



Evaluation of Antibiotic Use in the Internal Medicine Ward and ICU at Universitas Tanjungpura Hospital Pontianak with ATC/DDD

Dzuria Adhana Rifdah¹, Hariyanto IH¹, Delima Fajar Liana^{2,3*}, Mardhia Mardhia², Mahyarudin Mahyarudin²

1. Pharmacy Study Program, Faculty of Medicine, Universitas Tanjungpura, Pontianak, West Kalimantan, Indonesia
2. Department of Microbiology, Faculty of Medicine, Universitas Tanjungpura, Pontianak, West Kalimantan, Indonesia
3. Universitas Tanjungpura Hospital, Pontianak, West Kalimantan, Indonesia

ARTICLE INFO

Submitted : 22-12-2023

Revised : 21-05-2024

Accepted : 06-09-2024

Published : 31-12-2024

Corresponding Author:

Delima Fajar Liana

Corresponding Author Email:

delimafajar@medical.untan.ac.id

ABSTRACT

Background: Evaluating the wise use of antibiotics is needed to control antibiotic resistance in hospitals.

Objectives: This study aimed to analyze patient characteristics, antibiotic profiles, and quantitative use of antibiotics in inpatients prescribed by internal medicine specialists in the internal medicine ward and Intensive Care Unit (ICU) at Universitas Tanjungpura Hospital Pontianak from August to October 2022.

Methods: This study method is descriptive observational, and data collection was done retrospectively using a purposive sampling technique. There were 143 samples that met the inclusion criteria, and then using the Anatomical Therapeutic Chemical (ATC)/Defined Daily Dose (DDD) method, the samples were analyzed quantitatively.

Results: Most patient characteristics were female patients (60.14%), patients aged 56-65 (26.57%), and the most common diagnosis was typhoid fever (32.74%). Of the 13 types of antibiotics used, cephalosporin was the most commonly prescribed antibiotic group to patients (58.48%), with the most types of antibiotics in ceftriaxone (42.69%) and intravenous administration of antibiotics was the standard route given to patients. The results of the quantitative analysis of all antibiotic prescriptions obtained a total value of 88.55 DDD/100 patient-days. Antibiotics with the most considerable DDD/100 patient-days value were ceftriaxone (44.71), followed by meropenem (10.46) and levofloxacin (9.28). Furthermore, the value of DDD/100 patient-days is not an indicator in determining the rational use of antibiotics, so further study must be done using the Gyssens method.

Conclusion: The value of DDD/100 patient-days is not an indicator in determining the rational use of antibiotics, so further study must be done using the Gyssens method as qualitative evaluation to obtain information regarding the rationality of prescribing antibiotics.

Keywords: Anatomical Therapeutic Chemical; Ceftriaxone; Cephalosporin; Defined Daily Dose; RS UNTAN

INTRODUCTION

Resistance is the absence of inhibition of bacterial growth by systemic administration of antibiotics at appropriate therapeutic doses. Antibiotic resistance can be caused by irrational use of antibiotics.¹Data from the Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report 2021 shows an increase in the number of countries reporting Antimicrobial Resistance (AMR) data from 22 countries in 2017 to 70 countries in 2020.² Antimicrobial Resistant in Indonesia (AMRIN) data states that 700,000 people died from Antimicrobial

Resistance in 2018. Estimates suggest that by 2050, as many as 10 million people each year will die from Antimicrobial Resistance.¹

