

Analisis *cost-minimization* penggunaan injeksi antibiotik sulbenisilin dibandingkan amoksisilin dan kalium klavulanat pada seksio sesarea

Cost-minimization analysis of intravenous sulbenicillin versus coamoxiclav for cesarean section

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Abstrak

Telah dilakukan penelitian penggunaan antibiotik profilaksis, sulbenisilin dibandingkan amoksisilin dan kalium klavulanat injeksi. Penelitian dilakukan secara retrospektif pada pasien yang melahirkan secara seksio sesarea dan mendapatkan sulbenisilin atau coamoxiclav injeksi di PKU Muhammadiyah Yogyakarta. Data diambil dari tanggal 1 Januari 2000 sampai dengan 31 Desember 2000. Langkah-langkah penelitian meliputi pencatatan data mengenai identitas pasien, indikasi dilakukan bedah sesar, jenis irisan abdominal dan antibiotik yang digunakan. Data yang terkait dengan biaya meliputi pemakaian obat dan alat operasi, biaya obat, biaya perbekalan farmasi, waktu yang diperlukan perawat untuk memberikan obat, dan biaya untuk mengatasi komplikasi yang terjadi.

Dari 98 catatan medik yang terkumpul dilakukan analisis *cost-minimization*. Hasil penelitian menunjukkan lama hari perawatan pasien yang mendapatkan sulbenisilin injeksi adalah 4,85 hari dan pada pasien yang mendapatkan amoksisilin dan kalium klavulanat 4,90 hari. Dari perhitungan didapatkan biaya total rata-rata penggunaan sulbenisilin injeksi per hari lebih kecil, yaitu Rp.140.509, dibandingkan dengan amoksisilin dan kalium klavulanat, yaitu Rp. 376.310.

Hasil penelitian ini diharapkan dapat memberikan manfaat, yaitu sebagai masukan pada klinisi untuk mengambil keputusan dalam penggunaan antibiotik pada seksio sesarea, bahan masukan bagi Komite Farmasi dan Terapi dalam merevisi Formularium Rumah Sakit dan penyusunan Pedoman Penggunaan Antibiotik dan bahan masukan bagi rumah sakit untuk menentukan Kebijakan Obat Rumah Sakit.

Kata kunci : antibiotik, seksio sesarea, biaya

Abstract

The cost of antibiotic prophylaxis sulbenicillin versus coamoxiclav (in term of medication use and treatment of complications) to treat cesarean section was compared.

The medical records of patient receiving intravenous sulbenicillin or coamoxiclav for the treatment of cesarean section in PKU Muhammadiyah Hospital were retrospectively reviewed. Data were collected for patients treated from January 1, 2000 to December 31, 2000. Patient data collected included patient data based, indication of cesarean section, abdominal incision and oral antibiotics. Cost data collected included drug acquisition

cost, cost of drug supplies, nursing time to administer the agents and cost of managing complication.

The medical records of 98 patients were identified and reviewed. The average length of stay was 4.85 days for the sulbenicillin group and 4.90 days for the coamoxiclav group. The average total including the cost of complication was Rp. 140.509 in sulbenicillin group and Rp. 376.310 in coamoxiclav group.

In conclusion, the study demonstrates that intravenous coamoxiclav has a higher cost than that of intravenous sulbenicillin. This result can be used to assist institution, clinicians and pharmacists in determining the most appropriate and efficient use of drugs. These data can be a powerful tool to support various clinical and policy drug use decisions, for example included formulary management and drug use policy or guidelines.

Key words: antibiotics, cesarean section, cost.

Introduction

The demand for and hence the cost of health care are increasing in all countries in the world as the improvement and sophistication of health technologies increase. Many governments are focusing their activities on promoting the effective and economic use of resources allocated to health care. The increased use of evidence-based programmes not only concentrates on optimising health outcomes but also utilities health economic evaluation (Evans and Hurley, 1995).

