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Patient-Reported Outcomes After Enhanced Recovery Protocols for Cesarean Delivery

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ABSTRACT

Background: Enhanced Recovery After Cesarean Surgery (ERACS) is a structured perioperative care protocol designed to improve maternal recovery after cesarean delivery. However, evidence focusing on patient-reported outcomes remains limited.
Objective: This study aimed to compare patient-reported outcomes between mothers undergoing cesarean delivery with ERACS and those receiving conventional perioperative care.
Methods: This quantitative comparative study included 100 postpartum mothers who underwent cesarean delivery at a type C hospital in Surabaya, Indonesia, from June 1 to December 31, 2025. Participants were recruited using consecutive sampling and divided into two groups: 50 mothers in the ERACS group and 50 mothers in the non-ERACS group. Patient-reported recovery was measured using the Obstetric Quality of Recovery-11 score at 24 and 48 hours after surgery. Secondary outcomes included pain intensity, early mobilization, oral intake, urinary catheter removal, breastfeeding initiation, maternal satisfaction, readiness for discharge, and length of hospital stay.
Results: The ERACS group had higher ObsQoR-11 scores at 24 hours (82.60 ± 8.40 vs. 69.80 ± 9.60) and 48 hours (96.40 ± 6.90 vs. 84.20 ± 8.70) than the non-ERACS group. The ERACS group also reported lower pain scores, earlier mobilization, earlier oral intake, higher breastfeeding initiation, greater satisfaction, better readiness for discharge, and shorter hospital stay.
Conclusion: ERACS was associated with better patient-reported recovery and improved early postpartum outcomes after cesarean delivery. These findings support the implementation of ERACS as a patient-centered perioperative care strategy in routine obstetric surgical services.

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INTRODUCTION

Cesarean delivery is one of the most commonly performed obstetric surgical procedures worldwide and plays an essential role in reducing maternal and neonatal morbidity when medically indicated [1]. However, cesarean delivery is also associated with postoperative pain, delayed mobilization, prolonged hospital stay, delayed return to maternal function, and potential disruption of early breastfeeding and maternal–infant bonding [2]. Therefore, optimizing recovery after cesarean delivery has become an important priority in contemporary obstetric and perioperative care [3].

Enhanced Recovery After Cesarean Delivery (ERAC), adapted from the broader Enhanced Recovery After Surgery framework, is a multidisciplinary and evidence-based perioperative pathway designed to improve maternal recovery and healthcare efficiency [4]. ERAC protocols typically include preoperative counseling, optimized fasting and hydration, multimodal analgesia, prevention of nausea and vomiting, early oral intake, early mobilization, early urinary catheter removal, breastfeeding support, and standardized discharge planning [5]. These interventions aim not only to reduce postoperative complications and length of hospital stay but also to improve maternal comfort, functional recovery, and overall childbirth experience [4].

Previous studies and systematic reviews have shown that enhanced recovery protocols for cesarean delivery are associated with shorter hospital stay, reduced opioid consumption, lower postoperative pain scores, earlier mobilization, and improved patient satisfaction [5]. Despite these encouraging findings, many evaluations of ERAC implementation have focused primarily on clinical and institutional outcomes, such as length of stay, analgesic consumption, readmission, and complication rates. Although these indicators are important, they may not fully capture women's subjective recovery experience after cesarean delivery [4][6].

Patient-reported outcomes are increasingly recognized as essential indicators of healthcare quality because they reflect outcomes directly experienced by patients, including pain, physical comfort, mobility, emotional well-being, ability to care for the newborn, breastfeeding experience, and satisfaction with care [7]. In the context of cesarean delivery, patient-reported recovery is particularly relevant because maternal recovery involves not only surgical healing but also the ability to perform early postpartum roles and establish maternal–infant interaction [8].

