International Journal of Public Health Science (IJPHS)
Vol. 15, No. 3, September 2026, pp. 753~762
ISSN: 2252-8806, DOI: 10.11591/ijphs.v15i3.26890

Comparative study of hospital stay duration among cesarean section patients using ERACS and conventional care in Lampung, Indonesia

Anita Anita, Muhammad Abduh Musyaffa
Department of Nursing, Poltekkes Kemenkes Tanjungkarang, Lampung, Indonesia

Article Info

Article history:

Received Nov 10, 2025
Revised Feb 5, 2026
Accepted Jul 12, 2026

Keywords:

Comparative analysis
Conventional methods
Enhanced recovery after surgery
Length of stay
Sectio caesarea

ABSTRACT

This study is important to evaluate the impact of the effectiveness of the enhanced recovery after cesarean section (ERACS) method compared to conventional care on the length of hospital stay in cesarean patients in Lampung, Indonesia, considering the increasing number of cesarean sections and the need to optimize patient recovery and reduce care costs. This research is a quantitative study using a retrospective observational design. The total population was 210, with 102 samples (51 ERACS groups: 51 conventional groups) taken using purposive sampling. The research was conducted from March to September 2025 at Anugerah Medical Center and Yukum Medical Center Hospital Lampung. Inclusion criteria included cesarean patients aged ≥18 years, with written consent, ERACS, and conventional eligible. Exclusion criteria were complications, previous surgery, and chronic medical conditions. The ERACS group had a mean length of stay of 1.10 days (86.3% stayed 1 day), while the conventional method had a mean length of stay of 2.20 days (78.4% stayed 2 days). The test showed p-value of 0.000, indicating a significant difference between the two groups. The ERACS method proved more effective in reducing length of stay, which is expected to improve hospital quality and performance. This study contributes to health practice by advocating for the adoption of ERACS protocols, which may lead to better resource allocation and more efficient healthcare delivery in the context of increasing cesarean rates.

Corresponding Author:

Anita Anita
Department of Nursing, Poltekkes Kemenkes Tanjungkarang
Lampung, Indonesia
Email: anitapoltekkestanjungkarang@gmail.com

1. INTRODUCTION

Traditionally, cesarean sections are generally followed by a prolonged recovery, often accompanied by increased hospital stays, suboptimal nutritional management, and delayed mobilization. This can contribute to discomfort and a higher risk of postoperative complications [1], [2]. In order to address this issue, the enhanced recovery after surgery (ERAS) protocol was introduced, which adopts a multidisciplinary approach that includes reducing hospital length of stay, multimodal pain management, and early mobilization, which has shown significant results in reducing hospital length of stay as well as the risk of complications [2]-[4].

Health education also plays a crucial role in shortening postoperative hospital stays. Effective education about postoperative care for pregnant women can improve prenatal health behaviors and impact overall health outcomes [5]. While there is increasing understanding of medical procedures and the

importance of education, there is still a need to further raise awareness among patients about the healing process and associated risk factors, including in the context of cesarean delivery [6]. A review shows that increasing education and awareness can significantly influence women's attendance and engagement in maternal health services, which can ultimately improve health outcomes [7].

The integration of specialized health education for high-risk groups has demonstrated improvements in maternal health service utilization, especially in low- and middle-income countries (LMICs) [8], [9]. This observation underscores the potential benefits of coupling ERAS protocols with comprehensive health education strategies. ERAS frameworks have been shown to improve patient outcomes by reducing hospitalization duration and complications while promoting faster recovery times [10], [11]. Compliance with such multidisciplinary pathways not only addresses individual patient needs but also mitigates systemic healthcare burdens [12]. The findings suggest that the effectiveness of ERAS in surgical settings can be reflected in maternal health contexts, emphasizing a multidisciplinary approach that integrates educational elements to enhance service utilization among vulnerable populations [13], [14].

Research addressing the integration of ERAS protocols specifically in the context of cesarean sections highlights a significant gap in the literature. Despite the protocol's established benefits across various surgical fields, including reduced length of stay and improved recovery outcomes, there is limited exploration into its application for cesarean deliveries, particularly when complemented by health education strategies aimed at enhancing patient understanding and engagement [11], [15]. While preliminary studies suggest that ERAS protocols can lead to improved postoperative results for cesarean patients [11], [16], comprehensive analysis concerning the synergy between ERAS and patient education remains scarce.

This study aimed to analyze and compare the length of stay of patients undergoing cesarean section treated with the enhanced recovery after cesarean surgery (ERACS) protocol versus conventional methods. This study aims to provide insight into the effectiveness of ERACS in shortening postoperative recovery time and improving patient experience. The novelty of this study lies in the application of the ERACS protocol in the context of cesarean section, which is still rarely studied, and its impact on length of stay and clinical outcomes. By focusing on specific elements of ERACS, such as pain management and early mobilization, this study can make a significant contribution to the literature related to obstetric surgical practice.

2. METHOD

2.1. Design

This study adopts a quantitative research design characterized by an observational approach with a retrospective framework, allowing for the analysis of pre-existing data to identify patterns and outcomes associated with different surgical methodologies. This study design is quantitative, observational, and retrospective, effectively addressing the objectives of evaluating and comparing postoperative outcomes, particularly length of stay, between the ERACS method and conventional cesarean delivery methods. By utilizing pre-existing data from two medical institutions, this study was able to analyze patterns relative to this methodology without the limitations of a prospective design. Purposive sampling further enhanced this study by allowing selection based on specific inclusion criteria relevant to the objectives, thus ensuring a focused comparison.

