary Tract Infection among Patients with Indwelling urinary Catheter

Rasha Sayed Mohamed Ali [(1)], Salwa Samir Kamel [(2)], Howyda Ahmed Mohamed[(3)]

1) Demonstrator at Critical Care Nursing Department, Faculty of Nursing, Sphinx University,
2) Professor of Medical Surgical Nursing, Faculty of Nursing –Ain Shams University
3) Assistant Professor of Medical Surgical Nursing, Faculty of Nursing –Ain shams University

Abstract

Background: Urinary tract infections are the fifth most common type of health care-associated infection. Up to 70%-80% of these infections are due to urethral catheterization. Catheter associated urinary tract infections account for increased morbidity and medical expenses. **Aim of the study:** This study aimed to assess the effect of betadine versus normal saline on urinary tract infection among patients with indwelling urinary catheter. **Design:** A Quasi experimental research design was utilized to achieve the aim of this study. **Setting:** The study was conducted at Intensive Care Unit of Assuit police Hospital affiliated to Ministry of Inferio. **Study subjects:** A Purposive sample of 70 female patients with indwelling urinary catheter in the previous mentioned setting with no any other genito-urinary disorders at the time of admission and with no immune compromised status. **Data collection tools: Tool I:** Patient Assessment Tool. **Tool II:** Urinary Tract Infection Clinical Symptoms Assessment. **Tool III:** Urine Microbiological Analysis. **Results**: The study showed that, the mean age of the studied patients was 37.76±10.9 years, 74,3% of the studied patients in betadine group had positive growth of microorganism in urine culture and 82,9% of the studied patients in normal saline group had positive growth of microorganism in urine culture. **Conclusion:** The study findings concluded that, there was no significant statistical difference between betadine and normal saline in relation to urinary tract infection among patients with indwelling urinary catheter. **Recommendation**: A similar study should be replicated on a large sample and other place to generalize the finding.

Key words: Normal Saline, Betadine, Indwelling catheter.

Introduction

Urinary tract infection (UTI) is an infection in any part of the urinary system, caused by pathogenic microorganisms in the kidney, bladder, or urethra. Most UTIs are caused by the bacterium Escherichia coli normally found in the digestive system. Catheter-associated urinary tract infection is an infection of the urinary tract caused by a tube (urinary catheter) that has been placed to drain urine from the bladder. It is one of the most nosocomial Infections worldwide resulting from rational as well as sometimes irrational use of an indwelling urinary catheter **(Werneburg, 2022).**

Urinary tract infection (UTI) remains one of the most common healthcare-associated infections in the intensive care unit and predominantly occurs in patients with indwelling urinary catheters. Duration of catheterization is the most important risk factor for developing catheter associated urinary tract infection (CAUTI) **(Kranz, et al., 2020).**

Urinary tract infections (UTIs) are responsible for over a third of all hospital acquired infections. Most of these (at least 80%) follow some type of invasive procedures or instrumentation of the urinary tract usually catheterization. Still UTIs affect almost 11 million people in the United States and almost 150 million worldwide annually, there for placing UTIs among the most common microbial infection **(Flores-Mireles, et al., 2019).**

The recognition that a substantial proportion of Hospital-acquired infection (HAI) is preventable, including 55%-70% of CAUTIs, has resulted in the implementation of multiple strategies to reduce CAUTI rates. Patients in ICU have a high risk for urinary tract infections (UTIs), considered the most common type of HAIs. Virtually all healthcare-associated UTIs are caused by instrumentation of the urinary tract. Approximately 12%-16% of adult hospital inpatients will have an indwelling urinary catheter (IUC) at some time during their hospitalization **(Clark, et al, 2019).**

Significance of the study:

There are approximately 70% of the urinary tract infections (UTIs) associated with medical care are thought to be related to urinary catheters and this value rises to 95% in intensive care units in the united states **(Dehghanrad et al., 2019).**

Urinary tract infections (UTIs) are the fifth HAI among critical patients with an estimated 62, 700 UTIs in ICUs. UTIs account for more than 9.5% of infections reported by acute care settings. Approximately 12%-16% of critical patients will have an indwelling urinary catheter at some time during their stay in ICU, and each day the indwelling urinary catheter remains, a patient has a 3%-7% increased risk of acquiring CAUTI. It has been estimated that each year, more than 13, 000 deaths are associated with UTIs **(Clark et al., 2019).**

According to the records of Assuit Police Hospital revealed that the number of patients who had Urinary Tract Infection associated with urinary catheter in intensive care unit in year (2020)were 88 patients from 180 patients admitted to intensive care unit, it represent 48% from the total cases connected with urinary catheter.

