Indonesian Journal of Global Health Research
Volume 5 Number 4, November 2023
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

RATIONALITY OF ANTIBIOTIC USE IN PATIENTS WITH URINARY TRACT INFECTIONS AT THE DR OEN KANDANG SAPI HOSPITAL INPATIENT

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ABSTRACT
Urinary tract infection is an infectious disease that requires antibiotics in its treatment. In Indonesia, UTI cases reach 180,000 cases per year. The aim of the research is to determine the pattern of antibiotic use and the appropriateness of antibiotic use in UTI patients at Dr Oen Kandang Sapi Hospital in 2021. The method used is non-experimental by collecting data retrospectively from medical records of patients diagnosed with UTI in 2021, then the data is analyzed using the method Gyssens. and analyzed quantitatively descriptively. The results of this study were an analysis of the accuracy of antibiotics using the Gyssens method in UTI patients at DR Oen Kandang Sapi Hospital, with 45 rational prescriptions (54.88%) and 37 irrational prescriptions (45.12%). Inaccuracy in the IVA category was 2 prescriptions, IVC was 8 prescriptions, in category IIIA was 1 prescription, in category IIIB was 3 prescriptions, category IVA, IVC was 8 prescriptions, category IVC, IIIB was 5 prescriptions, category IVA, IVC, IIIB was 9 recipes, category IIA, IIB 1 recipe, category IVA, IVC, IIB 1 recipe. The conclusion of this study is that the most widely used UTI antibiotic is a single type of antibiotic with 67 prescriptions (81.71%), the most widely used class of antibiotic is the cephalosporin class of antibiotics with 60 prescriptions (61.22%), the most common type of antibiotic. The antibiotic ceftriaxone used was 42 prescriptions (42.42%).

Keywords: antibiotic rationality; gyssens method; urinary tract infection

First Received	Revised	Accepted
10 September 2023	14 September 2023	30 September 2023
Final Proof Received		**Published**
28 October 2023		28 November 2023

How to cite (in APA style)
Anggraini, T., & Ariyani, R. (2023). Rationality of Antibiotic use in Patients with Urinary Tract Infections at the Dr Oen Kandang Sapi Hospital Inpatient. *Indonesian Journal of Global Health Research*, *5*(4), 911-918. https://doi.org/10.37287/ijghr.v5i4.2526.

INTRODUCTION

Urinary ract Infection is one of the most common infections in the world, with 8.3 million cases. In 2019, UTI cases in the world reached 404.61 million cases in 2019 and 236,790 deaths (Yashir & Apriani, 2019) . UTI in Indonesia reaches 90 – 100 cases per 100,000 population per year or around 180,000 cases per year (Srigede et al, 2019) . At DR Oen Kandang Sapi Hospital, UTI is included in the 5 most frequently occurring infections. Common bacterial infections including UTIs, sepsis, sexually transmitted infections, and some forms of diarrhea are experiencing increasing resistance to some antibiotics. This results in the exhaustion of effective antibiotics. For example, UTIs are mostly caused by E. Coli bacteria, while antibiotic resistance for E. Coli has increased from 8.4% to 92.9%, and for Klebsiella Pneumoniae bacteria , antibiotic resistance 2 has increased from 4.2% to 79.4 % (WHO, 2021).

Irrational use of drugs can cause unexpected things, namely a decrease in the quality of therapy which can increase morbidity and mortality rates, increase treatment costs, arise the risk of unexpected effects, resulting in unexpected reactions. Irrational use of drugs will also

cause bacterial resistance and psychosocial impacts and result in the effect of dependence on patients on drugs that are not needed (Widya Kardela et al., 2014) . Based on this description, due to the increasing prevalence of the disease and the lack of accuracy in the use of UTI antibiotics as well as the negative impacts that arise, this is the background for the author to conduct research on the appropriate use of antibiotics for UTI in inpatients at Dr Oen Kandang Sapi Hospital.This study aims to determine the pattern of antibiotic use and the rationality of antibiotic use using the Gyssens method in inpatient UTI patients at Dr Oen Kandang Sapi Hospital for the 2021 period, so that later it can be used as a basis for evaluation regarding the antibiotic therapy that will be given to patients.

METHOD

The research carried out was non-experimental research carried out by collecting data retrospectively and analyzing it descriptively quantitatively. Research on the appropriate use of antibiotics was taken from the medical records of UTI patients in the Dr Oen Kandang Sapi Hospital in 2021. The research was conducted in the inpatient medical records section of the Dr Oen Kandang Sapi Hospital in December 2022. The tool used in the research was the results of grouping. based on the Gyssens flowchart as a reference for antibiotic assessment in accordance with the UTI Clinical Practice Guide at Dr Oen Kandang Sapi Hospital, data collection form for recording patient medical record data.