2.2. Setting

The study was conducted from March to September 2025 at two medical institutions in Lampung Province, Indonesia. A total population of 210 patients who underwent cesarean section deliveries was identified. These patients constituted the study population.

2.3. Population and sample

To ensure a focused approach in capturing relevant findings, the researchers employed a purposive sampling technique. This approach allowed the selection of participants based on specific criteria aligned with the study's objectives. Ultimately, the final sample consisted of 102 patients, equally divided into two groups, facilitating a direct comparison of the two surgical approaches.

The recruited sample was composed of 51 patients who underwent cesarean deliveries using the ERACS method at Anugerah Medical Center Hospital, while the other group included 51 patients who received conventional cesarean deliveries at Yukum Medical Center Hospital. This strategic division not only ensured that participants were representatives of the overarching questions posed by the research but also enhanced the validity of the comparative analysis between the outcomes of the ERACS and conventional methodologies. By using purposive sampling, the researchers were able to narrow their focus on patients whose surgical experiences reflected the distinct operational procedures characterized by each of

the delivery methodologies, thereby contributing to a nuanced understanding of the implications associated with both practices.

The selection of Anugerah Medical Center Hospital and Yukum Medical Center Hospital in Lampung Province for this study was strategically justified based on their differing surgical practices and patient demographics. These institutions were chosen to represent two distinct methodologies for cesarean delivery: the ERACS and conventional cesarean practices. The aim was to provide a comprehensive comparative analysis of outcomes associated with these methods.

To control for variations between the two sites, several measures were implemented. Firstly, both hospitals are situated within the same geographical region, thus minimizing external factors such as regional healthcare access or socioeconomic disparities that may influence outcomes. Secondly, the purposive sampling technique ensured that patient selection criteria were consistent across both institutions, allowing for comparable clinical characteristics among participants. Additionally, continuous monitoring of adherence to established protocols for both surgical practices was conducted to mitigate any discrepancies in procedural execution. By employing these controls, the study aimed to enhance the validity and reliability of the findings regarding the outcomes associated with the ERACS and conventional cesarean methodologies.

2.4. Variable

The independent variable was the type of cesarean delivery method employed, specifically the ERACS method or the conventional cesarean method. The dependent variable was the length of hospital stay (LOS) among patients who underwent these surgical procedures. The study examined the association between the cesarean delivery method and the patients' LOS.

2.5. ERACS implementation

The ERACS protocol was implemented consistently across patients through rigorous adherence to established guidelines and comprehensive staff training. To ensure uniformity, the research design mandated strict protocol adherence, whereby surgical teams at Anugerah Medical Center Hospital employed pre-defined practices aligned with ERACS principles, including multimodal analgesia, early mobilization, and optimized postoperative care. Staff training was pivotal, involving ongoing educational initiatives and workshops focusing on the ERACS methodology. This not only bolstered the knowledge base of the surgical teams but also promoted a culture of teamwork and collaboration, which is critical in ERACS implementations. Continuous monitoring and feedback loops were also established to assess adherence to surgical protocols, thus minimizing variability in patient care and reinforcing commitment to ERACS guidelines.

2.6. LOS standardization

In standardizing LOS in this study on cesarean delivery methodologies, specific admission and discharge criteria were systematically implemented to ensure consistency and comparability across patient groups. Admission criteria stipulated that participant be adults (≥18 years) who consented and underwent cesarean section within the specified timeframe. Disease complexity was minimized by excluding those with previous abdominal surgeries and chronic conditions that could negatively impact recovery. Discharge criteria were equally stringent, mandating that patients demonstrate stable vital signs, the ability to ambulate independently, and adequate postoperative pain control, in addition to the absence of significant complications. This approach harmonized the assessment period for LOS across both methodologies, ERACS and conventional cesarean delivery by controlling for variables that might unduly affect hospitalization duration. Because our objective was to compare LOS between ERACS and conventional methods, LOS was defined as the number of days from admission to discharge, verified through medical records

2.7. Sample criteria

Inclusion criteria included patients who delivered by cesarean section within the specified timeframe, were 18 years of age or older, and provided written informed consent to participate. Furthermore, patients had to meet the health criteria required for both ERACS and conventional methods, allowing a comprehensive analysis of both approaches. Exclusion criteria were designed to eliminate factors that could influence outcomes, such as prior abdominal surgery, significant intraoperative or postoperative complications, and chronic medical conditions that could impact hospital recovery time.

2.8. Data collection

Data were collected through direct observation and a structured data collection sheet. The primary measurement of interest was the duration of hospitalization for each patient following cesarean delivery,

which was recorded in the observation sheet designed specifically for this study. The medical records of all participants were accessed to corroborate the data and ensure accuracy in recording the length of hospital stay.

2.9. Data analysis

Data analysis in this study will encompass various statistical methods using SPSS designed to provide an in-depth understanding of the characteristics of patients and their respective lengths of stay in a clinical setting. The first step involves employing descriptive statistics, where a frequency distribution table will be created to delineate the demographic attributes of the respondents, such as age, parity (the number of times a woman has given birth), and other significant clinical features. To augment this profile, percentages will be calculated to generate an overview of the population's characteristics, facilitating a clearer grasp of the distribution of these variables. In tandem with this, measures of central tendency, specifically the mean and standard deviation, will be calculated to encapsulate the lengths of stay for patients treated via both ERACS and conventional cesarean delivery techniques. These calculations will not only summarize the lengths of stay but will also allow for understanding the variability present within each group.