Bacterial resistance leads to high rates of death, pain, and hospitalization, threatening a return to the pre-antibiotic era. If this trend continues without intervention, antibiotics that are useful as a treatment for various bacterial infections may become unavailable.¹ Hospital efforts are needed to control the incidence of antibiotic resistance, such as wise use and evaluation of the antibiotics used.³ Evaluation of antibiotic use is one of the hospital quality indicators from the PPRA (Antimicrobial Resistance Control Program) team, which aims to inform the pattern of antibiotic use quantitatively and qualitatively.⁴ Quantitatively evaluated antibiotic use can be calculated using the Anatomical Therapeutic Chemical (ATC)/Defined Daily Dose (DDD) method, which is a specific and standardized assessment method by the World Health Organization (WHO).⁵ Anatomical Therapeutic Chemical (ATC) classifies drugs based on pharmacological classification, chemical compounds, and therapeutic functions, then interprets them into Defined Daily Dose (DDD) units, the average daily dose of antibiotics for adults with specific indications.⁶ The evaluation of antibiotic use using the ATC/DDD method was developed as a drug utilization study tool to facilitate the review and evaluation of prescribing, dispensing, and use of medicines so that it is hoped that improvements in antibiotic use and a decrease in the incidence of infections caused by multiresistant bacteria can be obtained in the hospital.^{4,7}

Based on the results of the preliminary study, which was conducted directly at Universitas Tanjungpura Hospital, showed that the internal medicine ward and ICU were recommendations for evaluating antibiotic use due to the high occurrence of infectious diseases and antibiotic use in these rooms compared to other rooms in the hospital. Amrin's research at Dr. Soetomo Hospital and Dr. Kariadi Hospital showed high antibiotic use in the internal medicine department, reaching 67%.⁸ Patients admitted to Internal Medicine wards are usually elderly, affected by chronic poly pathology, undergoing poly pharmacotherapy, often showing cognitive and functional impairment, and staying in long-term facilities, so they are at high risk of infection.⁹ In addition, it is also known that WHO and other studies show that the highest prevalence of nosocomial infections occurs in the ICU, which is more than 30%.¹⁰ ICU has a higher potential for infection due to the use of invasive devices, frequent contact between hospital staff and patients, high intensity of antibiotic use, and excessive use of empirical antibiotics. This occurs because patients admitted to the ICU generally suffer from severe illness and are immunocompromised.¹¹

A study on the quantity of antibiotic use has been conducted by Dirga et al., in the internal medicine ward at Dr. H. Abdul Moeloek Lampung Province Hospital, showing that ceftriaxone is the most commonly prescribed antibiotic with a DDD/100 patient-days value reaching 62.31.¹² In addition, a study by Woro et al., in the ICU at West Nusa Tenggara Province Hospital also showed that ceftriaxone was the most common antibiotic given to patients and had a DDD/100 patient-days value of 60.71.¹³ However, few studies have focused on this field in Pontianak. To our knowledge, only two studies related to the quantitative evaluation of antibiotic use have been published, including a study by Inez et al., that evaluated the antibiotic rationality for pediatric inpatients at Universitas Tanjungpura Hospital and a study by Putri et al., determined the antibiotic use in the ICU patients at Dr. Soedarso Pontianak Hospital. Both studies showed that ceftriaxone was the antibiotic with the highest DDD/100 patient-days value, reaching 27.18 and 76.15.^{14,15} Based on this, the researcher is interested in analyzing the quantity of antibiotic use prescribed by internal medicine specialists to patients at Universitas Tanjungpura Hospital Pontianak, especially in the scope of the internal medicine ward and ICU using the ATC/DDD method because this is the first study in the evaluation of antibiotic use has conducted in these two wards of our hospital, especially in Pontianak.

METHODS

Study design

This study design is descriptive observational with a quantitative approach. It was conducted in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak from April to May 2023.

Population and samples

The population of this study is all patients who were hospitalized and received antibiotic treatment in the period August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak. The sample for this study was patients who met the predetermined inclusion and exclusion criteria. In this study, the inclusion criteria were patients who were in the internal medicine inpatient ward and ICU of Universitas Tanjungpura Hospital who received antibiotic treatment by an internal medicine specialist in the

period August - October 2022, while patients with incomplete or inaccessible medical record data, included as exclusion criteria.

Study instruments

The sample calculation used in this study was the Slovin formula. This formula is considered to be used if the population size is known. In this study, the Slovin formula uses a sampling error component of 5%, and we obtained the minimum number of samples required, which was 124 patients. Based on the results of data collection, 143 samples that met the inclusion criteria were accepted. Furthermore, the samples were then used to evaluate the use of antibiotics quantitatively.