Aim Of The Study

This study aims to assess the effect of betadine versus normal saline on urinary tract infection among patients with indwelling urinary catheter through the following:

1)   Assess the effect of betadine on urinary tract infection among patients with indwelling urinary catheter.

2)   Assess the effect of normal saline on urinary tract infection among patients with indwelling urinary catheter.

3)   Compare the presence of urinary tract infection among patients who received urinary catheter care with normal saline and versus urinary catheter care with betadine.

Research Questions:

The current study answered the following questions:

1)   What is the effect of betadine on urinary tract infection among patients with indwelling urinary catheter?

2)   What is the effect of normal saline on urinary tract infection among patients with indwelling urinary catheter?

3)   Is there a difference between betadine versus normal saline on urinary tract infection among patients with indwelling urinary catheter?

SUBJECTS AND METHODS

Subjects and methods of this study were portrayed under the four main designs as following four main designs:

I. Technical Design

II.   Operational Design

III.   Administrative Design

IV.   Statistical Design

Technical design:

The technical design includes research design, setting, subjects, and tool of data collection used in this study.

Research Design:

Quasi experimental research design was used for this study. Quasi-experimental design aims to establish a cause-and-effect the relation between an independent and dependent variable **(Thomas, 2022).**

Setting:

The current study was carried out at Intensive Care Unit of Assiut police Hospital, affiliated to the medical services sector at the Ministry of Interior. This unit is in the upper first floor medicine department at Assuit Police Hospital which consisted of 10 beds, each bed have monitor, table, chair and mechanical

ventilator. The nurse to patient ratio is 1 nurse to 1 patient and the total capacity of the ICU is 10 patients.

Subjects:

The study subjects composed of purposive sample of 70 female patients who were included in this study with indwelling urinary catheter where selected according to certain inclusion criteria.

Tools of data collection

Tool (I): Patient Assessment Tool:

It was developed by the researcher after reviewing the relevant and most recent literatures. It included three parts:

Part 1: Patients' Demographic Data:

It concerned with patients personal data as: age, marital status and educational level, Occupation, and Resident.

Part 2: Patients' Clinical Assessment Tool:

It include assessment of patients' clinical data and health assessment, such as present history (diagnosis, Chronic illness, level of consciousness, patient activity level, risk factors for infection, length of stay and date of insertion) and past history (previous experience of catheterization, and previous history of UTI). It was adapted from **(Fasugba, et al., 2019).**

Part 3: Catheter assessment among the studied patients:

It include assessment of catheter such as (Indications for catheterization, catheter type, catheter size, catheter lumen, catheter material, frequency of urinary catheter care provided, duration of catheter insertion, type of fluid used for catheter insertion, type of fluid used for catheter care provided, urinary catheter irrigation, type of fluid used for irrigation, reason for irrigation, vital signs and antibiotic that used).It was adapted from **(McNeill, 2017).**

Tool (II): Urinary Tract Infection Clinical Symptoms Assessment Tool:

Used to assess urinary tract infection symptoms such as (strong smell urine, urine contains blood, painful burning sensation, cramping in the pelvic area or back and discomfort in the lower abdomen, and fever). It was adapted from **(Abdel-Hakeim et al., 2018) (Fasugba, et al., 2019).**

Tool (III): Urine Microbiological Analysis:

It was used to assess the presence of urinary tract infection in urine sample from catheter. It consisted of urine microscopic analysis (pus cell, epithelial cells, bacteria and casts) and urine culture report (colony count, positive/negative) and type of organism. It was adopted from **Public Health England. Investigation of Urine (2014).**

Operational design:

The operational design included preparatory phase, pilot study, field work and ethical consideration.

Preparatory phase:

It included reviewing related literature and theoretical information of the study research using articles, books, network data base, periodicals, and magazine to develop basic data for the study.

Validity and reliability:

Content validity:

Content validity was conducted to test the tool for appropriateness, relevance, correction and clearance through a jury of 5 experts, three professors and two assistant professors from the medical surgical nursing staff at the Faculty of Nursing Ain Shams University. Reviewed the instrument for clarity, relevance, simplicity, comprehensivenesss and applicability, their opinions were elicited regarding the tool format layout, consistency and scoring system. The content validity index was 0.94 and the consistency was 0.7.

