

Penelitian Asli

The Use of Prophylactic Antibiotics in Patients with Caesarean Section in the Inpatient Installation of Cibinong Regional General Hospital in the Period of January - December 2023

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Abstract

Background: Postoperative infections after cesarean section (CS) remain a major concern, increasing morbidity, hospitalization duration, and healthcare costs. Prophylactic antibiotics are an important preventive measure, but their effectiveness depends on appropriate type, dose, timing, and adherence to guidelines. This study evaluated prophylactic antibiotic use in CS patients at Cibinong Regional General Hospital (RSUD).

Methods: A descriptive cross-sectional study analyzed medical records of 81 CS patients from January to December 2023. Data on antibiotic type, dose, timing, and clinical outcomes were assessed against hospital, POGI.

Results: All patients received prophylactic antibiotics. Cefazolin was most used (61.7%) and showed the highest effectiveness, with no infections among 50 patients. In contrast, ampicillin, gentamicin, and metronidazole were less effective, with infection rates of 26.7%, 100%, and 100%, respectively. Overall, 24.7% of patients developed postoperative infections.

Discussion: Findings highlight cefazolin's superiority, consistent with international guidelines recommending it as first-line prophylaxis for CS. Variations in antibiotic selection, dosing, and timing were linked to higher infection rates, emphasizing that protocol inconsistencies reduce effectiveness. Risk factors such as maternal age, obstetric history, and indication for CS may also influence outcomes.

Conclusion: Prophylactic antibiotic use at Cibinong RSUD generally followed guidelines, with cefazolin proving most effective. However, inconsistent practices in dosage and timing contributed to a notable infection rate, underscoring the need for stricter adherence to standards.

Keywords: *Cesarean Section, Prophylactic Antibiotics,*

1. INTRODUCTION

Postoperative infections are a common complication encountered in the operating room, with a significant incidence worldwide, particularly for those undergoing major procedures such as cesarean sections.¹ Data from the World Health Organization (WHO) reports that infections can affect approximately 5-15% of participants undergoing various medical procedures, with rates tending to be higher for obstetric and gynecological interventions, where additional risks such as surgical duration and patient condition contribute to an increased likelihood of infection.² Prophylactic antibiotics are an important measure in preventing postoperative infections particularly in cesarean section patients.³ Prophylactic antibiotics are administered before surgical procedures to reduce the risk of infection by inhibiting bacterial growth around the surgical wound.⁴ However, the effectiveness of prophylactic antibiotics depends heavily on several factors, including the type of antibiotic used, the dose, the timing of administration, and adherence to applicable clinical guidelines or protocols. Thus, inappropriate, or non-standard use of prophylactic antibiotics can potentially increase the risk of antibiotic resistance and prolong hospital stays.⁵

Although prophylactic antibiotics have been proven effective in reducing post-operative infection rates, a problem arises from the

discrepancy between antibiotic administration practices in the field and existing guidelines.⁶ Cibinong Regional General Hospital (RSUD) requires an evaluation of its prophylactic antibiotic administration practices for patients undergoing cesarean sections. This evaluation is crucial to ensure that antibiotic use complies with the standards set by the Hospital Formulary, guidelines from the Indonesian Obstetrics and Gynecology Association (POGI).⁷

Common problems include choosing different antibiotics than recommended, giving them at the wrong time (too early or too late), and using the wrong dose. These mistakes can make antibiotics less effective and increase the risk of infection. Antibiotic resistance is also a serious concern, largely caused by antibiotic misuse. Therefore, it is important to assess whether antibiotic use at Cibinong Regional Hospital follows current guidelines and effectively prevents post-operative infections.

Previous research has extensively discussed the effectiveness of prophylactic antibiotics in surgical procedures, with results showing that 60% are effective and 40% are ineffective. However, few studies have specifically evaluated the causes of ineffective prophylactic antibiotic administration in Caesarean section patients in Indonesia, particularly at Cibinong Regional Hospital.⁸⁻¹⁰

This study aims to evaluate the causes of this ineffectiveness by analyzing the level of adherence to guidelines and its impact on patient clinical outcomes at Cibinong Regional Hospital. This study also focuses on identifying factors influencing inappropriate prophylactic antibiotic use, including hospital policy, drug availability, and medical personnel knowledge and adherence to clinical guidelines. Furthermore, this study aims to identify any association between inappropriate antibiotic use and clinical outcomes such as postoperative infection and length of hospital stay.

This research is highly relevant because Cibinong Regional Hospital is a referral hospital in the region. The results are expected to assist the hospital in improving its policy on more rational prophylactic antibiotic use and aligning with clinical guidelines, thereby reducing post-operative infection rates and accelerating patient recovery.

