ORIGINAL ARTICLES

Cost-effectiveness analysis of 2 g of cefazolin compared with 1 g of cefazolin as prophylactic antibiotics in cesarean section at the Mekong Maternity Hospital from 2021 to 2022

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ABSTRACT

Objective: To investigate the cost-effectiveness of using the prophylactic antibiotic cefazolin during cesarean section with a dose of 2 g compared to 1 g by clinical practice at the Mekong Maternity Hospital.

Methods: A cost-effectiveness analysis applying a decision tree was conducted to compare the use of cefazolin 2g to cefazolin 1g from a healthcare sector's perspective. Cost parameters were extracted and calculated from electronic medical records from the Mekong Maternity Hospital, whereas quality-adjusted life-years were derived through literature review. Hospital data were collected retrospectively from January 2021- June 2021 for women prophylactically using 1g of cefazolin and prospectively from January 2022-June 2022 for those treating with 2 g of cefazolin. The Incremental Cost-effectiveness Ratio was estimated to determine whether it is cost-effective between two regimens. Sensitivity analyses were used to examine the robustness of the results.

Results: The use of 2 g of cefazolin for prophylactic antibiotics in the cesarean section per each woman was less expensive at 28.353.391 VND compared with 28.410.451 VND for the use of 1 g of cefazolin. Also, it was more effective expressed by higher QALYs at 0,9194 versus 0,9154 in case using 1 g of cefazolin, resulting as the dominant regimen. Cefazolin 2g usage gained a 65.9% probability being more cost-effective than 1 g of cefazolin at the willingness to pay threshold of 3GDP per capita.

Conclusion: The use of 2 g of cefazolin was likely to be dominant over 1 g of cefazolin pertaining to cost-effectiveness terms as a cesarean delivery infection prophylaxis.

Keywords: *Cesarean section; cost-effectiveness analysis; cefazolin; different doses; prophylactic antibiotics.*

INTRODUCTION

With the development of medicine, cesarean section techniques are becoming increasingly popular in medical interventions to ensure the safety of mothers and children. However, a cesarean section can increase the risk of postpartum infection by 5 - 20 times compared to vaginal delivery (1). The use of prophylactic antibiotics during cesarean section has been proven by the Centers for Disease Control and Prevention (CDC) to reduce the risk of surgical site infection and endometritis by 38% and 62% respectively

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(2). Besides, another study in Switzerland in 2018 also showed a reduction in healthcare costs by 31 Euro per cesarean section (95% CI: 4-58 Euro) with a 99% probability of cost savings by using antibiotic prophylaxis (3). Medical evidence related to prophylactic cefazolin dosing varies between organizations and specialized associations. Specifically, recent treatment guidelines provide additional recommendations by increasing the cefazolin dose to 2 g instead of 1 g for the prevention of surgical site infection (4). Elkomy et al. (2014) also demonstrated that a preoperative 2-g dose of cefazolin proved more effective in sustaining blood levels at or above the target minimum inhibitory concentration required for susceptible gram-positive bacteria during surgery compared to maternal administration of 1 g of cefazolin, ensuring neonatal exposure within clinically acceptable ranges (5). In 2019, the Mekong Maternity Hospital issued guidelines for the use of prophylactic antibiotics in surgery and obstetrics and gynecological procedures with a dose of 1 g of cefazolin. This guideline was later updated in 2021 with a change in conditions of application and an increase in the cefazolin dose to 2 g to ensure adequate serum and tissue concentrations as well as to minimize the surgical site infection, but the evidence of costs and effectiveness of this change has not been systematically assessed. The objective of the current study is to to analyze the cost-effectiveness of using the prophylactic antibiotic cefazolin during cesarean section with a dose of 2 g is compared to 1 g by clinical practice at the Mekong Maternity Hospital in the period 2021 and 2022. The study aimed to provide appropriate recommendations to help clinicians choose the optimal dose of prophylactic antibiotics and to achieve high efficiency in preventing infections after cesarean section, without increasing the cost of postoperative complications.