The Obstetric Quality of Recovery-11 score has been developed and validated as a concise, obstetric-specific patient-reported outcome measure for evaluating recovery after cesarean delivery [9]. This instrument assesses multidimensional aspects of recovery, including pain, nausea, dizziness, shivering, comfort, mobility, emotional state, and ability to care for the baby. Compared with generic postoperative recovery measures, ObsQoR-11 is more suitable for cesarean delivery because it reflects recovery domains that are clinically meaningful in postpartum women [10].

Nevertheless, several research gaps remain. First, although ERAC has been widely promoted as a strategy to improve postoperative recovery, evidence focusing specifically on patient-reported outcomes remains limited compared with evidence on clinical outcomes. Second, existing studies have used different outcome measures, making comparison across settings difficult. Third, patient-reported recovery after ERAC implementation has not been sufficiently explored in many maternal healthcare settings, particularly in low- and middle-income countries where differences in hospital resources, staffing patterns, patient education, and postoperative care routines may influence recovery experience. Fourth, limited studies have examined whether ERAC protocols remain independently associated with better patient-reported recovery after controlling for maternal and obstetric factors such as age, parity, body mass index, previous cesarean delivery, type of cesarean delivery, and pregnancy-related comorbidities [11].

Addressing these gaps is important because the success of ERAC should not be measured only by earlier discharge or reduced opioid use, but also by whether women feel physically capable, emotionally supported, satisfied with care, and ready to care for their newborns. Therefore, this study aimed to evaluate patient-reported outcomes after enhanced recovery protocols for cesarean delivery using the ObsQoR-11 score. Specifically, this study examined differences in quality of recovery, postoperative pain, early mobilization, breastfeeding initiation, maternal satisfaction, and perceived readiness for discharge between women managed with an enhanced recovery protocol and those receiving conventional perioperative care.

METHOD

Study Design

This study used a quantitative analytical design with a comparative approach. The study was conducted to compare patient-reported outcomes between mothers who underwent cesarean delivery with the Enhanced Recovery After Cesarean Delivery protocol and mothers who underwent cesarean delivery with conventional perioperative care. This design was selected because the study aimed to examine differences in recovery outcomes between two groups of patients receiving different perioperative care approaches.

Study Setting and Period

The study was conducted at a Type C hospital in Surabaya, Indonesia. The hospital provides obstetric and gynecological services, including cesarean delivery and postpartum care. Data collection was carried out from June 1 to December 31, 2025. During this period, all eligible postpartum mothers who underwent cesarean delivery and met the inclusion criteria were invited to participate in the study.

Study Population

The population of this study consisted of postpartum mothers who underwent cesarean delivery at a Type C hospital in Surabaya. The accessible population included all mothers who underwent cesarean delivery during the data collection

period from June 1 to December 31, 2025, and received either the Enhanced Recovery After Cesarean Delivery protocol or conventional perioperative care.

Sample Size

The total sample in this study was 100 respondents. The respondents were divided into two groups, consisting of 50 mothers in the Enhanced Recovery After Cesarean Delivery group and 50 mothers in the non-Enhanced Recovery After Cesarean Delivery group. The sample size was considered adequate for comparing patient-reported outcomes between the two groups in this hospital-based quantitative study.

Sampling Technique

The sampling technique used in this study was consecutive sampling. Respondents were recruited consecutively based on their eligibility during the study period until the required number of samples in each group was achieved. Mothers who met the inclusion criteria and agreed to participate were included as study respondents.

Inclusion Criteria

The inclusion criteria in this study were postpartum mothers aged 18–45 years who underwent cesarean delivery at the study hospital, received spinal or regional anesthesia, were clinically stable within the first 24 hours after surgery, were able to communicate well and complete the questionnaire, and provided informed consent to participate in the study.

Exclusion Criteria

Mothers were excluded from the study if they underwent cesarean delivery under general anesthesia, experienced major intraoperative or postoperative complications, required intensive care after surgery, had severe postpartum hemorrhage, had severe neonatal complications that interfered with participation, or had incomplete questionnaire data.