Reliability Test:

Testing of the reliability of the purposed data collecting tools was done by alpha Cronbach test which was 0.85. Below is the formula for Cronbach's alpha test.

$$\alpha = \frac{N * \overline{c}}{\overline{v} + (N - 1) * \overline{c}}$$

Where:

o N = the number of items =30

o $\overline{c}$ = average covariance between items-pairs. =0.14

o $\overline{v}$ = average variance.=1

A pilot study:

A pilot study was applied on 10% of the subjects (7 patients) to test the clarity, objectivity, applicability as well as estimating the time needed to answer. Carrying out the pilot study gave the investigator experience to deal with the included subjects and the data collection tools. Data obtained from the pilot study was analyzed and no modifications were done. Study subjects included in the pilot were included in the main study sample as no changes were needed.

Field work:

An approval was obtained from the director of Assuit Police Hospital. The investigator first met the patients as the previously mentioned sitting and explained the aim and nature of the study after introducing himself. The questionnaire tool filled by the researchers who interviewed the patients individually after taking informed consent. This study was carried out through a period of three months (from August 2022 to October 2022). This study was carried out 3 times per week (Saturday, Tuesday and Thursday) in morning and afternoon shifts for both groups to assess any complication. The average time required to fill full the questionnaire tool was (25-35) minutes.

The first group (normal saline group 35 patients): received urinary catheter care twice daily by using normal saline as a solution to provide the catheter care.

The second group (betadine group 35 patients): received urinary catheter care twice daily by betadine as agent solution to provide the catheter care.

Ethical considerations:

• The research proposal was approved from Ethical Committee in the Faculty of Nursing Ain Shams University.

• There was no risk for the study subjects during application of the research.

• The study followed common ethical principles in the clinical research.

• Confidentiality and anonymity were assured.

• Patients had the right to agree or disagree to participate in the study and to withdraw them from the study at any time without any effect on the care provided for their patients

• Study subjects privacy was considered during the collection of data.

Administrative design:

To carry out the study in the selected setting, official letters were issued from the faculty of nursing / Ain shams University explaining the aim of the study to obtain the permission for collecting of the data; this letters were submitted to the hospital directors at Assiut Police Hospital.

Statistical Design:

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 23, SPSS Inc. Chicago, IL, USA). The categorical variables were represented as frequency and percentage. Friedman test was used to test differences related categorical variables in related groups. Chi-square test was used to test the differences between categorical variables. Statistically significant was considered at p-value ≤ 0.05 &0.01.

Results:

Table **(1)** shows that, 51.4% of the studied patients were in age group 40> 50 years with mean age 37.76 ± 10.9 years. Also, 52.9% of the studied patients were married and 38.6% of the studied patients were housewives. Additionally, 45.7% of the studied patients have secondary education and 54.3% of the studied patients were from urban residence.

Table **(2)** shows that, 24.3%, of the studied patients in the most common UTI symptoms was discomfort or pressure in the lower abdomen/supra pubic.

Table **(3)** shows that, 82.9% and 77.1% of the studied patients have bacteria in urine analysis respectively. While, 80.0% and 88.6% of the studied patients have no casts in urine analysis respectively. Also, 85.7% and 57.1% of the studied patients have pus cells in urine analysis respectively. While, 88.6% and 80.0% of the studied patients have no epithelial cell in urine analysis respectively.

Table **(4)** shows that, 74.3% and 82.9% of the studied patients have positive growth of microorganism in urine culture respectively. The most common microorganism was E-coli among 40.0% and 34.2% of the studied patients respectively. Colony Count was >1, 00, 000/ml among 51.5% and 62.8% of the studied patients respectively.

Table **(5)** shows that, there was no statistically significant relation between type of fluid used for catheter care and chronic illness among the studied patients at P-value = > 0.05.

Table **(6)** shows that, there was a statistically significant relation between the type of fluid used for catheter care with pus cells in urine analysis at P-value=≤ 0.05. Also, there is no statistically significant relation between type of fluid used for catheter care with bacteria, casts and epithelial cell in urine analysis at P-value= > 0.05.

Table (1): Frequency and Percentage distribution of the studied patients regarding to their demographic characteristics (n=70).

