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Evaluation of Prophylactic Antibiotic Use in Sectio Caesarea Patients at Mintohardjo Naval Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: The main aim of this research is to determine the appropriateness of using prophylactic antibiotics in Sectio Caesarea patients at Mintohardjo Napal Hospital (RSAL Mintohardjo) in 2020
Methodology: This study is a non-experimental research study with a descriptive, retrospective design. It uses medical record data of patients who gave birth using SC surgery in 2020 at RSAL Mintohardjo and were given prophylactic antibiotics. The population of this study is all medical record data of mothers giving birth by SC at RSAL Mintohardjo in 2020. The sampling technique is total sampling where the number of samples is the same as the population.
Results: The results of the evaluation of the appropriateness of prophylactic antibiotic use based on five categories with assessment standards based on POGI (Indonesian Association of Obstetrics and Gynecology) guidelines show that of the 58 research samples, there were 58 samples (100%) that were appropriate for use based on indications where the samples were patients who were going to undergo surgery. , with clean and contaminated operating classes. However, based on the exact type and class of drug, it was found that all samples did not meet POGI guidelines; Likewise, evaluation of the right dose, right route and right time could not be

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carried out because all research samples did not pass the evaluation of the right type of drug according to the guidelines issued by POGI.
Conclusion: The percentage of accuracy in administering and using prophylactic antibiotics at RSAL Mintohardjo is 100% correct indication, however, there is no correct type of drug, right dose, right route, and right time based on the guidelines for prophylactic antibiotics in surgery published by POGI.

Keywords: Evaluation; prophylactic antibiotics; Sectio caesarea.

1. INTRODUCTION

One of the problems that threatens global public health, including Indonesia, is antimicrobial resistance. Antibiotics are antimicrobials [1]. Data from the Centers for Disease Control and Prevention (CDC), there are 25,000 deaths per year in Europe, there are 58,000 deaths per year in India, and there are 58,000 deaths per year in Thailand, where all of these deaths are caused by antibiotic resistance [2,18,19]. Apart from this data, according to Antimicrobial Resistance in Indonesia (AMRIN) at the Dr. Soetomo Regional General Hospital (RSUD), Surabaya, and the Central General Hospital (RSUP) Dr. Kariadi, Semarang, Methicillin Resistant Staphylococcus aureus (MRSA), and Extended Spectrum Beta-Lactamases (ESBL) were found [3]. Apart from that, in the Intensive Care Unit (ICU) of the Fatmawati Hospital, Jakarta has found that Staphylococcus epidermids, Enterobacter aerogenes, Pseudomonas aeroginosa, Klebsiella sp, and Serratia marcescens bacteria are resistant to the antibiotic ceftriaxone [4]. One of the causes of microbial antibiotic resistance is the unwise prescribing and use of antibiotics [1]. Sectio caesarea (SC) is surgery on the abdominal wall and uterus to give birth to a child [5,12,13]. The World Health Organization (WHO) recommends that the ideal rate of SC is 10-15%. However, the incidence of SC continues to increase [23]. The incidence of SC deliveries in Indonesia in 2013, according to Basic Health Research (RISKESDAS), was 9.8% and increased in 2017 to 17% according to data from the National Population and Family Planning Agency (BKKBN) [6,14].

The risk of complications is five times higher in SC delivery than in normal delivery [7,15]. One of the complications found in SC delivery is a Surgical Wound Infection (ILO) [5,22]. Prevention of ILO is done by administering prophylactic antibiotics and has been proven to be effective in reducing the risk of ILO by 30-65% [5,8,20,21]. Research on evaluating the use of prophylactic antibiotics, from research at RSUD dr. Soediran Mangun Sunarso Wonogiri by Hapsari (2017) stated that 0.6% of the administration and use of prophylactic antibiotics was not the right drug, and 0.6% was not the right dose [33]. prophylactic antibiotics that are not in the correct dosage [24,25], incorrect name and class, and incorrect duration is 100% when compared with the Regulation of the Minister of Health (Permenkes) of the Republic of Indonesia (RI) Number 2406 of 2011 concerning guidelines for the use of antibiotics, and when compared with the guidelines for use antibiotics at Ulin District Hospital, Banjarmasin, there were 30% of surgical procedures for section cesarean surgery that did not have the correct duration of administration [9]. These results show that there are still cases of inappropriate use of prophylactic antibiotics in SC operations. This basis is what prompted the author to conduct research on evaluating the use of prophylactic antibiotics in Sectio Caesarea operations at the Mintohardjo Naval Hospital (RSAL) in 2020 based on the Guidelines for Prophylactic Antibiotics in Obstetric Gynecological Surgery issued by the Indonesian Obstetrics and Gynecology Association (POGI) in 2013 [26,27,28].

