Indonesian Journal of Health Science
Volume 3 No.2a, 2023

PROFILE OF THE USE OF PROPHYLACTIC ANTIBIOTICS FOR CESAREAN SURGERY AT HOSPITAL "X" CENTRAL JAKARTA

Nindya Kusumawardhani[1)]; Devi Maulina [2)]; Anna Uswatun Hasanah Rochjana [3)]

[1)] nindyakusuma49@gmail.com, Politeknik Kesehatan Hermina
[2)] maulinadevi2011@gmail.com, Politeknik Kesehatan Hermina
[3)] annauswatun.hr@gmail.com, Politeknik Kesehatan Hermina

Abstract
Caesarean section refers to efforts to remove the fetus by performing surgical activities on the abdominal wall and uterus. This surgical activity carries a high risk of postoperative infection. In preventing postoperative infection in cesarean section patients, it is necessary to administer prophylactic antibiotics to prevent postoperative wound infection. Prophylactic administration of antibiotics in surgical patients must be closely monitored to prevent resistance. This study aims to evaluate the use of prophylactic antibiotics in cesarean section patients at a hospital in the Central Jakarta area. The study was conducted for three months, from December 2022 – February 2023. This study used a descriptive method, while data were collected retrospectively. The samples studied in this study were 154 patients. The results obtained in this study showed that the most criteria of patients based on patient age were at the age of 20-35 years as many as 120 patients (77.92%). The type of antibiotic that is often used is Ceftriaxone injection which was carried out in 147 patients (95.45%). Meanwhile, indications of pregnancy that were often found during cesarean section were requests from patients or mothers in 51 patients (33.12%). The use of prophylactic antibiotics based on the hospital formulary is in accordance with the percentage of 100%.
Keywords: *Caesaren Section, Ceftriaxone, Prophylactic Antibiotics*

Abstrak
Operasi sesar merujuk pada upaya dalam mengeluarkan janin dengan melakukan kegiatan bedah pada dinding abdomen dan uterus. Kegiatan bedah ini memiliki resiko tinggi terhadap terjadinya infeksi pasca operasi. Dalam mecegah infeksi pasca operasi terhadap pasien operasi sesar, maka diperlukan pemberian antibiotik profilaksis guna mencegah terjadinya luka infeksi pasca bedah. Pemberian antibiotik profilaksis pada pasien bedah harus diawasi dengan ketat untuk mencegah terjadinya resistensi. Penelitian ini bertujuan untuk mengevaluasi penggunaan antibiotik profilaksis pada pasien operasi sesar di salah satu rumah sakit di daerah Jakarta Pusat, penelitian dilakukan selama tiga bulan yaitu dari Desember 2022 – Februari 2023. Penelitian ini menggunakan metode deskriptif, sedangkan data dikumpulkan secara retrospektif. Sampel yang diteliti dalam penelitian ini sebanyak 154 pasien. Hasil yang diperoleh dalam penelitian ini menunjukkan kriteria pasien berdasarkan usia pasien terbanyak yaitu pada usia 20 – 35 tahun sebanyak 120 pasien (77,92%). Jenis antibiotik yang sering digunakan adalah Ceftriaxone injeksi yang dilakukan pada 147 pasien (95,45%). Sedangkan untuk indikasi kehamilan yang sering ditemukan saat operasi sesar yaitu permintaan pasien atau ibu sebanyak 51 pasien (33,12%). Penggunaan antibiotik profilaksis berdasarkan formularium rumah sakit sudah sesuai dengan persentase 100%.
Kata Kunci: Antibiotik Profilaksis, Ceftriaxone, Operasi Sesar

INTRODUCTION

Caesarean section is a medical activity used to eject or give birth to a fetus through an incision in the abdominal wall and uterus (Jitawiyono & Kristiyanasari, 2012). A cesarean section is performed when a normal delivery process through the vagina is not possible because it will pose a risk to the mother, fetus, and other medical complications. Based on the 2018 Basic Health Research of Indonesia, the delivery process by cesarean section in Indonesia is 17.6%, this figure has increased compared to 2013 which was 9.8% (Menteri Kesehatan Republik Indonesia, 2021)

Caesarean section carries a higher risk of death and infection rate, which is 20 and 80 times compared to vaginal delivery. The birth rate in the world that is carried out by cesarean section occurs up to 28-32% (Grisbrook et al., 2022). However, the risk of infection in the surgical wound in women who have a cesarean section is 5-20 times bigger than a vaginal delivery. Infections that occur in surgical wounds resulting from surgical procedures are known as Surgical Site Infections (SSI). Infection that occur as a result of cesarean section can be

prevented by using prophylactic antibiotics. This is due to the fact that prophylactic antibiotics can help eliminate the of microorganisms and control germs in the surgical site. Bratzler et al (2013) suggested that the use of antibiotics in hospitals for surgery was around 30 – 50%. Therefore, the use of prophylactic antibiotics in surgical patients in hospitals must be carefully monitored to reduce the risk of resistance (Bratzler et al., 2013).

