Risk Factors for of Urinary Tract Infection in Catheter Installation in Hospitals

Kusbaryanto[1] and Listiowati[2]

[1]Faculty of Medicine and Health, Departement of Medical, Universitas Muhammadiyah Yogyakarta, Indonesia
[2]Faculty of Medicine and Health, Departement of Medical, Universitas Muhammadiyah Yogyakarta, Indonesia
* Correspondence : koesbary@yahoo.co.id

ABSTRACT

CAUTI has been shown to increase the mortality rate, length of stay (LOS), susceptible patients to CAUTI are due to risk factors, namely women, the elderly, and diabetics. This study aimed to analyze the risk factors for the Incidence of urinary tract infections in patients with catheters in Hospitals. The research design used was an observational analytic study with a cross sectional design approach. The sample in this study were patients diagnosed with UTI in the inpatient room for 4 months from November 2019 to February 2020, obtained as many as 11 respondents with inclusion criteria being patients diagnosed with clinical urinary tract infection and having a catheter installed for at least 3 days. Sample selection is done by Consecutive Sampling. Data were taken from medical records at the hospital. Ethical permission for this research was granted from the research ethics section of Aisyiyah University Yogyakarta. There are three results of the analysis, namely: 1) gender has an effect on UTI ($p = 0.023$), the female gender is 7 times more at risk than the male gender ($OR = 7.041$), 2. age affects UTI ($p = 0.004$), age more than 70 years old is 11 times more likely to have UTI compared to those less than 70 years old ($OR = 11,445$), 3. Age factor is more influential on UTI than gender. The risk factors for the incidence of urinary tract infections in patients with catheters in the hospital are: 1. Gender, female sex is 7 times more at risk than male sex, 2. Age, over 70 years old is 11 times more at risk of UTI compared to those aged less than 70 years.

Keywords: *Risk factors, incidence, CAUTI, hospital*

INTRODUCTION

Approximately 1.7 million infections that occur in hospitals in the United States have resulted in 99,000 deaths, of which types of infection are UTIs. The incidence of urinary tract infections is 32% of all hospital infections and results in a total cost in the United States of $390-450 million[1].

Urinary tract infection (UTI) is an infectious disease that most individuals often experience. UTI infections are classified as upper UTI (pyelonephritis) and lower UTI (cystitis, prostatitis). The classification depends on the location. The clinical manifestations of UTI vary from asymptomatic bacteriuria to septic shock. A good understanding of UTI and the proper use of antibiotics is important to prevent complications and misuse of antibiotics[2].

The type of tube that is inserted into the bladder through the urethra is called an indwelling catheter. Indwelling urinary catheters play an important role in this aspect of medical practice. However, several problems arise in the installation of a persistent urinary catheter, namely CAUTI. CAUTI ranges from asymptomatic bacteremic urinary tract infections to symptomatic urinary tract infections. Approximately 30-40% of all hospital-acquired infections are CAUTI, 80% of which are catheter-related. Among the complications of the genitourinary tract are pyelonephritis and cystitis. Approximately 3% of all patients with catheters will develop bacteremia.

Complications of CAUTI lead to a lengthy hospital stay and increased costs, morbidity and mortality. Morbidity and mortality due to CAUTI, according to the Center for Disease Control, increased 2.8 times and length of stay increased by 1-3 days.[3]

There are hundreds of thousands of CAUTI in the United States, among the symptoms of CAUTI is bacteriuria, but not all cases of bacteriuria cause complaints in patients. The environment around the catheter insertion is very conducive to bacterial colonization so that catheter-related bacteriuria is unavoidable.[4]

About one-third of all healthcare-associated infections in the United States are caused by CAUTI and lead to increased patient care costs. Safety concerns and increased patient discomfort are also widely associated with CAUTI. Prevention of Catheter-related Urinary Tract Infections has important cost implications for hospitals.[5]

In 2011, there were an estimated 93,000 CAUTI cases in US acute care hospitals. More serious complications of CAUTI can arise such as sepsis and endocarditis, and it is estimated that more than 13,000 deaths each year are related to health care-associated UTIs.[6]

