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Evaluation of the rationality of using antibiotics in orthopedic surgery patients at the Cilacap Regional General Hospital using the Gyssens method

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ABSTRAK

A fracture is a condition of severing or damage to the cartilage, bone structure, or epiphysis, which is divided into open and closed fractures. Open fractures require antibiotic therapy to prevent infection, given the high risk of infection. Evaluation of the rationality of antibiotic use is very important to ensure effective therapy and prevent side effects, ineffective treatment, high costs, and antibiotic resistance. Antibiotic resistance can increase infections that are difficult to treat and increase morbidity and mortality. This study aims to evaluate the rationality of antibiotic use in orthopedic surgery patients at Cilacap Regional Hospital using the Gyssens method.

The study was observational and collected retrospective data from 55 patients who underwent orthopedic surgery for open fractures in 2023. The data used for analysis included patient identity, diagnosis, laboratory data, and antibiotic use. The results obtained were category 0 (appropriate and rational use of antibiotics) 37%, category II A (inappropriate dosage) 10%, category II B (inappropriate administration interval) 1%, category III B (administration of antibiotics too short) 9%, category IV A (presence of other more effective antibiotics) 1%, category IV C (presence of cheaper antibiotics) 39%, category VI (incomplete patient data) 4%.

The conclusion shows that there are still many antibiotic prescriptions that do not meet category 0, indicating the need for improvement in the rationality of antibiotic use at Cilacap Regional Hospital.

Keywords: Rationality, antibiotics, open fracture, Gyssens

Introduction

A fracture is a condition where there is a break or damage to the cartilage, bone structure, or epiphysis. Fractures are an important health problem in the world. The majority of fractures occur due to traffic accidents, sports injuries, falls, and acts of violence. In 2019, it is estimated that the number of fracture cases will reach around 178 million globally (

There are no sources in the current document.). Meanwhile, the prevalence of fractures in Indonesia reaches 5.8% (2). The number of fracture cases treated in the Orthopedics section of the Cilacap Regional General Hospital in 2023 will be 3,054 patients.

Fractures are divided into open and closed. An open fracture occurs when soft tissue is damaged and comes into contact with the external environment. Meanwhile, closed fractures have nothing to do with damaged tissue and the external environment. Fractures can be caused by trauma, repeated stress on the bone, or bone weakness (pathological fracture). Fractures caused by trauma usually occur suddenly. Fractures resulting from repetitive stress are often experienced by athletes, dancers, and military personnel. Pathological fractures are associated with metabolic conditions such as osteoporosis (2).

Objective

Research evaluating the rationality of antibiotic use in orthopedic surgery patients at Cilacap Regional Hospital was carried out on patients with open fracture cases. The goal of treating open fractures is to keep the fractured parts stable, reduce pain, prevent damage to soft tissue, reduce the risk of infection, and avoid the possibility of death. Open fractures have a very high risk of infection, so treatment requires antibiotic therapy (2).

Evaluation of antibiotic use is important to ensure the rationality of antibiotic use. Irrational use of antibiotics is a serious problem in society. Irrational use of antibiotics can cause side effects, less effective treatment, expensive treatment costs, and resistance to antibiotics. Antibiotic resistance can increase the rate of infections that are difficult to treat and cause high levels of morbidity and mortality (3).

Method

This study was observational and collected retrospective data from patients who had undergone orthopedic surgery. Data were analyzed using the Gyssens method, with the data used for analysis namely patient identity, diagnosis, laboratory data and antibiotic use.

Results and Discussion

Table 1. Classification of Patients Based on Age

Age	Percentage	Frequency (%)
Children (0-11 years)	3	5%
Teenagers (12-25 years)	8	15%
Adult (26-45 years)	13	24%
Elderly (46-65 years)	23	42%
Seniors (>65 years)	8	15%
Total	55	100%

Table 1 shows the classification of orthopedic surgery patients for open fracture cases at Cilacap Regional Hospital in 2023 based on age. It is known that the number of patients in the elderly age group is 23 patients with a percentage of 42%, adults are 13 patients with a percentage of 24%, elderly people are 8 patients with a percentage of 15%, teenagers are 8 patients with a percentage of 15%, and children are 3 patients. patients with a percentage of 5%.