Patients' Demographic Data	Betadine group (n=35)		Normal saline group (n=35)		Total (n=70)	
	No	%	No	%	No	%
Age						
<30 years	6	17.1	10	28.6	16	22.9
30 >40 years	9	25.7	6	17.1	15	21.4
40> 50 years	17	48.6	19	54.3	36	51.4
50+	3	8.6	0	0.0	3	4.3
Mean±SD	39.31±8.69		36.20±12.70		37.76± 10.9	
Marital status						
Single	5	14.3	5	14.3	10	14.3
Married	25	71.4	12	34.3	37	52.9
Widow/Divorced	5	14.3	18	51.4	23	32.9
Level of education						
Basic education	7	20.0	5	14.3	12	17.2
Secondary	17	48.6	15	42.9	32	45.7
Higher	8	22.8	10	28.6	18	25.7
Post-graduate	3	8.6	5	14.3	8	11.4
Occupation						
Office work	6	17.1	5	14.3	11	15.7
Worker	10	28.6	7	20.0	17	24.3
House wife	14	40.0	13	37.1	27	38.6
Retired	5	14.3	10	28.6	15	21.4
Resident						
Urban	20	57.1	18	51.4	38	54.3
Rural	15	42.9	17	48.6	32	45.7

Table (2): Frequency and percentage distribution of the studied patients regarding to urinary tract infection clinical symptoms (n=70).

Urinary Tract Infection Clinical Symptoms	Betadine group (n=35)		Normal saline group (n=35)		Total (n=70)	
	No	%	No	%	No	%
Painful burning sensation	5	14.3	10	28.6	15	21.4
Strong smell of urine	3	8.6	5	14.3	8	11.4
Discomfort or pressure in the lower abdomen/supra pubic	12	34.3	5	14.3	17	24.3
Urine contains blood	5	14.3	9	25.7	14	20.0
Fever	10	28.6	6	17.1	16	22.9

Table (3): Frequency and percentage distribution of the studied patients regarding to their urine analysis findings (n=70).

Patients' Urine Analysis findings	Betadine group (n=35)		Normal saline group (n=35)		Total (n=70)	
	No	%	No	%	No	%
Bacteria						
Absent	6	17.1	8	22.9	14	20.0
Present	29	82.9	27	77.1	56	80.0
Casts						
Absent	28	80.0	31	88.6	59	84.3
Present	7	20.0	4	11.4	11	15.7
Pus cells						
Absent	5	14.3	15	42.9	20	28.6
Present	30	85.7	20	57.1	50	71.4
Epithelial cell						
Absent	31	88.6	28	80.0	59	84.3
Present	4	11.4	7	20.0	11	15.7

Table (4): Frequency and percentage distribution of the studied patients regarding to their urine culture and sensitivity report (n=70).

Patients' Urine culture and sensitivity	Betadine group (n=35)		Normal saline group (n=35)		Total (n=70)	
	No	%	No	%	No	%
Growth of microorganism						
Negative	9	25.7	6	17.1	15	21.4
Positive	26	74.3	29	82.9	55	78.6
Type of organism						
E-coli	14	40.0	12	34.2	26	37.2
Enterococcus species	7	20.0	9	25.7	16	22.8
Klebseilla	3	8.6	5	14.3	8	11.4
Candida species	2	5.7	3	8.6	5	7.2
No growth	9	25.7	6	17.1	15	21.4
Colony Count						
> 50, 000/ ml	8	22.8	7	20.0	15	21.4
>1, 00, 000/ml	18	51.5	22	62.8	40	57.2
No growth	9	25.7	6	17.1	15	21.4

Table (5): Relation between studied patient's length of hospital stay and type of fluid used for catheter care (n=70).

Variables	Length of hospital stay		Student T- test	P-Value
	X	SD		
Type of fluid used for catheter care				
Betadine	4.14	2.10	0.754	0.804
Normal saline	4.26	1.72		(NS)
Growth of microorganism in Urine culture and sensitivity				
Negative	4.00	1.81	1.083	0.902
Positive	4.07	2.08		(NS)

* P-value ≤ 0.05 Significant (S). P-value > 0.05= Non-Significant (NS).

Table (6): Relation between microscopic urine analysis and type of fluid used for catheter care (n=70).

Patients' Urine Analysis finding	Type of fluid used for catheter care				X^2 Test	P-value
	Betadine		Normal saline			
	No	%	No	%		
Bacteria						
Absent	6	8.6	8	11.4	0.357	0.383
Present	29	41.4	27	38.6		(NS)
Casts						
Absent	28	40.0	31	44.3	0.971	0.256
Present	7	10.0	4	5.7		(NS)
Pus cells						
Absent	5	7.1	15	21.4	5.670	0.016*
Present	30	42.9	20	28.6		(S)
Epithelial cell						
Absent	31	44.3	28	40.0	0.891	0.971
Present	4	5.7	7	10.0		(NS)

X^2= Chi Square Test * P-value ≤ 0.05 Significant (S). P-value > 0.05= Non-Significant (NS)

Discussion:

Urinary tract infections (UTIs) are the fifth most common type of health care-associated infection (HCAI). Up to 70% - 80% of these infections are due to urethral catheterization. Catheter associated urinary tract infections (CAUTI) account for increased morbidity and medical expenses **(Suthar et al., 2022).** Numerous studies show no additional benefit from using an antiseptic solution in meatal cleaning before urinary catheter insertion **(Khahakaewa et al., 2021).**

Regarding to patient's age, the findings of the present study revealed that more than half of the studied patients were in age group 40> 50 years with mean age 37.76±10.9years.