The increase in the mean number of days hospitalized for complications of a UTI was approximately 0.4 days for asymptomatic UTIs, and about 2.0 days for symptomatic UTIs. without symptoms, length of hospitalization, an increase in the average number of days of hospitalization due to complications of symptomatic UTI. Other complications associated with the use of

indwelling urinary catheters include urethritis, urethral stricture, hematuria, bladder perforation, catheter obstruction, and urosepsis. Complications due to CAUTI are largely preventable.[7]

Factors that increase the risk of hospital-acquired infections, in particular catheter-associated urinary tract infections (CAUTI), are well documented and in many of them in surgical patients. Among the risk factors are older age, female gender, diabetes mellitus, and longer urinary catheter insertion time[8].

Preventing health care-associated infections (HAIs) has become a major concern to improve inpatient safety. Catheter-associated urinary tract infections (CAUTI) are one of the most common HAIs in the United States. CAUTI is included as a preventable disease so that costs due to cauti events during hospitalization are no longer reimbursed by the hospital[9]. This study aims to analyze the risk factors for the incidence of urinary tract infections in patients with catheters in the hospital.

1. METHOD

The research design used was an observational analytic study with a cross sectional design approach. The sample in this study were patients with catheter insertion in the Hospital Internal Medicine Room as many as 11 respondents. The sample in this study were patients diagnosed with UTI in an inpatient room for 4 months from November 2019 to February 2020 with inclusion criteria being patients diagnosed with a urinary tract infection clinically and having a catheter inserted for at least 3 days. Sample selection is done by Consecutive Sampling. Data were taken from medical records at the hospital. Ethical permission for this research was granted from the research ethics section of Aisyiyah University Yogyakarta.

RESULT

Table 1. The Incidence of UTI by Gender and Age

| Variable | Incidence of UTI | | | | p |
| | UTI | | No UTI | | |
	F	%	F	%	
Gender					
Woman	9	17,6	42	82,4	0,058
Man	2	4,5	42	95,5	
Age					
> 70 year	9	23,1	30	76,9	0,007
< 70 year	2	3,6	54	96,4	

The results of the analysis showed that the gender and age variables had a p value of < 0.25 so that both variables were included in the multivariate test.

Table 2. Odds Ratio (OR) from the results of the multivariate test

| Variable | Incidence of UTI | | | | P | OR | CI 95% | |
| | UTI | | No UTI | | | | | |
	F	%	F	%			Lower	Upper
Gender								
Woman	9	17,6	42	82,4	0,023	7,041	1,315	37,689
Man	2	4,5	42	95,5				
Age								
> 70 year	9	23,1	30	76,9	0,004	11,445	2,176	60,199
< 70 year	2	3,6	54	96,4				

DISCUSSION

There are significant differences both anatomically and physiologically in the male and female urogenital tracts. From the results of statistical tests it was proven that there was a difference, it was found that the female sex was 7 times more at risk for UTI than men with OR = 7.041, 95% CI 95% CI 1.315 - 37.689.

Age factors also often affect the risk factors for disease, even including the type of permanent risk factor. From the results of statistical tests, it was found that those aged over 70 years were 11 times more at risk of UTI than those aged less than 70 years with OR = 11.445 and 95% CI 2.176 - 60.199.

The urethra in women is shorter and closer to the rectum, this makes the urinary tract more susceptible to bacterial infection, so UTIs are more common in women. Among other risk factors for UTI are a history of previous UTI, sexual activity especially with a new partner, prostate enlargement and poor hygiene.[10]

Of all the incidence of UTI, about 70-80% are Cauti. Furthermore, CAUTI is associated with increased morbidity and mortality. Health insurance no longer reimburses costs for additional treatment resulting from hospital-acquired CAUTI.[11]

For decades, research has shown that the incidence of CAUTI has been decreasing steadily. However, research on the incidence, risk factors, and efforts to optimize CAUTI prevention strategies is important to prevent the risk. Potential risk factors of interest include patient gender, age, comorbidities, use of parenteral nutrition, urinary catheterization, suprapubic catheterization, and having undergone urological procedures.[12]

