

Comparison of Operating Costs and LOS of Cesarean Section Patients Using ERACS and Non-ERACS Method

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Abstract: The rate of births with cesarean section delivery in Indonesia is increasing. Along with the increasing rate, various clinical methods are used to reduce maternal morbidity and mortality, one of which is the Enhanced Recovery After Cesarean Section (ERACS). ERACS aims to speed up recovery, reduce postoperative complications, shorten length of stay (LOS) and lower patient care operational costs of cesarean section. The purpose of this study is to compare operational costs and LOS of cesarean section patients with ERACS and non-ERACS methods. The research used was case-control study which was carried out at RSUD dr. Rehatta Kelet from October-December 2022. This study involved 71 patients who met the inclusion criteria. Data were obtained from the patients' medical records. The data were analyzed by mann Whitney Test using SPSS software. The result shows that the difference in LOS and operational costs using ERACS and non-ERACS was statistically significant at $P=0.0001$. The study concludes that ERACS method reduces LOS and operational costs compared to non-ERACS methods. The authors recommend that the association of obstetricians and gynaecologists should encourage its members to apply ERACS whenever possible.

Keywords: cesarean section; ERACS; LOS.

Abstrak: Angka kelahiran dengan persalinan sectio sesarea di Indonesia semakin meningkat. Seiring dengan meningkatnya angka tersebut dibutuhkan metode klinik untuk mengurangi morbiditas dan mortalitas ibu, salah satunya dengan metode Enhanced Recovery After Cesarean Section (ERACS). ERACS memiliki tujuan untuk mempercepat pemulihan, mengurangi komplikasi pasca operasi seksio sesarea, memperpendek Length of stay (LOS) dan menurunkan biaya operasional perawatan pasien. Tujuan dari penelitian ini adalah membandingkan biaya operasional dan LOS pada pasien seksio sesarea dengan metode ERACS dan non-ERACS. Metode yang digunakan adalah case-control yang dilaksanakan di RSUD dr. Rehatta Kelet mulai bulan Oktober-Desember 2022. penelitian ini melibatkan jumlah responden sebanyak 71 pasien ibu melahirkan yang masuk kriteria inklusi. Data didapatkan dari rekam medis pasien. Data diolah dengan program SPSS dengan Uji mann Whitney. Hasil penelitian ini menunjukkan perbedaan LOS dan biaya

operasional pada pasien dengan metode ERACS dan non-ERACS memiliki nilai $P=0.0001$ untuk kedua variabel. Kesimpulan penelitian ini menunjukkan pasien dengan metode ERACS memiliki LOS dan biaya operasional yang lebih sedikit dibandingkan metode non-ERACS. Penulis merekomendasikan agar POGI menganjurkan anggotanya menerapkan ERACS jika memungkinkan.

Kata kunci: seksio sesarea; ERACS; LOS.

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) is used by surgeons in postoperative patients to reduce morbidity, mortality, and length of Stay (LOS) in hospitals so that treatment costs can be reduced (Tika et al., 2022). ERAS began to be used in colo-rectal surgery and began to be used by other surgical specialists such as general surgeons, urologists, and others, including Obstetrics and Gynecology Specialists (Peahl et al., 2019). The method was adopted by obstetricians and gynecologists along with the increase in the number of cesarean sections, which were later called Enhanced Recovery After Cesarean Section (ERACS).

Based on data from the Demographic and Health Survey of Indonesia, the number of cesarean section operations from 1991 to 2017 increased by 1.2% to 6.8%. Riskesdas in 2018 tested that the birth rate with cesarean section delivery in Indonesia reached 17.6%, with the highest prevalence reaching 31.1% in DKI Jakarta and the lowest at 6.7% in Papua (Milandri et al., 2022). Sectio sesarea is one of the delivery methods used to reduce childbirth complications. However, cesarean sectio itself has complications, for example are infections (Cahyaningtyas, 2020), more abdominal pain (Z. Arifaa, 2023), thromboembolism, illeus (Ogunkua, 2021) and so on. Where these side effects will increase maternal morbidity and mortality, so it requires a long treatment time and costs money. An obstetric survey conducted in the United Kingdom in 2013 showed a majority of respondents supported the ERAS method for cesarean sections and hospitals to implement the method. A survey in 2015 reported 50% had implemented ERACS, and 30% plan to implement the method (Habib & Ituk, 2018). Saint Barnabas Medical Center in Livingston, New Jersey, one of the hospitals in America, started implementing the ERACS method in 2018. From January 2018 to August 2019, 1,508 patients who had undergone surgery with the ERACS method showed an improvement in patient care. Patients with cesarean-section surgery can go home faster, and opioid administration is reduced to avoid other side effects (Mullman et al., 2020).