Study Groups

Respondents were classified into two groups based on the perioperative care they received. The Enhanced Recovery After Cesarean Delivery group consisted of mothers who received perioperative care based on an enhanced recovery protocol. This protocol included preoperative education, optimized fasting, multimodal analgesia, prevention of nausea and vomiting, early oral intake, early mobilization, early removal of urinary catheters, breastfeeding support, and discharge readiness assessment.

The non-Enhanced Recovery After Cesarean Delivery group consisted of mothers who received conventional perioperative care according to the routine standard practice of the hospital. Conventional care generally included routine postoperative monitoring, postoperative analgesia based on clinical judgment, delayed oral intake, delayed mobilization, and standard discharge planning.

Research Variables

The independent variable in this study was the type of perioperative care, categorized into Enhanced Recovery After Cesarean Delivery and non-Enhanced Recovery After Cesarean Delivery. The dependent variables were patient-reported outcomes after cesarean delivery, including quality of recovery, postoperative pain intensity, time to first mobilization, time to first oral intake, breastfeeding initiation, maternal satisfaction, and perceived readiness for discharge.

Several maternal and obstetric characteristics were also recorded as potential confounding variables, including maternal age, parity, body mass index, gestational age, previous cesarean delivery, type of cesarean delivery, and pregnancy-related comorbidities.

Research Instrument

Patient-reported recovery was assessed using the Obstetric Quality of Recovery-11 score. This instrument was used to evaluate multidimensional recovery after cesarean delivery, including pain, nausea, dizziness, shivering, comfort, mobility, emotional well-being, and the mother's ability to care for her newborn.

Postoperative pain intensity was assessed using the Numeric Rating Scale, with scores ranging from 0 to 10. A score of 0 indicated no pain, while a score of 10 indicated the worst possible pain. Maternal satisfaction was assessed using a 5-point Likert scale, ranging from very dissatisfied to very satisfied. Perceived readiness for discharge was assessed using a structured question asking whether the mother felt ready to continue recovery at home.

Data Collection Procedure

Data collection was conducted from June 1 to December 31, 2025. Eligible respondents were identified from the obstetric and postpartum wards after cesarean delivery. The researcher explained the purpose, procedures, benefits, and potential risks of the study to each eligible respondent. Mothers who agreed to participate were asked to sign an informed consent form.

Demographic and clinical data were obtained from medical records, including maternal age, parity, body mass index, gestational age, type of cesarean delivery, history of previous cesarean delivery, indication for cesarean delivery, and pregnancy-related comorbidities. Patient-reported outcomes were collected through direct questionnaire administration at 24 hours and 48 hours after cesarean delivery. The questionnaire was completed in the postpartum ward, with assistance from the researcher or a trained data collector as needed.

Outcome Measurement

The primary outcome of this study was the quality of recovery score measured using the Obstetric Quality of Recovery-11 score at 24 hours after cesarean delivery. Secondary outcomes included the Obstetric Quality of Recovery-11 score at 48 hours, postoperative pain score at rest, postoperative pain score during movement, time to first mobilization, time to first oral intake, breastfeeding initiation within 24 hours, maternal satisfaction, perceived readiness for discharge, and length of hospital stay.

Statistical Analysis

Data were analyzed using statistical software. Descriptive analysis was performed to summarize the demographic and clinical characteristics of respondents. Continuous variables were presented as the mean and standard deviation for normally distributed data, or the median and interquartile range for non-normally distributed data. Categorical variables were presented as frequency and percentage.

The normality of continuous data was assessed using the Shapiro–Wilk test. Differences in continuous variables between the Enhanced Recovery After Cesarean Delivery and non-Enhanced Recovery After Cesarean Delivery groups were analyzed using the independent t-test for normally distributed data or the Mann–Whitney U test for non-normally distributed data. Differences in categorical variables were analyzed using the chi-square test or Fisher's exact test.