Table 2 Classification of Patients Based on Gender

Gender	Frequency	Percentage (%)
Man	45	82%
Woman	10	18%
Total	55	100%

Table 2 shows the classification of orthopedic surgery patients for open fracture cases at Cilacap Regional Hospital in 2023 based on gender. It is known that the number of male patients is 45 patients with a percentage of 82%, while the number of female patients is 10 patients with a percentage of 18%.

Table 3 Use of Antibiotics

Antibiotics	Gyssens Category													Total	%
	0	I	IIA	IIB	IIC	IIIA	IIIB	IVA	IVB	IVC	IVD	V	VI		
Cefazolin	45	0	0	0	0	0	0	0	0	0	0	0	2	47	38%
Ceftizoxime	0	0	0	0	0	0	0	0	0	48	0	0	1	49	40%
Ceftriaxone	0	0	0	1	0	0	11	0	0	0	0	0	1	13	11%
Gentamicin	0	0	12	0	0	0	0	0	0	0	0	0	1	13	11%
Metronidazole	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1%
Total	45	0	12	1	0	0	11	1	0	48	0	0	5	123	100%
%	37%	0%	10%	1%	0%	0%	9%	1%	0%	39%	0%	0%	4%	100%	

Table 3 shows the results of an overall evaluation of the rationality of antibiotic use in orthopedic surgery patients with open fractures at Cilacap Regional Hospital in 2023 using the Gyssens method. The results of the analysis showed that 45 antibiotics (37%) were in category 0 (appropriate and rational use of antibiotics), 12 antibiotics (10%) were in category II A (inappropriate dose of antibiotics), 1 antibiotic (1%) was in II B (not appropriate interval for giving antibiotics), 11 antibiotics (9%) were in category III B (too short a course of antibiotics), 1 antibiotic (1%) was in category IV A (there are other antibiotics that are more effective), 48 antibiotics (39%) were in category IV C (availability of cheaper antibiotics), and 5 antibiotics (4%) were in category VI (incomplete patient data).

Category VI means patient data is incomplete. According to the Republic of Indonesia Minister of Health Regulation Number 24 of 2022 concerning Medical Records, medical records are documents that contain information about the patient's identity, examination results, treatment, procedures and other services provided to the patient (4). If the data is incomplete, such as not including age and weight, especially in pediatric patients, then the analysis cannot proceed to the next stage because this information is important for dose calculations. The results of the study were 5 antibiotics (4%) belonging to category VI. In previous research conducted at RSUP Dr. Kariadi found that the use of antibiotics in category VI was 1.3% (5).

Category V means there is no indication for giving antibiotics. In this study, open fracture cases were identified based on the diagnosis written by the doctor in the patient's medical record, supported by the patient's symptoms and laboratory results. The use of antibiotics is adjusted to the patient's diagnosis and symptoms. Evaluation of antibiotic use will be stopped and classified in category V if there are no supporting indications. The use of antibiotics belonging to category V was not found in this study. In previous research

conducted at RSUP Dr. Kariadi found that the use of antibiotics in category V was 42% (5). Meanwhile, at Kraton Regional Hospital, it was found that the use of antibiotics in category V was 14.4% (6).

Category IV A means there are other antibiotics that are more effective. This occurs because there are recommendations for other antibiotics in the guidelines that can provide more effective therapy. According to the Republic of Indonesia Minister of Health Regulation Number 28 of 2021 concerning Guidelines for the Use of Antibiotics and according to PPAB RSUD Cilacap, the prophylactic antibiotic recommended for open fracture cases is cefazolin, while the definitive antibiotic recommended for open fracture cases is gentamicin. The results of this study were 1 antibiotic (1%) belonging to category IV A. In previous research conducted at Kraton Regional Hospital, it was found that the use of antibiotics in category IV A was 81.1% (6). Meanwhile at Dr. Zainoel Abidin found that antibiotic use fell into category IV A at 2.9% (7).