Following the descriptive phase, using SPSS bivariate analysis will be employed to explore potential relationships between the length of stay and the method of delivery. The first step will include a normality test to evaluate the distribution of the length of stay data, which preliminary examinations suggest does not conform to a normal distribution. Consequently, the Mann-Whitney U test, a suitable non-parametric method, will be applied to compare the medians of the two independent groups those receiving ERACS and their counterparts undergoing conventional cesarean delivery. We used the Mann-Whitney U test because LOS data were non-normally distributed. The statistical significance of the results will be interpreted with a predetermined alpha level (α) of 0.05. In this context, rejection of the null hypothesis (H0) will occur if the derived p-value falls below this threshold ($p < 0.05$), indicating a statistically significant variance in the lengths of stay between the two delivery methods. This methodological approach underscores the objective of this analysis: to ascertain clinical insights that may inform decision-making and potentially improve patient outcomes based on the efficacy of the ERACS strategy compared to traditional cesarean delivery practices. Figure 1 illustrates the research flow.

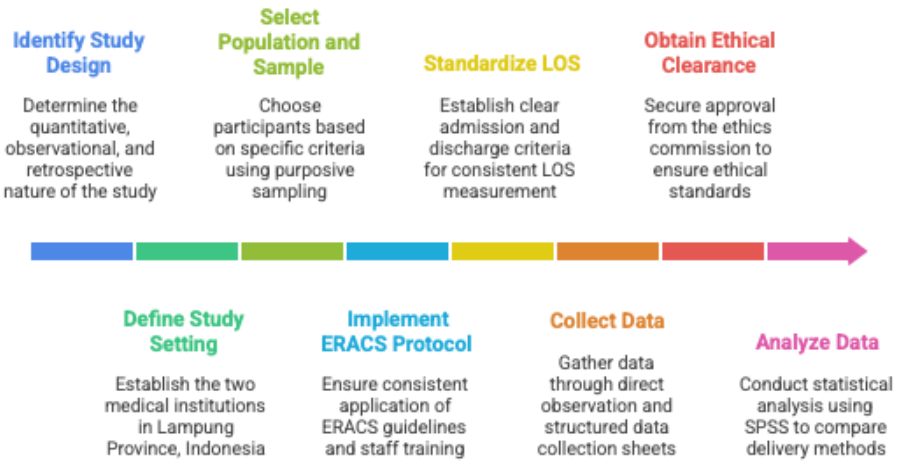

Figure 1. Research flow

3. RESULTS AND DISCUSSION

Based on the results of the study in Table 1, it can be seen that the age of the most respondents is early adulthood (26-35 years) in the ERACS method SC group as many as 32 people (62.7%) and in the conventional method SC group 29 people (56.9%). The most respondents' disease diagnosis is a single diagnosis in the ERACS method SC group as many as 43 people (84.3%) and in the conventional method SC group as many as 38 people (74.5%). The most surgical executors in both the ERACS method SC group and the conventional method SC group are specialists as many as 51 people (100%). The most surgical history in the ERACS method SC group has never been as many as 34 people (66.7%) and the most in the conventional method SC group has never been as many as 33 people (64.7%). The most postoperative catheter aff duration in the ERACS method SC group was 6-12 hours as many as 50 people (98.0%) and in the conventional

method group 20-26 hours as many as 50 people (98.0%). The ERACS method group had the highest post-SC operation mobilization implementation time of 6-12 hours (84.3%) and in the conventional group 27-33 hours as many as 40 people (78.4%).

Table 1. Distribution of respondent characteristics

Characteristics of respondents	SC ERACS method		SC conventional method		Homogenity
	N	%	n	%	test
Age					
Early teenagers (12-16 years)	-	-	1	2.0%	0.211
Late teenagers (17-25 years)	11	21.6%	12	23.5%	
Early adulthood (26-35 years)	32	62.7%	29	56.9%	
Late adulthood (36-45 years)	8	15.7%	9	17.6%	
Total	51	100%	51	100%	
Disease diagnosis					
Single diagnosis	43	84.3%	38	74.5%	0.186
Dual diagnostics	8	15.7%	13	25.5%	
Total	51	100%	51	100%	
Operations manager					
Specialist	51	100%	51	100%	0.720
Resident	-	-	-	-	
Total	51	100%	51	100%	
Operation history					
Once	17	33.3%	18	35.3%	0.630
Never	34	66.7%	33	64.7%	
Total	51	100%	51	100%	
Long affect catheter post operation					
6-12 hours	50	98.0%	-	-	0.882
13-19 hours	1	2.0%	-	-	
20-26 hours	-	-	50	98.0%	
27-33 hours	-	-	1	2.0%	
34-40 hours	-	-	-	-	
Total	51	100%	51	100%	
Post-operation mobilization					
6-12 hours	43	84.3%	-	-	0.722
13-19 hours	8	15.7%	-	-	
20-26 hours	-	-	-	-	
27-33 hours	-	-	40	78.4%	
34-40 hours	-	-	11	21.6%	
Total	51	100%	51	100%	

Based on the research results presented in Table 2, most caesarean section patients who received the ERACS method had a length of stay of 1 day, accounting for 44 patients (86.3%). Meanwhile, 7 patients (13.7%) had a length of stay of 2 days. Overall, the mean length of stay among caesarean section patients managed with the ERACS method was 1.1 days.

Based on the research results presented in Table 3, the majority of caesarean section patients managed using the conventional method had a hospital stay of 2 days, representing 40 patients (78.4%). In addition, 10 patients (19.6%) had a length of stay of 3 days, while 1 patient (2.0%) remained hospitalized for 4 days. The average length of stay among caesarean section patients managed with the conventional method was 2.2 days.