METHODS

Study design

We conducted a cost-effectiveness analysis applying a decision tree to compare the use of 2 g of cefazolin (intervention group) to 1 g of cefazolin (standard group) for preventing postoperative infections and then evaluated results from a healthcare sector's perspective. The time horizon for this analysis was the entire length of stay of the patient from the admission day to the discharge day. Figure 1 illustrates the model structure of the decision tree. The decision-analytic model begins with pregnant women who were indicated for cesarean delivery receiving either 2g of cefazolin or 1g of cefazolin for postoperative prophylaxis. Following the model, after having undergone cesarean section procedures with prophylactic antibiotics, women could experience either maternal outcomes including healthy state or postoperative infections during the remaining hospitalization time. Following the definitions related to nosocomial surgical infections of Centers of Disease Control, postoperative infections encompass both superficial surgical site infection and deep surgical site infection (similar to endometritis) emerging within 30 days post-operation. However, due to limited resources and the study design for retrospective and prospective data collection, we could only track the incidence of postoperative infection among pregnant women during their hospitalization days. We assumed that postoperative infections only occurred when patients were hospitalized after operation.

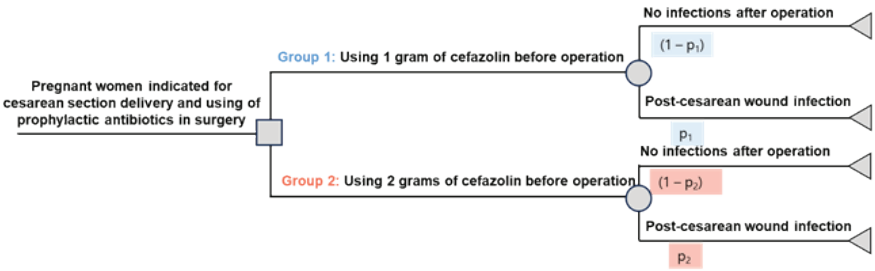

Figure 1. Model Structure

Location and Time of Study: This research was conducted at the Mekong Maternity Hospital from June 2021 to December 2022.

Research subjects: The subjects of this research were the costs associated with the effectiveness of treatment with 2 g of cefazolin (intervention group) versus treatment with 1 g of cefazolin (standard group) for preventing postoperative infections in the cesarean section. Data pertaining to these research subjects were collected retrospectively from January 2021- June 2021 for women prophylactically using 1g of cefazolin and prospectively from January 2022-June 2022 for those treating with 2 g of cefazolin by total population sampling method. All laboring women undergoing cesarean section (ICD code O82.0) administered 1g of cefazolin between January 2021-June 2021 or 2g of cefazolin from January 2022-June 2022 at the Mekong Maternity Hospital were eligible for this study. Exclusion criteria includes having unstable medical conditions (hypertension, cardiovascular disease, diabetes, ….), surgical infection or signs of infection or risk of infection detected during surgery, complications (adhesions, drainage, difficulty in hemostasis, hematoma, damage to neighboring organs, etc.), waters ruptured > 6 hours, total amount of blood loss > 1000 ml, pregnant woman's weight ≥ 80 kg, or missing treatment information.

Variables and Statistical Analysis:

Regarding the model inputs, we classified them into 4 main groups: demographic characteristics, clinical characteristics, cost and utility parameters. Demographic characteristics, clinical characteristics (transitional probabilities), cost parameters were directly extracted and calculated from electronic medical records from the Mekong Maternity Hospital, whereas quality-adjusted life-years (QALYs) were derived through literature review.

1. Demographic characteristics

The study analyzed the demographic characteristics of the study sample through variables which were reported as below:

- Continuous variables (mean, standard deviation): Age, weight, number of white blood cells before surgery, Gestational age

- Binary variables (numbers of cases, Percentage): Comorbidities, premature rupture of membrane before surgery

2. Clinical characteristics

Clinical characteristics of the study sample were described via operative and post-operative characteristics as follows:

- Operative characteristics:

+ Continuous variables (mean, standard deviation): Operation duration (minutes), volume of blood loss during surgery (ml), length of stay (days)

+ Categorical variables (numbers of cases, percentage): Period using prophylactic antibiotics (with 3 categories: timing before operation ≤ 60 mins, timing before operation > 60 mins, During Operation), time period before surgery (with 4 categories: < 6 hours, 6 - < 24 hours, 24 - < 48 hours, ≥ 48 hours)

- Postoperative characteristics:

+ Binary variables (numbers of cases, percentage): complications after surgery (Serum discharge, redness around the wound, purulent wound drainage), postoperative interventions (suction dilation and curettage or drainage in abdominal surgery, drainage, antibiotic switch therapy), post-cesarean wound infection rate

+ Categorical variables (numbers of cases, percentage): ASEPSIS score (with 5 categories: 0 – 10, 11 – 20, 21 – 30, 31 – 40, > 40)

In particular, the post-cesarean wound infection rate between two groups (presented as percentage with 95% confidence interval) mentioned above were used as transitional probabilities in the decision tree model.