The ERACS method is a series of treatments, including preoperative, intraoperative, and postoperative care until the patient goes home (Tika et al., 2022). This method is expected to: 1) Improve care as the number of mothers undergoing cesarean section surgery increases; 2) Provide evidence-based care to prevent maternal morbidity and mortality, as well as address status gaps and reduce treatment costs; 3) Limit postoperative opioid use to avoid opioid crisis (Peahl et al., 2019).

This is supported by research by Rosesau (2017), the average LOS of patients receiving treatment with the ERACS method is lower than patients receiving conventional treatment, namely 3.92 days and 4.34 days ($P < 0.01$) (Rousseau et al., 2017). Another study by Cattin (2017) concluded ERACS can reduce adverse outcomes that can increase LOS. The average LOS in patients with delivery with ERACS method treatment is for four days, while patients with delivery with conventional method treatment are treated for 5.5 days ($P < 0.05$) (Cattin et al., 2017).

Elements in the application of the ERACS method consist of the preparatory stage before operative, treatment during operative, and postoperative care. Preoperative preparation includes antenatal care, including counseling and education about the operative plan, scheduling the patient's fasting time, administering prophylactic antibiotics, and increasing hemoglobin levels in the blood. Treatment during surgery consists of blood pressure management, monitoring of body fluids, body temperature regulation, administration of anesthetic drugs, analgesic drugs, and uterotonic drugs, and delayed cord clamping ends with early initiation of breastfeeding (IMD) skin to skin mother and baby. Postoperative care includes oral feeding immediately after surgery, administration of analgesic drugs, mobilization immediately after surgery, the release of urinary catheter immediately after surgery, beginning with bladder training (Peahl et al., 2019; Tika et al., 2022).

According to the Decree of the Minister of Health of Indonesia No.1165/MENKES/SK/X/2007, the cost is the amount of money paid by patients in return for hospital services received and can include all or part of the cost of providing these services. In the National Health Insurance (JKN) program, the payment system used is Casemix INA CBG's, which is a grouping of diagnoses and treatment actions experienced by patients (Monica et al., 2021). Several financing components affect treatment rates, such as the cost of the Emergency Department (IGD), operative actions, hospitalization, medical procedures, supporting examinations, medical devices, and medicines. The weakness of INA CBGs is the high rates in non-surgical cases and low rates in surgical cases, including cesarean sections. Previous studies at the Indonesian Air Force Hospital Bandung showed weaknesses in the INA CBG's system, where the financing rate for cesarean section delivery for 77 patients was IDR 873,238,776, - while the total INA-CBG's tariff charged was IDR 396,413,700 (Monica et al., 2021). This difference caused hospital losses of IDR 476,825,076, - several factors that affect service costs, including maternal age, number of previous pregnancies (parity), type of operative action, and LOS (Mildawati et al., 2020). Therefore, it is important to control operational costs in hospitals, one of which is by shortening LOS.

ERACS aims to speed up recovery, reduce post-cesarean section complications, shorten LOS, and improve patient satisfaction. LOS is an indicator that describes the efficiency of hospital management (Baek et al., 2018; Purnaningrum & Suryawati, 2023). The shorter the LOS, the lower the risk of infection and long-term medication side effects, and the lower the operational costs of

patient care (Baek et al., 2018). In the study of Khoirunnisa et al. (2019), they hospitalized patients for one day after cesarean section can effectively allow going home, and their conditions remain safe this can be applied; besides that, the method reduces the incidence of infection and increases patient satisfaction (Bowden et al., 2019; Khoirunnisa et al., 2023).

In observations conducted in 2022 at Hermina Galaxy Hospital, 31 patients who performed cesarean section with the ERACS method had LOS for only about 2-3 days, so when compared to the previous method, there was a decrease in LOS. In addition, based on interviews with respondents, there was an increase in patient satisfaction who had experienced giving birth with the conventional cesarean section method, while patients who gave birth for the first time with this method did not feel terrible pain and made respondents want to give birth again with this method at the next birth (Nurhayati & Nadjib, 2022) .

Patient satisfaction is the feeling that arises between the patient’s expectations and reality in line or even more. Patient satisfaction with the ERACS method increases due to cost savings and the absence of adverse effects that arise after the early breastfeeding method, reduced risk of patient morbidity, and the possibility of patients being readmitted (Bowden et al., 2019). Currently, the National Health Insurance program has implemented the ERACS method for childbirth. The service expected by BPJS Kesehatan is that patients have satisfaction with good quality, but hospitals must make cost efficiency (Purnaningrum & Suryawati, 2023).

