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The effect Povidon iodine 10% with Chlorhexidine 2% on the event of catheter associated urinary track infection (CAUTI) in Uretra care

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ABSTRACT

Background

One of the HAIs that often occurs is CAUTI, which is an infection that occurs as a result of catheter placement when the patient is admitted to a health facility. The role of nurses as providers of nursing care for patients who have catheters attached to prevent CAUTI is to perform urethral treatment. One of them uses Povidon Iodine 10% with Chlorhexidine 2%.

Method

The type of research used is Quasy Experimental with a pretest-posttest control group design. This study arranged two groups, namely the intervention group and control. Technique Non probability sampling with method was consecutive sampling used to get 32 respondents divided into 2 groups.

Results

The results Mann Witney test show values p value 0.001 which means that there is a significant difference between the intervention groups and control.

Conclusion

The results of the study after giving intervention there was a difference between the use of Povidon Iodine and 10% with Chlorhexidine 2% on the incidence of urethral infection, so that the treatment was effectively implemented for patients to prevent the occurrence of Catheter Associated Urinary Track Infection (CAUTI) especially patients using catheters.

Keywords: Povidon Iodine 10%, Chlorhexidine 2%, Catheter Associated Urinary Track Infection (CAUTI), Catheter Care.

INTRODUCTION

Healthcare Associated Infections (HAIs) are infections that patients get during their care in health care facilities which is one of the health

problems in the whole world. HAIs include: Ventilator Aquired Pneumonia (VAP) / Hospital Acquired pneumonia (HAP), Surgical Site Infection (SSI), Catheter Associated Urinary Track Infection

(CAUTI) and Catheter Line Blood Stream Infection (CLABSI). [1]

The World Health Organization (WHO) states that out of 100 patients admitted to health care facilities, there are 7 patients with HAIs for developed countries and 10 patients in developing countries. European Center for Disease Prevention and Control (CDC, 2012) reports the incidence of HAIs around 7.1% of 4 million patients each year, the prevalence of HAIs in developed countries varies between 3.5% and 12% while in developing countries around 5.7% up to 19.1%. [1]

Indonesia globally does not yet have valid data so that it cannot be used as material for policy making, reports are local, for example from the Harapan Kita Heart Hospital Jakarta reported the incidence of HAIs in 2009 SSI: 2.5%, VAP: 30 %, CAUTI: 3 % and CLABSI: 5.3 %, in 2012 the CAUTI case increased to 4.83 %.

One of the HAIs that often occurs is CAUTI, which is an infection that occurs as a result of catheter placement when the patient is admitted to a health facility. [2] Catheter installation is one of the actions that can save a person's life, especially if there is obstruction in the urinary tract or difficulty in normal urination due to constriction. In addition to the catheter can also be done on the treatment needs of patients for example to determine the amount of discharge, one of which can be measured throughout urine in patients postoperatively on the area of the vagina, bladder or prostate. [3]

Patients who experience CAUTI will cause an increase in morbidity rates, affect the Length of Stay (increasing hospital care), the cost of hospitalization for patients and families will increase, this provides a reason to implement effective interventions to reduce the risk of CAUTI. [4] To prevent CAUTI, among others: doing hand hygiene, installing catheters using sterile techniques, treating urethra every day, and immediately releasing catheters if there is no indication. [5]

As a health worker, nurses have a role in carrying out their duties in accordance with their rights and authority. [6] One of the nurses' roles is as a nursing care provider/care provider. The role of nurses as providers of nursing care for patients who have catheters attached to prevent CAUTI is to perform urethral treatment. [5]

Care The urethra includes cleansing of the urethral area and catheter urine. [7] These actions

can prevent colonization of CAUTI-causing bacteria and can maintain the smooth flow of urine in the catheter flow system with various considerations including: the urethra is protected from trauma, irritation and does not interfere with patient comfort. Care urethra that is routinely performed must also pay attention to aseptic principles. [8] As at the time before catheter placement because antiseptics have an important role in preventing and controlling infection in patients. [9]

In CAUTI the most common bacteria were: *E coli* (21.4%) and *Candida spp* (21.0%). Other bacteria found were *P aeruginosa* (10.0%). *K pneumoniae* (7.7%), *Enterobacter spp* (4.1%) and several other gram negative bacteria and *Staphylococcus spp*. [10]

Duygu Sonmez Duzkaya, et al (2017) conducted a study with the main aim of evaluating the effects of periurethral cleansing before catheter placement using povidone iodine 10%, chlorhexidine 0.05% and sterile water in CAUTI events in intensively treated pediatric patients. The second objective of his research is to identify pathogenic species that cause CAUTI. The research subjects were 122 patients (40 patients using povidone iodine 10%; 42 patients using chlorhexidine 0.05%; 40 patients using sterile water). The results of the study of Povidone iodine 10% found 6 cases of CAUTI with pathogenic species *Candida albicans* 3 cases and *Klebsiella pneumoniae* 3 cases, chlorhexidine gluconate 0.05% found 2 cases of CAUTI with pathogenic species *Candida albicans*, and sterile water found in 3 cases of CAUTI with pathogenic species *Escherichia coli*. [11]