The population in this study were all patients diagnosed with UTI at Dr Oen Kandang Sapi Hospital in 2021, totaling 226 patients. Sampling was carried out using purposive sampling with inclusion criteria, namely patients without age restrictions, patients with or without comorbidities other than infections and other diseases that require antibiotic therapy, patients who received antibiotic treatment either alone or in combination, patients with complete medical record data. Exclusion criteria were patients who were discharged from the hospital at their own request and patients who died. There were 82 patients who met the criteria to be used as research samples.

RESULTS

Accuracy is Based on Antibiotic Use

Table 1.
Usage antibiotics single & combination (n=82)

Use Antibiotics	f	%
Single	72	87.80
Combination		12.20
a. Ceftazidime–As. Pipemidate	3	
b. Ceftriaxone-Levofloxacin	1	
c. Ciprofloxacin-As. Pipemidate	1	
d. Ceftriaxone-Ciprofloxacin	1	
e. Levofloxacin Metronidazole	1	
f. Ceftriaxone-As. Pipemidate	1	
g. Ceftriaxone-Metronidazole	1	
h. Ceftriaxone-Meropenem	1	

In table 1, single antibiotics were used more frequently in 72 prescriptions (87.80%). This is due to its pharmacological effect which has a high cure rate, but single dose therapy is associated with a high recurrence rate within 6 weeks after initial treatment. This results from the failure of a single dose of treatment to eradicate gram-negative pathogens from the perianal area. The advantages of using a single dose of antibiotics are increased compliance and a lower incidence of side effects (Martensson & Spigset, 1999) . The use of combination antibiotic therapy in the study was 10 prescriptions (12.20%). Combination antibiotics are preferred because of their

tolerability, spectrum of activity against suspected uropathogens, and favorable pharmacokinetic profile. (Martensson & Spigset, 1999).

In table 2, the most widely used antibiotic based on antibiotic type is ceftriaxone with 43 prescriptions (46.24%). Ceftriaxone has an appropriate spectrum of activity, a favorable safety and tolerability profile, and is the recommended empiric treatment for inpatient UTI. (Elajouz et al., 2022) . The use of levofloxacin antibiotic therapy was 12 prescriptions (12.90%), levofloxacin and ciprofloxacin are empiric therapies used as UTI antibiotics which have the same clinical success rate at the end of therapy or post-therapy, microbial eradication rate or side effect rates and there are no significant differences between them. these 2 drugs (Cao et al., 2021)

Table 2.
Use of Antibiotics by Group (n=93)

Group	f	%
Cephalosporins	63	67.74
Penicillin	3	3.22
Quinolones	21	22.58
Carbapenems	4	4.30
Nitroimidazole	2	2.44

Rationality of Antibiotics Using the Gyssens Method

Antibiotics are said to be rational if they can pass all categories in the Gyssens method flow diagram . The appropriateness of antibiotic use in UTI patients based on the Gyssens method at DR Oen Kandang Sapi Hospital was 45 rational prescriptions (54.88%) and 40 irrational prescriptions (45.12%). In the research conducted, there were 9 irrational categories, namely the category of having other alternative antibiotics (IVA), cheaper antibiotic prices (IVC), giving antibiotics too long (IIIA), giving antibiotics too short (IIIB), dose accuracy (IIA), and the accuracy of antibiotic administration intervals (IIB).

Table 3.
Rationality of antibiotics based on the Gyssens method (n=93)

Rationality of Antibiotics	Number of Antibiotic Prescriptions	%
Rational	45	54.88
Irrational		
a. IVC Category	8	9.76
b. Category IIIA	1	1.22
c. Category IIIB	3	3.66
d. Category IVA	2	2.44
e. Category IVC, IIIB	5	6.10
f. Category IVA, IVC	7	8.54
g. Category IVA, IVC, IIIB	9	10.98
h. Category IIA, IIB	1	1.22
i. Category IVA, IVC, IIB	1	1.22