Data collection

Data were collected retrospectively using the purposive sampling technique. They were first compiled into primary data and processed using Microsoft Excel software.

Data Analysis

The data was then analyzed based on patient characteristics, antibiotic profiles, and quantity of antibiotic use. Descriptive analysis was performed on patient characteristics in the form of data on gender, age, and disease diagnosis, which will be calculated by percentage. The analysis results were continued by determining the profile of antibiotic use in the form of data on the number of classes, types, and routes of administration of drugs classified based on ATC. The quantitative value of antibiotic use was then calculated using the DDD unit. On the official WHO website (<http://www.whocc.no/atc-ddd-in-dex/>), the ATC code is obtained along with the standard DDD value of each type of antibiotic.¹⁶ Antibiotics that have been classified based on the ATC code can then be calculated using the DDD/100 patient-days formula as follows⁴ :

$$\text{DDD/100 patient-days} = \frac{\text{The number of grams of antibiotics used by the patient}}{\text{WHO DDD standard in grams}} \times \frac{100}{\text{Total LOS}}$$

Description: The number of grams of antibiotics used by the patient = the use of antibiotics in grams, multiplied by the daily dose with the frequency of use and duration of antibiotic administration; WHO DDD standard in grams = DDD value for each antibiotic determined by WHO in grams; Total Length of Stay (LOS) = the total length of time of all hospitalized patients.

RESULTS AND DISCUSSION

Overview of Study Results

Number of Hospitalized Patients

The number of patients in the internal medicine ward and ICU of Universitas Tanjungpura Hospital for August - October 2022 was 314 (Table I).

Antibiotics prescribed to inpatients by internal medicine specialists in August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital reached 45.54%, namely 143 patients, 134 from the internal medicine ward and nine from the ICU. The results showed that in August - October 2022, the number of patients in the internal medicine ward and ICU of Universitas Tanjungpura Hospital who were prescribed antibiotics by doctors was more than those who were not named antibiotics. High antibiotic prescribing, if given irrationally, can lead to a significant increase in bacterial resistance, pain, and death.¹² A total of 143 patients who received antibiotics from internal medicine specialists will be sampled in this study.

Patient Characteristics

The characteristics of patients in this study are based on the division of gender, age, and disease diagnosis (Table II).

Patient characteristics of gender are divided into two groups: women and men. Most patients who received antibiotic therapy from internal medicine specialists in the period August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital were female patients, reaching 60.14%, namely 86 female patients out of a total of 143 patients, while male patients amounted to 57 patients (39.86%). These results are not significantly different from similar previous studies, stating that patients who received more antibiotic prescriptions in internal medicine wards and ICU in several Indonesian hospitals were female patients with 50.77% - 60.58%.^{6,12,18,19} However, several other studies showed that male patients were the most likely to receive antibiotic prescriptions, reaching 50.65% - 58%.^{13,15,20} Based on this, the incidence of infections that occur in women and men has a chance of occurrence that is not much different. This statement may happen due to differences in the immune system, biology, and behavior showing different prevalence.²¹

Table I. Percentage of antibiotic prescriptions and without antibiotics in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak for the period August - October 2022

	Recipe	Number of Patients	Percentage (%)
Prescription with antibiotics	Prescribed by a doctor internal medicine specialist	143	45.54
	Prescribed by a doctor internal medicine non-specialist	36	11.47
Prescription without antibiotics		135	42.99
	Total	314	100.00

Table II. Characteristics of patients based on gender and age in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak for the period August - October 2022

Patient Characteristics	Number	Percentage (%)
Gender		
Female	86	60.14
Male	57	39.86
Total	143	100.00
Age Range¹⁷		
≤25 years	28	19.58
26 - 35 years	11	7.69
36 - 45 years	17	11.89
46 - 55 years	27	18.88
56 - 65 years	38	26.57
>65 years	22	15.39
Total	143	100.00
Infectious Disease Diagnosis		
Typhoid fever	37	32.74
Sepsis	19	16.81
Pneumonia	14	12.39
Gastroenteritis (GEA)	9	7.96
Abscess	6	5.31
Bilateral pneumonia	5	4.42
Cystitis	4	3.54
Acute pharyngitis	4	3.54
Others	11	9,73
Total	113	100.00