This finding was consistent with **Sarani et al. (2020),** in a study entitled "Comparison of the effect of perineal care with normal saline and 2%chlorhexidine solution on the rate of catheter-associated urinary tract infection in women hospitalized in intensive care units: a quasi-experimental study" who found that mean age of the studied patients was 38.71 ± 13.38years.

Also, this finding was supported with **Abd-El Hak et al. (2022)** in a study entitled "Efficacy of protocol of hygienic care by chlorhexidine gluconate on the occurrence of catheter associated urinary tract infection among critical ill patients" who found that more than one third of the patients in both control and study groups were in between 40- <50 years old.

On the other hand, this finding was inconsistent with **Suthar et al. (2022)** in a study entitled "A study of clinical and economic burden imposed by catheter associated urinary tract infection in a tertiary care teaching hospital" who found that the mean age of the patients included in the study was 48 ± 18.06 years.

Regarding patient's marital status, the findings of the present study revealed that more than half of the studied patients were married.

This finding was consistent with **Abd-El Hak et al. (2022),** who found that near to two fifths of the studied patients were married.

This finding was supported with **Ndomba et al. (2022),** in a study entitled "Urinary tract infections and associated factors among patients with indwelling urinary catheters attending Bugando Medical Centre a Tertiary Hospital in Northwestern Tanzania" who found that majority of the studied patients were married.

Regarding patient's education, the findings of the present study revealed that more two fifths of the studied patients had secondary education.

The researcher believe that there is a negative correlation between the education level of participants and CAUTI prevalence in the ICU. This indicates that less educated individuals, such as primary education and basic literate individuals

have a higher affinity to HAI infections than higher academic study individuals.

This finding was in the same context with **Perotte et al (2019)** in a study entitled "Identifying the risk factors for catheter-associated urinary tract infections: a large cross-sectional study of six hospitals" who reported that about one quarter of studied patient in the control and study groups were secondary educated.

This finding was disagreed with **Ndomba et al. (2022)** who found that more than half of the studied patients had primary education.

Regarding patient's occupation, the findings of the present study revealed that about two fifths of the studied patients were housewives.

From researcher's point of view, this result may be attributed to the study was carried on females only and it's well known that some cultures prefer keeping the women in houses without work to take care of their families and children. In addition, lack of employment opportunities.

This finding was agreed with **Mahmoud et al. (2020),** in a study entitled "Prevalence of urinary tract infections among pregnant women at Sohag University Hospital" who found that majority of the studied patients were not working.

This finding was disagreed with **Alemu et al. (2020),** in a study entitled "Bacterial profiles and their associated factors of urinary tract infection and detection of extended spectrum beta-lactamase producing gram-negative uropathogens among patients with diabetes mellitus at Dessie Referral Hospital, Northeastern Ethiopia" who found that near half of the studied patients were employed.

Regarding to patient's residence, the findings of the present study revealed that more than half of the studied patients were from urban residence.

This finding was consistent with **Alemu et al. (2020),** who found that about two thirds of the studied patients were from urban residence.

This finding was inconsistent with Mahmoud et al., 2020, who found that more than three quarters of the studied patients were from rural residence.

Regarding urinary tract infection clinical symptoms, the findings of the present study revealed that discomfort or pressure in the lower abdomen/supra pubic, fever and painful burning sensation were the most common UTI symptoms.

This finding was in accordance with **Omran et al. (2020),** in a study entitled "Effect of implementing educational programs on reducing urinary tract infections among patients with urinary catheterization" who found that back pain, fever and suprapubic pain were the most common manifestations of urinary tract infection.

Also, this finding was consistent with **Santos et al. (2022),** in a study entitled "A review on urinary tract infections diagnostic methods: Laboratory-based and point-of-care approaches" who found that common symptoms of UTIs include severe back pain; inflammation or burning sensation while urinating and fever.

Regarding growth of microorganism, the findings of the present study revealed that more than three quarters of the studied patients had positive growth in urine culture.

This finding was agreed with **Ahmed and Shehata (2020),** in a study entitled "Effect of catheter care maintenance bundle on reducing incidence of urinary tract infection among catheterized patients" who found that urine culture were positive for the majority of the studied patients.