DISCUSSION

In the research conducted, there were 9 irrational categories, namely the category of having other alternative antibiotics (IVA), cheaper antibiotic prices (IVC), giving antibiotics too long (IIIA), giving antibiotics too short (IIIB), dose accuracy (IIA), and the accuracy of antibiotic administration intervals (IIB). In the research conducted, there were 2 irrational prescriptions in the IVA category. The irrationality of antibiotics in category IVA occurs because there are other alternative antibiotics that can be used by patients. Even though meropenem has high success in

treating UTIs, meropenem should only be given to patients with previous cultures indicating the presence of multi-drug resistance organisms (IAUI, 2021). The two patients who received meropenem had no history of comorbidities and no allergies to antibiotics, and there were no bacterial culture results indicating the presence of multi-drug resistant organisms. Meropenem can be replaced by another alternative antibiotic included in the UTI PPK at Dr Oen Kandang Sapi Hospital, namely nitrofurantoin can be recommended. Nitrofurantoin is the first line therapy for women with UTIs but should not be given in cases of G6PD deficiency and in late pregnancy (IAUI, 2020). Nitrofurantoin can be given at a dose of 50-100 mg 4 times a day for 5 days (IAUI, 2020) . Other alternatives that can be given if desired are in the same group as carbapenems according to the UTI PPK at Dr Oen Kandang Sapi Hospital, namely the antibiotics imipenem and cilastatin which are in the same group as meropenem. The dose given for the combination of imipenem and cilastatin is 250-500 mg 3-4 times a day. The combination of imipenem and cilastatin protects imipenem from being split so that the formation of toxic metabolites does not occur. This makes the drug active for the treatment of UTI (Febrianto & Mukaddas, 2013).

In the research conducted, there were 8 irrational prescriptions in the IVC category. The irrationality of antibiotics in the IVC category occurs because there are other antibiotics that are cheaper than the antibiotics received by the patient. Cheaper replacement of antibiotics is seen by comparing the price of antibiotics with other antibiotics in the same group to minimize the budget spent when undergoing hospitalization. There were 5 patients who received single levofloxacin therapy and 1 patient received the antibiotic pipemidic acid for UTI antibiotic therapy. In 5 patients who received the antibiotic levofloxacin alone and 1 patient who received the antibiotic pipemidic acid, none of them had contraindications to the antibiotic levofloxacin and pipemidic acid or to the quinolone group. So, a cheaper alternative to antibiotics than levofloxacin and pipemidic acid is another class of quinolones, namely ciprofloxacin.

According to research, there is no significant difference between the 2 drugs in the clinical success rate at the end of therapy or post-therapy, the rate of microbial eradication or the rate of side effects (Cao et al., 2021). There were 2 patients who received antibiotic combination therapy, namely ceftazidime and pipemidic acid . The 2 patients had no contraindications to the cephalosporin and quinolone antibiotics and did not have comorbidities. So, a cheaper alternative antibiotic than ceftazidime and pipemidic acid that is recommended is a combination of antibiotics between ceftriaxone and ciprofloxacin. The combination of antibiotics from the cephalosporin group, namely ceftriaxone, and the quinolone group, namely ciprofloxacin, will produce a synergistic effect for UTI therapy (Sari & Muhartono, 2018).

In the research conducted, there was 1 irrational prescription in category IIIA. The irrationality of antibiotics in category IIIA occurs due to prolonged use of antibiotics. The patient received amoxicillin + AS antibiotics. Clavulanate as a UTI therapy. Administration of antibiotics amoxicillin + as. Clavulanate is used according to the literature, but when administering the antibiotic amoxicillin + as. Clavulanate in patients has an antibiotic administration period that is too long. According to the UTI PPK at Dr Oen Kandang Sapi Hospital, the use of the antibiotic amoxicillin + as. Clavulanate is only given for 7 days. In the prescription for antibiotics, the dose is appropriate, namely 500 mg twice a day, but used for up to 10 days. Use of antibiotics amoxicillin + as. Prolonged use of clavulanate can cause side effects such as mild gastrointestinal symptoms, and the most common complaints are diarrhea, nausea, vomiting and stomach discomfort. Giving antibiotics for too long also risks causing antibiotic resistance.

In the research conducted, there were 3 irrational prescriptions in category IIIB. The irrationality of antibiotics in category IIIB occurs due to the use of antibiotics that are too short. The aim of treatment using antibiotics is in accordance with the predetermined duration of use, namely to kill or inhibit the growth of disease-causing bacteria. The use of ceftriaxone as a UTI therapy is 5-14 days and the use of pipemidic acid as a UTI therapy is 7 days in accordance with the UTI PPK at Dr Oen Kandang Hospital Cow. The combination of metronidazole and levofloxacin for UTI is used for 7 – 14 days. However, the antibiotics ceftriaxone and pipemidic acid were only used for 4 days, and the combination of metronidazole and levofloxacin for only 5 days. Giving antibiotics that are too short is also caused by the patient's condition starting to improve and the leukocyte value has decreased, but the result of using antibiotics that are too short will also cause bacteria to experience a high increase in resistance to several antibiotics so that the choice of effective antibiotics will run out.