Table 2. Distribution of average length of stay for caesarean section patients using the ERACS method

Variable	Frequency	Percent	Means	Standard deviation	Min	Max	Median	IQR	95% confidence interval for mean
1 day	44	86.3%							
2 days	7	13.7%	1.1373	.34754	1.00	2.00	1.00	0	1.063, 1.211
Total	51	100.0%							

Table 3. Distribution of average length of stay of caesarean section patients using conventional methods

Variable	Frequency	Percent	Means	Standard deviation	Min	Max	Median	IQR	95% confidence interval for mean
2 days	40	78.4%							
3 days	10	19.6%	2.2353	.47279	2.00	4.00	2.00	0	2.094, 2.375
4 days	1	2.0%							
Total	51	100.0%							

Based on the results presented in Table 4, the non-parametric analysis using the Mann–Whitney test yielded a p-value of 0.000, which was lower than the significance level of 0.05. This finding indicates a statistically significant difference in the length of hospital stay between caesarean section patients managed using the ERACS method and those managed using the conventional method. The ERACS group had a lower sum of ranks (1466.00) than the conventional group (3787.00), indicating that the ERACS method was more effective in reducing the length of hospital stay.

Table 4. Results of the analysis of differences in length of care for SC patients using the ERACS method and the conventional method

Variable	SC method	(n)	Mean ranking	Sum of ranks	p-values
Length of patient care day	SC ERACS method	51	28.75	1466.00	
	SC conventional method	51	74.25	3787.00	0.000
	Total	102			

The predominant age group of respondents in both ERACS and conventional surgery groups was early adulthood (26-35 years), which aligns with demographic structures often seen in surgical populations for cesarean sections. This finding is consistent with previous research indicating that younger age groups are more likely to undergo cesarean deliveries [17], [18]. The data showed that 62.7% of the ERACS group and 56.9% of the conventional group were within this age bracket, reflecting a trend towards these ages being the most frequent among those needing surgical intervention.

Disease diagnosis highlights the efficacy of the ERACS method. The predominance of single diagnoses in both groups 84.3% in the ERACS group compared to 74.5% in the CS group indicates a potentially more streamlined surgical approach within the ERACS framework, which has been associated with less complexity and potentially fewer postoperative complications [18], [19]. The surgical team was exclusively specialists in both groups, underscoring the consistency in clinical expertise across different treatment protocols.

The ERACS method has shown potential benefits in postoperative outcomes when compared to conventional care (CS). Studies suggest that ERACS can enhance recovery, reduce hospital stay lengths, and lower opioid requirements, supporting its effectiveness as a modern surgical protocol for cesarean deliveries [20], [21]. The absence of significant disparities in outcomes between ERACS and standard care emphasizes its value within clinical practices [20]. It is important to note that while ERACS has demonstrated positive results, some inconsistencies in study findings regarding wound infections require careful interpretation of the data [20]. Specialist surgical teams conducted both ERACS and CS procedures, ensuring consistency in clinical expertise that further stabilizes outcome measurements [21], [22].

An important finding revolves around the duration of postoperative catheter placement. The ERACS group showed a markedly shorter catheter duration (98.0% for 6-12 hours) compared to the conventional group (98.0% for 20-26 hours). This shorter duration reflects the fundamentally different philosophies underpinning the two methods, where the ERACS protocol emphasizes rapid recovery and reduced invasive interventions as part of its core protocol [20]. This aligns with existing literature suggesting that ERAS protocols generally lead to shorter hospitalization durations and improved recovery trajectories [23], [24].

The length of stay metrics painted a significantly favorable picture for the ERACS cohort. The majority of patients in the ERACS group had a length of stay of just 1 day (86.3%), with an average of 1.1 days. In contrast, the conventional CS group exhibited a longer average stay of 2.2 days (78.4% staying for 2 days), corroborating earlier studies that highlight the efficacy of ERAS programs in reducing hospital stays [24].

The findings indicated significant differences between the ERACS and conventional cesarean section methods, particularly in terms of LOS and postoperative mobilization. The ERACS group demonstrated a reduction in LOS, with data suggesting that patients typically had an average discharge time of roughly 1.1 days compared to approximately 2.2 days for conventional methods, where a significant percentage remained hospitalized longer [18], [25]. This aligns with literature suggesting ERACS's efficiency in minimizing hospital stays through standardization of postoperative care and early mobilization protocols [26].

Furthermore, the age distribution reflects a predominance of early adulthood among respondents, which is consistent with studies indicating younger women are more likely to require cesarean deliveries [27]. Notably, the surgical team's consistency comprising specialists in both groups ensured that surgical expertise did not introduce bias into the results [28]. Therefore, ERACS not only contributed to improved

recovery times but also underlined the importance of multidisciplinary teams in enhancing surgical outcomes in obstetrics [29].

Statistical analysis using the Mann-Whitney U test demonstrated a significant difference in the length of hospital stay between patients managed through the ERACS methodology and those receiving conventional care, with a p-value of 0.0001. The ERACS group showed a sum of ranks of 1466.00 compared to 3787.00 for the conventional group, underscoring its effectiveness in minimizing hospital stay duration [30]. This finding aligns with existing literature discussing ERACS protocols, which emphasize reduced lengths of stay and overall healthcare costs associated with obstetric surgeries [31], [32]. The adoption of ERACS methodologies is supported not only by statistical evidence but also from broader research advocating for enhanced recovery protocols in surgical practices that yield better postoperative outcomes [33].