2. METHODS

2.1. Study Design

This study is a descriptive observational study because the researcher did not provide any treatment (intervention) to the research subjects with a cross-sectional design. The raw data collected will be analyzed qualitatively to determine the appropriate antibiotic. The study design used was cross-sectional. The variables studied include the type of antibiotic,

dose, time of administration, route of administration, and clinical outcomes such as the incidence of post-operative infections. The analysis will assess the appropriateness of antibiotic use with clinical guidelines and its effectiveness in preventing infections. The results study are expected to provide recommendations for improving the quality of health services at Cibinong Regional General Hospital.

2.2. Population and sample

The population in this study were all patients who underwent Caesarean section surgery at the Inpatient Unit of Cibinong Regional General Hospital from January to December 2023. Sampling was carried out using a probability sampling method. The method of determining the sample in this study was carried out using the systematic probability method, in which researchers selectively selected patients who met the predetermined inclusion and exclusion criteria.

2.3. Data collection

This study used secondary data collection. The data were obtained through document analysis of medical records from patients who underwent Caesarean Section surgery at the Inpatient Installation of Cibinong Regional Hospital during the period January–

December 2023. These records provided information relevant to the study variables without direct interaction with patients or healthcare providers.

2.4. Data analysis

Data were analyzed using SPSS with descriptive (univariate) statistics. Medical record data (antibiotic type, dose, timing, infection incidence, and length of stay) were cleaned and coded, then summarized using frequencies, percentages, and averages/medians. Antibiotic use was also compared with the Hospital Formulary, POGI to assess compliance. Results were presented in tables and graphs to support conclusions and recommendations.

3. RESULT

This research was conducted on a total of 81 patients, all of whom were included in the study population and consistently administered prophylactic antibiotics. The administration of these antibiotics was carried out as an integral component of the standard perioperative management protocol, which is routinely implemented with the primary objective of minimizing and preventing the occurrence of postoperative infections, a complication that remains one of the major concerns in surgical procedures, particularly in obstetric surgery.

Regarding the demographic characteristics of the participants, the distribution based on age demonstrated a diverse range. Specifically, 25 patients (30.9%) were categorized into the younger age group of 20 to 30 years, reflecting the group of women who were generally in their early reproductive period. The largest proportion of patients, namely 35 individuals (43.2%), were in the 31 to 40 years age group, which represents the peak reproductive age. Meanwhile, 21 patients (25.9%) were aged above 40 years, illustrating that cesarean section is also performed in women of advanced maternal age.

In terms of previous obstetric history, the data revealed that 18 patients (22.2%) had undergone at least one cesarean section procedure in the past, indicating a history of surgical delivery. On the other hand, most patients, 63 individuals (77.8%), did not have any prior experience with cesarean delivery and were therefore categorized as having no surgical obstetric history. This distribution highlights the presence of both repeat cesarean cases and first-time cesarean deliveries within the study cohort.

Furthermore, the clinical indications that necessitated the performance of cesarean section

surgery in this study population were quite varied and encompassed several common obstetric complications. These included conditions such as oligohydramnios, cephalopelvic disproportion (CPD), severe preeclampsia (PEB), abnormal fetal presentations including transverse or breech position, placenta previa, as well as premature rupture of membranes (PROM) that lasted for more than 24 hours. Among these various indications, the two most frequently encountered were oligohydramnios and cephalopelvic disproportion, each of which was recorded in 15 patients, accounting for 18.5% respectively. Severe preeclampsia was documented in 11 patients (13.6%), while abnormal fetal presentation, either transverse or breech, was observed in 10 patients (12.3%). Placenta previa was found in 9 patients (11.1%), and premature rupture of membranes persisting beyond 24 hours was noted in 6 patients (7.4%).

All patients undergoing cesarean sections were administered prophylactic antibiotics, which constituted an essential component of perioperative care. The antibiotics prescribed included cefazolin, ampicillin, metronidazole, and gentamicin, either as single agents or in combination, depending on the

patient's condition and institutional guidelines. The choice of antibiotics was based on their effectiveness against common pathogens associated with postoperative infections in obstetric surgery. The detailed frequency and percentage of antibiotic use across the study population are presented in the subsequent table, which illustrates the distribution patterns and highlights the most administered regimens.

Table 1 shows that cefazolin is the primary antibiotic of choice for prophylaxis in cesarean sections. In this study, the effectiveness of prophylactic antibiotic use was evaluated. Of the 81 patients given prophylactic antibiotic therapy, 24.7% experienced postoperative infections, while 75.3% did not.

Table 2 shows that the most effective antibiotic for preventing post-operative infections is cefazolin. Of the 50 patients given the antibiotic, none showed signs of post-operative infection.

