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ORIGINAL RESEARCH ARTICLE

Evaluating the impact of an enhanced recovery programme on the Obstetric Quality-of-Recovery score (ObsQoR-10) after elective Caesarean section in a South African public hospital: a prospective before–after study

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Abstract

Background: Caesarean section is a common surgical procedure, accounting for almost a third of all surgical procedures in low- middle-income countries. Enhanced recovery after Caesarean section (ERAC) programmes are rarely implemented in resource-limited settings. This study evaluated a tailored enhanced recovery programme's impact on quality of recovery after elective Caesarean section in a Johannesburg public hospital.

Methods: This was a prospective, observational, before–after cohort study. Fifty-two patients (aged ≥18 yr) undergoing elective Caesarean section were analysed, comprising a pre-ERAC cohort (n=25), analysed from 8 to 22 April 2024 and a post-ERAC cohort (n=27), analysed from 3 to13 June 2024. The primary outcome was postpartum recovery measured by the Obstetric Quality of Recovery-10 score.

Results: There was a significant improvement in Obstetric Quality of Recovery-10 scores post-ERAC, with a difference in medians of 9 between cohorts (95% confidence interval: 6–14; P<0.001). There was also a significant reduction in opioid consumption with a median decrease of 10 mg oral morphine equivalent in the post-ERAC cohort in the first 24 h after operation (95% confidence interval: −26 to 6; P<0.001). Time to urinary catheter removal, time to first oral intake, time to first mobilisation, and preoperative fasting for liquids all showed significant improvement in the post-ERAC cohort. There was no difference in length of stay and other secondary outcomes.

Conclusion: This study demonstrates that ERAC implementation in a resource-limited setting is feasible and can enhance maternal recovery after elective Caesarean section. These findings highlight the potential for ERAC programs to significantly improve patient-centred outcomes in low-middle income countries.

Keywords: Caesarean section; enhanced recovery; ERAC; low-middle income country; obstetric quality of recovery; ObsQoR; patient-reported outcomes

Caesarean section (CS) represents one of the most common surgical procedures performed worldwide. CS currently accounts for almost a third of all surgical procedures in low-middle income countries (LMICs) and it is projected that 38 million CS will be performed annually by 2030, of which 33.5 million will be in LMICs.[1,2] Enhanced recovery protocols in other surgical disciplines have shown improved recovery, improved patient satisfaction, reduced complication rates, and decreased opioid consumption and length of stay (LOS).[3] Multiple society guidelines have since emerged for the implementation of enhanced recovery after Caesarean section (ERAC) programmes.[4–8]

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Most of the literature on ERAC implementation originates from high-income countries, with limited adoption in LMICs and no studies assessing its use for elective CS in Africa.[9] With maternal mortality after CS in Africa ~50 times higher than in high-income countries, research priorities have understandably focused on reducing mortality rather than enhancing recovery.[10] However, there is a recommendation that the adoption of ERAC should be prioritised in LMICs despite the typical challenges these regions face.[11] This can be achieved by tailoring protocols to better suit the intended environment. LMICs should focus on feasible core elements, rather than implementing entire published protocols.[12] Given that CS is such a large proportion of the surgical burden in these nations, even small improvements in patient care are likely to have a large-scale impact.

The heterogeneity of outcomes reported in most existing ERAC studies provides a barrier to the formulation of high-quality evidence, as noted by Sultan and colleagues.[13] The CRADLE study (Community Blood Pressure Monitoring in Rural Africa: Detection of Underlying Pre-Eclampsia) subsequently provided international consensus on a core outcome set for evaluating the impact of an ERAC protocol.[14] The appreciation that postpartum recovery is a multidimensional construct lead to the inclusion of the validated patient-reported outcome measure (PROM) of postpartum recovery, the Obstetric Quality of Recovery-10 (ObsQoR-10). PROMs are currently the gold standard means to assess postoperative recovery.[15] ObsQoR has been shown to be the best available measure of inpatient postpartum recovery.[16]

This study aimed to assess the impact of a tailored ERAC program, adapted from existing guidelines, on maternal outcomes after elective CS in a public hospital in Johannesburg, South Africa. The primary outcome measured was the ObsQoR-10 score. Secondary outcomes included fasting duration, opioid consumption, and other recovery-related metrics. We hypothesised that implementing the ERAC protocol would lead to a significant improvement in ObsQoR-10 scores in the immediate postoperative period.