Increased resistance of microorganisms that cause CA-UTI is associated with increased mortality, morbidity, health care costs, and needs. It aims to introduce broad-spectrum antibiotics. Identification of risk factors for antimicrobial resistance may contribute to the improvement of CA-UTI treatment. The risk factors associated with an increased incidence of CAUTI are E. coli and Klebsiella spp. These bacteria can potentially produce CA ESBLs, including old age, female gender, diabetes mellitus, recurrent UTIs, invasive urological procedures, and previous use of antibiotics, such as aminopenicillins cephalosporins, and fluoroquinolones.[13]

Approximately 75% of UTIs are caused by the use of a urinary catheter. CAUTI is almost always preceded by bacteriuria. Among the symptoms of bacteriuria are urgency, dysuria and fever. Sepsis, septic shock, and multiorgan failure can result from microbes from the urinary tract. With prolonged use of the catheter, neurogenic bladder dysfunction will occur. This condition can progress to damage to the brain, spinal cord, or other nerve damage. Forms of disease that arise include stroke, spinal cord injury, multiple sclerosis.[14]

As many as 20.6% of CAUTI patients were caused by colorectal surgery. The incidence of Cauti may be related to patient characteristics, laboratory values, and surgical procedures. Among the risk factors for CAUTI are the patient's age, gender, steroid use, diabetes, hypertension, and history of cerebrovascular disease.[15]

We found that gender had no association with CAUTI. Men and women have the same chance of suffering from infection, but the number of men who suffer from infection is more than women. This study contradicts the theory that women are more at risk of developing infections because women have short urethras. The increase in urinary tract infections due to catheter insertion in men causes differences in hormones and microorganisms in the urine. An equal chance of developing a catheter-related urinary tract infection is due to personal hygiene. Poor personal hygiene in men and women, especially in the genital area is at risk for infectious diseases. For the effect of Age, in this study it was found that, those aged over 60 years had a greater risk of suffering from catheter-related urinary tract infections. This is in accordance with the theory of immunosenescence (immune dysfunction due to age), like other diseases as well, that age is a permanent risk factor[16].

The prevalence of long-term catheter use varies between countries and healthcare settings. In Italy it was found that 35.9% of men and 27.4% of women in elderly home care patients used either indwelling catheters, in other countries the figure was lower, namely in Finland (2.9%) and in women in the Czech Republic (0.6%). including urinary tract infections. Complications arising from the use of long-term catheters besides UTI are the appearance of mineral deposits and leaks around the catheter[17].

Among the most effective approaches to reducing CAUTI is limiting the use of indwelling urethral catheters to a list of appropriate indications, as most inpatients have catheters inserted at some point during hospitalization, with many of these insertions not considered medically necessary[5].

A study of cauti, when the catheter was removed immediately after surgery or within 24 hours was safer than removing the catheter after 48 to 72 hours. The catheter should be left in place for as short a time as possible to prevent UTI. This is one of the recommended strategies to minimize the incidence of CA-UTI[18].

Inserting a catheter is a risk factor for CAUTI, so proper insertion can reduce infection and prevent CAUTI. Other risk factors for CAUTI are female gender, older age, and not maintaining a closure system19.

In addition to the above factors, cerebral infarction is thought to increase the incidence of CAUTI. Cerebral infarction is a common neurological disorder associated with urinary tract infections due to bladder dysfunction. 6,10-12 A prospective study reports that urinary tract infections complicate cerebral infarction and are associated with poor outcomes. Cerebral infarcts are susceptible to CAUTI, evidence of antimicrobial efficacy in preventing CAUTI in these patients is lacking20.

CONCLUSION

The risks of urinary tract infections during catheter insertion in hospitals are 1. Gender, female sex is seven times greater risk than male sex, 2. Age, over 70 years old, has 11 times greater risk of experiencing urinary tract infection. UTI compared to those less than 70 years of age.

CONFLICT OF INTEREST

There is no conflict of interest for this manuscript.

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