3. Cost parameters

Drug costs, specifically costs for antibiotic prophylaxis between two groups were obtained from electronic medical records with the support of inpatient management software.

From a healthcare sector's perspective, costs are calculated as direct medical costs including surgery costs, bed day costs, nursing care costs, drug costs, medical equipment costs, testing costs, diagnostic imaging costs, and other costs (6). In addition, the study analyzed factors associated with total direct medical costs using a general linear regression model with the log link function, and the Gamma distribution was used because it was appropriate for the distribution of cost data in the study. Finally, adjusted total direct medical costs were estimated from a generalized linear regression model with adjustments for cost-related variables that were analyzed and divided into two groups with and without post-cesarean wound infection.

All costs were inflated to the 2022 VND based on the Consumer Price Index (CPI) conversion formula as follows:

Costs (in 2022) = with CPI_{2022} index equaled to 177.31 and CPI_{2021} index equaled to 171.88 (7,8)Click or tap here to enter text..

4. Quality-adjusted Life Year (QALY) parameters

QALYs were derived from the study by Lee BY et al. We used a maternal QALY of 0.92 for healthy women after cesarean section, and 0.6 for those developed a postoperative wound infection (9).

Total costs and QALYs were estimated for each regimen to determine the incremental cost-effectiveness ratio of replacing 1 g of cefazolin regimen with 2 g of cefazolin regimen fot cesarean delivery infection prophylaxis. The cost-effectiveness threshold was set at 1GDP- 3GDP per QALY with GDP per capita in Vietnam in 2022 was 95.6 million VND (10).

Sensitivity analysis was performed to allow for variations of model inputs and measurement of how this variation would change ICER results. For univariate sensitivity analysis, we evaluated the impact of each model input such as to ICER by changing the value of each model input around the 95% confidence interval or within ±20% and performed the results by Tornado chart (11). Regarding the probabilistic sensitivity analysis (PSA), we quantified the impact of multiple model inputs on the ICER result by random sampling

all the model inputs simultaneously from their probability distributions. We carried out 10,000 Monte Carlo simulations drawn from the probability distributions of model inputs. Beta distributions were assigned to the probabilities, gamma distributions were applied to the cost parameters, and QALYs were assumed to follow the normal distributions. PSA resulted in a distribution of outputs that can be performed with point estimates of ICER with a confidence level of 95%, cost-effectiveness plane and cost-effectiveness acceptability curve.

Research ethics:

All patient information was anonymized and stored as unlinked data prior to analysis to prevent the disclosure of personal information. This study protocol was approved by Biomedical Research Ethics Council at the University of Medicine and Pharmacy at Ho Chi Minh City under the Decision No 625/ HĐĐĐ-ĐHYD.

RESULTS

Characteristics of the sample

Table 1 presents the characteristics of the sample. There was a total of 1116 women in the study sample, dividing equally in two groups (558 women per group). For demographic characteristics, the mean age of pregnant women in the study sample was 32.2 ± 4.3 years old. In particular, the mean age of pregnant women in the standard group (1g Cefazolin) is smaller than that in the intervention group (2g Cefazolin) (31.9 ± 4.0 years compared to 32.5 ± 4.5 years old) ($p < 0.05$). The average weight of pregnant women in the study sample was 64.6 ± 6.3 kg and there was no statistically significant difference in weight between the two groups ($p > 0.05$). The study also showed that the rates of gestational diabetes in the standard group and 2 are 6.8% and 11.6%, respectively ($p < 0.05$). Regarding to the gestational age, the mean gestational age of the study subjects was 38.8 ± 0.8 weeks, with the older one in the standard group than in the intervention group (38.8 ± 08 weeks vs. 38.7 ± 08 weeks).

In the study, over 95% of pregnant women had a cesarean section within 24 hours of hospital admission. Pregnant women in The standard group had a preoperative hospital stay of more than 48 hours, a statistically significant higher rate than in the intervention group (1.4% vs. 0%, $p < 0.05$).