Methods

Approval to conduct this study was granted by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (M231026). This report adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. This study was conducted at Rahima Moosa Mother and Child Hospital, a regional facility affiliated with the University of the Witwatersrand in Johannesburg, South Africa, performing ~5800 CS annually of which 15% are typically elective. We utilised a prospective observational before-and-after cohort study design. A consecutive, convenience sampling method was used. Data from the pre-ERAC cohort were collected between 8 April 2024 and 22 April 2024. On 29 April 2024, our health facility implemented an ERAC programme for elective CS, described below. Data from the post-ERAC cohort were collected between 3 June 2024 and 13 June 2024. Written informed consent was obtained from participants before the completion of the ObsQoR-10 and subsequent data collection.

Inclusion and exclusion criteria

All patients presenting for elective CS during the data collection periods were assessed for eligibility. The following exclusion criteria were applied: (1) <18 yr of age; (2) emergency CS; (3) CS performed with or converted to general anaesthesia; (4) patient or neonate requiring admission to a high-dependency unit; (5) inability to converse in English; (6) BMI >40 kg m^{-2}; (7) CS performed outside core working hours; (8) known or suspected obstructive sleep apnoea; (9) opioid dependency; (10) ASA physical status classification >3.

Pre-Enhanced Recovert after Caesaran Section (ERAC) care

Before ERAC, the pre-, intra-, and postoperative management was at the discretion of the attending healthcare providers. Because of a high burden of emergency CS at the institution, it is challenging to schedule elective CS, with patients having to wait for theatre availability. This often led to prolonged periods of fasting with patients being kept nil per os for longer than 12 h. There was also no routine use of long-acting intrathecal opioids and supplementary analgesics in theatre. Nursing staff only allowed patients to resume oral intake after complete resolution of the spinal anaesthetic and patients had urinary catheters removed at an arbitrary time on day 1 after operation. Pre- and post-ERAC management are summarised in Table 1.

Development of context-specific ERAC and post-ERAC care

The ERAC protocol implemented was adapted from available society guidelines in consultation with an institutional multidisciplinary team.[4–8] The team comprised heads of departments from anaesthesia, obstetrics and gynaecology, dietetics, and leadership and operational managers from nursing. We attempted to improve preoperative fasting by allowing patients to have clear liquids until 06:00 on the morning of the procedure. We also had the theatre manager inform the ward when it was likely that a particular patient would be presenting for their elective CS, thereby allowing the ward to provide that patient with a clear carbohydrate containing drink before operation. We created an educational pamphlet handed to patients admitted for elective CS, describing what they can expect during their stay and explaining aspects contributing to enhanced recovery. This booklet also included information on breastfeeding. Notable intraoperative changes included the routine use of a long-acting intrathecal opioid and standardised initiation of multimodal analgesia and anti-emetics. After the operation, we encouraged patients to resume an oral diet as soon as they returned to the ward. We educated nurses and advocated for earlier urinary catheter removal, starting 6 h after operation. We also standardised the postoperative analgesic prescription. A complete bundle of interventions tailored from society guidelines is available as a supplement.[8]

Data collected

The primary outcome was assessed using the ObsQoR-10 questionnaire, completed by participants between 22 and 26 h after operation, at the convenience of the primary researcher and participant. This 10-item questionnaire rates various recovery items on 10-point Likert scales, with a maximum score of 100, where higher scores indicate better outcomes. Secondary outcomes included: LOS (defined as days spent in hospital after operation) and opioid consumption within the first 24 h after operation. Opioid consumption was

Table 1 Summary of pre and post ERAC management. ERAC, enhanced recovery after Caesarean section.

	Pre-ERAC	Post-ERAC
Preoperative	Basic education dependent on provider with no focus on enhanced recovery. Patients instructed to stay nil per os from the night before their operation.	Educational booklet handed to patients containing information on ERAC pathway and breastfeeding. Patients encouraged to drink clear liquids on the morning of their operation. Provision of preoperative carbohydrate drink where scheduling permits.
Intraoperative	Prophylactic antibiotics. Use of forced-air warming devices. Fentanyl 10 ug used as additive to intrathecal drug mixture. Spinal hypotension typically managed with i.v. crystalloid and manual bolus dosing of phenylephrine. Use of analgesic adjuncts at the discretion of the anaesthetic provider. Anti-emetics administered at the discretion of the anaesthetic provider.	Prophylactic antibiotics. Use of forced-air warming devices. Morphine 50 ug used as additive to intrathecal drug mixture. Suggestion to prevent spinal anaesthesia-induced hypotension with prophylactic phenylephrine infusion. Paracetamol 1 g and diclofenac 75 mg administered intraoperatively. Intra- and postoperative nausea and vomiting prophylaxis with at least two different agents.
Postoperative	Typical analgesic script: paracetamol 1 g p.o. every 6 hI buprofen 400 mg p.o. every 8 hP ethidine 100 mg i.m. every 8 h Resumption of oral diet after resolution of spinal anaesthetic. Urinary catheter removed at some time on day 1 after operation No advice provided on patient mobilisation.	Scheduled analgesia: paracetamol 1 g p.o. every 6 hI buprofen 600 mg p.o. every 6 h As required analgesia: tramadol 50 mg p.o. every 6 h Patients encouraged to resume oral diet as soon as possible. Encouraged earlier urinary catheter removal starting at 6 h after operation Patients encouraged to mobilise after resolution of spinal anaesthetic.