Based on the Regulation of the Minister of Health of Indonesia Number 28 of 2021 concerning Guidelines for the Use of Antibiotics, prophylactic antibiotics are antibiotics given before, during and after surgical procedures to prevent complications of infection in the operating area. The procedure for giving prophylactic antibiotics after surgery is a maximum of 24 hours after giving the first antibiotic, this aims to prevent bacteria from developing that enter the surgical site during surgery and prevent post-surgical infectious complications. Prophylactic antibiotics are generally used with the aim of reducing morbidity and mortality due to infection in childbirth (Anggraini & Syachroni, 2020).

In addition, appropriate prophylactic antibiotics are expected to minimize the possibility of emergence of resistant microbes and prevent patients from post-surgical infections. This can be done by determining the use of antibiotics that are the right indication, the right dose, the right time, and the right type that can control microbes in the surgical site (Sarmalina simamora, 2021).

Research conducted by (Rusdiana et al., 2016), shows that the results of the suitability of the class or type and time of prophylactic antibiotic administration at hospital X in Tangerang are 0% where the selection of groups, types and times of administration of antibiotics is still not in accordance with the basic guidelines of pharmacology and therapy according to Goodman & Gilman. Meanwhile, the results of conformity in the method of administering prophylactic antibiotics showed a percentage of 100% and for the results of appropriateness of the dosage, showed of 7.12% was obtained.

Then in a research by (Yulia et al., 2018), the types of prophylactic antibiotics used at the Pasuruan District General Hospital for cesarean sections include *ampicillin-sulbactam* (37%), *cefuroxime* (34%), *Ceftriaxone* (24%), *cefazolin* (5%), *metronidazole* (1%) and *Gentamicin* (1%). While the suitability level based on the type of antibiotic is 5% based on the Guidelines for Use of Antibiotics and 100% based on the hospital formulary also 63% based on Fornas.

Research conducted by (Maelaningsih et al., 2020), suggested that the use of prophylactic antibiotics in one hospital in cesarean section patients aged 20-35 (76.41%) and >35 years (23.59%) used *cefazoline* injection (82, 05%) and *Ceftriaxone* injection (17.95%) and the suitability level based on the hospital formulation is 82.05%.

The level of cesarean section services at a hospital X in Central Jakarta is relatively high, the use of prophylactic antibiotics at that hospital has also increased. Prophylactic administration of antibiotics in cesarean section patients must be closely monitored to avoid resistance. Based on the authors description of the backdrop, this study was conducted with the aim of obtaining a profile of the use of prophylactic antibiotics in cesarean section patients, as well as evaluating the suitability of prophylactic antibiotics with the hospital formulary.

METHODS

This type of research is quantitative research with approach used is non-experimental or observational. The research design used is a descriptive method, namely a research design that requires large amounts of information in a certain field through a scientific description of the phenomenon, with the aim of describing the situation by collecting, analyzing and interpreting data, also not for testing hypotheses (Heryana, 2020). The data used in this study was carried out retrospectively, which means that the data in this study were taken from patient

without coercing the patient. The data was taken from patient medical record from December 2022 – February 2023 at hospital X in the Central Jakarta.

The population used in this study were cesarean section patients who were given prophylactic antibiotics at hospital X in the Central Jakarta started from December 1 2022 until February 28 2023. Meanwhile, the samples in this study were obtained using a purposive sampling technique in which the determination of the sample was made with certain considerations, for example the characteristics population. Then, instruments and form sheets were used to write down the data obtained for this study in the form of observation tables. The sample used in this study were cesarean section patients who received prophylactic antibiotics and to determine the number of samples, the slovin's formula was used.

Picture 1. The Slovin's Formula

$$n = \frac{N}{1 + Ne^2}$$

n = sample size
N = population size
E = margin of error 5% or 0,05

Source: statology.org

$$n = \frac{251}{1 + 251.0{,}05} = 154$$

The data in this study were obtained retrospectively for the period December 2022 – February 2023. Meanwhile, the data source came from the medical records of cesarean section patients at hospital X in the Central Jakarta where the data consisted of patient data (age, number of previous births, and patient weight) as well as data on prophylactic antibiotics used for patients (type, dosage form, strength, dose, and duration of administration). Then the data is collected in master data using Microsoft Excel.