Economic evaluation techniques were designed to help decision makers to ensure that scarce public resources are used to obtain the greatest possible social benefit. The similar term of health economic evaluation is Pharmacoeconomics. Pharmacoeconomics can be defined as the measurement of both the cost and consequences of therapeutic decision-making. Pharmacoeconomics provides a guide for decision makers on resource allocation but does not offer a basis on which decisions should be made (Bootman *et al.*, 1996).

Cesarean section is defined as the birth of the fetus through incisions in the abdominal wall and the uterine wall. Although cesarean delivery can be regarded as a reasonably safe surgical procedure, it is associated with higher risks of morbidity and mortality than vaginal delivery. For the past 20 years, interest in the perioperative and prophylactic use of antibiotics for cesarean section has been stimulated by a number of events, including the high rate of postoperative infections, the recent increase in the rate of cesarean section and the success of infection prophylaxis in vaginal hysterectomy (Cunningham *et al.*, 1997).

The antibiotics chosen for prophylaxis for gynaecologic surgery should have activities against the broad range of vaginal organism. The first and second generation cephalosporins are well suited for this purpose because of their activity against gram-positive, gram-negative, and anaerobic organism. Most classes of antibiotics (including penicillin, tetracycline, sulfonamide, broad spectrum penicillin, and cephalosporins) and anaerobic drugs have been shown to be as effective as prophylactic antibiotics (Jarning and Rybak, 1997).

American Medical Association reviewed that cefoxitin, cefotetan, third generation cephalosporins and extended spectrum penicillin have been shown to be effective for prophylaxis of cesarean section. (Briceland and Guglielmo, 1996) In PKU Muhammadiyah Yogyakarta Hospital, the majority of antibiotics prophylaxis for cesarean section referred to 2000 was IV sulbenicillin and coamoxiclav. The purpose of this study was to compare costs of IV sulbenicillin and coamoxiclav (in term of medication use and treatment of complications). We conducted a cost-minimization analysis from an institutional perspective.

Methodology

We conducted a retrospective review of the medical records of patients receiving intravenous (iv) sulbenicillin or coamoxiclav for cesarean section. Patients were identified through the pharmacy computer database. Data were collected for patient treated from January 1, 2000 to December 31, 2000 in the gynaecologic and obstetric division PKU Muhammadiyah Hospital Yogyakarta. Patients were included if they admitted for cesarean section, admitted to economic class and received iv sulbenicillin or coamoxiclav. Patients

were excluded if they received combination IV antibiotics therapy.

Patient data collected included baseline demographics (maternal age, indication prior cesarean section, the type of abdominal incision and weight birth), antimicrobial dosage and dosage interval. Because this was a retrospective review, adverse effects were not evaluated. The complication was documented from medical record if occurs draining wound or presence of pus after discharge from the hospital.

Cost data included drug acquisition cost, nursing time to administer the agent, cost of drug supplies and cost of managing complications. In our study, the Pharmacy cost of drug preparation was not included, because the drug was prepared by the same time in all patients.

All evaluation was carried out from the hospital perspective and the cost was referred to 2000, the year in which the trial was conducted. We evaluated direct cost per patient after cesarean section related to iv antibiotic treatment and mean cost of complication.

The cost of iv therapy was calculated by summing the acquisition cost of drugs and the cost of both materials used and the time spent by nursing staff to administer the therapy. The cost of drugs and materials were evaluated using hospital acquisition prices.

The cost of nursing time was calculated by using an average nursing salary of Rp 3.500 per hour (average of Sakinah ward nurse's; the salaries were obtained from Administrative Department). Time to administer the medication was determined by polling Sakinah ward nurse's about the time taken to administer these iv medications.

The cost of treating complications (i.e. presence of pus or wet wound) included the cost of drugs and materials to treat the complication.

Using student's t test compared continuous variables. The chi-square test was used to compare categorical variables between the two groups.

Table I. Distribution of intravenous antibiotics usage

Antibiotics	number	%
Sulbenisilin	77	78,6
coamoxiclav	21	21,4
Total	98	100

Results and Discussion

The medical records of 98 patients who received iv sulbenicillin or coamoxiclav were identified and reviewed. Seventy-seven patients (78,6%) received iv sulbenicillin and 21 patients (21,4%) received iv coamoxiclav (table I).

