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Evaluation of Prophylactic Antibiotic Use in The Surgical Action of Urinary Tract in Siloam Hospital Bali from January-June 2019

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A B S T R A C T

Inappropriate use of antibiotics raises various problems to health, especially bacterial resistance to antibiotics. One of them is surgery with prophylactic antibiotics. The purpose of this study is to observe the accuracy of the usage of antibiotics in the surgical action of urinary tract. The method used is descriptive method with retrospective data collection from January to June 2019. The analyses used are the Gyssens method and the 2016 Indonesian Ministry of Health Guidelines for Antibiotics Usage. The biggest patient profile are aged 41-50 years (51 patients-43%), with 80% male and 20% female patients. Gyssens method is used to gain evaluation result; IVA Category (there is more effective alternative) (100%) and I Category (inappropriate timing) (99,92%). Evaluation using the 2011 Indonesia Ministry of Health method, namely accurate patient 100%, accurate doses 100%, and time of prophylactic antibiotics is 100%. This retrospective study concluded that the use of third-generation cephalosporin as prophylactic antibiotics for the urinary tract surgical action used is not accordance to the guideline Prophylactic antibiotics used for urinary tract surgical action is third-generation cephalosporin; cefoperazone (85%), cefotaxime (10%) and ceftriaxone (5%).
Keywords: *antibiotics, antibiotics rationality, Gyssens method.*

1. Introduction

A good pharmaceutical service will give a good impact to the improvement of health service quality, decreasing of medical expenses, and the improvement of

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rational behaviour from all health workers, patients, and the society. This pharmaceutical service including a service to all hospital inpatients or patients who are soon to be released, because hospital inpatients or released patients have immense opportunities to be contracted to nosocomial infection or hospital acquired infection (HAI). According to Linda (2004), the impacts of nosocomial infection are adding to functional vulnerability, emotional tension, and sometimes in some cases, will cause disability to the deterioration of the quality of life. One of the reasons this condition can happen, is due to the irrational use of antibiotic. Therefore, the role of health practitioner in the rational usage of antibiotic is very significant. The occurrence of infection increases the morbidity and mortality rate, the length of treatment, and the increase of medical expenses for the patients. Those risks can be decreased or avoided by preventing the infections that happen in the hospital. One of the methods of decreasing infections, especially in surgery is the use of prophylactic antibiotics (Dellinger *et a*l 1994). The use of cephalosporin antibiotics is usually chosen as prophylaxis in surgical procedure. However, some bacteria are resistant to the activity of this antibiotic because of the irrational usage in the practice. The rational usage of cephalosporin antibiotics is expected to give a positive impact to the patients. Surgical procedure is one of the causes of infection in hospitals, which is 23%. In colorectal surgery patients, infection was found in 40% patients who were not given prophylactic antibiotics, whereas in patients with prophylactic antibiotics, the infection occurrence was found by 11%. In 1993, it was estimated that the hospital acquired infection happened in surgical patients in England caused the increase of medical expenses for more than 170 million pounds (Siregar, 2005).

According to Djoko Widodo (2006), the use of antibiotics in hospital inpatients reached 23-28%. From that percentage, 20-65% of the usage was considered not appropriate. A research by Antimicrobial Resistance in Indonesia/ AMRIN -study) obtained that 84% of hospital inpatients in RSUP (general hospital of Goverment Kariyadi Semarang acquired antibiotics therapy, while in the internal medicine ward, the usage of antibiotics reached 67%.

One of the antibiotics that are chosen to deal with infection and surgical prophylaxis in Siloam Hospital Bali, especially in surgical polyclinic is cephalosporin antibiotics. It is because cephalosporin antibiotics is the safest antibiotics and have various choices of medicines that can be adjusted with the condition on site and have a significant anti-bacterial potential. Moreover, Siloam Hospital Bali is a private hospital that focused their service not only to regular patients / private insured patients, but also Social Insurance Administration Organization (BPJS) patients. The use of prophylactic antibiotics need to be given a special attention by the medicine practitioner, since some bacteria, in practice, is resistant to its activity because of the irrational use of antibiotics. This led researchers to study the rational usage of prophylactic antibiotics in hospital inpatients at Siloam Hospital of Bali from January-June 2019 by using Gyssens criteria and the Guidelines for the 2011 Guidelines for the Use of Antibiotics in rational usage in accordance to Department of Health (DepKes) and the 2016 National Guidelines to Prophylactic Antibiotics (KPRA).