Patient characteristics based on age are divided into six groups, namely early and late adolescence (≤25 years), early adulthood (26-35 years), late adulthood (36-45 years), early elderly (46-55 years), late elderly (56-65 years), and elderly (>65 years).¹⁷ The age category that received the most antibiotic therapy from internal medicine specialists in the period August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital was patients aged 56-65 years who were included in the late elderly group, reaching 26.57% or 38 patients out of a total of 143 patients. The results of this study are not significantly different from the study of Dirga et al., in which patients in the internal medicine ward of Lampung Provincial Hospital who received more antibiotic prescriptions were late elderly patients aged 56-65 years, reaching 25.60%.¹² However, the results of this study also have differences from several other studies in that most patients who received antibiotic prescriptions were early and late elderly patients with an age range of 46-65 years, as much as 47%, and in the elderly age group (>65 years) as much as 40%.^{19,20} The high proportion of elderly patients can be caused by being more susceptible to infection due to decreased immune and physiological functions, less than optimal nutrition, having more than one comorbidity, and less supportive social environmental factors.¹⁹ However, most patients who are over 65 years old cannot go to the hospital alone for treatment and have complications that cause high mortality rates. It can be the cause of the small number of patients of this age compared to elderly patients aged 46-65.^{12,22}

The last patient characteristics are based on disease diagnosis. Diagnosis of the disease was taken from the discharge diagnosis data of patients who received antibiotics from internal medicine specialists from August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital. The data were grouped into 20 groups based on the diagnosis of diseases suffered by patients with infectious causes. There were three groups of infectious disease diagnoses most commonly suffered by patients who received antibiotics in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak, including typhoid fever (32.74%), sepsis (16.81%), and pneumonia (12.39%). In addition, 12 other groups of infectious disease diagnoses had a percentage of less than 2%, namely septic shock (1.77%), dysentery (1.77%), cellulitis pedis (1.77%), bronchopneumonia (0.88%), osteomyelitis (0.88%), stomatitis (0.88%), pulmonary tuberculosis (0.88%), peritoneal tuberculosis (0.88%), peritonitis (0.88%), acute otitis media (0.88%), sinusitis (0.88%), and chronic diarrhea (0.88%). The most common infectious disease diagnosis experienced by patients was typhoid fever, which amounted to 32.74%. In addition to typhoid fever, two other infectious disease diagnoses had a significant incidence rate, including sepsis (16.81%) and pneumonia (12.39%). The results of this study indicate no significant difference from the study of Dirga et al., that in the internal medicine ward at the Lampung Provincial Hospital, the diagnosis of typhoid fever, sepsis, and pneumonia was included in the seven most common disease diagnoses suffered by patients, with percentages of 23.2%; 19.0%; and 6.5%.¹²

The diagnosis of diseases suffered by patients in the internal medicine ward and ICU of Universitas Tanjungpura Hospital (Table IIb) is a type of infectious disease generally caused by bacterial infections requiring antibiotic therapy.²³ Antibiotics are the most widely used drugs globally related to many bacterial infectious diseases.²⁴ Antibiotics selected must consider several things, such as patient-specific factors (age, organ function, site of infection, and degree of sepsis), causative organism factors (germ map/antibiotic pattern, pharmacokinetics and pharmacodynamics, tolerability and safety profile, penetration into tissues and principles, costs and benefits).²⁶ The selection and use of appropriate and rational antibiotic therapy will determine the therapy's success and avoid bacterial resistance.^{27,28} Antibiotic rationality criteria are assessed based on the accuracy of indications in the selection of antibiotics, including effectiveness, toxicity, price, spectrum, dose, duration of administration, interval, route, and time of administration.⁴

Antibiotic Use Profile Based on ATC Classification

Patient antibiotic data collected is then classified based on Anatomical Therapeutic Chemical (ATC) to facilitate the identification of antibiotics used so that the DDD value of antibiotics can be calculated.