Data analysis in this study used static data with a univariate analysis design. This analysis was carried out with the aim of providing an overview of each variable which includes patient characteristics (age, number of previous births, type of previous birth, and complications of pregnancy) and the use of prophylactic antibiotics (class, type, dosage form, time of administration, and dose of administration).

RESULT AND DISCUSSION

Patient data was collected in March 2023, which included the data on patients giving birth at hospital X in Central Jakarta from December 2022 to February 2023. Data was collected by pulling the database through an application provided by the hospital used Medical Record Number indicator. After tracing the data, a population of 251 patients was found, while those included in the inclusion criteria (patients at the hospital who had a caesarean section and were given prophylactic antibiotics and had complete medical record data) were 154 samples.

Table 1. Characteristics Based on the Age of Cesarean Section Patients at Hospital X in Central Jakarta, December 2022 – February 2023

No.	Patients Age	Amt.	Percentage
1	<20 years old	0	0%
2	20 – 35 years old	120	77,92%
3	>35 years old	34	22,08%

Total	**154**	**100%**

Source:

Based on the table data above, it was found that during December 2022 - February 2023, cesarean section patients aged 20-35 years at this hospital were the highest with a percentage of 77.92%. Patients aged >35 years were 22.08% and patients with aged <20 years were 0%, which means that there were no cases of cesarean section in this category. In line with Saifudin (2009), a mother's age range of 20 to 35 years is considered ideal for pregnancy and labor. Pregnancy at this age are also not at high risk in giving birth, including in wound healing after cesarean section. Conversely, the greater of gestational age, the higher the chance of cesarean wound healing (Dewi, 2012).

Table 2. Types of Prophylaxis Antibiotic for Cesarean Section Patients at Hospital X in Central Jakarta, December 2022 – Februari 2023

No.	Types of Antibiotic	Amt.	Percentage
1	*Ceftriaxone*	147	95,45%
2	*Sagestam® (Gentamicin)*	6	3,90%
3	*Cefotaxime*	1	0,65%
	Total	**154**	**100%**

Source:

During December 2022 – February 2023, it was found that the highest use of prophylactic antibiotics used for cesarean section patients at this hospital was *Ceftriaxone* injection of the third generation *cephalosporin* class showed a percentage of 95.45% or 147 cases. Then, the use of *Sagestam®* injection was 3.90% or 6 cases and the lowest was the use of *Cefotaxime* with a percentage of 0.65% or 1 case.

Based on the data processing completed, the use of *Ceftriaxone* injection in cesarean section patients at this hospital during December 2022 – February 2023 was found to be the most commonly utilized in February 2023, specifically 99 cases or 67.35%. Followed by December 2022 with 26 cases or 17.69% and in January 2023 with 22 cases or 14.97%.

Ceftriaxone itself is an antibiotic that works by inhibiting *mucopeptide* synthesis in the bacterial cell wall. *Ceftriaxone* contains *beta-lactams* which has function to bind *endopeptidases, carboxypeptidases* and *transpeptodases* in the bacterial cytoplasmic membrane. Then, these enzymes play a role in cell wall synthesis and cell division. As a result, the formation of damaged cell walls and cell death can be carried out by *Ceftriaxone* by binding to these enzymes.

Pharmacodynamics of *Ceftriaxone*, which is a broad-spectrum antibiotic that is bactericidal or can kill bacteria. Inhibition of synthesis in the bacterial wall provides the bactericidal effect of *Ceftriaxone*. *Ceftriaxone* has high stability against *beta-lactamases*, both against *penicillins* and *cephalosporins*. Meanwhile, the pharmacokinetics of *Ceftriaxone* follow non-linear or dose-dependent pharmacokinetics and are also bound to plasma proteins by 85 to 95%. *Ceftriaxone* must be taken parenterally due to gastrointestinal absorption of this antibiotic thought to be poor. *Ceftriaxone* is digested in the urine as much as 33 to 67% and the remainder is excreted in the bile up to the stage found in the feces (Melnick & Adelberg's, 2013)

While, the use of *Cefotaxime* injection in cesarean section patients at this hospital during December 2022 - February 2023 was only carried out for 1 case (100%), occurred in February. *Cefotaxime* is a third generation *cephalosporin* antibiotic which acts as a bactericidal. *Cefotaxime* has a function in inhibiting bacterial cell wall synthesis by binding to 1 or more penicillin-binding proteins. This operation will result in inhibition of *transpeptidation*, which will stop the synthesis of peptidoglycan in the cell wall, resulting bacterial cell death.