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2. Material and Methods

Time and Place

This study was conducted from April 2020 to May 2020 by obtaining data on patients treated at Siloam Hospital Bali during January-June 2019 period.

Population and Sample

The populations of this research were patients who underwent urinary tract surgery treated at Siloam Hospital Bali. The sample taking technique used was total sampling method.

Inclusion and Exclusion Criteria

The inclusion criteria in this study were medical records of patients who underwent urinary tract surgery at Siloam Hospital Bali, prescriptions containing a combination of at least two antibiotics, prescriptions containing dosages and rules of use, prescriptions containing the names and medical record numbers of the patients, male and female patients of all ages.

The exclusion criteria in this study were medical records of discharged patients who underwent treatment in the Intensive Care Unit (ICU/HCU), incomplete ICP medical records, and medical records of patients who are forced home or referred.

Data Collection Technique

The data were collected by collecting Siloam Hospital Bali patients' medical records. And then, the counting of the total number of all Inpatient Medical Record (IMR), prescriptions containing prophylactic antibiotics were separated and recorded.

The samples which were collected then numbered from one to the number of the last sample. Sampling was recorded in data collection forms, which included the patient's name, age, medical record number, prescription

date, drug name, dosage and rule of use. Medical record was taken according to the patient's name and age.

The recorded data include name and age of the patient, medical record number, also initial and final diagnoses. The data obtained from patient's medical record were then analyzed for their rationality using the National Guidelines for the Use of Antibiotics, the 2011 Guidelines for the Use of Rational Medicines of the Indonesian Ministry of Health, and Gyssens method :

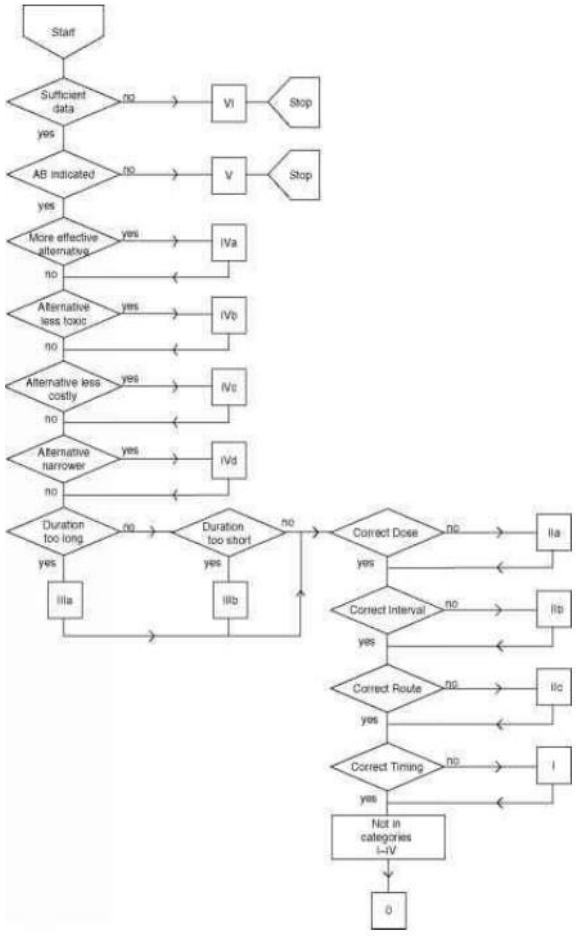

Figure 1. Gyssens Algorithm

1. Category 0: Appropriate antibiotics usage
2. Category I: Inappropriate timing of antibiotics usage
3. Category IIA: Inappropriate antibiotics dosage
4. Category IIB: Inappropriate interval of antibiotics usage
5. Category IIC: Inappropriate antibiotics administration route
6. Category IIIA: Antibiotics is administered for too long
7. Category IIIB: Antibiotics is administered for too short
8. Category IVA: There is a more practical option
9. Category IVB: There is a less toxic option
10. Category IVC: There is a cheaper option
11. Category IVD: There is a narrower antibiotics spectrum
12. Category V: No indication of antibiotics
13. Category VI: Incomplete data

3. Result and Discussion

The research data is part of the population that meets all the criteria. The total number of urological surgery cases performed in the BPJS (Social Insurance Administration Organization) inpatient rooms from January to June 2019 were 140 patients, and the samples that met the inclusion and exclusion criteria were 120 patients during January to June 2019 period.