The literature discussing ERACS protocols provides a broader understanding of the implications of implementing these methodologies in surgical practices. Numerous studies advocate for similar enhanced recovery guidelines, emphasizing decreasing lengths of stay and improved patient satisfaction without increasing complications [34]. For example, Gadiya *et al*. [35] demonstrated that ERAS protocols significantly reduced length of hospital stays across various surgical specialties without increasing complication rates, reinforcing the efficacy of these guidelines. The statistical evidence from these analyses, along with corroborative literature, underscores the substantial benefits of adopting ERACS methodologies in obstetric surgeries and beyond, including overall improved postoperative outcomes and cost efficiency.

The adoption of ERAS methodology, specifically its adaptation for obstetric surgeries ERACS, has been shown to yield significant benefits in terms of improved postoperative outcomes and enhanced cost efficiency. Evidence indicates that ERAS protocols lead to reduced lengths of hospital stays and lowered complication rates, which have been documented across various surgical fields, including gynecologic oncology and obstetrics [36]. Economic analyses demonstrate that these practices can result in substantial cost savings, often exceeding several thousand dollars per patient [37].

ERACS achieves shorter lengths of stay LOS primarily through early mobilization, multimodal analgesia, and reduced catheter duration. Early mobilization facilitates postoperative recovery, decreases the risk of venous thromboembolism (VTE), and enhances overall functional return [38]. By enabling patients to ambulate soon after surgery, ERACS protocols mitigate complications associated with prolonged bed rest [30]. Multimodal analgesia reduces reliance on opioids, which are linked to adverse side effects such as constipation, nausea, and prolonged sedation [26], [39]. Implementing effective pain management strategies allows for enhanced patient comfort and quicker rehabilitation, further decreasing LOS [40].

Moreover, the ERACS method includes early removal of urinary catheters, significantly lowering infection risks associated with prolonged catheterization [41]. By addressing these key areas mobilization, analgesia, and catheter management ERACS not only improves patient outcomes but also yields marked reductions in overall hospitalization durations [42], [43]. Collectively, these factors enhance recovery and optimize resource utilization in surgical care settings.

In obstetric settings, the emergence of enhanced recovery for obstetric surgery (EROS) reflects the successful integration of ERAS principles. Studies have shown that EROS improves maternal and neonatal outcomes, patient satisfaction, and breastfeeding rates [44]. Furthermore, systematic reviews indicate that implementing ERAS in cesarean sections results in faster recovery and reduced readmission rates, reinforcing the cost-benefit of these protocols [45].

Studies indicate that ERAS procedures can lower some postoperative complications [46]. However, concerns about elevated readmission risks in high-complexity surgeries persist, particularly with pancreaticoduodenectomy, where one study reported a 90-day readmission rate of 8.8%, lower than Western reports of 19%-42% [47]. Cultural and systemic factors, especially in regions like Indonesia, must not be overlooked. Issues such as patient education and healthcare infrastructure play a crucial role in the effective implementation of ERAS principles, directly influencing patient outcomes [48].

3.1. Limitation

This study has several limitations, including its retrospective design, which limits the ability to establish causal relationships. The retrospective use of pre-existing data may also introduce selection bias. In addition, the purposive sampling method, although appropriate for the research objectives, may limit the generalizability of the findings because of its non-random nature.

4. CONCLUSION

The findings of this study highlight important implications for obstetric clinical practice, particularly in the management of cesarean section patients. The substantial reduction in the average length of hospital stays from 2.2 days with conventional cesarean sections to 1.1 days with the ERACS method ($p < 0.05$)

indicates that implementing ERACS can optimize resource utilization in healthcare facilities, reducing bed occupancy rates and associated costs. Furthermore, improved postoperative recovery indicators, such as shorter catheterization times and shorter mobilization times, support the implementation of ERACS protocols to improve patient outcomes. This aligns with evidence showing that ERACS principles contribute to reduced complication rates and increased patient satisfaction without compromising safety. Thus, implementing ERACS protocols not only benefits patients through accelerated recovery and increased satisfaction but also serves the healthcare system by potentially reducing costs and improving service delivery efficiency. These findings encourage further integration of ERACS principles into obstetric care, aiming to achieve better maternal and neonatal health outcomes. Future research should focus on prospective studies examining the long-term effects of the ERACS protocol on maternal and neonatal outcomes. Specifically, randomized controlled trials (RCTs) are needed to establish causality and minimize biases associated with retrospective studies. Future research should also examine the impact of ERACS on diverse patient populations, considering factors such as age, pre-existing conditions, and socioeconomic status to assess generalizability.

ACKNOWLEDGMENTS

The author would like to express his deepest gratitude to the Director of the Health Polytechnic of the Ministry of Health, Tanjungkarang, the Director of the Anugerah Medical Center Hospital, and the Director of the Yukum Medical Center Hospital, Lampung Province. The author would like to thank all parties who have provided support and significant contributions in completing this research.

FUNDING INFORMATION

This research was funded by the Ministry of Health through the Tanjung Karang Ministry of Health Polytechnic with number 1137/LB/PKPT/2025.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Anita Anita	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Muhammad Abduh Musyaffa	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

ETHICAL APPROVAL

Ethical approval obtained from Poltekkes Kemenkes Tanjung Karang with the number: 008/KEPK-TJK/I/2025.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [AA], upon reasonable request.

REFERENCES

[1] B. Debono *et al.*, "Consensus statement for perioperative care in lumbar spinal fusion: enhanced recovery after surgery (ERAS®) society recommendations," *Spine Journal*, vol. 21, no. 5, pp. 729–752, 2021, doi: 10.1016/j.spinee.2021.01.001.