Absorption of *Cefotaxime* after injection (IM) is quite fast where the time needed to reach peak plasma concentrations is 30 minutes (IV) and 4 hours (IV). This antibiotic will be distributed into body fluids and tissues by crossing the blood barrier when it is inflamed, through the placenta, entering breast milk (small amount) and binding to plasma proteins (about 31-50%). The process of excretion of *Cefotaxime* is through urine (40-60% as unchanged drug, 20% as *O-desacetyl Cefotaxime*), feces (about 20%), and the elimination half-life is around 1-1.5 hours for *Cefotaxime* and 1.3 - 1.9 hours for *O-desacetyl Cefotaxime* (MIMS, 2023a).

Then, the use of *Sagestam*® antibiotics or injection *Gentamicin* in cesarean section patients at this hospital during December 2022 - January 2023 was carried out in 6 cases (50%), specifically with 3 cases each in December 2022 and January 2023. *Gentamicin* is a type of *aminoglycoside* class of antibiotics that sucks bacterial protein synthesis by binding to the 30s ribosomal subunit which causes damage to bacterial cells. *Gentamicin* is considered to have poor absorption by the gastrointestinal tract, but works quickly intramuscularly, while the time needed to reach peak plasma concentrations is around 30-60 minutes.

The bactericidal effect possessed by *Gentamicin* reacts on gram-positive and gram-negative bacteria. *Gentamicin* has poor absorption when given orally. As for the excretion of 70% *Gentamicin* through the urine in an unchanged form. Removal of *Gentamicin* is carried out by the kidneys. Meanwhile, the excretion of *Sagestam*® carried out by bile is very small. The time needed to set aside *Sagestam*® is two to three hours in its active form without changing its form (MIMS, 2023b).

Medical Indication

Table 3. Medical Indications in Cesarean Section Patients at Hospital X in Central Jakarta, December 2022 – February 2023

No.	Medical Indications	Amt.	Percentage
1	Breech Presentation	6	3,90%
2	Cephalopelvic Disproportion (CPD)	6	3,90%
3	Twin Births	1	0,65%
4	Premature Rupture of Membranes (PROM)	11	7,14%
5	Oblique Position	5	3,25%
6	Macrosomia	2	1,29%
7	Oligohidramnios	3	1,95%
8	Prior Cesarean Delivery	28	18,18%
9	Advanced Maternal Age	10	6,49%
10	Maternal Request	51	33,12%
11	Other Indications	31	20,13%
	Total	**154**	**100%**

Source:

Medical indication is a term in which certain conditions are experienced by the patient that can lead to the necessity of having a cesarean birth. Based on the table data above, the medical indications experienced by cesarean section patients at this hospital from December 2022 to January 2023 were mostly due to maternal request, which found 51 patients or 33.12%, while the least was due to indications of multiple births namely only 1 case or 0.65%. Then for

the second largest was due to other indications in which there were 31 cases or 20.13%, where other indications in this study included anxiety, bleeding, induction failure, fetal anemia, brown spots, scars from surgery, fetal distress, low platelets and primary infertile.

Prophylatic Antibiotics Conformity with Hospital Formularies

Table 4. Prophylatic Antibiotics Conformity with Hospital Formularies at Hospital X in Central Jakarta, December 2022 – February 2023

No.	Prophylatic Antibiotics Conformity	Amt.	Percentage
	Accordance with Hospital Formularies	154	100%
	Not in Accordance with Hospital Formularies	0	0%
	Total	**154**	**100%**

Source:

Based on the data above, it is known that the use of prophylactic antibiotics in cesarean section patients at hospital X in the Central Jakarta during December 2022 - January 2023 is in accordance with the hospital formulary. While, the type of prophylactic antibiotic that is widely used for cesarean section patients at this hospital is *Ceftriaxone* injection. The injectable *Ceftriaxone* used in this hospital belongs to the third generation cephalosporin group which is given by intravenous injection.

CONCLUSION

Conclusion

From the research that was conducted on 154 samples of cesarean section patients using prophylactic antibiotics at a hospital in Central Jakarta and spanning from December 2022 to January 2023, it was concluded that the most age criteria were found in the category of female patients aged 20-35 years with a total of 120 patients or a percentage of 77.92%. Meanwhile, the most widely used type of prophylactic antibiotic for cesarean section patients at this hospital was an injection of *Ceftriaxone* with a total of 147 cases or 95.45%. Then *Sagestam* injection with 6 cases or 3.90% and the least used was *Cefotaxime* injection with 1 case or 0.65%.