Multivariable linear regression was performed to examine the association between Enhanced Recovery After Cesarean Delivery and patient-reported quality of recovery, controlling for potential confounders. Logistic regression analysis was used for categorical outcomes, including early mobilization, breastfeeding initiation, and perceived readiness for discharge. A p-value of less than 0.05 was considered statistically significant.

RESULT AND DISCUSSION

Result

A total of 100 postpartum mothers who underwent cesarean delivery were included in the final analysis. The participants were divided into two groups: 50 mothers in the ERACS group and 50 in the non-ERACS group. All participants completed the patient-reported outcome assessment at 24 hours and 48 hours after cesarean delivery.

The baseline demographic and obstetric characteristics of the participants are presented in Table 1. Maternal age, body mass index, gestational age, parity, previous cesarean delivery, type of cesarean delivery, and pregnancy-related comorbidities were comparable between the two groups. There were no statistically significant differences in baseline characteristics between the ERACS and non-ERACS groups.

Table 1. Baseline Characteristics of Respondents

Variable	ERACS Group n = 50	Non-ERACS Group n = 50	p-value
Maternal age, years, mean ± SD	30.84 ± 5.12	31.26 ± 5.48	0.693
Body mass index, kg/m², mean ± SD	27.10 ± 3.40	27.60 ± 3.80	0.489
Gestational age, weeks, mean ± SD	38.20 ± 1.10	38.00 ± 1.20	0.387
Primiparous, n (%)	22 (44.0)	24 (48.0)	0.841
Multiparous, n (%)	28 (56.0)	26 (52.0)	0.841
Previous cesarean delivery, n (%)	20 (40.0)	23 (46.0)	0.686

Variable	ERACS Group n = 50	Non-ERACS Group n = 50	p-value
Elective cesarean delivery, n (%)	31 (62.0)	29 (58.0)	0.838
Emergency cesarean delivery, n (%)	19 (38.0)	21 (42.0)	0.838
Pregnancy-related comorbidity, n (%)	12 (24.0)	14 (28.0)	0.820

Patient-reported quality of recovery was measured using the Obstetric Quality of Recovery-11 score at 24 hours and 48 hours after cesarean delivery. The ERACS group showed significantly higher quality-of-recovery scores than the non-ERACS group at both assessment points.

At 24 hours after cesarean delivery, the mean ObsQoR-11 score was 82.60 ± 8.40 in the ERACS group and 69.80 ± 9.60 in the non-ERACS group, with a mean difference of 12.80 points. At 48 hours after cesarean delivery, the mean ObsQoR-11 score remained higher in the ERACS group than in the non-ERACS group.

Table 2. Patient-Reported Quality of Recovery After Cesarean Delivery

Outcome	ERACS Group n = 50	Non-ERACS Group n = 50	Mean Difference	95% CI	p-value
ObsQoR-11 score at 24 hours, mean ± SD	82.60 ± 8.40	69.80 ± 9.60	12.80	9.22 to 16.38	<0.001
ObsQoR-11 score at 48 hours, mean ± SD	96.40 ± 6.90	84.20 ± 8.70	12.20	9.08 to 15.32	<0.001

Postoperative pain intensity was assessed using the Numeric Rating Scale. The ERACS group reported significantly lower pain scores at rest and during movement compared with the non-ERACS group at both 24 hours and 48 hours after cesarean delivery.

At 24 hours after surgery, the mean pain score at rest was 2.40 ± 1.00 in the ERACS group and 4.80 ± 1.30 in the non-ERACS group. Pain during movement was also lower in the ERACS group, indicating better postoperative pain control.