[2] S. Hajibandeh, S. Hajibandeh, V. Bill, and T. Satyadas, "Meta-analysis of enhanced recovery after surgery (ERAS) protocols in emergency abdominal surgery," *World Journal of Surgery*, vol. 44, no. 5, pp. 1336–1348, 2020, doi: 10.1007/s00268-019-05357-5.

[3] L. Cao, L. Zhang, B. Chen, L. Yan, X. Shi, and L. Tian, "Application of multimodal standardized analgesia under the concept of enhanced recovery after surgery in laparoscopic radical colorectal cancer surgery," *Frontiers in Oncology*, vol. 14, no. 5, pp. 1–12, 2024, doi: 10.3389/fonc.2024.1381809.
[4] H. I. H. Albalawi *et al.*, "Beyond the operating room: a narrative review of enhanced recovery strategies in colorectal surgery," *Cureus*, vol. 1, no. 2, pp. 1–11, 2024, doi: 10.7759/cureus.76123.
[5] F. Ramadhan, "The impact of obstetric care education on prenatal health behaviors among pregnant women," *Magenta Journal De Healthymedi*, vol. 2, no. 3, pp. 270–281, 2025.
[6] R. Liu, "Exploring the application of health education during pregnancy in clinical nursing of obstetrics and gynecology," *Journal of Clinical and Nursing Research*, vol. 8, no. 10, pp. 106–112, 2024, doi: 10.26689/jcnr.v8i10.8642.
[7] E. N. Osoro, W. M. Tenambergen, and K. Njoroge, "Effect of an educational intervention on the utilization of maternal healthcare services for high-risk obstetric clients, systematic review," *International Journal of Professional Practice*, vol. 12, no. 2, pp. 71–85, 2024, doi: 10.71274/ijpp.v12i2.414.
[8] A. A. Creanga *et al.*, "Maternal health policy environment and the relationship with service utilization in low and middle-income countries," *Journal of Global Health*, vol. 13, no. 5, pp. 1–11, 2023, doi: 10.7189/jogh.13.04025.
[9] M. O. Rahman, N. Yamaji, Y. Nagamatsu, and E. Ota, "Effects of mhealth interventions on improving antenatal care visits and skilled delivery care in low- and middle-income countries: systematic review and meta-analysis," *Journal of Medical Internet Research*, vol. 24, no. 4, pp. 1–12, 2022, doi: 10.2196/34061.
[10] H. J. Golder and V. Papalois, "Enhanced recovery after surgery: history, key advancements and developments in transplant surgery," *Journal of Clinical Medicine*, vol. 10, no. 8, pp. 1–10, 2021, doi: 10.3390/jcm10081634.
[11] A. Darwish, M. Mustafa, E. Youness, and B. Al-Harazi, "Enhanced recovery after cesarean section (CS) versus conventional care in a lower middle-income country: a randomized controlled trial," *Open Journal of Nursing*, vol. 12, no. 12, pp. 831–841, 2022, doi: 10.4236/ojn.2022.1212058.
[12] G. A. Macones *et al.*, "Guidelines for postoperative care in cesarean delivery: enhanced recovery after surgery (ERAS) society recommendations (part 3)," *Obstetric Anesthesia Digest*, vol. 40, no. 2, pp. 69–70, Jun. 2020, doi: 10.1097/01.aoa.0000661356.57542.dd.
[13] R. Zhu, F. Yang, C. Li, H. Zhu, L. Lin, and X. Zhao, "Effect of enhanced recovery after surgery on the prognosis of patients with hip fractures: a systematic review and meta-analysis," *Journal of Trauma Nursing*, vol. 30, no. 5, pp. 271–281, 2023, doi: 10.1097/JTN.0000000000000741.
[14] M. Hübner *et al.*, "Guidelines for perioperative care in cytoreductive surgery (CRS) with or without hyperthermic intraperitoneal chemotherapy (HIPC): enhanced recovery after surgery (ERAS®) society recommendations — part i: preoperative and intraoperative management," *European Journal of Surgical Oncology*, vol. 46, no. 12, pp. 2292–2310, 2020, doi: 10.1016/j.ejso.2020.07.041.
[15] P. Sravani, R. Pravalina, G. Sahoo, and B. K. Pati, "Comparative study between eras protocol and conventional perioperative care in elective cesarean section patients in a tertiary care centre of eastern India," *Journal of Public Health and Development*, vol. 21, no. 3, pp. 94–106, 2023, doi: 10.55131/jphd/2023/210308.
[16] C. A. Macgregor *et al.*, "Post-cesarean opioid use after implementation of enhanced recovery after surgery protocol," *American Journal of Perinatology*, vol. 38, no. 7, pp. 637–642, 2021, doi: 10.1055/s-0040-1721075.
[17] D. Karki and R. Saha, "Assessment of patient satisfaction after implementing an enhanced recovery after surgery (ERAS) protocol for elective caesarean sections," *Journal of Kathmandu Medical College*, vol. 1, no. 12, pp. 188–193, 2021, doi: 10.3126/jkmc.v10i4.43859.
[18] D. S. Junaidi, D. A. Rajaratnam, and D. A. Safoorah, "A comparative study of enhanced recovery after surgery (ERAS) versus non enhanced recovery after surgery (non-ERAS) pathway for caesarean deliveries," *International Journal of Clinical Obstetrics and Gynaecology*, vol. 4, no. 5, pp. 93–95, 2020, doi: 10.33545/gynae.2020.v4.i5b.688.
[19] U. Afreen, F. K. Faisal, M. Khalid, Z. Rao, R. Mustafa, and S. Afreen, "Enhanced recovery after caesarean section – an improved pathway than conventional care for reducing hospital stay," *Journal of Ayub Medical College*, vol. 36, no. 1, pp. 50–55, 2024, doi: 10.55519/JAMC-01-12522.
[20] M. I. Lestari, D. Sari, S. Chandra, P. Purwoko, I. Isngadi, and T. P. Umar, "Enhanced recovery after cesarean (ERAC) versus conventional care: an expanded systematic review and meta-analysis of 18,368 subjects," *Journal of Anaesthesiology Clinical Pharmacology*, vol. 41, no. 1, pp. 48–61, 2025, doi: 10.4103/joacp.joacp_339_23.
[21] J. A. Meyer *et al.*, "Enhanced recovery after cesarean from the patient perspective: a prospective study of the ERAC questionnaire (ERAC-q)," *Journal of Perinatal Medicine*, vol. 52, no. 1, pp. 14–21, 2024, doi: 10.1515/jpm-2023-0234.
[22] I. Nurhayati and M. Nadjib, "Enhanced recovery after caesarean delivery: a narrative review," *Journal of Health Sciences*, vol. 16, no. 01, pp. 99–104, 2023, doi: 10.33086/jhs.v16i01.3098.
[23] T. Tamang, T. Wangchuk, C. Zangmo, T. Wangmo, and K. Tshomo, "The successful implementation of the enhanced recovery after surgery (ERAS) program among caesarean deliveries in bhutan to reduce the postoperative length of hospital stay," *BMC Pregnancy and Childbirth*, vol. 21, no. 1, pp. 637–647, 2021, doi: 10.1186/s12884-021-04105-9.
[24] F. S. Utami and E. M. Rosa, "The effectiveness of the enhanced recovery after cesarean surgery (ERACS) method on patients' pain levels and satisfaction in hospitals: a quasi-experimental posttest design," *Journal of Public Health and Development*, vol. 21, no. 3, pp. 107–119, 2023, doi: 10.55131/jphd/2023/210309.
[25] I. Iswahyudi, I. G. A. P. Kartika, S. P. M. Purwani, and I. B. G. F. Manuaba, "Implementation of regulation about enhanced recovery after caesarean surgery in Indonesia: a literature review," *Jurnal Penelitian Pendidikan IPA*, vol. 9, no. SpecialIssue, pp. 8–15, 2023, doi: 10.29303/jppipa.v9ispecialissue.6175.
[26] L. Mullman *et al.*, "Improved outcomes with an enhanced recovery approach to cesarean delivery," *Obstetrics and Gynecology*, vol. 136, no. 4, pp. 685–691, 2020, doi: 10.1097/AOG.0000000000004023.
[27] S. Kurmi, N. Pandit, S. Sah, A. Subedi, and S. Adhikary, "Safety and feasibility of enhanced recovery after surgery (ERAS) protocol in patients undergoing stoma closure," *Indian Journal of Surgery*, vol. 83, no. 3, pp. 703–707, 2021, doi: 10.1007/s12262-020-02320-w.
[28] J. Weindelmayer *et al.*, "The 'weekday effect' on enhanced recovery after surgery protocol for gastrectomy," *Digestive Surgery*, vol. 40, no. 3–4, pp. 100–107, 2023, doi: 10.1159/000531022.
[29] S. King *et al.*, "A multi-country, prospective cohort study to measure rate and risk of relapse among children recovered from severe acute malnutrition in Mali, Somalia, and South Sudan: a study protocol," *BMC Nutrition*, vol. 8, no. 1, 2022, doi: 10.1186/s40795-022-00576-x.
[30] C. D. C. Puspitasari, Y. Paripurna, and N. Trianasari, "Comparison of operating costs and LOS of cesarean section patients using eracs and non-eracs method," *Jurnal Jaminan Kesehatan Nasional*, vol. 4, no. 1, pp. 1–12, 2024, doi: 10.53756/jjkn.v4i1.142.