Table 1. Distribution of Antibiotic Usage Among Cesarean Section Patients

Antibiotic	Frequency	Percentage (%)
Ampisilin	15	18.5
Cefazolin	50	61.7
Gentamisin	5	6.2
Metronidazol	11	13.6
Total	81	100.0

Table 2. Effectiveness of Antibiotic Therapy

Antibiotic	Infection		Total
	Yes	No	
Ampisilin	4	11	15
Cefazolin	0	50	50
Gentamisin	5	0	5
Metronidazol	11	0	11
Total	20	61	81

4. DISCUSSIONS

The use of prophylactic antibiotics during cesarean sections (CS) is an effort to reduce the risk of postoperative infection, a major complication that can increase morbidity, hospitalization duration, and healthcare costs. Post-CS infections, particularly those caused by bacteria such as *Staphylococcus aureus* and *Escherichia coli*, can worsen the patient's condition and prolong recovery time. Therefore,

administering appropriate prophylactic antibiotics at the right time can provide significant protection against post-CS infections. Recent research has shown that administering prophylactic antibiotics, including selecting the appropriate type, dose, and timing, significantly reduces the incidence of post-CS infections, contributing to improved patient care quality and reduced costs associated with infection.¹¹

This study found that cefazolin was used in most patients, reaching 61.7% of the total patients involved. This figure aligns with clinical guidelines recommending cefazolin as the primary prophylactic antibiotic in cesarean sections, given its broad effectiveness against skin flora, the primary cause of infection during these procedures. Ampicillin was used in 18.5% of patients, while metronidazole was used in 13.6% and gentamicin in 6.2%. The use of metronidazole and gentamicin reflects a more specific strategy based on certain clinical indications, such as infections caused by anaerobic or Gram-negative bacteria, as well as patients with high-risk factors.

Cefazolin, a first-generation cephalosporin antibiotic, has been shown to be effective in preventing post-cesarean section infections. A study showed that cefazolin significantly reduced the incidence of postoperative infections compared to a group not given prophylactic antibiotics. This study is supported by other evidence showing that cefazolin is highly effective in preventing surgical site infections caused by *Staphylococcus aureus*, a bacterium commonly found on the skin and upper respiratory tract, and at high risk of contamination during surgical procedures. Administering prophylactic antibiotics 30-60 minutes before

incision is crucial to ensure optimal antibiotic concentration in the target tissue and prevent bacterial colonization.^{4,12}

The effectiveness of prophylactic antibiotics is also influenced by various patient risk factors, such as obesity, diabetes mellitus, a history of previous uterine surgery, and the duration and type of surgery, which can increase susceptibility to infection. Therefore, in addition to selecting the right antibiotic, managing the patient's risk factors is also crucial in determining the clinical outcome of this surgical procedure. In addition to appropriate antibiotic choice, attention to the dose, duration, and timing of administration is crucial.⁴

A similar study showed that administering 2 grams of prophylactic cefazolin 30 minutes before incision reduced the incidence of surgical site infections from 11% to 3% in elective CS patients. This study also emphasized the importance of adherence to the timing and dosage of antibiotic administration in reducing the risk of nosocomial infections. Meanwhile, research from the United States by Tita et al. (2016) showed that the combination of cefazolin with azithromycin before a CS in high-risk patients (e.g., emergency CS) significantly reduced the incidence of endometritis and wound

infection compared to cefazolin alone.

Based on the findings, 61.7% of patients received the correct standard dose, and none of them experienced infection. However, 38.3% of patients received different doses, such as 1 gram or divided doses. This mismatch in dosage can affect antibiotic concentrations in the tissue, ultimately impacting its effectiveness in preventing infection.¹³

5. CONCLUSION

Based on research on the use of prophylactic antibiotics in cesarean sections at Cibinong Regional Hospital, the following conclusions can be drawn, cefazolin was the most frequently used antibiotic, at 61.7% of cases at Cibinong Regional Hospital. The success of prophylactic antibiotic use in cesarean sections at Cibinong Regional Hospital showed quite good results, with most patients receiving standard antibiotics, and cefazolin being proven to be the most effective in preventing postoperative infections. However, approximately 24.7% of patients still experienced infections, indicating the need to improve the effectiveness of prevention. The selection and type of antibiotics were in accordance with hospital protocols, POGI recommendations, although

discrepancies were still found in dosage, timing of administration, and the use of antibiotic combinations without clear indications. This indicates the need for increased oversight and consistency in protocol implementation to prevent resistance and reduce infection rates.

6. SUGGESTION

Based on the findings of this study, it is recommended that hospitals strengthen the consistency of prophylactic antibiotic administration in cesarean sections, with particular attention to the accuracy of dosage, timing, and the indications for combination therapy. Regular monitoring and evaluation should be implemented to ensure compliance with both national and international guidelines, thereby reducing the incidence of postoperative infections and minimizing the risk of antimicrobial resistance. Furthermore, continuous training for healthcare professionals and additional research with larger study populations are advised to provide stronger evidence regarding the effectiveness of cefazolin compared to other antibiotic regimens.

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