Table 3. Postoperative Pain Outcomes

Outcome	ERACS Group n = 50	Non-ERACS Group n = 50	Mean Difference	95% CI	p-value
Pain score at rest, 24 hours	2.40 ± 1.00	4.80 ± 1.30	-2.40	-2.86 to -1.94	<0.001
Pain score during movement, 24 hours	3.10 ± 1.20	6.00 ± 1.40	-2.90	-3.42 to -2.38	<0.001
Pain score at rest, 48 hours	1.50 ± 0.80	3.20 ± 1.10	-1.70	-2.08 to -1.32	<0.001
Pain score during movement, 48 hours	2.10 ± 1.00	4.40 ± 1.20	-2.30	-2.74 to -1.86	<0.001

Functional recovery outcomes were significantly better among mothers in the ERACS group. A higher proportion of mothers in the ERACS group were able to mobilize within 12 hours of surgery than in the non-ERACS group. Early oral intake and urinary catheter removal within 12 hours were also more frequently achieved in the ERACS group.

Breastfeeding initiation within 24 hours was reported by 44 mothers in the ERACS group and 31 mothers in the non-ERACS group. The ERACS group also had a shorter mean length of hospital stay compared with the non-ERACS group.

Table 4. Functional Recovery Outcomes

Outcome	ERACS Group n = 50	Non-ERACS Group n = 50	p-value
Mobilization within 12 hours, n (%)	43 (86.0)	22 (44.0)	<0.001
Oral intake within 6 hours, n (%)	46 (92.0)	25 (50.0)	<0.001
Urinary catheter removal within 12 hours, n (%)	41 (82.0)	18 (36.0)	<0.001
Breastfeeding initiation within 24 hours, n (%)	44 (88.0)	31 (62.0)	0.006
Length of hospital stay, hours, mean ± SD	47.80 ± 8.60	72.40 ± 12.30	<0.001

Maternal satisfaction was significantly higher in the ERACS group than in the non-ERACS group. A total of 45 mothers in the ERACS group reported being satisfied or very satisfied with their postoperative care, compared with 28 mothers in the non-ERACS group.

The ERACS group also had a higher proportion of mothers who reported feeling ready for discharge. These findings suggest that ERACS was associated not only with improved physical recovery but also with better patient-reported experience and confidence to continue recovery at home.

Table 5. Maternal Satisfaction and Readiness for Discharge

Outcome	ERACS Group n = 50	Non-ERACS Group n = 50	p-value
Satisfied or very satisfied, n (%)	45 (90.0)	28 (56.0)	<0.001
Ready for discharge, n (%)	42 (84.0)	24 (48.0)	<0.001
Not ready for discharge, n (%)	8 (16.0)	26 (52.0)	<0.001

Multivariable linear regression was performed to examine the association between ERACS implementation and patient-reported quality of recovery, controlling for potential confounders. After adjustment for maternal age, body mass index, parity, previous cesarean delivery, emergency cesarean delivery, and pregnancy-related comorbidities, ERACS remained independently associated with a higher ObsQoR-11 score at 24 hours after cesarean delivery. The regression model showed that mothers who received the ERACS protocol had an adjusted increase of

11.84 points in the ObsQoR-11 score compared with mothers who received conventional perioperative care.

Table 6. Multivariable Linear Regression Analysis for ObsQoR-11 Score at 24 Hours

Variable	β Coefficient	95% CI	p-value
ERACS protocol	11.84	8.52 to 15.16	<0.001
Maternal age	-0.08	-0.29 to 0.13	0.452
Body mass index	-0.19	-0.52 to 0.14	0.256
Primiparity	1.10	-1.90 to 4.10	0.468
Previous cesarean delivery	-0.72	-3.79 to 2.35	0.642
Emergency cesarean delivery	-2.36	-5.67 to 0.95	0.160
Pregnancy-related comorbidity	-3.08	-6.49 to 0.33	0.076

Model summary: $R^2 = 0.38$; adjusted $R^2 = 0.33$; $p < 0.001$.

Overall, the results showed that mothers who underwent cesarean delivery with the ERACS protocol had better patient-reported outcomes than mothers who received conventional perioperative care. The ERACS group demonstrated higher quality-of-recovery scores, lower postoperative pain intensity, earlier mobilization and oral intake, higher breastfeeding initiation, greater maternal satisfaction, better perceived readiness for discharge, and shorter length of hospital stay.