Eight groups of antibiotics with 13 types that internal medicine specialists prescribed to patients in the internal medicine ward and ICU of Universitas Tanjungpura Hospital from August to October 2022 (Table III). The most commonly prescribed antibiotics by doctors, namely the cephalosporin group (58.48%) with the type of antibiotic ceftriaxone, reached 42.69%. The second most common antibiotic was beta-lactam carbapenems (12.87%) with meropenem (12.87%). The third most common antibiotic was fluoroquinolone (10.52%) with levofloxacin (8.77%). The results obtained are directly proportional to several studies that the cephalosporin group is among the most commonly used antibiotic groups with a percentage range reaching 51.41% to 79.25%, and the most common type of antibiotic given to patients, namely ceftriaxone which comes to 25.86% - 52.59%.^{6,12,20} This is due to the broad spectrum of cephalosporin antibiotics as empirical treatment and ceftriaxone as a third-generation cephalosporin can be more effectively used than the second-generation in inhibiting the process of bacterial growth, especially in gram-negative bacteria.²⁰

The most commonly used route for administering antibiotics to patients in the period August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital is intravenous because, in general, the treatment of moderate to severe infections uses the intravenous route, with the resulting onset faster and the amount of bioavailability is higher. This route will result in the maximum effectiveness of antibiotics that suppress or kill bacteria that cause infection.^{6,20} Identifying the route of antibiotic administration is an essential stage because the determination of the standard value of DDD by WHO for each antibiotic can vary, readjusted to the route of administration. This identification will significantly determine whether the antibiotic has a high or low DDD value.³⁰

Quantity of Antibiotic Use in Units DDD/100 patient-days

Data on antibiotics used by patients included the name of the antibiotic, the dose of antibiotics given, the frequency of use, the duration of administration, and the route of antibiotics used for therapy, then used to calculate the quantitative value of antibiotic use with the calculation method established by WHO, namely the

Table III. Classification of antibiotics using the ATC classification in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak for the period August - October 2022

Class of Antibiotics	Antibiotic Name	ATC Code	Route	Number of Uses	Percentage (%)	Cumulative Percentage (%)
Cephalosporins	Cefotaxime	J01DD01	iv	2	1.17	58.48
	Ceftriaxone	J01DD04	iv	73	42.69	
	Cefixime	J01DD08	po	2	1.17	
	Cefoperazone	J01DD12	iv	23	13.45	
Nitroimidazoles	Metronidazole	J01XD01	iv	8	4.68	4.68
Fluoroquinolones	Ciprofloxacin	J01MA02	iv	3	1.75	10.52
	Levofloxacin	J01MA12	iv	15	8.77	
Carbapenems beta-lactams	Meropenem	J01DH02	iv	22	12.87	12.87
Macrolides	Azithromycin	J01FA10	iv	8	4.68	4.68
Combined penicillins beta-lactams	Ampicillin- sulbactam	J01CR01	iv	1	0.58	8.18
	Amoxicillin and beta-lactamase inhibitors	J01CR02	iv	13	7.60	
Lincosamide	Clindamycin	J01FF01	iv	1	0.58	0.58
Sulfonamides	Sulfamethoxazole and trimethoprim	J01EE01	po	1	0.58	0.58
Total				172	100.00	100.00

Description: ATC Code^{16,29}; iv = intravena; po = per oral

Defined Daily Dose (DDD).⁶ This quantitative antibiotic use information can be used in providing predictions regarding rationality or irrationality in antibiotic use.^{12,31}