Prophylactic antibiotics are used widely in surgical procedures and account for up to 50 % of total antibiotic usage in many hospitals. The purpose of surgical antibiotic prophylaxis is to reduce the prevalence of postoperative wound infection at or around the surgical site. Appropriate Prophylactic antibiotics can reduce the incidence of postoperative infection by 50–70 % as documented by controlled clinical trials. Administration of prophylactic antibiotics in certain surgical procedures can decrease postoperative infections, decrease length of hospital stay, and reduce the overall cost of care.

Antibiotic prophylactic in cesarean section should be limited to patients at high risk for infectious disease. Only a short perioperative course of antibiotics should be administered and continuing for one or two postoperative doses at 6-hour intervals. In our study, patient received 4 to 6 postoperative dose at 8 to 12 hour intervals.

Table II showed that the maternal age of 33,8% (26 of 77) patients in iv sulbenicillin group were 25 to 29 years old and 47,6% (10 of 21) in the coamoxiclav group.

Table II. Distribution of age

Maternal age	Sulbenisilin		coamoxiclav		Total	
	number	%	number	%	number	%
15 - 19	3	3,8	-	-	3	3,0
20 - 24	12	15,6	3	14,3	15	15,3
25 - 29	26	33,8	10	47,6	36	36,8
30 - 34	20	26,0	5	23,8	25	25,5
35 - 39	16	20,8	3	14,3	19	19,4
Total	77		21		98	100

Table III. Indication for cesarean section

Indication	Sulbenisilin		coamoxiclav		Total	
	number	%	number	%	number	%
Serotinus	5	6,5	3	14,3	8	8,2
KPD	14	18,2	2	9,6	16	16,3
Breech	8	10,4	5	23,8	13	13,3
Proven cephalopelvic disproportion	10	13,0	1	4,7	11	11,2
dystocia	16	20,7	6	28,6	22	22,4
Preeklampsia	7	9,1	1	4,7	8	8,2
Placenta previa	11	14,3	2	9,6	13	13,2
others	6	7,8	1	4,7	7	7,1
Total	77		21		98	100

Table IV. Type of incision

Type of incision	Sulbenisilin		coamoxiclav		Total	
	number	%	number	%	number	%
Vertical	45	58,4	7	33,3	52	53,1
Fannenstiell	32	41,6	14	66,7	46	46,9
Total	77		21		98	100

Table V. Mean cost per patient for intravenous antibiotics usage

Regimen	Acquisition cost	Drug supplies	Nursing time	Complication cost	Total cost
sulbenicillin	Rp.133.550	Rp.17.809	Rp. 800	Rp. 8.350	Rp.140.509
coamoxiclav	Rp.332.850	Rp.22.010	Rp.1.690	Rp.19.760	Rp.376.310

In general, the indication for cesarean section is any situation in which delivery of the fetus must be accomplished and in which induction of labor, a trial labor, additional labor, or vaginal delivery of the fetus is deemed to be of greater risk to the mother or the fetus than abdominal delivery. Our study demonstrates that the most frequent indication for cesarean section is dystocia or failure to progress in labor (Table III).

Trial of labor in patients with a vertical abdominal incision for cesarean section was 53,1% and 46,9% with a fannenstiell (table IV). The advantages of the transverse uterine incision over the vertical uterine incision for cesarean section, that low vertical incision almost always extend into the thicker muscle layers of the fundus and are more frequently complicated by improper healing and subsequent rupture. Also when the entire uterine incision can be covered by the bladder peritoneum there is less risk of postoperative

ileus, peritonitis, and subsequent adhesions and bowel obstruction.

Our study demonstrates that the most common weight birth between two groups was 3000 – 3499 gram. The differences about maternal age, indication for cesarean section, the type of abdominal incision, and weight birth between two groups were no significant.