The Characteristic of Research Subjects

Table I. The Characteristic of Urinary Tract Surgery Patients

Characteristic	Category	Total (N= 120)	Percentage (%) (N=120)
Sex	Male	96	80%
	Female	24	20%
Age	20-30 years	5	4%
	31-40 years	11	10%
	41-50 years	51	43%
	51-60 years	38	32%
	61 -70 years	12	10%
	71 – 80 years	3	3%
Accompanying Diagnosis	None	95	79%
	Hypertension	7	6%
	HT+ DM+ACKD	2	2%
	Renal Insufficiency/ACKD/CKD	11	9%
	HT + ACKD	1	1%
	Anaemia	2	2%
	Extrapulmonary Tuberculosis	2	2%

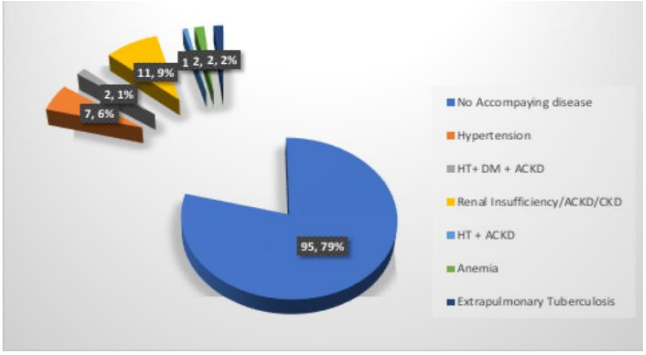

Figure 2. The Characteristic of Urinary Tract Surgery Patients Based on Comorbidity Diseases

The profile of urinary tract surgery patients can be seen in Table 1. The age range in adult patient is 20-70 years, with the most incidence of urinary tract surgery range in adult patients aging from 40-60 years. This is

thought to be caused by several factors, such as; deficiency in water intake and mineral level consumed affected by increased activity, a lot of sitting activity in working hours, high purin diet, oxalates and calcium, lack of sporting activity due to hectic working hours (Purnomo, B.B., 2003). The profile of urinary tract surgery patients based on gender can be seen in Table 1, with 96 male patients (80%) and 24 female patients (20%). Based on the result of this study, the number of male patients is four times higher than female patients. This is thought to be related to the differences in the anatomy of male and female bodies, where the urethra size of adult men (23-25 cm) is longer than that of women (3-5 cm), so that men often experience urinary obstruction in which case, the chance of having urinary tract surgery is higher than women (Purnomo, B.B., 2003). The result on this study, there is no contraindication of patients who given those prophylactic antibiotics.

b. The Profile of Prophylactic Antibiotics for Urinary Tract Surgery

Urological surgery is classified as clean contaminated surgical procedure, where prophylactic antibiotics are used to prevent infectious complications. In urinary tract surgery, there are three types of surgical actions, namely, Endourology, Open Surgery, Laparoscopy, and Extracorporeal shock Wave Lithotripsy (ESWL) (Campbell M. *et al,* 2012). The most type of urological surgery performed at Hospital X are endurogical surgery (RPG (A retrograde pyelogram) URS (ureteroscopy), Lithotripsy, Double J Stent, and ERCP (endoscopic-assisted pilonidal irrigation and cleaning)), while the most procedures put into practice are URS and DJ Stent.

The antibiotics profile in this study includes types of antibiotics, antibiotics doses, and routes of antibiotic administration in patients undergo urinary tract surgery at the inpatient rooms of Siloam Hospital Bali from January to June 2019. There are three types of parenteral antibiotics that are used as prophylaxis. Parenteral antibiotics include cefoperazone, cefotaxime, and ceftriaxone.