Then, based on medical indications, patients who had caesarean sections were most commonly found due to maternal requests, namely 51 cases with a percentage of 33.12%. Followed by other indications in 31 cases or 20.13% where these indications were caused by anxiety, brown spots, fetal distress, surgical scars, fetal anemia, failed induction, low platelets and primary infertile. Furthermore, the suitability of using prophylactic antibiotics with the internal hospital formulary was 100% of 154 patients, which means that the use of prophylactic antibiotics with the hospital formulary was fully compatible.

Suggestion

Future research is expected to be carried out prospectively in order to obtain more precise information about the patient's condition. Then regarding the rationale for the use of prophylactic antibiotics with the hospital formulary, further research should be carried out. For hospitals, it is hoped that patient data recording can be done better so that data such as patient profiles and drug use can be seen easily.

REFERENCES

Anggraini, A. B., & Syachroni, S. (2020). Penggunaan Antibiotik Profilaksis pada Bedah Bersih di Rumah Sakit di Jakarta. *Jurnal Penelitian Dan Pengembangan Pelayanan Kesehatan*, *4*(1), 7–12. https://doi.org/10.22435/jpppk.v4i1.3201

Bratzler, D. W., Dellinger, E. P., Olsen, K. M., Perl, T. M., Auwaerter, P. G., Bolon, M. K., Fish, D. N., Napolitano, L. M., Sawyer, R. G., Slain, D., Steinberg, J. P., & Weinstein, R. A. (2013). Clinical practice guidelines for antimicrobial prophylaxis in surgery. *Surgical Infections*, *14*(1), 73–156. https://doi.org/10.1089/sur.2013.9999

Dewi, S. (2012). Efektivitas Pendidikan Kesehatan Tentang Nutrisi dan Perawatan Luka Dengan Video Terhadap Penyembuhan Luka Sesar. Universitas Indonesia.

Grisbrook, M. A., Dewey, D., Cuthbert, C., McDonald, S., Ntanda, H., Giesbrecht, G. F., & Letourneau, N. (2022). Associations among Caesarean Section Birth, Post-Traumatic Stress, and Postpartum Depression Symptoms. *International Journal of Environmental Research and Public Health*, *19*(8). https://doi.org/10.3390/ijerph19084900

Heryana, A. (2020). Desain Penelitian Non Eksperimental (Issue June, p. 62). https://doi.org/10.13140/RG.2.2.30493.95201

Jitawiyono, S., & Kristiyanasari, W. (2012). Asuhan Keperawatan Post Operasi. Nuha Medika.

Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/Menkes/200/2020 Tentang Pedoman Penyusunan Formularium Rumah Sakit, (2021).

Maelaningsih, F. S., Fahriati, A. R., Wijanarko, D. A. W., & Supriyati, E. (2020). Evaluasi Penggunaan Antibiotik Profilaksis Pada Pasien Section Caesarea Di Rumah Sakit Swasta Tangerang Selatan. *1*(1).

Melnick, J., & Adelberg's. (2013). Mikrobiologi Kedokteran. Salemba Medika.

MIMS. (2023a). *Cefotaxime*. Mims.Com. https://www.mims.com/indonesia/drug/info/*Cefotaxime*?mtype=generic

MIMS. (2023b). *Gentamicin*. Mims.Com. https://www.mims.com/indonesia/drug/info/*Gentamicin*?mtype=generic

Rusdiana, N., Safitri, M., & Resti, A. (2016). Evaluasi Penggunaan Antibiotika Profilaksis Pada Pasien Bedah Sesar Terencana Di Rumah Sakit Ibu Dan Anak "X" Di Tangerang. *Social Clinical Pharmacy Indonesia Journal (Vol., 1*(1), 67–75.

Sarmalina simamora, H. (2021). Evaluasi Penggunaan Antibiotik Profilaksis Pada Pasien Bedah Kategori Highly Recommended Di Rumah Sakit "X" Kota Prabumulih. *Jurnal Muara Sains,Teknologi,Kedokteran,Dan Ilmu Kesehatan*, *5*(1), 121–134.

Yulia, R., Herawati, F., Jaelani, A. K., & Anggraini, W. (2018). Evaluation of Antibiotics Use and Bacteria Profile of Caesarean Section at Regional General Hospital, Pasuruan. *Indonesian Journal of Clinical Pharmacy*, *7*(2), 69–77. https://doi.org/10.15416/ijcp.2018.7.2.69