1.1 Reasearch Problem

How appropriate is the use of prophylactic antibiotics in SC surgery patients at RSAL Mintohardjo in 2020 with POGI guidelines based on 1) Precise indication, 2) Correct type and class of drug, 3) Correct dosage, 4) Exact route and 5) punctual.

1.2 Research purposes General purpose

Knowing the appropriateness of prophylactic antibiotics in Sectio Caesarea operations at RSAL Mintohardjo in 2020.

1.3 Special Purpose

Knowing the accuracy of use (suitable indication, right type and class of drug, correct dose, right

route, and right time) of prophylactic antibiotics in SC patients at RSAL Mintohardjo in 2020

2. MATERIALS AND METHODS

The research design is a non-experimental study with a descriptive design using medical record data of patients who gave birth using SC surgery in 2020 who were given prophylactic antibiotics from April 2021 to April 2022 at RSAL Mintohardjo located on Jalan Bendungan Hilir number 17A, RT 4, RW 3, Tanah Abang District, Central Jakarta City, Special Capital Region of Jakarta.

2.1 Research Population

This study's population includes all medical records of mothers who gave birth to SC at RSAL Mintohardjo in 2020.

2.2 Research Sample

Sampling was carried out by total sampling; namely, the number of samples was the same as the population.

2.3 Inclusion and Exclusion Criteria Inclusion Criteria

- Mother gave birth by CS during that period
- Maternity mothers who receive prophylactic antibiotics.

2.4 Exclusion Criteria

- Incomplete data on records of mothers giving birth by CS.
- Maternity women receiving antibiotics due to diagnosed infection.

2.5 Data Collection

Data was collected by examining secondary data, namely all medical records of patients registered at RSAL Mintohardjo in 2020. Data collected included age, educational status, employment, history of parity, history of SC, history of previous illnesses, and indications for SC data. Prophylactic antibiotics include patient diagnosis, type, dose, interval, route, and time of administration of prophylactic antibiotics.

2.6 Research Instrument

1. Medical records of patients who gave birth by SC in January – December 2020.
2. Guide to Prophylactic Antibiotics in Obstetrics and Gynecology Surgery, POGI 2013.

2.7 Data Processing and Analysis Data Processing

2.7.1 Editing

The data in the form of medical records will be edited first so that the data obtained does not find any incompleteness (missing data).

2.7.2 Coding

The data obtained and edited will then be converted into numbers or numbers using a coding process.

2.7.3 Entry

The data presented in numbers or figures will be entered into computer software.

2.7.4 Cleaning

Cleaning activities are done by checking again and ensuring no errors in entering data.

2.8 Data Analysis

Data analysis was done by analyzing research results on using prophylactic antibiotics in SC surgery patients with the Guide to Prophylactic Antibiotics in Obstetric-Gynecological Surgery, POGI, in 2013. Data analysis was carried out to describe the frequency distribution of each variable; this analysis will produce data in the form of percentages and descriptions or descriptive data. After obtaining the results of the frequency distribution of the variables, it will be continued with a type of analysis of the accuracy of using prophylactic antibiotics.

2.8.1 Patient characteristics

Data analysis on the number of patients who underwent SC surgery based on maternal age, education, occupation, number of parties, history of SC, indications for SC, history of previous illnesses, duration of surgery, and amount of bleeding.

2.8.2 Pattern of prophylactic antibiotic use

Data analysis of the number of patients undergoing SC surgery is based on the type and

class of antibiotics, antibiotic dose, route, and administration time.