Table 2. Prophylactic Antibiotics Profile in Urinary Tract Surgery

Name of Prophylaxis Antibiotics	Route	Total Dosage (N = 120)	Percentage (%) (N=120)	Typical Dosage Based on Literature
Cefoperazone 1 gram	I.V	99	82%	1-2 gram every 12 hours
Cefoperazone 2 grams	I.V	3	3%	1-2 gram every 12 hours
Cefotaxime 1 gram	I.V	2	1%	1-2 gram every 8 hours
Cefotaxime 2 grams	I.V	10	8%	1-2 gram every 8 hours
Ceftriaxone 1 gram	I.V	3	3%	1-2 gram/day
Ceftriaxone 2 grams	I.V	3	3%	1-2 gram/day

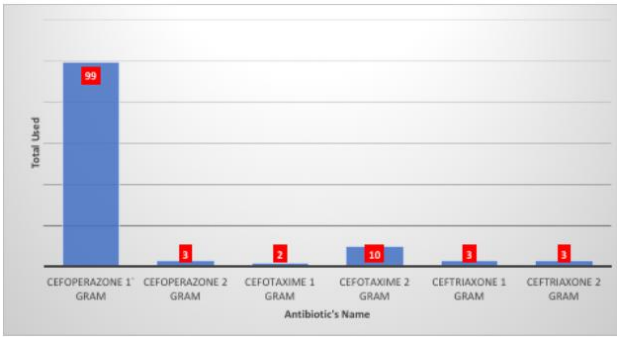

Figure 2. Prophylactic Antibiotic Urinary Tract Surgery Profile

Evaluation of the Use of Prophylactic Antibiotics Based on the 2011 Indonesian Ministry of Health Indonesia

Based on the evaluation that has been done, prophylactic antibiotics administration in cases of appendicitis surgery can be said to be rational if it met the aspect of accuracy in indication, patient accuracy, drug and dose accuracy, time of administration, and duration.

Table 3. The Accuracy of Prophylactic Antibiotics Usage for Urinary Tract Surgery Patients from January to June 2019 Period

The Accuracy of Prophylactic Antibiotics Usage in Urinary Tract Surgery	Total Patients	Total of Accurate Patients	Total of Inaccurate Patients
Accurate Patients	120	120 (100%)	-
Accurate Drugs	120	0%	(100%)
Accurate Doses (Dosage and Administration Route)	120	120 (100%)	-
Timely Providing Prophylaxis	120	1 (0,8%)	119 (99,92%)
Accurate Duration of Administration (1 x 24 hours)	120	120 (100%)	-

The antibiotics profile in this study can be seen in Table 2, including the types of antibiotics, antibiotics doses, administration routes in patients undergo urinary tract surgery in the inpatient rooms at Siloam Hospital Bali from January to June 2019. There are three types of parenteral antibiotics that are used as prophylaxis. The parenteral antibiotics include cefoperazone, cefotaxime, and ceftriaxone. The three antibiotics are classified as third-generation cephalosporin. None of the urinary tract surgery patients in this study undergo urine culture, only complete blood count before the procedure. In urological surgery study, the prophylactic antibiotics used include ampicilin, aminoglycosides, second and third-generation cephalosporin, and fluoroquinolone (Devlin, J.W., et al., 2002; Lee, A.J, *et al*., 1999; PMFT, 1994; Woods, R.K and Dellinger, E.P., 1998, Cariou, G., 2003).

Antibiotics classified as cephalosporin, particularly cetriaxone, are widely used because they have broad and active antibacterial activity against *S. aureus* and *E. coli* which can cause infections in surgical wounds; a longer half-life time compared to all other cephalosporin antibiotics that can take 5 to 11 hours, so that if surgery takes longer time that it should, there is no need for repeated doses; fine tissue penetration; and low toxicity (Reese and Betts, 2000). However, this antibiotic has a weakness, which is, ceftriaxone is a broad-spectrum antibiotic so that it can interfere with the normal flora in the intestine and accelerate bacterial resistance such as *P. auriginosa, Enterobacter cloacea, C. freundi* and *Serattia* whose manifestations also increase the risk of surgical wound infection (Riaz and Khatoon, 2013). Therefore, ceftriaxone becomes an alternative for prophylactic antibiotic if the recommended antibiotics cannot be given.