The mean operation duration of the study sample was 40.3 ± 5.9 minutes, the average operation duration of pregnant women in The standard group was statistically significantly shorter than in the intervention group (39.8 ± 5.4 minutes vs. 40.7 ± 6.4 minutes) with $p<0.05$.

Pertaining to postoperative characteristics, our study found that the rate of post-cesarean wound infection in the group taking a dose of 2 g cefazolin was statistically significantly lower than the group taking a dose of 1 g cefazolin (0.2% vs. 1.4%; $p<0.05$). Signs of post-operative infection such as redness around the wound and purulent wound drainage developed in women belong to the standard group were significantly higher than those in the intervention group (2.3% versus 0.4% , 0.2% versus 0.0%, respectively).

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Table 1. Characteristics of the sample

Characteristics	Standard group: Using 1g of cefazolin N = 558 (%)	Intervention group: Using 2g of cefazolin N = 558 (%)	Total N = 1.116 (%)	p-value
Demographic characteristics				
Age				
Mean (Standard Deviation)	31.9 ± 4.0	32.5 ± 4.5	32.2 ± 4.3	0.02***
Weight (kg)				
Mean (Standard Deviation)	64.3 ± 6.1	64.8 ± 6.5	64.6 ± 6.3	0.16***
Comorbidities				
Diabetes	38 (6.8)	65 (11.6)	103 (9.2)	0.01*
Hypertension	9 (1.6)	6 (1.1)	15 (1.3)	0.44*
Cardiovascular disease	7 (1.2)	4 (0.7)	11 (1.0)	0.61**
COPD	5 (0.9)	2 (0.4)	7 (0.6)	0.55**
Others	39 (7.0)	31 (5.6)	70 (6.3)	0.32*
Premature rupture of membrane before surgery				
Yes	39 (7.0)	22 (3.9)	61 (5.5)	0.03*
No	519 (93.0)	536 (96.1)	1,055 (94,5)	
Number of white blood cells before surgery (x10^9 cells//L)				
Mean (Standard Deviation)	9.5 ± 2.5	9.8 ± 2.1	9.7 ± 2.3	0.04***
Gestational age (weeks)				
Mean (Standard Deviation)	38.8 ± 0.8	38.7 ± 0.8	38.8 ± 0.8	0.01***
***Operative characteristic*s**				
Period using prophylactic antibiotics				
Timing before Operation ≤ 60 mins	501 (89.8)	521 (93.3)	1,022 (91.6)	0.00**
Timing before Operation > 60 mins	56 (10.0)	6 (1.1)	62 (5.5)	
During Operation	1 (0.2)	31 (5.6)	32 (2.9)	
Time period before surgery				
< 6	288 (51.6)	323 (57.9)	611 (54.7)	0.006**
6 - < 24	240 (43.0)	216 (38.7)	456 (40.9)	
24 - < 48	22 (4.0)	19 (3.4)	41 (3.7)	
≥ 48	8 (1.4)	0 (0.0)	8 (0.7)	
Operation Duration (minutes)				
Mean (Standard Deviation)	39.8 ± 5.4	40.7 ± 6.4	40.3 ± 5.9	0,01***
Volume of blood loss during surgery (ml)				
Mean (Standard Deviation)	214.3 ± 50.1	209.2 ± 35.6	211.7 ± 43.5	0,05***
Length of Stay (days)				
Mean (Standard Deviation)	5.2 ± 0.9	5.1 ± 0.6	5.2 ± 0.8	0.03***
Postoperative characteristics				
Complications after surgery				
Serum discharge				
Yes	8 (1.4)	1 (0.2)	9 (0.81)	0.04**
No	549 (98.4)	557 (99.8)	1,106 (99.1)	