Based on the background mentioned earlier, the purpose of this study was to compare LOS and cesarean section operational costs between ERACS and non-ERACS methods in BPJS patients. Based on the treatment method received by ERACS patients compared to non-ERACS patients, the length of stay should be shorter and operational costs less.

METHOD

ERACS	Non- ERACS
Pre-Operative	Pre-Operative
<ul style="list-style-type: none"> - Patient education - Educational material in print provided to patient or accessible via the web - Breastfeeding education - Discuss NPO status, fluid and caloric intake - Hemoglobin optimization - Patients are advised to fasting 6 hours before delivery 	<ul style="list-style-type: none"> - Patient education - Educational material in print provided to patient or accessible via the web - Breastfeeding education - Discuss NPO status, fluid and caloric intake - Hemoglobin optimization - Patients are advised to fasting 8 hours before delivery

Intra-Operative

- Giving of prophylactic antibiotics
- Prophylactic phenylephrine infusion
- Active warming
- Providing anesthesia via spinal anesthesia by combining anesthetic drugs with additional anti-pain medication such as morphine or fentanyl
- Skin to skin contact/breastfeeding

Intra-Operative

- Giving of prophylactic antibiotics
- Prophylactic phenylephrine infusion
- Active warming
- Providing anesthesia via spinal anesthesia
- Skin to skin contact/breastfeeding

Post-Operative

- Early oral intake
- Regular oral and multimodal analgesia
- Early mobilization (2 hours pasca delivery)
- Early removal of urinary catheter
- Lactation col consultant
- Neonatology team visit
- Audit of compliance and outcomes

Post-Operative

- Regular oral and multimodal analgesia
- Early mobilization (12-24 hours pasca delivery)
- Early removal of urinary catheter
- Lactation col consultant
- Neonatology team visit
- Audit of compliance and outcomes

The method carried out in this study is the case control method. This research was conducted at RSUD dr. Rehatta Kelet, Central Java Province, from October 2022 to December 2022 by looking at patient medical records. In this study, the samples used were patients who met the inclusion and exclusion criteria.

The inclusion criterias in this study are all pregnant women who undergo cesarean section delivery in all inpatient room including all ages, all number of parity, and same condition without contraindication to do ERACS such as diabetic disease, severe anemia, severe anxiety, and pre eclampsia, using JKN at RSUD dr. Rehatta Kelet in October-December 2022 that did operative by all obstetrician there.

The exclusion criteria for this study include:

1. Cesarean section delivery by transfusion
2. Cesarean section delivery with severe preeclampsia
3. Cesarean section delivery with ICU care
4. Cesarean section delivery with non-JKN ERACS method

The data is analyzed by statistical tests using the SPSS program and presented in tabular form. The patients was divided into two criteria of section caesaria operative, ERACS and non ERACS and divide it depend on anesthesiology and also depend on the contraindication of doing ERACS method. There is no specification criteria to divide the method of Caesar operation using ERACS or

non ERACS method. In ERACS method there are contraindication that have to obey such as; pre eclapmtion, severe anemia, severe anxiety, and patient with diabetic gestational cannon using ERACS method.

RESULT

In the period October – December 2022, there were 192 deliveries at RSUD dr. Rehatta Kelet, Central Java. Then 71 people met the inclusion criteria. Table 1 can be seen the basic characteristics of the study patients.

Tabel 1. Description of the Basic Characteristics of JKN Patients in Childbirth Cases at RSUD dr. Rehatta Kelet, Central Java, for the period October - December 2022

Variabel	N=71
LOS	
Mean±Std	3.38±1.139
Median	3.00
Range (min-max)	2.00-5.00
Age	
Mean±Std	27.87±6.068
Median	26.00
Range (min-max)	17.00-47.00
Section Caesarean Indications	
Section caeseran second	21(29.6%)
Malpresentation	11(15.5%)
Induction failure	12(16.9%)
Distress of fetus	11(15.5%)
Cephalopelvic disproportion	12(16.9%)
Impending Rupture of uteri	2(2.8%)
Previa Placenta	2(2.8%)
Method	
ERACS	40(56.3%)
non-ERACS	31(43.7%)
Operating Cost	
Mean±Std	11.78%±5.55%
Median	13.65%
Range (min-max)	10497.00-231e+006

Note : Data is presented with mean, median, standard deviation, and range for numerical data, while data is presented with sum/frequency and percentage for categorical data.