Along with the current development of science, the recommended usage of prophylaxis in urological surgery nowadays is first-generation cephalosporin (cefazolin) or fluoroquinolone categories, or the combination of cefazolin and metronidazole. If allergy is found, the alternative antibiotics that can be used as prophylaxis are aminoglycoside or vancomycin, or a combination of fluoroquinolone and metronidazole (ASHP, 2013; WHO, 2016). The most common bacteria that can be found in the urinary tract are gram-negative bacteria (*E. coli, Klebsiella, Enterobacter, Serratia, Pseudomonas spp, Proteus* and *citrobacter*), so empirically, the administration of prophylactic antibiotics in this study are correct, however, the accuracy of the antibiotic selection that is based on the latest guideline, shows that the selection is not accurate. This is because the principle of prophylactic antibiotics usage is to prevent the colonization of bacteria that enter the operating tissue, where the bacteria on the skin (before the incision) are gram-positive bacteria. Cefazoline is sensitive to gram-positive bacteria that reside in human skin tissue. In prophylaxis, the bacteria will be killed by the body's innate immune system, so the prophylaxes needed are low-power antibiotics such as first and second-generation cephalosporin. In addition, prophylactic antibiotics must be able to reach and distribute in the target area of the surgery rapidly to reach the expected level safely and effectively (Eke *et.al*/SOGC 2012). The attainment of the desired drug level is related to pharmacokinetics and pharmacodynamics of a drug. The Cefazolin has 17 to 22 minutes to reach optimal drug levels in the tissue (Goede *et al*, 2013) with half-life elimination of 2 hours, while ceftriaxone, cefotaxime, or cefoperazone take about 1 to 2 hours to reach optimal level in the tissue (DIH 26th edition). Cefotaxime and cetiaxone can be used as prophylactic antibiotics alternatives, but are off label toward the indication, while cefoperazone is not recommended for prophylaxis usage, but as therapeutic antibiotic in the event of complications during surgery (CDC, 2012). Too frequent use of third-generation cephalosporin as surgical prophylactic antibiotics can lead to the occurrence of Methicillin-resistant *Staphylococcus aureus* (MRSA), Extended Spectrum-beta lactamase (ESBL), Vankomicin-resisten Enterococci (VRE) and can be a potential threat in resistance. So, it is necessary to increase awareness in the selection of surgical prophylactic antibiotics (Oh *et al*., 2014). In addition, the third-generation cephalosporin has less activity against Staphylococcus infection than cefazolin, so the third-generation cephalosporin should not be used for surgical

wound infections (Vessal *et al.*, 2011). Therefore, the administration of high grade prophylactic antibiotics will indeed protect the patient from the effect of infection, but can also kill the normal flora in the body that will lead to resistance in the future.

All prophylactic antibiotics in this study are administered via intravenous route. This route is appropriate because it has rapid onset of action so that the desired antibiotic concentration in serum and tissue is achieved at the time of the first surgical incision and is maintained during the surgical procedure (Dellinger EP, 2007).

In this study, the profiles of prophylactic doses given to urinary tract surgery patients are the usual doses according to the literature (1-2 grams). According to literature, antibiotics ceftriaxone and cefoperazone do not require dose adjustment for patients with kidney or liver disease, while cefotaxime requires dose adjustment for patients with kidney or liver disease. None of the urinary tract surgery patients in this study underwent a dose adjustment related to the patients' disease. Surgery patients who had comorbidities or diseases that affect the immune system, including Diabetes Mellitus, Tuberculosis, malnutrition, and others (Table 1) will interfere with the wound healing process. The result obtained by the researchers that Diabetes Mellitus was a comorbid disease with a higher percentage in accordance with the CDC (2012). The surgical wound infection factor was a patient factor, namely Diabetes Mellitus disease. Therefore, patients with comorbidities receive more thorough postoperative treatment. However, throughout this study, patients with comorbidities did not develop any signs of postoperative infections.

Prophylactic antibiotic by intravenous administration should be given 30-60 minutes before surgery, unless if certain antibiotics (alternative) are used, the administration must adjust the pharmacokinetics-pharmacodynamics of those antibiotics. In Table 4, the most time of administration is in range of 0-20 minutes (<30 minutes), while for the span of 30-60 minutes, only administered to 27 patients, and the span of >60-120 minutes are given to 6 patients.