Characteristics	Standard group: Using 1g of cefazolin N = 558 (%)	Intervention group: Using 2g of cefazolin N = 558 (%)	Total N = 1.116 (%)	p-value
Redness Around the Wound				
Yes	13 (2.3)	2 (0.4)	15 (1.3)	0.007**
No	546 (97.9)	556 (99.6)	1,102 (98.8)	
Purulent Wound Drainage				
Yes	1 (0.2)	0 (0.0)	1 (0.1)	1.00**
No	557 (99.8)	558 (100.0)	1,115 (99.9)	
Postoperative interventions				
Suction dilation and curettage or drainage in abdominal surgery				
Yes	2 (0.4)	0 (0.0)	2 (0.2)	0.50**
No	556 (99.6)	558 (100.0)	1,114 (99.8)	
Drainage				
Yes	1 (0.2)	0 (0.0)	1 (0.1)	1.00**
No	557 (99.8)	558 (100.0)	1,115 (99.9)	
Antibiotic switch therapy				
Yes	14 (2.5)	7 (1.3)	21 (1.9)	0.12*
No	544 (97.5)	551 (98.7)	1,095 (98.1)	
ASEPSIS score				
0 - 10	545 (97.7)	556 (99.6)	1,101 (98.7)	0.048**
11 - 20	6 (1.1)	1 (0.2)	7 (0.6)	
21 - 30	5 (0.9)	1 (0.2)	6 (0.5)	
31 - 40	1 (0.2)	0 (0.0)	1 (0.1)	
> 40	1 (0.2)	0 (0.0)	1 (0.1)	
Post-cesarean wound infection				
Yes	8 (1.4)	1 (0.2)	9 (0.8)	0.038**
No	550 (98.6)	557 (99.8)	1.107 (99.2)	

Figure 2 illustrates the breakdown of total direct medical costs stratified by two groups. The mean total direct medical costs for each pregnant woman undergoing cesarean section in the study sample was 2,838 million VND. Specifically, bed day cost was identified to be the highest (8,976 million VND) that accounted for 34,6% of the total costs. Surgery cost and nursing care costs also made up a high proportion of over 20% of the total direct medical costs for each woman. Meanwhile, the drug cost was only 3.9% of the total costs.

The mean total costs for each pregnant woman in the standard group was lower statistically compared to the intervention group (25,673 million VND compared to 31,093 million VND; $p < 0.05$). Except for bed day cost and nursing care cost in the intervention group which were much higher than similar components in the standard group, the remaining components in the intervention group accounted for lower proportions than those in the standard group.

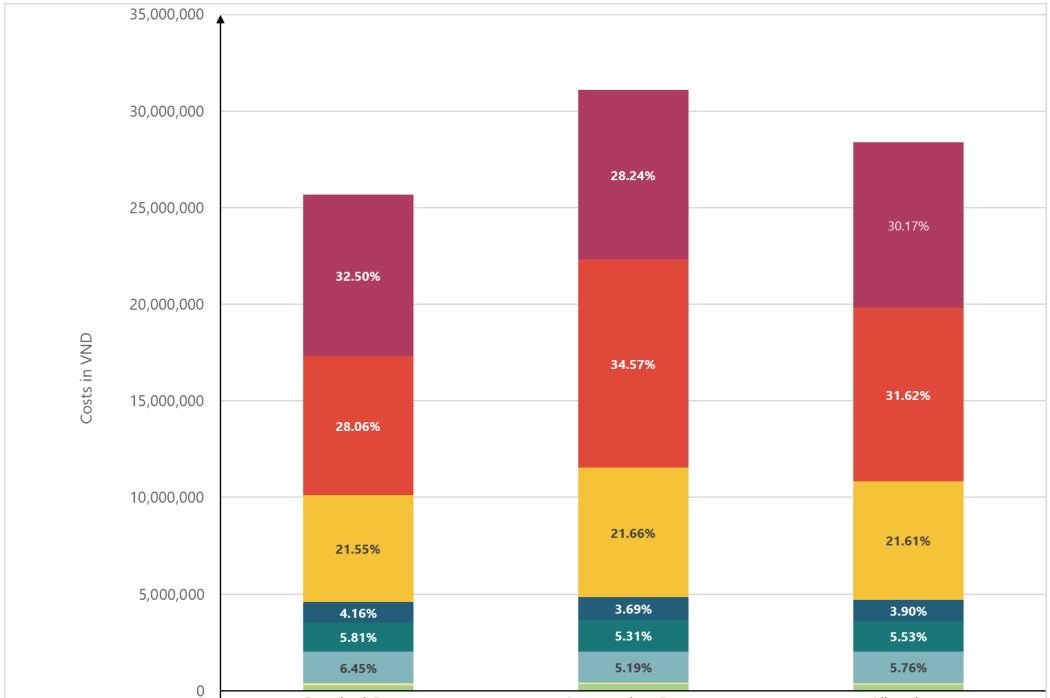
The factors associated with total direct medical costs were identified by using

generalized linear regression model, including age, gestational age, comorbidity of diabetes, period using prophylactic antibiotics, operation duration, and post-cesarean wound infection. Then, the study used this generalized linear regression model to estimate the total direct medical costs stratified by two groups with and without post-cesarean wound infection. Finally, the adjusted total costs for women undergoing cesarean section with and without post-cesarean wound infections were 32,895,420 and 28,345,140 VND respectively.