Table 1 describes the overall patient characteristics, LOS has an average of 3.38±1,139, with an average patient age of 27.87±6,068 years. For patients with indications of cesarean section

category Former cesarean section as many as 21 (29.6%), Malpresentation as much as 11 (15.5%), Induction Failure as much as 12 (16.9%), Fetal Distress as much as 11 (15.5%), Cephalopelvic disproportion as much as 12 (16.9%), Impending Rupture as much as 2 (2.8%) and Placenta Previa as much as 2 (2.8%). Patients with ERACS Method were 40 (56.3%), and non-ERACS were 31 (43.7%). The average operational cost efficiency is 11.78±5.55%.

Table 2 Comparison of LOS in patients with ERACS and non-ERACS delivery methods. In patients with ERACS delivery, LOS had an average of 2.53±0.506 days. In patients with non-ERACS delivery, LOS had an average of 4.48±0.677 days.

Tabel 2. Comparison of LOS in Patients with ERACS and non-ERACS Methods

Variabel	Metode		P Value
	ERACS N=40	non-ERACS N=31	
LOS			0.0001**
Mean±Std	2.53±0.506	4.48±0.677	
Median	3.00	5.00	
Range (min-max)	2.00-3.00	3.00-5.00	

Note : The p-value in numerical data is tested for distribution. If the data is normally distributed, an unpaired T test is performed, while if the data is abnormally distributed, it is tested with Mann-Whitney. A value of p<0.05 indicates significant results.

The results of the analysis showed that the LOS variable data was not normally distributed, so it was then continued with the Mann-Whitney test. The results of statistical tests show results smaller than 0.05 (P value <0.05) which means statistically significant, based on the test results, it can be explained that there is a statistically significant average difference between LOS variables in patients with ERACS and non-ERACS delivery methods.

Based on Table 3 Comparison of operational costs in patients with ERACS delivery with patients with non-ERACS delivery. Operating costs are calculated based on Cost Loanable Fund (COLF), which is with the following formula (Amalia & Diana, 2022):

$$\frac{\text{Operating Cost}}{\text{Operating Income (Plafon JKN)}} \times 100\%$$

In patients with ERACS delivery, operational costs averaged 15.9% ± 2.40%. In patients with non-ERACS delivery, operational costs had an average of 6.36% ± 3.24%.

Tabel 3. Comparison of Operating Costs in Patients with ERACS and non-ERACS Deliveries

Variabel	Metode		P Value
	ERACS N=40	non-ERACS N=31	
Operating Cost			0.0001**
Mean±Std	15.9% ± 2.40%.	6.36% ±3.24%	
Median	15.55%	6.35%	
Range (min-max)	1.26E+006-2.31E+006	10597.00-1.30E+006	

Note : The p-value in numerical data is tested for distribution. If the data is normally distributed, an unpaired T test is performed, while if the data is abnormally distributed, it is tested with Mann-Whitney. A value of $p < 0.05$ indicates significant results.

The results of the analysis showed that the data were not normally distributed, so it was continued with the Mann-Whitney test. The results of statistical tests show a result smaller than 0.05 (P value < 0.05) which means statistically significant thus, it can be explained that there is a statistically significant average difference between operational cost variables in patients with ERACS and non-ERACS delivery methods.

DISCUSSION

The increase in the number of cesarean section operations in the world is a problem in the morbidity and mortality of women giving birth. Therefore, reducing maternal morbidity and mortality, one of which is the Enhanced Recovery After Section cesarean section (ERACS) method. In this study, it was seen how the comparison of LOS and operational costs in cesarean section between ERACS and non-ERACS methods.

Elements in the application of the ERACS method consist of the preparatory stage before operative, treatment during operative, and postoperative care. Preoperative preparation includes antenatal care, including counseling and education about the operative plan, scheduling the patient's fasting time, administering prophylactic antibiotics, and increasing hemoglobin levels in the blood. Treatment during surgery consists of blood pressure management, monitoring of body fluids, body temperature regulation, administration of anesthetic drugs, analgesic drugs, and uterotonic drugs, and delayed cord clamping ends with early initiation of breastfeeding (IMD) skin to skin mother and baby. Postoperative care includes oral feeding immediately after surgery, administration of analgetic drugs, mobilization immediately after surgery, the release of urinary catheter immediately after surgery, beginning with bladder training (Peahl et al., 2019; Tika et al., 2022).