Table 4. The Administration of Prophylactic Antibiotics based on National Prophylactic Antibiotics Guidelines (KPRA)

Prophylaxis Time	Total Patients (N= 120)	Percentage (N = 120)
0-10 minutes	21	18%
10-20 minutes	54	45%
21-30 minutes	16	13%
31-40 minutes	13	11%
41-50 minutes	10	8%
51-60 minutes	1	1%
>> 90 -120 minutes	1	1%
>>>120 minutes	4	3%

Based on the recommendation from ASHP and WHO, there is no significant difference in the increased risk of surgical wound infections (ILO) in 30-60 minutes prophylactic antibiotics administration, or 60-120 minutes administration before surgery is performed. A study conducted by de Jonge *et al*. (2017) stated that, prophylactic antibiotics given more than 120 minutes (2 hours) will increase the risk of infection in the surgical wounds. This statement is supported by the study of Classen *et al.* (1992) that compared the administration of prophylactic antibiotics from 2-24 hours preoperative, 2 hours preoperative, 3 hours postoperative, and 2-24 hours postoperative that include 2847 patients who underwent surgery to be clean and clean contaminated. The result obtained were the lowest risk of surgical wound experienced by the patients who receive prophylaxis 2 hours preoperative (0.6%), 2-24 hours pre-surgery (1.4%), 3 hours postoperative, and then >3 hours postoperative. This is due to the insufficient concentration of drug in the blood serum to prevent bacterial infection so that the possibility of infection in surgical wound will increase. There were 4 patients who had >2 hours of antibiotic administration time so it was feared that they could not provide protection towards the target tissue. There was only 1 patient who has timely prophylactic antibiotic administration time when viewed from the pharmacokinetics-pharmacodynamic of the antibiotic used (ceftriaxone), where ceftriaxone, cefotaxime, or cefoprazone takes about 1-2 hours to reach optimal level in the tissue (DIH 26th edition). The timing of administration that is not in accordance with the level of drug in the blood will not protect the targeted tissue/organ against bacterial colonization which can cause complication.

Table 5. The Timely Administration of Prophylactic Antibiotics to Urinary Tract Surgery Patients based on Pharmacokinetics-Pharmacodynamics

Antibiotics	Route	Administration Time	Frequency and Duration	Doses (Total Patients)		Percentage of Timely Administration
				1 gram	2 grams	
Cefoperazone	I.V	0– ≤30 minutes	1x ≤ 24 hours	73	2	-
		30-60 minutes	1x ≤ 24 hours	21	1	-
		60-90 minutes	1x ≤ 24 hours	-	-	-
		90-120 minutes	1x ≤ 24 hours	1	-	0,8%
		>> 120 minutes	1x ≤ 24 hours	4	-	-
Ceftriaxone	I.V	0– ≤30 minutes	1x ≤ 24 hours	3	3	-
		30-60 minutes	1x ≤ 24 hours	-	-	-
		60-90 minutes	1x ≤ 24 hours	-	-	-
		90-120 minutes	1x ≤ 24 hours	-	-	-
		>> 120 minutes	1x ≤ 24 hours	-	-	-
Cefotaxime	I.V	0– ≤30 minutes	1x ≤ 24 hours	1	8	-
		30-60 minutes	1x ≤ 24 hours	1	2	-
		60-90 minutes	1x ≤ 24 hours	-	-	-
		90-120 minutes	1x ≤ 24 hours	-	-	-
		>> 120 minutes	1x ≤ 24 hours	-	-	-

All patients who underwent surgery receive postoperative antibiotics for 1 day (24 hours) by continuing the usual frequency as therapeutic antibiotics, would receive postoperative oral antibiotics therapy for the next 5 days. The types of postoperative antibiotics have the same spectrum, that is, from third-generation cephalosporin; Cefixime 200 mg (8%) or cefixime 100 mg (3%) or fluroquinolone; levofloxacin 500 mg (93%), or amoxicillin 500 mg (08%). However, there are 3 patients who did not receive postoperative antibiotics (2,5%). This was presumably because the parameters of infection in those 3 patients did not show an increase in leukocytes or neutrophils.