measured in oral morphine equivalents (OME), using conversion factors as proposed by Nielsen and colleagues.[17] We also collected process measures such as duration of preoperative fasting, time to oral intake after operation, time to mobilise after operation, and duration of indwelling urinary catheter after operation.

Sample size calculation

The sample size was determined using STATA version 17 (StataCorp, College Station, TX, USA), considering the primary objective of the study (ObsQoR-10). There is no existing literature on the use of ObsQoR-10 as an outcome measure in ERAC studies. There was also no determination of the minimum clinically important difference (MCID) for ObsQoR-10. In most studies used to translate and validate the ObsQoR-10, the mean or median difference in ObsQoR-10 of patients with a 'good' *vs* a 'poor' recovery were >10, with standard deviations or interquartile ranges of <10.[18–22] Using an expected difference in ObsQoR-10 scores of 10 between cohorts, with a standard deviation of 10, the minimum calculated sample size based on a two-sided two-sample *t*-test to achieve a power of 80% and an alpha error of 0.05 was 17 patients per cohort, 34 in total. We aimed to recruit a minimum of 25 patients per cohort.

Statistical analysis

All analyses were performed using R version 4.3.3 (R Core Team, Vienna, Austria). As the ObsQoR-10 subscale scores (0–10) and total score (0–100) have lower and upper bounds, and the individual subscale scores tended to be left-skewed, scores were summarised using robust assessments of centrality and spread, namely, median (1st and 3rd quartile). For the same reason, the non-parametric Wilcoxon rank-sum test was used to assess for statistically significant differences in scores between the pre- and post-ERAC cohorts. When analysing each of the 10 individual questions that make up the total ObsQoR-10 questionnaire score, *P*-values were corrected for multiple comparisons using the Holm method. For consistency with the use of median (1st and 3rd quartile) for numeric summaries of continuous data, data were plotted using Tukey box-and-whisker plots, where the box consists of the median, and 1st and 3rd quartiles, and the whiskers are calculated as: 1.5×interquartile range (the method of calculating the whiskers is used to assist in identifying extreme values). All other continuous variables were analysed and summarised using the same methodologies. Categorical data were summarised as counts with percentages. Because the expected values for some categories were less than five, Fisher's exact tests were used to assess for statistically significant associations between the pre- and post-ERAC cohorts. Statistical significance was set at *P*-value <0.05.

Results

A total of 68 patients presented for elective CS during the study period, with 32 in the pre-ERAC and 36 in the post-ERAC data collection periods. After eligibility assessment, 52 patients were enrolled and analysed, comprising 25 in the pre-ERAC cohort and 27 in the post-ERAC cohort (Fig 1). Baseline patient characteristics, obstetric characteristics, and preoperative haemoglobin were collected for descriptive purposes and are indicated in Table 2. There were no statistically significant differences between the two groups for any of the baseline and obstetric characteristics as demonstrated in Table 2. The total and component ObsQoR-10 scores are demonstrated in