Category IV B means the presence of other antibiotics that are minimally toxic. If it does not cause interactions with other drugs, side effects or unexpected allergic reactions, antibiotics are considered safe. One antibiotic that needs to be considered carefully is the aminoglycoside group, because its nature can cause nephrotoxic effects. Monitoring blood levels is very important, especially for patients with renal impairment, and dose adjustments may be necessary (Ministry of Health, 2011). The use of antibiotics belonging to category IV B was not found in this study. In previous research, no use of antibiotics was found in category IV B.

Table 4 Antibiotic Price List

Antibiotic Name	Price
Cefazolin	Rp8,625
Ceftizoxime	Rp83,250
Ceftriaxone	Rp5,400
Gentamicin	Rp2,701
Metronidazole	Rp12,006

Table 4 shows a list of antibiotic prices set by the Cilacap Regional Hospital. Category IV C means there are other antibiotics that are cheaper. Considerations in choosing antibiotics must take into account the cost of the drug. It is better to use antibiotics that are affordable or cheap. If prescribed antibiotics are too expensive, patients may not be able to afford them, which may result in failure of therapy (9). The results of this study were 48

antibiotics (39%) belonging to category IV C. In previous research conducted at Kraton Regional Hospital, it was found that the use of antibiotics in category IV C was 1.1% (6).

Category IV D means there are other antibiotics with a narrower spectrum. The choice of antibiotic must be adjusted to the type of bacteria that is infecting. Empiric therapy (broad spectrum antibiotics) is given to patients when it is not yet known what type of bacteria is causing the infection. Once the cause of the bacterial infection is identified, empiric therapy can be switched to definitive therapy with narrow-spectrum antibiotics (10). The use of antibiotics belonging to category IV D was not found in this study. In previous research conducted at RSUP Dr. Kariadi found that the use of antibiotics in category IV D was 8% (5).

Category III A means giving antibiotics for too long, while Category III B means giving antibiotics too short. An antibiotic course is considered too short if it is given for a shorter time than recommended in the guidelines. Conversely, prolonged antibiotic administration occurs when antibiotics are given for a longer period than recommended in guidelines. Empiric antibiotics are generally given for 72 hours or 3 days, while the duration of definitive antibiotics is determined based on clinical effectiveness in treating bacteria according to a confirmed diagnosis (9). The results of this panel were 11 antibiotics (9%) belonging to category III B. In previous research conducted at RSUP Dr. Kariadi found that antibiotic use fell into category III A at 3.3% (5). Meanwhile, research at Kraton Regional Hospital found that the use of antibiotics in category III A was 3.3% (6).

Category II A means that the antibiotic dose was not given correctly. If the antibiotic dose deviates from the recommended dose, it is considered that the antibiotic dose was used incorrectly. Too low a dose can make the antibiotic not work effectively because it does not reach the minimum levels required, while excessive doses can increase the risk of toxicity in patients (11). The results of this research were 12 antibiotics (10%) belonging to category II A. In previous research conducted by RSUD dr. Zainoel Abidin found that antibiotic use fell into category II A at 5.9% (7).

Category II B means that antibiotics are given at inappropriate intervals. Accurate frequency or interval of drug administration involves establishing a schedule that is in line with the drug's characteristics and pharmacokinetic profile, such as every 4, 6, 8, 12, or 24

hours (Ministry of Health, 2011). If the interval for antibiotic use is shorter or longer than recommended, antibiotic use is considered inappropriate. The results in this study were that 1 antibiotic (1%) was classified as category II B. In previous research, no use of antibiotics was found to be classified as category II B.

Category II C means that antibiotics are given in the wrong route. If antibiotics are given via a route that deviates from existing recommendations, then the administration is considered inappropriate. In cases of open fractures, the recommended antibiotic therapy is intravenous (11). The use of antibiotics belonging to category II C was not found in this study because all patients received intravenous antibiotic therapy. In previous research, no use of antibiotics classified as category II C was found.