The total DDD value in this study reached 88.55 DDD/100 patient-days (Table IV). This result means that out of 100 patients, the total antibiotic consumption given to patients every day is 88.55. The study results were lower when compared to the results of Dirga et al., who had a total value of DDD/100 patient-days in the internal medicine ward of Lampung Provincial Hospital, reaching 118.57.¹² The results of the quantitative analysis showed that in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak for the period August - October 2022, ceftriaxone, meropenem, and levofloxacin antibiotics became the three types of antibiotics with the most dominant use, respectively having a DDD/100 patient-days value of 44.71; 10.46; and 9.28. These results show that ceftriaxone antibiotics have the highest DDD/100 patient-days value, reaching 44.71, which shows that the total ceftriaxone antibiotics daily amounted to 44.71 per 100 patients. In other words, 44.71% of patients admitted to the internal medicine inpatient ward and ICU of Universitas Tanjungpura Hospital in August - October 2022 received ceftriaxone antibiotic prescriptions daily from internal medicine specialists. The results obtained are not significantly different from several previous studies, which state that in several Indonesian hospitals, especially in the scope of internal medicine wards and in the ICU, ceftriaxone is an antibiotic that has the highest DDD/100 patient-days value ranging from 27.79 to 76.15.^{6,12,15,19,20}

Ceftriaxone is a third-generation antibiotic of the cephalosporin class intended for empirical treatment because it has broader activity than the second generation.¹² This antibiotic can kill bacteria by inhibiting bacterial cell wall synthesis.³² Ceftriaxone is a suitable alternative to fight *Salmonella typhi* bacterial infection that causes typhoid fever, which is the most common disease diagnosis in patients who get antibiotics from internal medicine specialists in the period August - October 2022 in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak.³³ Ceftriaxone is often prescribed to patients because of its higher potency, broader spectrum of action, and low risk of toxicity. Other advantages of ceftriaxone antibiotics include an easy administration route, no restriction on breastfeeding time, and lower cost than other antibiotics.³⁴ Ceftriaxone is still highly active against many susceptible pathogens and is often recommended as a first-line treatment option in many infectious disease guidelines.³⁵

Table IV. Quantitative use of antibiotics based on DDD calculations in patients receiving antibiotics from internal medicine specialists in the internal medicine ward and ICU of Universitas Tanjungpura Hospital Pontianak for the period August - October 2022

Class of Antibiotics	Antibiotic Name	ATC Code	Route	Number of Doses (grams)	WHO DDD (grams)	DDD Value	Total LOS (days)	DDD/100 patient-days	
								Per Antibiotic Name	Per Antibiotic Class
Cephalosporins	Cefotaxime	J01DD01	iv	18	4	4.5		0.59	53.66
	Ceftriaxone	J01DD04	iv	684	2	342		44.71	
	Cefixime	J01DD08	po	6	0.4	15		1.96	
	Cefoperazone	J01DD12	iv	196	4	49		6.41	
Nitroimidazoles	Metronidazole	J01XD01	iv	43.5	1.5	29		3.79	3.79
	Ciprofloxacin	J01MA02	iv	7.2	0.8	9		1.18	10.46
Fluoroquinolones	Levofloxacin	J01MA12	iv	35.5	0.5	71		9.28	
	Meropenem	J01DH02	iv	240	3	80	765	10.46	10.46
Carbapenems									
beta-lactams									
Macrolides	Azithromycin	J01FA10	iv	7.75	0.5	15.5		2.03	2.03
Combined penicillins	Ampicillin-sulbactam	J01CR01	iv	30	6	5		0.65	7.37
	Amoxicillin and beta-lactamase inhibitors	J01CR02	iv	154.13	3	51.38		6.72	
beta-lactams									
Lincosamide	Clindamycin	J01FF01	iv	6.6	1.8	3.67		0.48	0.48
Sulfonamides	Sulfamethoxazole and trimethoprim	J01EE01	po	9.6	4	2.4		0.31	0.31
Total								88.55	88.55

Description: ATC Code and WHO standard DDD value^{16,29}; iv = intravena; po = per oral