2.8.3 The analysis technique for evaluating the use of prophylactic antibiotics is carried out using the formula:

Percentage (%) of appropriate use of prophylactic antibiotics: Number of appropriate cases (indication, type and group, dose

3. RESULTS AND DISCUSSION

Research carried out in the medical records room at RSAL Mintohardjo Jakarta in December 2021 found 58 cases of giving birth using the SC method and receiving prophylactic antibiotics. Data taken by total sampling was then selected using inclusion and exclusion criteria, and 58 cases were obtained, or all cases could be used as research samples. Patient data collected in this study included age, education, occupation, parity, history of having performed a CS, indications for having an SC, history of previous illnesses, duration of surgery, and amount of bleeding during surgery, as well as a list of prophylactic antibiotic use (type and class of antibiotics, dosage, route of administration, time of administration), then analyzed to look for patient characteristics, patterns of antibiotic use, and appropriateness of prophylactic antibiotic use.

3.1 Patient Characteristics

The characteristics of the patients in this study were examined in terms of age, occupational education, parity, history of having a CS, indications for having an SC, history of previous illnesses, duration of surgery, and amount of bleeding during surgery. Tables 1, 2, 3, and 4 show the analysis results of SC patients' characteristics at RSAL Mintohardjo Jakarta in 2020.

The data in Table 1, shows that the frequency of mothers giving birth using the SC method in the age group 20 years to 35 years was 36 people, and in the age group over 35 years, there were 22 people at RSAL Mintohardjo in 2020. According to the theory, as technology improves, this will also increase. Science so that society, in this case, parents and women, increasingly understand the risks and dangers of pregnancy and childbirth outside the productive age [35,36] The high number of women who give birth using the SC method at the age of 20-35 years was also found in research conducted by Maelaningsih et al. 37 Theory said that pregnancy beyond the age of 20-35 years can endanger the mother and baby in the process of pregnancy or giving birth because at the age of teenagers or under 20 years, the reproductive system of teenagers is not yet perfect so that

Table 1. General characteristics of SC patients at RSAL Mintohardjo in 2020

Characteristics	Number of Patients	Percentage (%)
Age		
20-35 year	**36**	**62,1**
> 35 year	**22**	**37,9**
Education		
Junior High School	3	5,2
Senior High School	32	55,2
Diploma	9	15,5
Bachelor	14	24,1
Job		
Housewife	35	60,3
Civil servants	8	13,8
Private sector employee	10	17,2
Honorary	4	6,9
Students	1	1,7
Parity		
Nulliparous	14	24,1
1-3 Times	42	72,4
>3 Times	2	3,4

various components that support pregnancy such as perineal muscle strength and size are not yet optimal. An unsuitable pelvis causes prolonged labor [10,11]. Apart from that, in adolescence, from a psychological perspective, they are generally not ready to become mothers and accept pregnancy [37,38]. Apart from fertility, which decreases at the age of over 35 years, pregnancy and giving birth at this age also causes a woman to have a greater risk of experiencing obstetric diseases due to other diseases such as hypertension and diabetes [38] At the age of 40 there is a possibility of a successful pregnancy, but what needs to be taken into account is that pregnancy at this age This has a higher risk of miscarriage considering that the mother's stamina begins to decline so she gets tired easily, besides that the quality of egg cells at that age is no longer like that of the productive age. The things above can lead to the use of tools such as forceps and SC procedures to assist with birth [38].

The data in Table 1 shows that there are mothers with high school education 32 patients, 14 patients in the group of mothers with bachelor's education, 9 patients in the group of mothers with diploma education, and 3 in the group of mothers with junior high school education. Research conducted by Rahmawati at the Amal Sehat Islamic Hospital, Sragen, stated that in mothers with low and middle education, antenatal care was more irregular, and the level of SC procedures was higher in this group. This confirms the theory that education level is often used as an assessment. Knowledge and insight influence giving birth using the SC method [39]. According to theory, this could be because mothers who have received higher education can understand the risks that can occur during pregnancy and childbirth, considering that all pregnant women are at risk; apart from that, this group of mothers tends to be able to make decisions, and actions related to health services and problems such as being able to see access to care and visiting health services to detect and provide treatment for complications, as well as preparing for birth along with the most appropriate delivery method. [36,39,40].

