Relationship between Frequency of Urinary Catheter Care and Incidence of Urinary Tract Infection (UTI)

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ABSTRACT

Urinary tract infections (UTIs) are a frequent occurrence in hospitals; of all patients who had catheters installed at the Muhamadiyah Ponorogo General Hospital, 38% experienced UTIs. The frequency of urinary catheter maintenance can influence the incidence of UTIs. This study aims to determine the relationship between the frequency of urinary catheter treatment and the incidence of urinary tract infections (UTIs). The design of this research is a cross-sectional approach. The study population was 484 patients, averaging 242 per month. The sampling technique used purposive sampling with the research sample consisting of 30 inpatients who had catheters installed. Data collection uses a checklist. The results of this study showed that of the 30 respondents, the majority of the 28 respondents (93.33%) had irregular urinary catheter maintenance frequency (not every day), and the majority of the 29 respondents (96.67%) experienced urination incidents—urinary tract infection (UTIs). The results of the Chi-Square statistical test obtained a p-value of 0.095 > 0.05, so it did not reject H0, which means there is no significant relationship between the frequency of urinary catheter treatment and the incidence of urinary tract infections (UTIs).

Keywords: Urinary Catheter Care, Incidence of Urinary Tract Infections (UTIs)

Background

According to the World Health Organization, urinary tract infection (UTI) is the second most common infectious disease in the body after respiratory infections and as many as 8.3 million cases are reported per year. Urinary tract infection is an infection due to the proliferation of microorganisms in the urinary tract, which, under normal circumstances, urine does not contain bacteria, viruses or other microorganisms. The human urinary tract consists of the organs that collect and store urine and the organs that remove urine from the body, namely the kidneys, ureters, bladder, and urethra[1].

The American Urology Association (2016) states that urinary tract infections are estimated at 150 million annually. Urinary tract infections in the United States are more than 7 million visits yearly. Based on data from the Ministry of Health of the Republic of Indonesia, patients with urinary tract infections in Indonesia amounted to 90-100 cases per 100,000 population per year or around 180,000 cases per year[2]. The incidence of nosocomial infections in East Java from 2011 to 2013 based on the type of infection in 13 government hospitals, 2 TNI / Polri and BUMN hospitals and 14 private hospitals are as many as 24 cases of urinary tract infection. Based on the results of preliminary studies at Muhamadiyah Ponorogo General Hospital on inpatients who experienced the incidence of urinary tract infections in the KH Ahmad Dahlan Room of Muhamadiyah Ponorogo General Hospital in 2022 a total of 2,647 inpatients with 979 patients installed with catheters (37% of the total number of inpatients) or

per month 82 patients, and who experienced urinary tract infections due to insufficient catheter care of 31 people (38% of inpatients installed with catheters).

The cause of most urinary tract infections is from endogenous microbiota present in the perineum ascending the urethra to the bladder along the catheter surface. A small proportion of microorganisms (34%) are due to intraluminal contamination from exogenous sources, often resulting from the cross-transmission of organisms from the hands of healthcare workers. Approximately 15% of bacteriuria during hospitalization is due to patient-to-patient transmission while in the hospital [3]. Another factor is that the use of urinary catheters is the biggest risk factor for urinary tract infections, accounting for more than 80% of the urinary tract infections that occur in health services [4]. A catheter inside the bladder makes the patient more susceptible to infection. The urinary tract will be kept sterile by the flow of urine during micturition, which flushes bacteria out during micturition. The urethral sphincter helps keep the bladder closed and prevents the reflux of contaminated urine into the bladder [4].

One of the strategies to prevent catheter-related urinary tract infections is called "catheter bundle". The catheter bundle includes educational interventions to improve appropriate catheter use and clinical skills in catheter placement, practical interventions such as catheter restriction and removal protocols, and specific technologies such as bladder ultrasound. Prevention of catheter-associated urinary tract infections has proven successful in infection prevention measures, such as monitoring the use of urine catheters, proper urine insertion practices and changing the habits and mindset of nurses, doctors and patients about the need for catheter insertion. The use of the bundle approach to catheter care has been successful in reducing the incidence of catheter-associated urinary tract infections 5. A urinary tract infection prevention strategy for each hospital is recommended to provide and implement guidelines for catheter use, insertion, and care.

Methods

This research method is quantitative with a correlational design using a Cross-Sectional approach to determine the relationship between variables. The study population was all inpatients in the KH Ahmad Dahlan Room at Muhamadiyah Ponorogo General Hospital in September - October 2023, totalling 484 patients with an average of 242 people/month. The sampling technique used purposive sampling, with the research sample being a portion of inpatients with catheters installed, totalling 30 respondents. Data collection using Check List. Data analysis techniques using Chi-Square.