Model inputs in the model

Main model input variables of the cost-effectiveness model including costs (antibiotic and total costs with adjustment), post-cesarean wound infection rate, QALY values are presented in Table 2.

Cost analysis



	Standard Group	Intervention Group	All patients
Surgery Cost	8,343,500	8,780,500	8,562,000
Bed day Cost	7,204,100	10,748,600	8,976,300
Nursing Care Cost	5,531,600	6,733,500	6,132,600
Drug Cost	1,068,300	1,147,300	1,107,800
Medical Equipment Cost	1,490,800	1,650,700	1,570,700
Testing Cost	1,657,100	1,613,300	1,635,200
Diagnostic Imaging Cost	94,000	86,400	90,200
Other Cost	284,400	333,600	309,000
Total Costs	25,673,700	31,093,700	28,383,700

Figure 2. Breakdown of total direct medical costs

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Table 2. Model inputs in the model

Variable	Mean	Lower Value	Upper Value	Distribution Type	Reference
Antibiotic Cost (Cefazolin 1 g)	16,906	15,216	18,596	Gamma	Hospital data
Antibiotic Cost (Cefazolin 2 g)	33,812	30,431	37,193	Gamma	Hospital data
Total costs (without post-cesarean wound infections) (*)	28,345,140	28,207,900	28,482,390	Gamma	Hospital data
Total costs (with post-cesarean wound infections) (**)	32,895,420	29,519,400	36,271,440	Gamma	Hospital data
Post-cesarean wound infection rate (the standard group) (p_1)	1.43%	1.29%	1.57%	Beta	Hospital data
Post-cesarean wound infection rate (The intervention group) (p_2)	0.18%	0.16%	0.20%	Beta	Hospital data
QALY value: Healthy pregnant women indicated for cesarean section	0.92	0.828	1	Normal	Lee và cs, (2011)
QALY value: inpatient treatment of wound infection	0.6	0.54	0.66	Normal	Lee và cs, (2011)

Base case analysis

The base case analysis results showed that the use of 2 g of cefazolin for prophylactic antibiotics in the cesarean section is less expensive at 28.353.391 VND compared with 28.410.451 VND for the use of 1 g of cefazolin. Also, it is more effective expressed by higher QALYs at 0,9194 versus 0,9154 in case using 1 g of cefazolin (**Table 3**). With lower costs and higher QALYs, the use of 2 g of cefazolin is the dominant regimen.

Table 3. Summary of the base case analysis

Value	The standard group: Using 1g of cefazolin	The intervention group: Using 2g of cefazolin	Incremental value
Total Costs (VND)	28,410,451	28,353,391	-57,059
QALYs	0.9154	0.9194	0.0040
ICER (VND/QALY)	**-**	**-**	**-14,264,849**