Parity is the number of children a mother gives birth to, whether alive or dead. 41 This study found that most mothers who gave birth using the SC method were in the 2-3 times parity group, namely 42 patients. Apart from that, there is a group of mothers with null parity, or who have never given birth, or in other words, this is the first time the mother has given birth; there are 14 patients in this group, and mothers with more than 3 parties, namely two patients. This study's results align with research conducted by Hijriani et al., which stated that the highest group of mothers who gave birth using the SC method were mothers who had given birth 1-3 times [40]. According to theory, the safest number of times a mother gives birth is no more than three times due to changes in the reproductive system, such as the formation of scar tissue due to repeated pregnancy and childbirth, causing weakness in the uterine muscles to contract [16,17]dea. Another theory says that mothers who have never given birth are potentially unprepared and afraid of giving birth, thereby increasing the production of the hormone cortisol and leading to the emergence of various complications [41]. The results of this study show that parity is not the only thing that plays a role in determining the delivery method.

The delivery method in the previous pregnancy greatly influences the choice of delivery method in the following delivery process [42]. In this study, it was found that more mothers had a history of CS compared to mothers who did not have a history of CS. The number of mothers who had a history of cesarean section was 31 people, and 27 mothers who had never had a cesarean section before. According to the American Pregnancy Association, several factors support a mother who has given birth using the SC method to give birth again using the same process in the subsequent pregnancy, including the problem of the disease, which was previously the reason for having an SC which is still suffered by the mother who wants to give birth, the vertical shape at the time of the incision. Surgery in previous births and the distance between birth and previous birth was less than 18 or 24 months [43]. Tampa et al. also found that former SC operations were the main reason mothers in their research location received the SC delivery method [43].

Medical indications for SC are a diagnosis that provides instructions for giving birth using the SC method for the benefit and safety of the mother and baby. In contrast, non-medical indications are based on requests or things other than the presence of factors that endanger the mother and baby [44]. In this study, 58 cases were found. Or all SC surgery cases are carried out based on medical indications. The majority of patients in this study were advised to have a CS because of the presence of SC scars from

previous births, fetal abnormalities, pelvic disproportion, and premature rupture of membranes. Research conducted by Subekti found that most indications for having SC were also medical indications. Non-medical indications are starting to become more common and are usually influenced by social factors and requests from mothers and families. Apart from that, the fear of the pain of vaginal delivery as well as psychological, belief, and economic factors also play a role [44]. The decision to give birth using the SC birth method must be made by fully considering the advantages and disadvantages that can occur, considering that the risks of this delivery method are greater. Higher compared to vaginal delivery, including puerperal infection, bleeding due to uterine atony, pulmonary embolism, and uterine rupture in the following pregnancy [45,47].

In this study, the results in Table 3 showed that out of 58, 5 patients had a history of previous illness. The five patients each had a history of diseases, namely hyperthyroidism, uterine myoma, chronic cephalgia, disturbed ectopic pregnancy (KET), and anemia. It is important to assess whether there is a history of previous illness Because it is related to the guidelines issued by POGI, which considers changing the use of beta-lactam antibiotics if the patient has a history of allergies to this group [31], in this study, no patients with a history of antibiotic allergies were found.

The duration of SC surgery in this study was under 3 hours, the duration of SC surgery plays a role in administering antibiotics. In the guidelines issued by POGI, prophylactic antibiotics are given again for a second dose if the operation lasts more than 3 hours because the concentration of antibiotics in the patient's body needs to be maintained to suppress bacterial colonization [31]. The amount of blood wasted during SC operations at RSAL Mintohardjo in 2020 was less than 1,500 mL for each patient, where the majority recorded that the most blood wasted was 500 mL, and the least wasted was 200 mL. The importance of knowing the amount of blood lost is to see whether prophylactic antibiotics need to be added after the first dose because according to POGI guidelines, prophylactic antibiotics before an SC operation need to be repeated if there is blood loss of more than 1,500 mL because this can affect the concentration of antibiotics in the patient's body. and also affects the effectiveness of the antibiotic [31].