Results

The characteristics of respondents based on the analysis carried out are as follows:

Table 1. Respondent Characteristics

	Variable	Frequency	Percentage %
Gender	Man	18	60%
	Woman	12	40%
Age	36-45	3	10%
	46-55	5	17%
	56-65	11	37%
	66-75	8	27%
	76-85	3	10%
Level of education	No school	1	3%

Variable		Frequency	Percentage %
	elementary school	17	57%
	Junior High School	5	17%
	Senior High School	7	23%
Work	Private	10	33%
	Self-employed	8	27%
	Civil servants	1	3%
	Farmer	11	37%
Urinary Catheter Installation Time	1 day	0	0%
	2 days	1	3%
	3 days	3	10%
	4 days	6	20%
	5 days	20	67%
Medical Diagnosis	Internal	13	43%
	Neurology	13	43%
	Cardiology	2	7%
	Surgery	1	3%
	Urology	1	3%
Urinary Catheter Maintenance Frequency	Regular (every day)	2	7%
	Irregular (Not every day)	28	93%
Urinary tract infection (UTI)	Negative (No bacteriuria)	1	3%
	Positive (There is bacteriuria)	29	97%

Based on the characteristics of respondents in Table 1, it shows that out of 30 respondents, most of them are male, namely 60%. Most of the respondents were aged 56-65 years, 37%. Based on the length of catheter insertion, most were installed for 5 days, as many as 67%. Based on the medical diagnosis of the patients, most of them were due to internal medicine and neurology, 43% each. Based on the level of patient care, 93% were not regularly treated, while based on urinary tract infections, 97% were positive.

Table 2. Relationship between frequency of urinary catheter care and Incidence of Urinary Tract Infection (UTI)

Urinary Catheter Maintenance Frequency	Urinary Tract Infection (UTI)				Amount	%	p-value
	Positive (There is bacteriuria)	%	Negative (No bacteriuria	%			
Regular (Every day)	1	50%	1	50%	2	100%	
Irregular (Not every day)	28	100%	0	0%	28	100%	0.098
Total	29		1		30	100%	

Based on Table 2 above, it can be seen that out of 30 respondents, the frequency of regular urine catheter care (every day) and positive (there is bacteriuria) is half, namely 1 respondent (50%) while those with regular urine catheter care (every day) and negative (no bacteria) are half, namely 1 respondent (50%), and the frequency of irregular urinary catheter care (not every day) and positive (no bacteriuria) were all 28 respondents (100%) while those with irregular urinary catheter care (not every day) and negative (no bacteriuria) were none of the respondents. The results of the analysis using chi-square showed that the p value (0.098) was more than alpha (0.05) so that there was no relationship between the frequency of catheter care and the incidence of urinary tract infections

Discussion

The results of 30 respondents showed that the highest number was the frequency of irregular urine catheter care (not every day) of 28 respondents with a percentage of 93.33%, and the frequency of regular urine catheter care (every day) of 2 respondents with a percentage of 6.67%. In accordance with research conducted by Christina Magdalena (2019) shows that of the 30 respondents, 12 respondents (40%) with good quality catheter care and 17 respondents (56.63%) with sufficient quality catheter care did not experience UTI events, while 1 respondent (3.33%) with poor quality catheter care experienced UTI events, this means that the percentage of nosocomial urinary tract infections in respondents with catheters and poor care is greater than that of respondents with sufficient and good quality catheter care. Risk factors for urinary tract infection in catheter insertion are divided into modifiable factors and non-modifiable factors[3,6]. Some of the factors that can affect irregular urinary catheter care, as written in the theoretical framework, include predisposing factors (internal to the patient), motivating factors (attitudes and skills of family and nurses), and supporting factors (facilities and regulations in the hospital). From internal patients, it can be seen from, among others, gender, age, education level, medical diagnosis, and duration of urinary catheter insertion. From nurses, it can be seen from their knowledge, skills and compliance with standard operating procedures for urinary catheter care. Regulations have been provided for the existing facilities that must be carried out. These predisposing factors can be studied further.

The highest number of positive urinary tract infections (UTI) (there is bacteriuria) was 29 respondents with a percentage of 96.67%, and the lowest number of negative urinary tract infections (UTI) (no bacteriuria) was 1 respondent with a percentage of 3.33%. In accordance with research conducted by Afsah (2008) showed that out of 30 respondents, there was a UTI of as much as 20%, while research conducted, which was also conducted at PKU Muhammadiyah Yogyakarta Hospital, showed the incidence of UTI as much as 100% of 30

patients. In a study conducted at Panembahan Senopati Bantul Hospital, the CAUTI attack rate was 114.75‰, indicating that CAUTI is a serious problem[7]. Factors affecting the incidence of urinary tract infections (UTIs) can be influenced by P fimbrial-loaded bacteria (uropathogens) Pseudomonas aeruginosa E.Coli (UPEC). They can be influenced by disease factors such as HIV disease, type 2 DM, and urinary incontinence. They can be influenced by other factors such as multi-drug resistant UTIs, prolonged diaper use in children, poor hygiene habits and children who have not been circumcised[8]. According to CDC, 2017 and Permenkes Number 27 of 2017, patients are declared UTI if they have signs and symptoms of at least one of the signs, including fever (body temperature>38°C, tenderness in the suprapubic region, pain in the spinal region, urgency to urinate, increased frequency of urination, dysuria. In line with the existing theory, the diagnosis of UTI can be seen from two important things, namely the appearance of bacteriuria and the appearance of at least one symptomatic sign that can appear fever>38°C, suprapubic tenderness, spinal pain, urinary urgency, or increased frequency of urination [9].