Jumuatul Masullah (2013), Effectiveness of catheter care with povidone iodine 10% on the colonization of *Escherichia coli* in urine female in the women's surgery room (RBW) Dr. Soebandi Jember found that the number of colonies before catheter treatment was 4120 CFU (Colony forming unit / colony forming unit) / ml and after the intervention was given the average number of colonies was 3640 CFU / ml. [12] Under normal conditions in the urine does not contain bacteria, viruses or other microorganisms. [13]

Juan H. Macias (2013) obtained the results of research that chlorhexidine is a better choice than povidone iodine and sodium hypochlorite as an antiseptic on the skin to perform actions or procedures before catheter installation, preparation

for surgery or hand hygiene before performing surgery with the results that Chlorhexidine can inhibit bacterial growth in any part that has contact with the skin. [10]

Based on the above background, to improve health services, especially nursing services and to reduce the risk of urinary tract infections due to catheter placement, the researchers will conduct a study of the effect of povidone iodine 10% compared with chlorhexidine 2% on the treatment of CAUTI in urethral treatment. Until now there have been no similar studies especially in the field of nursing specializing in urethral treatment using chlorhexidine 2%.

METHODS

This type of research uses True Experimental with a pretest-posttest control group design. The researcher arranged two groups, namely the intervention groups and control. The assessment of the incidence of Catheter Associated Urinary Tract Infection (CAUTI) respondents by examining urine culture was carried out 2 times, namely before treatment and after treatment. Culture examination Urinetechniques are carried out after the sample is bred for 24 hours in the medium nutrient to determine the presence of bacteria that are

developing and to know the number of colonies. Then the results of the observations and examinations are included in the observation sheet according to the signs and symptoms of patients who are met every day.

The population in this study were adult patients who had a catheter attached with a minimum length of 5 days in the treatment room at the Regional General Hospital (RSUD) Panglima Sebaya Tanah Grogot Paser Regency, East Kalimantan. Determination of the minimum number of samples using techniques sampling non probability with method consecutive sampling and based on inclusion and exclusion criteria as many as 32 respondents were divided into 2 groups with each of the 16 respondents in the intervention group and 16 respondents in the control group.

In this study researchers conducted data collection by observing, identifying, interviewing and filling out the questionnaire. The collected data was analyzed through the IBM SPSS version 24.0, and continued with a different test, namely the non-parametric test (Wilcoxon Test and Mann Withney). The processed data is used as the basis for discussing problem statements, which are then presented in table form so conclusions can be drawn.

RESULTS

Table 1 Frequency distribution of respondents in the intervention group and control based on demographic characteristics (n = 32)

Characteristics		Intervention		Control	
		N	(%)	N	(%)
Age	Young adults	2	13.3	0	0
	Old adults	13	86.7	15	100
Gender	Male	6	40	5	33.3
	Female	9	60	10	66.7
TOTAL		15	100	15	100

Value mean and SD.

Table 1 shows that the age distribution of respondents in the treatment group and the control group. In the treatment group most of them were elderly adults as many as 13 people (86.7%) and young adults as many as 2 people (13.3%) while in the control group all were elderly adults as many as

15 people (100%). In the treatment group respondents more than half of the female sex were 9 people (60%), while the male sex was 6 people (40%). More than half of the control group respondents were female as many as 10 people (66.7%), and male sex numbered 5 people (33.3%).

Table 2 Frequency distribution of urine culture in intervention groups and control based on characteristics

Characteristics		Pre		Post		p value
		N	(%)	N	(%)	
Culture	No	19	63.3	30	100	0.001
	Normal	11	36.7	0	0	
	Total	30	100	30	100	
Conclusion	No	30	100	27	90	0.001
	CAUTI	0	0	0	10	
	Total	30	100	100	100	

Value mean and SD.

Based on table 2 shows that the data distribution of all variables is abnormal (p value <0.005) so that for bivariate tests using non-parametric.

Table 3 Differences in the use of povidone iodine 10% and Chlorhexidine 2% in the intervention group and control group

Culture	N	Pre		Post		p value
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Intervention	15	,12 ± ,12	,87 ± 1,16			0.001
Control	15	,186 ± ,209	8,24 ± 6,94			0.001

*Wilcoxon Test

**CFU : *Colony Forming Unit* (Hasil x 10³)

Value mean and SD.

From the table above, the culture results show differences before and after treatment in the intervention group and control group so that the

value p = 0.001. This shows a significant difference between those given povidone iodine 10% and Chlorhexidine 2%.