Discussion

This study evaluated patient-reported outcomes after cesarean delivery among mothers receiving Enhanced Recovery After Cesarean Surgery compared with those receiving conventional perioperative care. The findings showed that mothers in the ERACS group had significantly better patient-reported recovery than mothers in the non-ERACS group. This was demonstrated by higher ObsQoR-11 scores at 24 and 48 hours after cesarean delivery, lower postoperative pain intensity, earlier mobilization, earlier oral intake, earlier urinary catheter removal, higher breastfeeding initiation, greater maternal satisfaction, better readiness for discharge, and shorter length of hospital stay [12]. After adjustment for maternal and obstetric characteristics, ERACS remained independently associated with higher quality of recovery at 24 hours after cesarean delivery [13].

The higher ObsQoR-11 scores observed in the ERACS group indicate that enhanced recovery protocols may improve multidimensional maternal recovery after cesarean delivery [14]. Recovery after cesarean delivery is not limited to wound healing or hospital discharge. It also includes pain control, physical comfort, emotional well-being, mobility, ability to care for the newborn, breastfeeding readiness, and confidence in continuing recovery after discharge [15]. Therefore, the use of patient-reported outcome measures provides a more comprehensive evaluation of postoperative recovery than clinical indicators alone. In this study, the improvement in ObsQoR-11 scores suggests that mothers who received ERACS experienced better overall recovery from their own perspective [10][16].

The findings of this study are consistent with the basic principles of enhanced recovery pathways, which emphasize standardized, multidisciplinary, and evidence-based perioperative care. ERACS combines several interventions across the preoperative, intraoperative, and postoperative periods, including preoperative education, optimization of fasting, multimodal analgesia, prevention of nausea and vomiting, early oral intake, early mobilization, early urinary catheter removal, and structured breastfeeding support [17][18]. The combined effect of these interventions may explain the better recovery outcomes observed in the ERACS group.

One of the most important findings of this study was the significantly lower postoperative pain intensity among mothers in the ERACS group. Pain scores at rest and during movement were lower at both 24 and 48 hours after surgery. This finding suggests that ERACS may provide more effective postoperative pain control than conventional care [19]. Better pain control is clinically important because uncontrolled postoperative pain can delay mobilization, interfere with breastfeeding, reduce maternal comfort, and increase anxiety during the early postpartum period [20]. In the ERACS protocol, pain management generally relies on multimodal analgesia, which aims to control pain through different mechanisms while reducing dependence on opioid analgesics. Lower pain intensity may also contribute to the higher quality of recovery scores reported by mothers in the ERACS group [21].

The ERACS group also demonstrated better functional recovery, as shown by a higher proportion of mothers who were able to mobilize within 12 hours after surgery. Early mobilization is a central component of enhanced recovery because it supports functional independence, improves circulation, reduces the risk of postoperative complications, and increases maternal confidence [15][22]. In conventional care, mobilization is often delayed due to pain, urinary catheter use, fear of movement, or lack of structured encouragement. In contrast, ERACS provides clearer postoperative targets and support for early mobilization. The better mobilization outcome in this study may therefore reflect both improved pain control and the structured nature of postoperative care in the ERACS pathway [23][24].

Early oral intake was also achieved more frequently in the ERACS group. This finding supports the concept that prolonged postoperative fasting is often unnecessary after uncomplicated cesarean delivery [25]. Early oral intake can improve maternal comfort, reduce thirst and hunger, support energy restoration, and facilitate earlier return of gastrointestinal function [26]. In postpartum mothers, early nutrition is also relevant for breastfeeding and general recovery. The higher rate of early oral intake in the ERACS group may have contributed to improved maternal satisfaction and perceived readiness for discharge [12].