For single prophylactic antibiotics, POGI recommends using antibiotics from the 1st generation cephalosporin group, namely cefazolin [29,30,31], whereas according to existing data, the single antibiotic used at Mintohardjo Hospital is using the antibiotics ceftriaxone and cefotaxime which are 3rd generation cephalosporins. According to several sources, single prophylactic antibiotics are given. Has been effective in preventing postoperative infections. [34,46]. Prophylactic antibiotics are a combination of 2 or more antibiotics given simultaneously to broaden the spectrum and improve the work of prophylactic antibiotics in dealing with more than one type of bacteria. 46 POGI recommends metronidazole together with gentamicin as a combination antibiotic, 31 but the data in Table 4 is different. In this study, it was found that the most frequently used prophylactic antibiotics were a combination of ceftriaxone from the 3rd generation cephalosporin group and gentamicin from the aminoglycoside group [48,49]. POGI does not recommend the use of 3rd and 4th generation cephalosporin antibiotics as prophylactic antibiotics in the field of obstetrics-gynecology because they can cause the formation of MDRO or Multi-Drug Resistant Organisms [31] Even though POGI recommends gentamicin for use together with metronidazole, this does not mean that it justifies the use of a combination antibiotic between third-generation cephalosporins together with gentamicin, this is because 3rd generation cephalosporins are broad-spectrum antibiotics that can work against both gram-negative and gram-positive bacteria, and If gentamicin is given again, the use of combination antibiotics will not be efficient. Apart from being inefficient in terms of the antibiotic spectrum of action, the use of 3rd generation cephalosporin antibiotics together with gentamicin can increase the burden of drug costs; this is very contrary to one of the principles for selecting prophylactic antibiotics issued by POGI and Minister of Health Regulation Number 2406 of 2011, namely affordable prices. This is the same as using ampicillin with gentamicin, considering ampicillin is a broad-spectrum antibiotic [31,32].

There are similarities between this research and the research conducted by Rahmadanti, where there was more use of combined prophylactic antibiotics from the 3rd generation cephalosporin class and the 1st generation cephalosporin antibiotic class. Proven to be able to help the wound healing process after SC surgery [8,50] and WHO issued a circular regarding the use of

prophylactic antibiotics for SC surgery which states that the choice of antibiotic type is not limited to 1st generation cephalosporins but must be reviewed from various things and conditions such as local germ maps, microbes. Local resistance and experience of health workers, as well as availability and price of antibiotics [51]. WHO also revealed that the majority of guidelines recommend using 1st and 2nd generation cephalosporin antibiotics because two-thirds of studies on the use of prophylactic antibiotics in SC operations used cephalosporin antibiotics of this generation, but this does not rule out the possibility of using other classes of antibiotics in certain circumstances [34] The choice of antibiotic type for prophylaxis in SC at RSAL Mintohardjo, if seen from the clinical pathways issued by the hospital, is indeed appropriate, namely using ceftriaxone or cefotaxime. The hospital selects the type of antibiotic listed in the clinical pathways for the implementation of SC based on various considerations adjusted to the hospital conditions. Things like those described could be why RSAL Mintohardjo uses antibiotics outside the guidelines issued by POGI.

3.2 Patterns of Prophylactic Antibiotic Use

In Table 6, data are presented showing that prophylactic antibiotics for SC surgery patients were administered intravenously in 58 patients (100%). According to POGI, the oral administration route is also not needed to continue prophylactic antibiotics that have been given intravenously [31]. The aim of administering antibiotics intravenously is to ensure that the antibiotics can quickly reach peak levels [31].

Table 2. Patient characteristics based on history and Indication for CS

Characteristic	Patient Number	Percentage (%)
SC History		
Yes	31	53
No	27	46,6
SC Indication		
Medical	58	100

Table 3. Patient characteristics based on past disease history

Characteristic	Patient Number	Percentage (%)
Past medical history		
Hyperthyroid	1	1,7
Uterine Myoma	1	1,7
Chronic Cephalgia	1	1,7
KET	1	1,7
Anemia	1	1,7
There isn't any	53	94,1

Table 4. Patient characteristics based on operation duration and amount of bleeding