Category I means that antibiotics are not given on time. The risk of resistance may increase and the effectiveness of treatment may decrease if antibiotics are not given on time. Therapy is considered inappropriate if it is not administered consistently every day, both at the recommended time and interval (Ministry of Health, 2011). The use of antibiotics belonging to category I was not found in this study. In previous research conducted at RSUP Dr. Kariadi found that antibiotic use fell into category I at 45.3% (5). Meanwhile, research at RSUD dr. Zainoel Abidin found that antibiotic use fell into category I at 14.7% (7).

Category 0 means appropriate and rational use of antibiotics. If it has passed category VI-I according to the Gyssens pathway, the use of antibiotics is considered rational. From this research, the results obtained were that as many as 45 antibiotics (37%) were classified as category 0. In previous research conducted at Kraton Regional Hospital, the use of antibiotics that reached category 0 was 10% (6). Meanwhile, research conducted at RSUD dr. Zainoel Abidin's use of antibiotics reached category 0 at 76.5% (7).

The use of antibiotics in accordance with rational standards will produce effective therapeutic results for patients. Besides that, the risk of bacterial resistance to antibiotics can be reduced by using antibiotics according to guidelines. This can prevent a decrease in the effectiveness of therapy, increased health costs and increased disease and death rates. This research is retrospective so researchers cannot interact directly with patients to determine their actual condition. Information about the patient's condition can only be

known from the medical record file. In addition, the patient's condition after they are discharged from hospitalization may not be clearly documented. In addition, the rationality of antibiotic use in outpatient therapy could not be analyzed in this study.

Conclusion

Based on research conducted on the rationality of antibiotic use in orthopedic surgery patients at Cilacap Regional Hospital in 2023 using the Gyssens method, it was concluded that there are still many antibiotic prescriptions that have not reached category 0 (appropriate and rational use of antibiotics). This shows that some of the use of antibiotics in orthopedic surgery patients with open fractures at Cilacap Regional Hospital in 2023 is still not rational.

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Bibliography

Wu AM, Bisignano C, James SL, Abady GG, Abedi A, Abu-Gharbieh E, et al. Global, regional, and national burden of bone fractures in 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019. Lancet Heal Longev. 2021;2(9):e580–92.

Kemenkes R. Keputusan Menteri Kesehatan Republik Indonesia Nomor Hk.01.07/Menkes/270/2019 Tentang Pedoman Nasional Pelayanan Kedokteran Penatalaksanaan Fraktur. 2019.

Aisyah & Nadjib. Aisyah, E., & Nadjib, M. (2017). Evaluasi Ekonomi Penggunaan Antibiotika Profilaksis Cefotaxime dan Ceftriaxone pada Pasien Operasi Seksio Sesarea di Rumah Sakit X, 3, 57–67. 2017;

Kemenkes R. Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 Tentang Rekam Medis. 2022.

Waridiarto D, Priambodo A, Lestari E. Kualitas Penggunaan Antibiotik Pada Kasus Bedah Orthopedi di Bangsal Bedah RSUP Dr. KARIADI. J Kedokt Diponegoro.

2015;4(4):618–25.

Muthoharoh A, iana ND, Rahmatullah S, Wirasti W. Evaluasi Kualitatif Penggunaan Antibiotika Profilaksis Di Instalasi Bedah Sentral Secara Retrospektif. Proceeding of The URECOL [Internet]. 2019;490–7. Available from: http://repository.urecol.org/index.php/proceeding/article/view/386

Erdani F, Novika R, X IFR. Evaluasi Penggunaan Antibiotik Profilaksis terhadap Kejadian Infeksi Luka Operasi pada Operasi Bersih dan Bersih Terkontaminasi di RSUD dr. Zainoel Abidin. J Med Sci. 2021;2(1):21–7.

Kementrian Kesehatan Republik Indonesia. Pedoman Pelayanan Kefarmasian Untuk Terapi Antibiotika Kementrian Kesehatan Republik Indonesia. 2011;

Kemenkes R. Pedoman Umum Penggunaan Antibiotik. 2013.

Pratiwi A. Hubungan Pengetahuan Dan Sikap Terhadap Rasionalitas Perilaku Penggunaan Antibiotik Pada Masyarakat Sekampung Kabupaten Lampung Timur. 2018.

Kemenkes R. Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2021 Tentang Pedoman Penggunaan Antibiotik. 2021.