Table 4 Analysis differences in the use of povidone iodine 10% and chlorhexidine 2% against CAUTI in urethral treatment between the intervention group and the control group

Culture	Mean	Standard deviation	p value
Intervention	9.33	140.00	0.001
Control	21.67	325.00	

*Man Withney Test

**CFU : *Colony Forming Unit*

Table above, can be seen from the results of culture examination that there is a difference between the use of povidone iodine 2% and chlorhexidine 10% with a significance value of 0.001 (<0.005) which means that there is a difference between the use of povidone iodine 10% and chlorhexidine 2%.

DISCUSSION

Differences in the use of povidone iodine 10% with Chlorhexidine 2% in the intervention group and control group

The results of this study indicate that examination of culture showed a difference in the use of povidone iodine 10% with Chlorhexidine 2%

before and after urethral treatment in the intervention group and control group that had the same significance value 0.001 (<0.05).

Povidone-iodine is used in various conditions, most of which are used in medicine. these uses are prophylactic, such as skin care and mucous membranes, or disinfection before surgery. Other conditions can also be used in the treatment of burns, skin diseases, vaginitis and diseases of the urinary tract, pressure sores, eye infections, and wound infections in surgery. Additional uses include disinfection in various cases such as surgical, dental and oral practices, general gynecology, pediatrics and disinfection of medical instruments and hospital environments. [14]

In addition, recent clinical studies have documented the use of chlorhexidine 2% or chlorhexidine 4% used as standard protocols resulting in sufficient surface concentrations to inhibit / kill flora colonization, including Staphylococcus Aureus Resistant Methicillin (MRSA). A new focus for the use of chlorhexidine in surgical patients involves wound irrigation before closure with chlorhexidine 0.05% followed by normal saline. Recent laboratory studies show that, after 1 minute exposure, chlorhexidine 0.05% produces a > 5-log reduction in pathogens associated with effective health care and reduces microbes to the surface of implantable biomedical devices. In general, orthopedic, cardiothoracic, and obstetrical surgical studies have documented the safety of the formulation chlorhexidine in surgical procedures. [15]

This is in line with research conducted by Jumuatul Masullah, Rondhianto, Lantin Sulistyorini (2014) which showed that povidone iodine was 10% effective in decreasing the amount of Escherichia Coli bacterial colonization in culture results in the Women's Surgery Room (RBW) dr. Soebandi, Jember. [12]

Another study was conducted by Noviani Nastiti Susantiningdyah, Ninuk Dian Kurniawati, Sriyono (2015) who stated that there was no difference in the incidence of urinary tract infections in patients who received indwelling catheter treatment urine using chlorhexidine gluconate 2% with a standard value ($p = 0.138$). [16]

Analysis differences in the use of povidone iodine 10% and chlorhexidine 2% against CAUTI in urethral treatment between intervention groups and control group

The results of this study indicate that there are differences in the effect of urethral treatment using povidone iodine 10% and chlorhexidine 2% in the treatment of urethra. However, this study proves that there is a relationship between urethral treatment using povidone iodine 10% and chlorhexidine 2% can prevent CAUTI, but in its

implementation there are 3 respondents in the control group experiencing CAUTI while in the treatment group there were no respondents who experienced CAUTI. The researcher believes that this occurs because chlorhexidine 2% has a broad spectrum antibacterial activity and provides antimicrobial effects on gram positive, gram negative and some fungi so it is more effective in preventing CAUTI.

According to the research of Lawrence L. Yeung, et al (2014) with the title A Comparison of Chlorhexidine-Alcohol Versus Povidone-Iodine for Eliminating Skin Flora Before Genitourinary Prosthetic Surgery showed that there was a significant difference between povidone iodine and chlorhexidine with a value of $p = 0.02$. [17]

This is in line with this study that chlorhexidine is more effective than povidone iodine 10% even though povidone iodine 10% is also effective in preventing CAUTI. Another study by Natsuo Yamamoti, et al (2014) entitled Efficacy of 1.0% chlorhexidine-gluconate ethanol compared with 10% povidone iodine for central long term venous catheter care in hematology departments: A prospective study states that Chlorhexidine 1% is more effective than povidone iodine 10% in fighting bacterial growth in central venous catheter hoses especially Staphylococcus epidermidis in hematological patients. [18]

This proves that chlorhexidine is not only effective in central venous catheter hoses but also in the treatment of the urethra of patients who have a fixed catheter. This study has answered the research hypothesis that there are differences in the effect of using povidone iodine 10% and chlorhexidine 2% on CAUTI in the treatment of urethra.

CONCLUSION

This study proves that the effect of using chlorhexidine is 2% more effective than povidone iodine 10% for the incidence of Catheter Associated Urinary Tract Infection (CAUTI) in the treatment of the urethra.

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