Choosing an antimicrobial agent to treat or prevent an infection is far more complicated than simply matching a drug to known or suspected pathogens. The medication order form recorded 50 % of the oral antibiotics administered after the iv antibiotics stopped was amoxicillin. Selection of antimicrobial therapy is nearly always empiric and based on drug of choice for the treatment of most pathogens.

As efforts to minimize health care cost increase, it is essential to look beyond drug acquisition costs and consider others factors involved in drug therapy, included drug

preparation, drug administration dosage frequency and patient tolerability. Although drug acquisition cost is a substantial component of the total cost of drug therapy, the additional factor previously mentioned can have a substantial impact on total cost.

All evaluation was carried out from the hospital perspective. Cost-minimization analysis is used to compare alternative intervention for the same disease or condition where it can be proved that the alternatives have identical outcomes. The option, which is the least costly, is the most efficient.

In our study, we attempted to account for the major components contributing to the total cost of drug therapy. Our result should be viewed with caution because of the retrospective nature of study would provide more accurate information in term of patient tolerability and other confounding factors that may contributes to adverse effects.

The cost of nursing time was calculated by using an average nursing salary multiplied by the time to administer the medication. From data obtained by administrative department, the mean cost per hour per worker in the medical obstetric and gynaecology division (sakinah ward) was obtained by dividing the total annual (2000) cost of nursing staff by the number of hours worked by each group in the same year. This cost was Rp 3500 (Rp 60/minute). In our study, the average cost to administer iv sulbenicillin was Rp 800 and Rp 1.690 for iv coamoxiclav.

The dose of iv sulbenicillin therapy was 1 gram three times daily for about two days and for iv coamoxiclav was 1 gram twice daily for about three days. As sulbenicillin is available in vials containing 1 gram (hospital acquisition price Rp 18.925). Therefore, the average of intravenous sulbenicillin acquisition cost for each patient would be $\text{Rp } 18.925/\text{vial} \times 3 \times 2 \text{ days} = \text{Rp } 113.550$. The average of intravenous coamoxiclav acquisition cost for each patient would be $\text{Rp } 55.475/\text{vial} \times 2 \times 3 \text{ days} = \text{Rp } 332.850$.

To administer iv sulbenicillin, 5 ml syringe (Rp 2.965) was needed. For iv coamoxiclav, 10 ml syringe (Rp 3.665) was needed. All these prices were obtained from the hospital pharmacy. Cost of intravenous sets

and needles for the administration of drugs were not included, because antibiotics were administered using the same equipment.

The cost of treating complications (presence of pus or wet wound) included the cost of drugs and materials were Rp 8.350 for iv sulbenicillin group and Rp 19.760 for coamoxiclav group.

The mean total days of therapy were 4,85 for the iv sulbenicillin group and 4,90 for the coamoxiclav group. There were no significant differences between groups ($p=0,05$). The average total cost, including the cost of complication was Rp.140.509 (over 4,85 days) in the iv sulbenicillin group and Rp.376.310 (over 4,90 days) in the coamoxiclav group. It was suggested that the cost of drug acquisition, drug supplies, administration cost and complication cost for coamoxiclav was greater than for sulbenicillin.

Limitation

Given that our evaluation was retrospective, it is important to consider other factors that may have biased our result. Although both sulbenicillin and coamoxiclav are associated with other adverse effects (e.g. hypersensitivity reactions and irritation of the gastrointestinal tract), we focused only on complication.

We did not consider cost associated with any potential therapy used for phlebitis or thrombophlebitis, nor did we consider the impact of these adverse effects on nursing time. Because this was a retrospective study, we have no information about the patient perspective on the treatment regimens. Factors such as discomfort due to phlebitis and the potential inconvenience of dosage intervals are important to consider in the choice of optimal drug therapy.

Although pharmacoeconomic data are always interesting and sometimes compelling, they need to be interpreted in terms of the specific clinical context being addressed before they can be used to influence the clinical decision-making process.

Conclusion

The combined drug acquisition, drug supplies, administration cost, and complication cost for coamoxiclav was greater than that for sulbenicillin.

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