[31] P. Sultan, R. George, C. F. Weiniger, K. El-Bodhdadly, P. Pandal, and B. Carvalho, "Expert consensus regarding core outcomes for enhanced recovery after cesarean delivery studies: a Delphi study," *Obstetric Anesthesia Digest*, vol. 43, no. 2, pp. 55–56, Jun. 2023, doi: 10.1097/01.aoa.0000927740.32458.99.
[32] S. Ciechanowicz, J. X. C. Ke, N. Sharawi, and P. Sultan, "Measuring enhanced recovery in obstetrics: a narrative review," *AJOG Global Reports*, vol. 3, no. 1, pp. 1–12, 2023, doi: 10.1016/j.xagr.2022.100152.
[33] N. Badreldin, J. D. Ditosto, K. Holder, M. Beestrum, and L. M. Yee, "Interventions to reduce inpatient and discharge opioid prescribing for postpartum patients: a systematic review," *Journal of Midwifery and Women's Health*, vol. 68, no. 2, pp. 187–204, 2023, doi: 10.1111/jmwh.13475.
[34] X. Zhang *et al.*, "The effect of prehabilitation on the postoperative outcomes of patients undergoing colorectal surgery: a systematic review and meta-analysis," *Frontiers in Oncology*, vol. 12, no. 7, pp. 1–12, Jul. 2022, doi: 10.3389/fonc.2022.958261.
[35] A. D. Gadiya, J. E. J. Koch, M. S. Patel, M. Shafafy, M. P. Grevitt, and N. A. Quraishi, "Enhanced recovery after surgery (ERAS) in adolescent idiopathic scoliosis (AIS): a meta-analysis and systematic review," *Spine Deformity*, vol. 9, no. 4, pp. 893–904, 2021, doi: 10.1007/s43390-021-00310-w.
[36] L. Bollag *et al.*, "Society for obstetric anesthesia and perinatology: consensus statement and recommendations for enhanced recovery after cesarean," *Anesthesia and Analgesia*, vol. 132, no. 5, pp. 1362–1377, 2021, doi: 10.1213/ANE.0000000000005257.
[37] Y. Dong, Y. Zhang, and C. Jin, "Comprehensive economic evaluation of enhanced recovery after surgery in hepatectomy," *International Journal for Equity in Health*, vol. 20, no. 1, pp. 245–254, 2021, doi: 10.1186/s12939-021-01583-3.
[38] Y. Vipulachandra, H. Narkhede, P. L. Bhanap, A. Karale, and R. B. Chavan, "Enhanced recovery after surgery protocol implementation on elective cesarean delivery: a cross-sectional study," *Journal of South Asian Federation of Obstetrics and Gynaecology*, vol. 14, no. 6, pp. 667–671, 2022, doi: 10.5005/jp-journals-10006-2152.
[39] R. Twomey *et al.*, "Impact of early mobilization on recovery after major head and neck surgery with free flap reconstruction," *Cancers*, vol. 13, no. 12, p. 2852, 2021, doi: 10.3390/cancers13122852.
[40] S. Petrillo *et al.*, "One-day surgery is safe and effective in unicompartmental knee arthroplasty: a prospective comparative study at 1 year of follow-up," *Knee Surgery, Sports Traumatology, Arthroscopy*, vol. 32, no. 12, pp. 3272–3280, 2024, doi: 10.1002/ksa.12350.
[41] H. Vihervaara, A. Väänänen, and M. Kaijomaa, "Association between duration of urinary catheterization and post-operative mobilization following elective cesarean section: a retrospective case-control study in Espoo, Finland," *European Journal of Midwifery*, vol. 8, no. November, pp. 1–9, Nov. 2024, doi: 10.18332/ejm/193602.
[42] A. Millizia, A. Rizka, and W. P. Mellaratna, "Patient satisfaction level of enhanced recovery after c-section at Abby Maternal and Child Hospital, Lhokseumawe," *Eureka Herba Indonesia*, vol. 4, no. 1, pp. 171–175, 2022, doi: 10.37275/ehi.v4i1.60.
[43] M. Baluku, F. Bajunirwe, J. Ngonzi, J. Kiwanuka, and S. Ttendo, "A randomized controlled trial of enhanced recovery after surgery versus standard of care recovery for emergency cesarean deliveries at mbarara hospital, uganda," *Anesthesia and Analgesia*, vol. 130, no. 3, pp. 769–776, 2020, doi: 10.1213/ANE.0000000000004495.
[44] A. Nair and R. Al Qasaab, "Anesthetic practices for lower segment cesarean section in the Sultanate of Oman: a national survey," *Cureus*, vol. 1, no. 5, pp. 1–12, 2024, doi: 10.7759/cureus.61204.
[45] N. C. Teigen *et al.*, "Enhanced recovery after surgery at cesarean delivery to reduce postoperative length of stay: a randomized controlled trial," *American Journal of Obstetrics and Gynecology*, vol. 222, no. 4, pp. 372.e1-372.e10, Apr. 2020, doi: 10.1016/j.ajog.2019.10.009.
[46] Z. Wu, X. Ge, and D. Shi, "ERAS and gastrointestinal site infections: insights from a comprehensive systematic review and meta-analysis," *Surgical Infections*, vol. 25, no. 9, pp. 699–709, 2024, doi: 10.1089/sur.2024.112.
[47] D. H. Kim, Y. S. Yoon, H. S. Han, J. Y. Cho, J. S. Lee, and B. Lee, "Effect of enhanced recovery after surgery program on hospital stay and 90-day readmission after pancreaticoduodenectomy: a single, tertiary center experience in korea," *Annals of Surgical Treatment and Research*, vol. 100, no. 2, pp. 76–85, 2021, doi: 10.4174/astr.2021.100.2.76.
[48] H. Yokoi, V. Chakravarthy, R. Winkleman, M. Manlapaz, and A. Krishnaney, "Incorporation of blood and fluid management within an enhanced recovery after surgery protocol in complex spine surgery," *Global Spine Journal*, vol. 14, no. 2, pp. 639–646, 2024, doi: 10.1177/21925682221120399.