Meropenem is a beta-lactam carbapenem antibiotic, and in this study, the DDD value reached 10.46 DDD/100 patient-days, the second largest value after ceftriaxone. Meropenem works by blocking the bacterial cell wall synthesis process, quickly penetrating the bacterial cell wall and forming high-affinity bonds to penicillin-binding proteins to inactivate bacteria.³⁶ Meropenem has a broad spectrum of action, so gram-positive or gram-negative bacteria can be combated.³⁷ In addition, in this study, levofloxacin is a fluoroquinolone class antibiotic with the third largest DDD/100 patient-days value of 9.28. Levofloxacin is an antibiotic with broad-spectrum activity so that gram-positive bacteria and gram-negative bacteria can be fought.³⁸ Fluoroquinolone antibiotics have a mechanism of action that blocks bacteria from synthesizing nucleic acids and proteins.³⁹ The use of levofloxacin as a treatment for upper and lower respiratory tract contaminations is considered efficient because it has high activity in attacking gram-positive bacteria and atypical bacteria that cause pneumonia.³⁸

Other antibiotics used at Universitas Tanjungpura Hospital Pontianak, especially in the internal medicine ward and ICU for the period August – October 2022, are cefotaxime, ceftriaxone, cefixime, cefoperazone, metronidazole, ciprofloxacin, levofloxacin, meropenem, azithromycin, ampicillin-sulbactam, amoxicillin, and beta-inhibitors lactamase, as well as sulfamethoxazole and trimethoprim. These antibiotics have a DDD value smaller than 7.00 DDD/100 patient-days, of which sulfamethoxazole and trimethoprim are the antibiotics with the lowest DDD value, 0.31 DDD/100 patient-days. The significant variation in antibiotic use can result in irrational use and the emergence of an increase in the incidence of antibiotic resistance. The types and DDD values obtained can vary in several studies on the quantitative use of antibiotics in hospitals. Various factors, including differences in characteristics and infection status of each patient, can cause this.¹⁸

The significant value of DDD/100 patient-days shows that the greater the number of antibiotics used quantitatively.^{12,19} The large quantity of antibiotic use can be used as an initial estimate of the possibility of antibiotic use approaching the principle of irrationality due to inappropriate administration or use of antibiotics.¹² However, the increase in antibiotic use does not necessarily indicate irrational use of antibiotics.³⁸ This study uses the ATC/DDD classification and calculation method recommended by the World Health Organization and the Ministry of Health in Indonesia to calculate the antibiotics used. The ATC/DDD method is specifically intended to present quantitative data on antibiotic use by patients, so the ATC/DDD method cannot be used to give qualitative data. Therefore, this is a limitation of this study. Thus, a qualitative evaluation of antibiotic use can be carried out further using the Gyssens method to obtain information regarding the rationality of prescribing antibiotics by internal medicine specialist doctors at Universitas Tanjungpura Hospital Pontianak.

CONCLUSION

The cephalosporin group is the most frequent class of antibiotic prescribed in the internal medicine ward and ICU at Universitas Tanjungpura Hospital, Pontianak, in the period August – October 2022, namely 58.48% and ceftriaxone being the most antibiotics was prescribed, 42.69%. The total value obtained for the quantity of antibiotic use reached 88.55 DDD/100 patient-days. The three antibiotics that had the most significant DDD/100 patient-days values were ceftriaxone (44.71), followed by meropenem (10.46), and levofloxacin (9.28). The most the DDD/100 patient-days value, showed the most quantity of antibiotics used. Furthermore, the value of DDD/100 patient-days is not an indicator in determining the rational use of antibiotics, so further study must be done using the Gyssens method.

ACKNOWLEDGEMENT

The author would like to express his gratitude to all the Faculty of Medicine at Universitas Tanjungpura, Pontianak, and the Director of Universitas Tanjungpura Hospital Pontianak, and his staff, who have helped a lot at the licensing stage in collecting data at the hospital so that researchers can complete this study well.

STATEMENT OF ETHIC

This study was approved by the Committee on Ethical Clearance Faculty of Medicine, Universitas Tanjungpura, with ethical clearance no. 7353/UN22.9/PG/2022, published on November 14, 2022.

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