In this study, it was found that there was no significant relationship between the frequency of urinary catheter care and the incidence of urinary tract infections (UTI) in the KH Ahmad Dahlan room of the Muhammadiyah Ponorogo General Hospital. Based on table 9 shows that out of 30 respondents, the frequency of regular urinary catheter care (every day) and positive (bacteriuria) was 1 respondent (50%). In contrast, those with regular urinary catheter care (every day) and negative (no bacteriuria) were 1 respondent (50%). The frequency of irregular urinary catheter care (not every day) and positive (bacteriuria) were 28 respondents (100%), while those with irregular urinary catheter care (not every day) and negative (no bacteriuria) were zero.

Based on the hypothesis testing and inference as previously described, we obtain information that at the 5% significance level, there is no significant relationship between the frequency of urinary catheter care and the incidence of urinary tract infection (UTI). This is because the calculated p-value obtained is $0.095 > 0.05$, so do not reject H0. The absence of a significant relationship, according to the results of this study, is due to several things, including the incidence of UTI that arises from this study, which is not purely from the urinary catheter care factor alone but can also be due to other factors. This is not in accordance with research conducted by Widya Sepalanita (2012) Master of Nursing Science Study Program for Medical-Surgical Nursing Specialization, Faculty of Nursing Science entitled "The Effect of Indwelling Urine Catheter Care Model American Association Of Critical Care Nurses (AACN) Against Bacteriuria at Raden Mattaher Jambi Hospital" with the results showing that bacteriuria occurs mostly in patients who are treated using indwelling urine catheters. The results of the bivariate test showed that the AACN model indwelling urine catheter treatment significantly reduced bacteriuria compared to the control group (OR 6.75, p = 0.038); this occurred due to limitations in this study because the data collection of this study used a checklist filled in by respondents and daily activity sheets in the patient's medical record status filled in by nurses. Both tools were used to collect data. This causes the data obtained not necessarily to match the actual situation. Risk factors for urinary tract infection in catheter insertion are divided into modifiable factors and non-modifiable factors[3]. The variety of causes of UTIs, the broad spectrum of causative organisms, and the small number of clinical trials that have been conducted make it difficult to select antimicrobials that can be used in UTI therapy[10]. The DPJP advised checking UL because he had predicted from the beginning that the patient had a UTI based on the signs and symptoms that appeared to confirm the diagnosis. The most commonly identified risk factors are previous antibiotic use and the use of catheterization. Urine catheterization is not performed on patients with indications of UTI only. This is also considered to reduce the additional costs that these patients must incur. In accordance with one of the JKN rules contained in Presidential Regulation No. 12 of 2013, article 39, paragraph 3,

the Health Social Security Organizing Agency (BPJS) makes payments to advanced referral health facilities based on the Indonesian Case Based Groups (INA-CBG's) method[11]. In the technical guidelines for the implementation of JKN, CBG (Case-Based Groups) is one of the case-mix systems, namely the grouping of several diseases that have the same symptoms or characteristics as well as the use of the same resources (treatment costs) and procedures or service actions in a hospital that are associated with financing which aims to improve the quality and effectiveness of services to patients in health facilities. Recording in Julga's PPI surveillance billing has not been running, so the analysis of suspected factors of possible infection incidence (seen intrinsically and extrinsically) is not certain. Infection Prevention and Control (PPI) in hospitals and healthcare facilities is an activity effort to minimize and prevent infection in patients, staff, visitors, and the community around the hospital [12]. This surveillance activity is one of the very important and extensive IOP programs that must be implemented in IOP; this surveillance activity will also be able to reduce HAIs. HAIs are an important health challenge around the world and pose a major threat to patient safety, which should receive top priority and, in turn, rn, become an important instrument in efforts to prevent, control, and reduce the impact of infections that can occur in the health care environment, ensure patient safety, and improve the quality of medical care in hospitals, especially at RSU Muhammadiyah Ponorogo.

Conclusions and Recommendations

At the 5% significance level, the p-value obtained was $0.095 > 0.05$, so there was no significant relationship between the frequency of urinary catheter care and the incidence of urinary tract infections (UTI. The incidence of urinary tract infection (UTI) that arises is not purely from the problem of frequency of urinary catheter care alone but also from other factors such as internal patient factors (predisposing factors), supporting factors (attitudes and skills of family and nurses), and supporting factors (facilities and regulations in the hospital) which can be known from various factors.

Acknowledgement

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