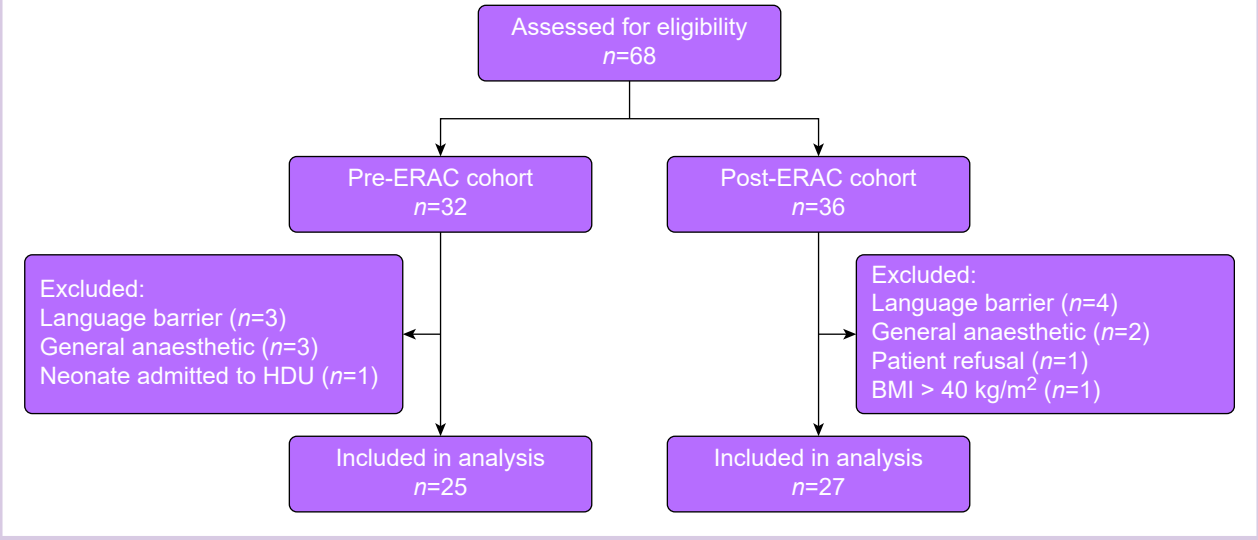

Figure 1. Flow diagram for study. ERAC, enhanced recovery after Caesarean section.

Table 2 Baseline patient and obstetric characteristics. Values are presented as mean (standard deviation), or count (%).

	Pre-ERAC (*n*=25)	Post-ERAC (*n*=27)	SMD (95% CI)
Age, yr	30.5 (5.2)	31.6 (5.1)	−0.21 (−0.83 to 0.35)
Body mass index, kg m^{-2}	30.0 (4.7)	31.6 (3.6)	−0.38 (−1.00 to 0.15)
Gravidity, *n*	3 (1)	3 (1)	−0.55 (−1.08 to 0.02)
Parity, *n*	3 (1)	3 (1)	−0.48 (−1.01 to 0.14)
Gestation at delivery, weeks	39.0 (1.2)	38.6 (1.1)	0.32 (−0.26 to 0.96)
Previous CS, *n* (%)			
0	5 (20)	1 (3.7)	
1	14 (56)	15 (56)	
2	5 (20)	8 (30)	
≥3	1 (4.0)	3 (11)	
Preoperative haemoglobin, g dl^{-1}	12.2 (1.3)	12.2 (1.5)	−0.05 (−0.66 to 0.54)

CI, confidence interval; CS, Caesarean section; ERAC, enhanced recovery after Caesarean section; SMD, standardised mean difference.

Table 3 ObsQoR-10 scores. Values are presented as median (inter-quartile range). Significant differences italicised. Higher scores indicate improved outcomes.

	Pre-ERAC (*n*=25)	Post-ERAC (*n*=27)	*P*-value
Total score	**75 (66–78)**	**84 (76–87)**	**<0.001**
Components			
Q1: Pain	2 (1–4)	5 (3–6)	0.010
Q2: Nausea and vomiting	10 (9–10)	10 (9–10)	>0.999
Q3: Dizziness	8 (6–10)	10 (7–10)	0.889
Q4: Shivering	5 (4–8)	8 (4–10)	0.889
Q5: Feel comfortable	5 (4–7)	7 (5–8)	0.085
Q6: Mobilise independently	8 (6–9)	10 (9–10)	0.085
Q7: Can hold baby	10 (9–10)	10 (9–10)	0.746
Q8: Can feed/nurse baby	10 (10–10)	10 (9–10)	>0.999
Q9: Can look after personal hygiene	9 (8–9)	10 (9–10)	0.046
Q10: Feel in control	7 (5–8)	8 (7–9)	0.213

ERAC, enhanced recovery after Caesarean section; ObsQoR-10, Obstetric Quality of Recovery-10.

Table 4 Outcome measures and process measures. Values presented as median (inter-quartile range) or count (%). Significant differences italicised.