BIOGRAPHIES OF AUTHORS

Anita Anita is a nursing academic who currently serves as a faculty member in the Department of Nursing, Poltekkes Kemenkes Tanjungkarang, Lampung, Indonesia. With a background in nursing, she has extensive experience in research and teaching. Her research focuses include evidence-based nursing practice, public health, and nurse professional development. Furthermore, she actively contributes to curriculum development and training at her institution, striving to improve the quality of nursing education in Indonesia. She has published numerous articles in scientific journals and presented at various conferences to share her knowledge and insights with fellow healthcare professionals. Her commitment to community service is also evident in her involvement in various local health programs. She can be contacted at email: anitapoltekkestanjungkarang@gmail.com.

Muhammad Abduh Musyaffa is an academic and researcher in the field of nursing, currently contributing to the Nursing Department of the Tanjungkarang Ministry of Health Polytechnic in Lampung, Indonesia. He has a strong educational background in health and nursing, with a focus on research related to nursing practice, health policy, and nursing education. As a researcher, he has published numerous scientific papers covering cutting-edge topics in nursing and actively participates in seminars and conferences to share his findings and develop knowledge among his peers. His dedication to nursing and education reflects his commitment to improving the quality of healthcare in Indonesia, particularly in the context of patient-centered nursing. He can be contacted at email: musyaffa0507@gmail.com.