Also, this finding was supported with **Omran et al. (2020),** who found that more than three fifths of the studied patients had positive growth urine culture.

Regarding type of organism, the findings of the present study revealed that the most common microorganism was E-coli among more than one third of the studied patients.

This finding was in the same line with **Moussa et al. (2021)**, in a study entitled "Bladder irrigation with Povidone-iodine prevent recurrent urinary tract infections in neurogenic bladder patients on clean intermittent catheterization " who found that E-coli was the most common microorganism among more than half of the studied patients.

Also, this finding was supported with **Vahabi et al. (2019),** in a study entitled "10% Povidone-iodine versus 2% chlorhexidine gluconate for Peri-urethral cleansing before catheterization among hospitalized patients: A randomized controlled trial " who found that E-coli was the most frequent cultured bacteria in more than two fifths of 10% Povidone-iodine group.

On the other hand, this finding was contradicated with **Ramadana et al. (2021),** in a study entitled "Bacterial biofilm dependent catheter associated urinary tract infections: Characterization, antibiotic resistance pattern and risk factors" who showed that Klebsiella pneumonia was the most common isolated organism.

Regarding colony count, the findings of the present study revealed that colony count was >1, 00, 000/ml among more than half of the studied patientspost catheterization in urine culture.

This finding was agreed with **Almalki and Varghese (2020)**, in a study entitled "Prevalence of catheter associated biofilm producing bacteria and their antibiotic sensitivity pattern" who documented that UTI infection was considered as positive when the density of the culture exceeds to 10^5 colony forming units (CFU/ml).

Also, this finding was consistent with **Santos et al. (2022),** who documented that UTIs are caused by a high concentration of specific bacteria values $\geq 10^5$ of colony-forming units (CFU) of bacteria per mL in their urine samples.

Regarding the relation between length of hospital stay and type of fluid used for catheter care, the findings of the present study revealed that length of hospital stay has no significant statistical relation with type of fluid used for catheter care or growth of microorganism in urine culture.

This finding was consistent with **Kim et al. (2021)**, in a study entitled "Incidence and risk factors of urinary tract infections in hospitalized patients with spinal cord injury" who found that the number of days in the hospital had no statistically significant correlation to growth of microorganism in urine culture in cases of CAUTI.

This finding was contradicted with **Schmudde et al. (2019),** in a study entitled "Navel to knees with chlorhexidine gluconate preventing catheter-associated urinary tract infections" who found that the length of hospital stay has a significant statistical relation with growth of microorganism in urine culture where median length of hospitalization in patient with UTI was significantly longer.

Regarding the relation between microscopic urine analysis and type of fluid used for catheter care, the findings of the present study revealed that type of fluid used for catheter has no significant statistical relation with bacteria, casts and epithelial cell in urine analysis. While, type of fluid used for catheter has a significant statistical relation with pus cells in urine analysis

This finding was consistent with **Clark, and Wright (2019)**, in a study entitled "Antisepsis for urinary catheter insertion: a review of clinical effectiveness and guidelines" who documented that there was no statistically significant difference in the rate of CAUTIs associated with any of the antiseptic agents that were studied (Iodine versus saline) for use prior to the insertion of urinary catheters.

Also, this finding was in the same line with **Nugraha et al. (2019),** in a study entitled "Comparison of 10% Povidone iodine and sterile water as a periuretra cleansing solution before the insertion of indwelling urine catheter on the occurrence of bacteria" who found that there was no difference in effectiveness between sterile water and 10% Povidone iodine for against the incidence of bacteriuria.

Additionally, this finding was supported with **Mitchell et al. (2021),** in a study entitled "Effectiveness of meatal cleaning in the prevention of catheter-associated urinary tract infections and bacteriuria: an updated systematic review and meta-analysis" who reported that there was no evidence of differences in the incidence of bacteriuria or CAUTI between the both groups when comparing the different agents: Povidone-iodine versus normal saline.

On the other hand, this finding was contradicted with **Vahabi et al. (2019),** who found that there was no significant difference between two groups, amount of positive pyuria.

Conclusion

Based on findings of the current study, it can be concluded that, regarding to effect of betadine and normal saline on urinary tract infection, about three quarters of the studied patients in betadine group had positive growth of microorganism in urine culture. Regarding to effect of normal saline on urinary tract infection, majority of the studied patients in normal saline group had positive growth of microorganism in urine culture.

Concerning the difference between betadine and normal saline on urinary tract infection, there was no significant statistical difference between betadine and normal saline in relation to urinary tract infection among patients with indwelling urinary catheter.