Sensitivity analyses

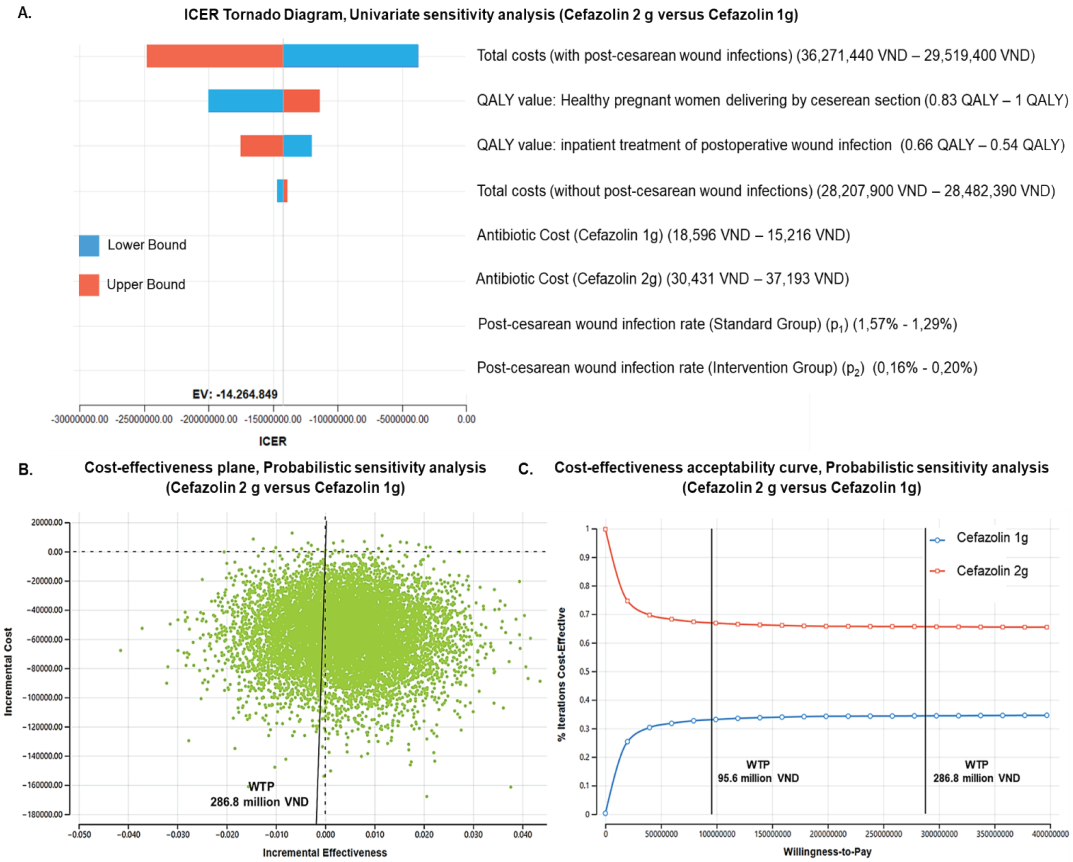

Figure 3. A. Results of univariate sensitivity analysis by Tornado diagram, B. Results of probabilistic sensitivity analysis performed by cost-effectiveness plane, C. Results of probabilistic sensitivity analysis performed by cost-effectiveness acceptability curve.

Univariate and probabilistic sensitivity analyses are shown in **Figure 3**. The results of univariate sensitivity analysis showed that the model inputs that have the highest impact on ICER were total costs (with post-cesarean wound infections), QALY values (with and without post-cesarean wound infections). The willingness-to-pay for one additional QALY was set to 3 GDP per capita which was equivalent to 286.8 million VND. The use of 2 g of cefazolin gained a 65.9% probability being more cost-effective than 1 g of cefazolin at the threshold of 286.8 million VND. Specifically, the probability that cefazolin 2 g is a dominant regimen (lower costs, higher QALYs) was 64.4%. The cost-effectiveness acceptability curve (CEAC) in the **Figure 3C** also showed that there was always an over-65% probability of cefazolin 2g being cost-effective over a range of WTP threshold per QALY.

DISCUSSION

In this study, we evaluated the cost-effectiveness of using 2 g of cefazolin compared to using 1 g of cefazolin for prophylactic antibiotic during cesarean section by a decision tree model.

The regimen of 2 g of cefazolin emerged as the dominant one in cost-effectiveness terms as it not only reduced total costs of 57.059 thousand VND but also improved 0.004 QALYs compared to the regimen of 1 g of cefazolin. PSA showed that at a threshold of 286.8 million VND, the use of 2 g of cefazolin demonstrated a 65.9% probability of being more cost-effective than the 1 g of cefazolin. This study found similar results to prior health economic studies in the world. Specifically, a study conducted in the United States (2004) revealed that the total cost of an uncomplicated elective cesarean section was $1,638.57 and the cost of an elective cesarean section with endometritis was $2,327.29. In particular, the cost of cefazolin administration also accounted for a small amount with 1.01 USD. However, the cefazolin prophylaxis contributed to reduce the total cost of cesarean delivery to $1653.06 as well as the relative risk of endometritis with antibiotics (RR (95% CI)) of 0.18 (0.07 – 0.45) (12). Another study by Martin Jack Mwamba in Norway (2015) showed similar results, emphasizing the cost-effective role of prophylaxis antibiotic regimens for women undergoing caesarian sections. Specifically, with a 5% and 4% incidence of surgical site infections (SSI) for the current and extended guidelines respectively, there was a cost-saving of NOK 40,300 per avoided SSI. The extended guidelines demonstrated a cost and effectiveness difference of NOK 403 (95% CI: NOK -900 to NOK 150) and 0.01 (95% CI: 0.0025 to 0.012), respectively, in comparison to the current guidelines (13).