Preoperative Preparation

Preoperative preparation includes antenatal care and inpatient care. Antenatal care is needed to determine the success of the ERACS program because, at this stage, education and counseling, as well as decision-making, are carried out. The education provided includes information about surgical procedures, pain management plans, nutrition for pregnant and lactating women, early mobilization, length of treatment, and discharge criteria. In the inpatient room, patients are satisfied for 6-8 hours for solid food and 2 hours for liquid food. Patients are asked to bathe with antiseptic liquid before cleaning the surgical area and preventing infection. Ranitidine or omeprazole premedication is administered 2 hours before the procedure, and prophylactic antibiotics 30-60 minutes before the procedure. In this preoperative preparation, anemia screening is also carried out in patients, and iron administration if Hb < 11 g / dL (Macones et al., 2019; Tika et al., 2022).

Intraoperative Treatment

Intraoperative treatment begins when the patient enters the operating room. The temperature of the operating room is set at 22-23o C. Active warming system is performed on the mother by draining warm intravenous fluids to prevent hypothermia. Before the cesarean section, the patient receives spinal anesthesia in the subarachnoid space, followed by intravenous (IV) injection of non-opioid analgesics. Patients are given uterotonic at low doses to achieve adequate contractions but do not cause hypotension and myocardial ischemia (Macones et al., 2019; Tika et al., 2022). Patients are given education about delayed cord clamping for 30-60 seconds if the baby is term and fit. If the baby does not cry within 20 seconds, clamps and umbilical cord cutting will be done for further resuscitation. Early initiation of breastfeeding and skin to skin is carried out on mothers with stable conditions and fit babies for 30-60 minutes (Macones et al., 2019; Tika et al., 2022).

Post Operative Treatment

After cesarean section surgery, within 30 minutes, the patient is given clear fluids unless experiencing nausea. Pain control using opioid sparing methods such as paracetamol and NSAID. In the early stages of care, patients are encouraged to mobilize early at different levels. At level 1, the patient sits leaning on the bed for 15-30 minutes. At Level 2 sit on the side of the bed with your legs dangling for 5-15 minutes. At Level 3: the patient begins to stand, and at Level 4: the patient is asked to walk. Urinary catheters are released a maximum of 6 hours postoperative to reduce the risk of urinary tract infections (UTI). If the patient has breakthrough pain, the patient will be given opioid analgesics through a venous pathway, such as pethidine. Patients are given early oral food intake to promote recovery of bowel function and reduce the risk of sepsis. Oral intake was given 4 hours postoperative (Macones et al., 2019; Tika et al., 2022).

Based on Table 2, there is a statistically significant mean difference between the LOS variable in patients with ERACS and non-ERACS delivery methods with a P value smaller than 0.05. The average LOS in cesarean section patients with the ERACS method is 3 days, while in the non-ERACS method is 5 days. This is in line with one of the objectives of ERACS, which is to shorten LOS. (Baek et al, 2018). Stress while also reducing insulin resistance and malnutrition in postoperative. Third, urinary catheters are released more quickly to reduce the risk of infection and postoperative venous thromboembolism. Fourth, the use of prophylactic antibiotics and mobilization carried out immediately reduces the risk of infection at the site of surgery, lung and urinary tract infections. Fifth, the use of appropriate analgesics and faster feeding are important to maintain body homeostasis to speed up the recovery of the patient's condition and reduce the risk of postoperative complications.

The ERACS method when compared to conventional methods. First, preoperative education and counseling reduce the stress felt by patients. Second, shortened fasting time reduces patient In Table 3, there is a statistically significant average difference between variable operational costs in patients with ERACS and non-ERACS delivery methods with p values smaller than 0.05. These results prove that the ERACS method is more efficient in terms of operational costs. This efficiency can be achieved due to the shorter patient LOS time, less medication needed by patients during treatment than conventional methods, and a low risk ratio of complications after treatment.

Based on this study, it is proven that there is a significant difference in LOS and operational costs between ERACS and non-ERACS methods. The ERACS LOS Method is shorter and has lower operational costs than non-ERACS. This is in line with research conducted by Purwaningrum and Suryati (2022). In their research, it was stated that the ERACS method makes patients not need longer treatment so that the LOS period is short and operational costs at the hospital are lower. In addition, according to Bowden et al. (2019), cost savings and reduced morbidity risk become patient satisfaction with the ERACS method.

CONCLUSION

In this study, the ERACS method has a shorter LOS and lower operational costs compared to non-ERACS methods. This ERACS method can be a solution to ease financial boundaries between hospitals and patients. The limitation of this study is that it does not survey direct patient satisfaction and the risk of infection or treatment afterward, so further research is needed.

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