In patients undergoing surgery, other postoperative therapies are given other than antibiotics with the aim of treating nausea, pain, bleeding, and stress ulcer that appear after surgery. The drugs used include anti-emetic (ondansentron), analgesics (paracetamol, ketrolac, or tramadol), anti-stress ulcer (PPI category, ranitidine), antifibrinolysis/bleeding (tranexamic acid) and even diuretics for certain cases (furosemide) due to the expected dieresis for postoperative urinary tract surgery patients.

Evaluation of the Use of Prophylactic Antibiotics Based on Gyssens Method

Based on the result of the study, it was found that all antibiotics used as prophylaxis included in the IV A category, that is, there is a selection of prophylactic antibiotics that are more specifically given as prophylaxis. That antibiotic is cefazolin. The selection of cefazolin is based on the sensitivity of the antibiotic in covering gram-positive bacteria which are abundant in the surface layer of human skin. In prophylaxis, the bacteria will be killed by the body's innate immune system, so the prophylaxis which is needed is a low-power antibiotic such as first and second-generation cephalosporin. In addition, prophylactic antibiotics must be able to reach and distribute in the target area of operation rapidly in order to reach the expected levels, safely and effectively (Eyk *et. al*/SOGC 2012). This becomes the basis of the National Guidelines for the Use of Prophylactic Antibiotics in determining which antibiotics are suitable for surgical procedure.

Table 6. Evaluation Result of the Accuracy of the Use of Prophylactic Antibiotics in Urinary Tract Surgery Patients with the Gyssens Method in Inpatient Rooms of X Hospital Bali for the January-June 2019 Period

NO	ANTIBIOTICS	CATEGORIES												
		0	1	II	II	II	III	III	IV	IV	IV	IV	V	VI
				A	B	C	A	B	A	B	C	D		
1	Ceftriaxone injection		6						6					
2	Cefotaxime injection		12						12					
3	Cefoperazone injection		101						102					

1. Category 0: Appropriate antibiotics usage
2. Category I: Inappropriate timing of antibiotics usage
3. Category IIA: Inappropriate antibiotics dosage
4. Category IIB: Inappropriate interval of antibiotics usage
5. Category IIC: Inappropriate antibiotics administration route
6. Category IIIA: Antibiotics is administered for too long
7. Category IIIB: Antibiotics is administered for too short
8. Category IVA: There is a more practical option
9. Category IVB: There is a less toxic option
10. Category IVC: There is a cheaper option
11. Category IVD: There is a narrower antibiotics spectrum
12. Category V: No indication of antibiotics
13. Category VI: Incomplete data

The success of antibiotic therapy can be seen from the data of the presence of infection, such as; leukocyte values, body temperature values, pulse (90x/minute), respiration rate (>20x/minute), and surgical wound infection (ILO) (Purnomo, B.B., 2003). In this study, all patients did not show any of the previously mention signs of infections. This could be due to the use of high category prophylactic antibiotics (third-generation cephalosporin). The effectiveness of high category antibiotic can also affect the length of stay of patients undergoing urological surgery. In this study, the length of stay for urinary tract surgery patients ranged from 1-2 days. In terms of length of stay, it can also reduce the patients' treatment cost and their quality of life. On the other hand, the use of prophylactic antibiotics in the third-generation cephalosporin category can lead to the presence of bacteria producing enzyme extended spectrum beta-lactamase (ESBL) ranging from 30-70% (NAP AMR Surveillance, National Institute of Health Research and Development, WHO 2013). The well-known ESBL producing bacteria are *E.Coli* (ESBL+) and *Klebsiella pneumonia* (ESBL-). One example of bacteria that often infects the urinary tract is *E.coli*, so it is feared that the selection of high category of prophylactic antibiotics will accelerate the development of ESBL with a "selective pressure" mechanism. Therefore, it is important to carefully select the proper prophylactic antibiotics and adherence to their use in preventing the formation of ESBL bacteria. If ESBL occurs, it will have an impact on antibiotic resistance so that it requires higher category antibiotic treatment which can prolong the length of stay, increase treatment cost, even death.

Conclusion

This retrospective study concluded that the use of third-generation cephalosporin as prophylactic antibiotics for the urinary tract surgical action used is not accordance to the guideline. Further study and examination of this research using prospectively method is necessary to confirm that there is no resistance to antibiotics reaction or an occurrence of postoperative infection.

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The authors declare no conflicts of interest.

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