Recommendations:

On the light of the present study, the following recommendations are made:

♦ Replication of the study on alarger probability sample acquire from different geographical areas to achieve more generalized results.

♦ Further researches have to be carried out in order to determine best practice regarding management of urethral care.

♦ Further studies regarding knowledge gap concerning early predictions to prevent infection of catheter care.

♦ Develop plan for health education program about proper screening and prevention of infection for catheter.

♦ The need for further multidisciplinary collaboration between nurses, physicians, patient' relatives to increase awareness of early signs and symptoms, management of prevent catheter infection.

♦ Further study is also recommended to be done to compare the efficacy of normal saline or betadine with other antiseptic solutions as cholorhexidine.

References:

Abd-El-Hak, A. E., Ebrahim, E., Sahban, Z. M., Tag El Din, E. S. M., ElHay, A., & Ahmed, S. (2022). Efficacy of Protocol of Hygienic Care by Chlorhexidine Gluconate on the Occurrence of Catheter Associated Urinary Tract Infection among Critical Ill Patients. *Tanta Scientific Nursing Journal*, *24*(1), PP:125-152.

Abdel-Hakeim, E., & Hamza, A. (2018). The Effect of Implementing Urinary Catheter Care Bundle on The Prevention of Catheter-Associated Urinary Tract Infections. *IOSR J Nurs Heal Sci*, *7*(1):PP: 2320-1940.

Ahmed, G., and Shehata, G. (2020). Effect of catheter care maintenance bundle on reducing incidence of urinary tract infection among catheterized patients. *American Journal of Nursing*, *8*(4), PP: 477-482.

Alemu, M., Belete, M., Gebreselassie, S., Belay, A., & Gebretsadik, D. (2020). Bacterial profiles and their associated factors of urinary tract infection and detection of extended spectrum beta-lactamase producing gram-negative uropathogens among patients with diabetes mellitus at Dessie Referral Hospital, Northeastern Ethiopia. *Diabetes, Metabolic Syndrome and Obesity*, PP: 2935-2948.

Almalki, M., & Varghese, R. (2020). Prevalence of catheter associated biofilm producing bacteria and their antibiotic sensitivity pattern. *Journal of King Saud University-Science*, *32*(2), PP:1427-1433.

Clark, M., & Wright, M-D., (2019); Antisepsis for Urinary Catheter Insertion: A Review of Clinical Effectiveness and Guidelines [Internet] Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2019 Jan 9.

2019 PMID: 31095353 Bookshelf ID: NBK541212. https://www.ncbi.nlm. nih.gov/books/NBK541212/

Dehghanrad, F., Nobakht-e-Ghalati, Z., Zand, F., Gholamzadeh, S., Ghorbani, M., & Rosenthal, V. (2019). Effect of instruction and implementation of a preventive urinary tract infection bundle on the incidence of catheter associated urinary tract infection in intensive care unit patients. *Electronic Journal of General Medicine*, *16*(2).

Fasugba, O., Cheng, A. C., Gregory, V., Graves, N., Koerner, J., Collignon, P., & Mitchell, B. G. (2019). Chlorhexidine for meatal cleaning in reducing catheter-associated urinary tract infections: a multicentre stepped-wedge randomised controlled trial. *The Lancet Infectious Diseases*, *19*(6): PP:611-619.

Flores-Mireles A., Herha, T.N., and Hunstad, D.A., (2019): Pathophysiology, Treatment, and Prevention of Catheter-Associated Urinary Tract Infection. Top Spinal Cord Inj Rehabil. 2019 Summer; 25(3): PP: 228–240. doi: 10.1310/sci2503-228.

Khahakaewa, S., Suwanpimolkula, G., Wongkeskijb, G. Punakabutrab, N., and Suankrataya, C. (2021): Incidence and risk factors of urinary tract infections in hospitalized patients with spinal cord injury, International Journal of Infectious Diseases 105 (21), PP:702–708.

Kim, Y., Cho, M. H., Do, K., Kang, H. J., Mok, J. J., Kim, M. K., &Kim, G. S. (2021). Incidence and riskfactors of urinary tract infections in hospitalized patients with spinal cord injury. Journal of clinical nursing, 30(13-14), PP:2068-2078.

Kranz, J., Schmidt, S., Wagenlehner, F., & Schneidewind, L. (2020). Catheter-Associated Urinary Tract Infections in Adult Patients. *Deutsches Arzteblatt international*, *117*(6), PP:83–88. https://doi.org/ 10.3238/arztebl.2020.0083.