In the research conducted, there were 7 irrational prescriptions in the IVA and IVC categories. There were 2 patients who received the antibiotic cefotaxime as UTI therapy. Cefotaxime is an empirical antibiotic therapy for UTI, however cefotaxime can be recommended to be replaced with another antibiotic that is more effective and in the literature it is recommended to use ceftriaxone because ceftriaxone can reduce leukocytes more effectively than cefotaxime. Irrationality in the IVA and IVC categories occurred in 3 patients who received the antibiotic ceftazidime, and 2 patients who received cefoperazone sulbactam. None of the 4 patients experienced hypersensitivity or contraindications to cephalosporin antibiotics. Thus, it can be recommended to change antibiotics to ceftriaxone because ceftriaxone has an appropriate spectrum of activity, a favorable safety and tolerability profile, and is currently the recommended empiric treatment for inpatient UTI (Elajouz et al., 2022). The use of ceftriaxone in patients can be given according to the literature, namely 2 grams per day. Apart from that, ceftriaxone is an alternative antibiotic which is included in the UTI PPK at Dr Oen Kandang Sapi Hospital and is a cephalosporin class antibiotic which has a cheaper price than other cephalosporin class antibiotics.

In the research conducted, there were 5 antibiotics that were irrational in categories IVC and IIIB. There were 4 patients who received the single antibiotic levofloxacin. To reduce the costs incurred during hospitalization, the use of the single antibiotic levofloxacin can be replaced with an antibiotic from the quinolone group, namely ciprofloxacin. Things to consider in changing therapy are that none of the four patients had contraindications to the antibiotic levofloxacin or the quinolone class and the success of therapy between levofloxacin and ciprofloxacin did not have a significant difference (Cao et al., 2021). So ciprofloxacin can be a cheaper alternative to antibiotics than levofloxacin. The duration of administration of the antibiotic levofloxacin can be given for 7 days to achieve a therapeutic effect and kill or inhibit the growth of bacteria and avoid giving it too short which can cause resistance to the antibiotic. There was 1 patient who received the antibiotics ceftazidime and pipemidic acid which were used as UTI therapy. A cheaper alternative antibiotic than ceftazidime and pipemidic acid that can be used is a combination of ceftriaxone and ciprofloxacin which is a combination of the quinolone and cephalosporin groups. This combination will produce a synergistic effect with a duration of use in cases of infection, namely 7 – 14 days. Using a combination of ceftazidime and pipemidic acid for too short a period of 3 days can cause antibiotic resistance so that there are fewer effective antibiotic alternatives.

In the research conducted there were 9 antibiotics that were irrational in the IVA, IVC and IIIB categories. The antibiotics obtained are cephalosporins. The cephalosporin group is widely used for antibiotic therapy in UTIs. The patient does not have hypersensitivity to the cephalosporin

class so that he can be replaced with an alternative antibiotic from another cephalosporin class which is included in the UTI PPK at Dr Oen Kandang Sapi Hospital, namely the antibiotic ceftriaxone. In terms of price, ceftriaxone is cheaper than other cephalosporin antibiotics. The period of empirical antibiotic therapy is 48 – 72 hours. Next, an evaluation must be carried out based on microbiological data, the patient's clinical condition and other supporting data (Saraswati et al, 2018). The antibiotics in table 19 have been given for a long time, but the minimum use of antibiotics in UTI patients is 7 days. The antibiotics studied have not reached the minimum use of antibiotic therapy for UTI, so there is a risk of antibiotic resistance, so the choice of effective antibiotics is less (Triono & Purwoko, 2019).

In the research conducted, there was 1 irrational antibiotic in categories IIIB, IIA and IIB. The patient received the antibiotic cefixime, with a history of DM, and did not have hypersensitivity to cephalosporin antibiotics. The choice of the antibiotic cefixime for UTI therapy is in accordance with the UTI PPK at Dr Oen Kandang Sapi Hospital, however for oral use of cefixime for UTI therapy it must be used at a dose of 400mg once a day for 3 days. Even though the administration of oral cefixime antibiotics is in accordance with PPK, namely for 3 days, antibiotic therapy is not in accordance with the dose used and the interval of antibiotic use will cause antibiotic resistance and result in recurrent infections because the bacteria that cause UTI are not completely killed as in antibiotics given to patients for only 2 x 100mg a day so that UTI antibiotic therapy with cefixime is not optimal in its use.

CONCLUSION

The rationality of using antibiotics using the Gyssens method in inpatient urinary tract infection patients at Dr Oen Kandang Sapi Hospital for the 2021 period was 45 rational prescriptions (54.88%) and 37 irrational prescriptions (45.12%).

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