Characteristic	Patient Number	Percentage (%)
Operation Duration ≤ 3 Hours	58	100
Amount of Bleeding ≤1,500 mL	58	100

Table 5. Patterns of prophylactic antibiotic use in SC patients at RSAL Mintohardjo in 2020

Group	Antibiotik Type	Patient	Percentage
Single			
Cephalosporin gene 3	Ceftriaxone	17	29,4 %
	Cefotaxime	1	1,7%
Combination			
Cephalosporin gene 3	- Ceftriaxone Gentamicin	38	65,5 %
aminoglycoside			
Penicillin Aminoglycosides	- Ampisilin Gentamisin	1	1,7 %
Cephalosporin gene 3 Aminoglycosides	- SefotaksimeGentamisin	1	1,7 %

Table 6. Patterns of Prophylactic Antibiotic Use Based on Route of Administration

Route	Patient Number	Percentage (%)
IV	58	100

Table 7. Patterns of prophylactic antibiotic use based on time of use

Time	Patient Number	Percentage (%)
2 hours before the incision	2	3,4
15 – 60 Minutes before the incision	7	12,1
0-14 Minutes before incision	11	19
After incision	38	65,5

Table 8. Percentage of accuracy in using prophylactic antibiotics in SC Patients at RSAL Mintohardjo in 2020

Accuracy of Use Indicator	Proper Use		Improper Use	
	Amount	Percentage	Amount	Percentage
Indication	58	100 %	-	-
Type of Medicine	-	-	58	100 %
Dose	-	-	58	100 %
Route	-	-	58	100 %
Time	-	-	58	100 %

The time for administering prophylactic antibiotics from the results of this study is listed in Table 7, where it can be seen that more patients or 38 patients (65.5%) received prophylactic antibiotics after incision, while there were 11 patients (19%) who received antibiotics at 14-0 minutes. before incision, and in Table 7 also presents data that there were 7 patients (12.1%) who received prophylactic antibiotics 60-15 minutes before incision, and there were 2 patients (3.4%) who received prophylactic antibiotics 2 hours before incision. POGI, in its guidebook for prophylactic antibiotics, states that prophylactic antibiotics should be given 60-15 minutes before incision [31], which means seven patients received antibiotics at a time following POGI guidelines. According to WHO, recommendations for administering antibiotics during this time are classified as recommendations based on strong evidence [34]. According to the results of 10 studies that wanted to know the difference in administration time of prophylactic antibiotics in SC surgery, in administration post incision or intraoperative antibiotics and post umbilical cord clamping compared with administration 15 - 60 minutes before incision is indeed lower in effectiveness, however administration of antibiotics after the recommended time is still effective and useful in certain situations such as SC surgery in emergency conditions so that there is not enough time available. Sufficient to administer prophylactic antibiotics. Apart from that, according to WHO, no data suggests there will be short-term side effects in babies exposed to the recommended prophylactic antibiotics. However, the long-term side effects are not yet known [34].

3.3 Evaluation of the Appropriate Use of Prophylactic Antibiotic

Evaluation of the use of prophylactic antibiotics in SC patients begins with assessing whether the use of prophylactic antibiotics is appropriate for the indications, followed by assessing the appropriate use of the type of drug, after that the appropriate dose, appropriate route and appropriate time of administration. Evaluation of the use of prophylactic antibiotics will use the Guidelines for Prophylactic Antibiotics in Obstetric-Gynecological Surgery issued by POGI in 2013

4. CONCLUSION

Based on the results of the evaluation of the use of prophylactic antibiotics in SC patients at RSAL Mintohardjo in 2020 according to the guidelines for prophylactic antibiotics in obstetric - gynecological surgery issued by POGI, it was concluded that the administration of prophylactic antibiotics was 100% appropriate for the indications, and none of them matched the type and class of antibiotics

according to the guidelines. POGI issued, as well as the dose, route and time do not comply with POGI guidelines]

CONSENT

It is not applicable.

ETHICAL APPROVAL

RUMKITAL Health Commission Dr. Mintohardjo Jakarta has provided the research protocol with an ethical clearance letter number, namely No. 042/EC/LKS/RSMTH/XII/2021 Declared Ethically Eligible.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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