Mahmoud, M., Kamel, A., Ahmed, S., & El-Hamed, A. (2020). Prevalence of urinary tract infections among pregnant women at Sohag University Hospital. *Egyptian Nursing Journal*, *16*(3), pp:162-170.

McNeill, L. (2017). Back to basics: How evidence-based nursing practice can prevent catheter-associated urinary tract infections. Urologic Nursing, 37(4): PP:204-207**.**

Mitchell, B., Curryer, C., Holliday, E., Rickard, C. M., & Fasugba, O. (2021). Effectiveness of meatal cleaning in the prevention of catheter-associated urinary tract infections and bacteriuria: an updated systematic review and meta-analysis. BMJ open, 11(6), 46-81.

Moussa, M., Chakra, M. A., Papatsoris, A. G., Dellis, A., Dabboucy, B., & Fares, Y. (2021). Bladder irrigation with povidone-iodine prevent recurrent urinary tract infections in neurogenic bladder patients on clean intermittent catheterization. Neurourology and Urodynamics, 40(2), PP:672-679.

Ndomba, A., Laisser, R., Silago, V., Kidenya, B., Mwanga, J., Seni, J., & Mshana, S. (2022). Urinary tract infections and associated factors among patients with indwelling urinary catheters attending Bugando Medical Centre a Tertiary Hospital in Northwestern Tanzania. Journal of Microorganisms, 10(2),PP: 47-53.

Nugraha, A., Puspita, T., Patimah, I., & Nagara, A. (2019). Comparison of 10% povidone iodine and sterile water as a periuretra cleansing solutionbefore the insertion of indwelling urinecathetheron the occurance of bacteria. International Journal of Pharmaceutical Research, 11(4), PP:264-272.

Omran, E., Tolba, A., & Ahmed, O. (2020). Effect of Implementing Educational programs on Reducing Urinary Tract Infections among Patients with Urinary Catheterization. Egyptian Journal of Health Care, 11(2),PP: 1068-1089.

Perotte, R., Letica-Kriegel, A., Salmasian, H., Vawdrey, D. K., Youngerman, B., Green, R., & Furuya, E. (2019). Identifying the risk factors for catheter-associated urinary tract infections: a large cross-sectional study of six hospitals. BMJ open, 9(2), PP:122-137.

Public Health England. Investigation of Urine. (2014). UK Standards for Microbiology Investigations. B 41 Issue 7.2. URL: http://www.hpa.org.uk/SMI/pdf.

Ramadan, R., Omar, N., Dawaba, M., & Moemen, D. (2021). Bacterial biofilm dependent catheter associated urinary tract infections: Characterization, antibiotic resistance pattern and risk factors. Egyptian

Journal of Basic and Applied Sciences, 8(1), PP: 64-74.

Santos, M., Mariz, M., Tiago, I., Martins, J., Alarico, S., & Ferreira, P. (2022). A review on urinary tract infections diagnostic methods: Laboratory-based and point-of-care approaches. Journal of Pharmaceutical and Biomedical Analysis, 21(9), PP:1148-1159.

Sarani, H., Mofrad, Z. P., Faghihi, H., & Ghabimi, M. (2020). Comparison of the effect of perineal care with normal saline and 2% chlorhexidine solution on the rate of catheter-associated urinary tract infection in women hospitalized in intensive care units: a quasi-experimental study. Medical-Surgical Nursing Journal, 9(2), PP:116-129.

Schmudde, Y., Olson-Sitki, K., Bond, J., and Chamberlain, J. (2019). Navel to knees with chlorhexidine gluconate: preventing catheter-associated urinary tract infections. Dimensions of Critical Care Nursing, 38(5), PP:236-240.

Suthar, B., Shah, P. C., & Trivedi, N. (2022). A study of clinical and economical burden imposed by catheter associated urinary tract infection in a tertiary care teaching hospital. QAI Journal for Healthcare Quality and Patient Safety, 3(2), PP: 44-49.

Thomas, L. (2022, December 05). *Quasi-Experimental Design | Definition, Types & Examples. Scribbr.* Retrieved January 24, 2023, from https://www.scribbr. com/methodology/quasi-experimental-design.

Vahabi, E., Ghafari, S., & Haghighat, S. (2019). 10% povidone-iodine versus 2% chlorhexidine gluconate for Periurethral cleansing before catheterization among hospitalized patients: A randomized controlled trial. Isfahan University of Medical Sciences Journal, 20(5), PP:232-245.

Werneburg, G. (2022). Catheter-associated urinary tract infections: current challenges and future prospects. Research and Reports in Urology, 12(7), PP:109-133.