Despite of the lower post-cesarean wound infection rate in the intervention group versus the standard group, results from the cost analysis showed that the mean total costs for each pregnant woman in the intervention group was statistically higher compared to the standard group with the bed day accounted for the majority (34,6% of the total costs). This can be explained that there was an increase in the number of pregnant women choosing a service room type with a higher price in the first 6 months of 2022, which leads to higher bed-day costs and mean total costs in the intervention group.

The evaluation of prophylactic antibiotic effectiveness relied on monitoring the clinical progression throughout the patient's postoperative hospital stay. Successful prophylactic antibiotic use was determined when no symptoms or signs of infection manifested after a cesarean section during the hospitalization period. Cases of post-cesarean section infection that occurred during the outpatient postoperative period would be still closely monitored if the patient was readmitted to the Mekong Maternity Hospital. Nonetheless, the study may not have detected certain mild infections, and the infection rate post-cesarean section could be underestimated due to women in the sample not returning for follow-up check-ups. Although the study sample included 558 women at each group, the number of women experiencing post-cesarean wound infections was relatively low with a total of 9 women (0.8% of the study sample). In which, the rate of post-cesarean wound infections in the group taking a dose of 2 g of cefazolin was statistically significantly lower than in the group taking a dose of 1 g of cefazolin (0.2% versus 1.4%; $p<0.05$). Therefore, the relatively small number of observations might lead to uncertainties in the resource that used estimates on which the cost analysis was based. This result was relatively low compared to other studies. According to the research by La Rosa M (2020) on 730 pregnant women divided into 2 groups (group using low dose of cefazolin 1 g and group using high dose of 2 g with BMI < 30), the rate of surgical wound infection was 5%. The group using high doses of prophylactic

antibiotics had a lower rate of risk factors for surgical wound infections. The surgical site infection rate did not differ between the low dose and high dose groups, even after adjusting for confounding variables (adjusted OR = 1.78; 95% CI: 0.82-3.9) (14). Another study by author Vu Huong Huyen (2019) shows that the rate of surgical wound infection diagnosed according to the ASEPSIS scale in pregnant women undergoing cesarean section at Hung Vuong hospital was 0.98% (15). There were differences between studies that may be due to our sample size not being large enough or different sample selection criteria. Our study excluded cases of rupture of membranes more than 6 hours before cesarean section, severe anemia (Hb < 9 g/dL), unstable medical conditions... The study sample was only observed during the length of hospital stay and no follow-up of women in the sample after discharge. Regarding the women's medical condition before operation according to the ASA score, all pregnant women had an ASA score of 1 or 2. With this risk score, the pregnant women in the study sample did not belong to the group with a high risk of postoperative infection. The study by Wloch C (2012) also reported that the risk of surgical site infection was higher in the group with the ASA score of more than 3 compared to in the group with ASA score of 1 (OR=1.86; 95% CI: 0.96 - 3,60) (16). The study did not evaluate the effectiveness of prophylactic antibiotics on all clean surgical patients with other high-risk factors for surgical wound infection (high ASA score). Moreover, the rate of postoperative wound infections at the hospital is well controlled thanks to combined strategies such as classifying high-risk pregnant women, preparing patients before surgery, and applying prophylactic antibiotics...

Our study had some limitations. First, the value of model input in regard to QALYs was cited from the reference as there was no real-world evidence published in Vietnam. Besides, our study only calculated the inpatient costs, and we did not track outpatient costs, as well as postoperative wound infections were not diagnosed until the patient was discharged from the hospital. Moreover, the study focused on direct medical costs instead of all direct costs from a social perspective such as direct non-medical costs (travel costs, meals, lodging, and other patient expenses). and caregivers) and indirect costs (the patient's lost income due to hospitalization, the cost of hiring a caregiver).

CONCLUSION

The use of 2 g of cefazolin was likely to be dominant over 1 g of cefazolin pertaining to cost-effectiveness terms as a cesarean delivery infection prophylaxis. These findings support the choice of the optimal dose of prophylactic cefazolin to achieve high efficiency in preventing infections at the time of cesarean delivery.

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