Another important finding was the higher proportion of mothers in the ERACS group initiating breastfeeding within 24 hours. Early breastfeeding after cesarean delivery may be affected by postoperative pain, delayed mobilization, maternal fatigue, nausea, and limited physical ability to position the baby [27]. By reducing pain, encouraging early mobilization, and promoting maternal comfort, ERACS may indirectly support earlier initiation of breastfeeding. This finding is important because cesarean delivery can sometimes delay early maternal–infant interaction [5]. A recovery pathway that facilitates early breastfeeding may therefore provide benefits beyond surgical recovery and contribute to improved postpartum maternal and neonatal care [28].

Maternal satisfaction was significantly higher in the ERACS group than in the non-ERACS group. This may be explained by several factors, including better pain control, earlier return to activity, clearer preoperative information, greater involvement in recovery, and increased confidence after surgery [29]. Patient satisfaction is an important indicator of the quality of care, particularly in childbirth services, where women's experiences may influence their psychological well-being, future care preferences, and trust in healthcare providers. The higher satisfaction found in this study suggests that ERACS may improve not only objective recovery indicators but also the overall patient experience [30][31].

The ERACS group also reported greater readiness for discharge. Readiness for discharge is an important patient-reported outcome because early discharge should not be based solely on institutional targets or clinical stability [32]. Mothers should feel physically able, emotionally prepared, adequately informed, and confident to continue recovery at home [33]. In this study, the higher readiness for discharge among mothers in the ERACS group was accompanied by a shorter length of hospital stay. This suggests that reduced length of stay in the ERACS group was not merely an administrative outcome but was supported by better perceived recovery and maternal confidence [34].

The shorter length of hospital stay observed in the ERACS group is consistent with the expected effect of enhanced recovery pathways. However, length of stay should be interpreted carefully. Although shorter hospitalization may reduce healthcare costs and improve bed availability, discharge should remain safe and patient-centered [35]. The findings of this study suggest that ERACS may support earlier discharge by improving pain control, mobility, oral intake, breastfeeding readiness, and overall quality of recovery. Nevertheless, appropriate discharge education and follow-up remain essential to prevent complications after discharge [8][36].

The multivariable analysis showed that ERACS remained independently associated with higher ObsQoR-11 scores after controlling for maternal age, body mass index, parity, previous cesarean delivery, emergency cesarean delivery, and pregnancy-related comorbidities. This finding strengthens the evidence that the difference in quality of recovery was not solely explained by baseline maternal or obstetric characteristics [33]. The adjusted analysis suggests that the ERACS protocol itself may have meaningfully contributed to improved patient-reported recovery. However, because this study used a non-randomized comparative design, residual confounding cannot be completely excluded [37].

The findings of this study have several clinical implications. First, hospitals that provide cesarean delivery services should consider implementing standardized ERACS protocols to improve maternal recovery and the patient experience. Second, patient-reported outcome measures, such as the ObsQoR-11, should be incorporated into postoperative evaluation because they capture recovery domains that may not be evident in routine clinical assessment. Third, successful ERACS implementation requires multidisciplinary collaboration among obstetricians, anesthesiologists, midwives, nurses, nutrition staff, and lactation support teams. Fourth, patient education should be strengthened because maternal understanding of early mobilization, pain management, oral intake, and breastfeeding may improve adherence to the recovery pathway.

This study also highlights the importance of implementing enhanced recovery principles in type C hospitals. In many healthcare systems, type C hospitals provide essential obstetric services to many mothers. Demonstrating better patient-reported outcomes in this setting suggests that ERACS may be feasible and beneficial outside highly specialized tertiary hospitals. However, implementation should be adapted to local resources, staffing capacity, patient characteristics, and institutional policies [22].

CONCLUSION

This study found that mothers who underwent cesarean delivery with the ERACS protocol had better patient-reported outcomes than those who received conventional perioperative care. ERACS was associated with higher quality of recovery, lower postoperative pain, earlier mobilization, earlier oral intake, earlier urinary catheter removal, higher breastfeeding initiation, greater maternal satisfaction, better readiness for discharge, and shorter length of hospital stay. These findings support the implementation of ERACS as a patient-centered strategy to improve recovery after cesarean delivery.

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