	Pre-ERAC (n=25)	Post-ERAC (n=27)	Difference in medians (95% CI)	P-value
Outcome measures				
Opioid consumption, mg, OME	40 (40–80)	30 (20–30)	−10 (−26 to 6)	*<0.001*
Length stay, days[a]	2 (2–3)	2 (2–2)	0 (0–0)	0.156
Process measures				
Fasting preoperative solids, h	16 (14–17)	15 (12–17)	−1 (−4 to 2)	0.433
Fasting preoperative liquids, h	16 (14–17)	10 (4–14)	−6 (−10 to −2)	*<0.001*
Time to first oral intake, h	7 (6–8)	4 (4–6)	−3 (−4 to −2)	*<0.001*
Time to first mobilisation, h	8 (6–10)	7 (6–8)	−1 (−3 to 0)	*0.043*
Time to removal of urinary catheter, h				*<0.001*
≤6	0 (0)	1 (3.7)		
7–12	0 (0)	10 (37)		
13–24	14 (56)	16 (59)		
>24	11 (44)	0 (0)		

CI, confidence interval; ERAC, enhanced recovery after Caesarean section; OME, oral morphine equivalent.
[a] Day of procedure=day 0.

Table 3. Additional outcome and process measures are presented in Table 4.

The post-ERAC cohort had significantly greater ObsQoR-10 scores with a median difference of 9 between groups (95% confidence interval: 6–14). Figure 2 illustrates the difference in total ObsQoR-10 scores between groups. The post-ERAC cohort also showed a significant reduction in postoperative opioid consumption, and an improvement in the pain score component of the ObsQoR-10 questionnaire. LOS was similar across both cohorts.

Table 4 demonstrates that patients overall were subjected to prolonged fasting times. While fasting times for solids were similar in both cohorts, the post-ERAC cohort was able to show a meaningful reduction in fasting time for liquids. After operation, the post-ERAC cohort showed significant improvements across time to first oral intake, time to mobilisation, and time to urinary catheter removal (Table 4). In the pre-ERAC cohort, all patients had to wait at least 13 h before catheter removal (44% had to wait longer than 24 h), while no women in the post-intervention group waited longer than 24 h, and 37% of them waited <12 h.

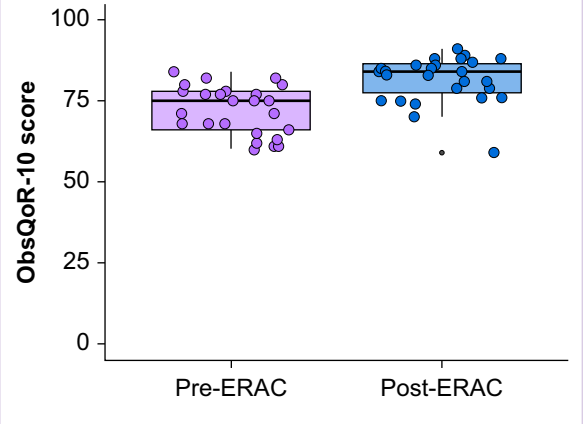

Figure 2. ObsQoR-10 scores in the pre-ERAC and post-ERAC cohorts. The median score is indicated by the black line and the inter-quartile range indicated by the shaded box. Individual data points are scattered for clarity. Black points indicate extreme values. ERAC, enhanced recovery after Caesarean section; ObsQoR-10, Obstetric Quality of Recovery-10.

Discussion

The implementation of a tailored ERAC programme at our institution resulted in a statistically significant improvement in ObsQoR-10 scores. We also demonstrated a significant reduction in postoperative opioid consumption, an improved pain score component of the ObsQoR-10, and earlier indwelling urinary catheter removal. Additionally, we were able improve on facility-specific challenges, such as prolonged fasting times. To our knowledge, this is the first study in Africa to evaluate the implementation of an ERAC programme for elective CS and the first globally to assess it using the ObsQoR-10.

The ObsQoR-10 score was adapted from the ObsQoR-11 by combining two pain-related questions and it has been validated for use following all modes of delivery.[22–24] ObsQoR-10 scores are influenced by the mode of delivery, with patients undergoing CS scoring lower than those who deliver vaginally.[23] It has also been shown to correlate with hospital LOS, estimated blood loss, transfusion requirements, and antiemetic use.[23] Lower inpatient ObsQoR-10 scores have also been associated with positive postpartum depression screening at 6 weeks.[25] Already the preferred PROM in assessing postpartum recovery, ObsQoR-10 could become one of the leading metrics in evaluating ERAC implementation.[16]

While higher ObsQoR-10 scores indicate better postpartum recovery, the absolute value varies across populations and is arbitrary in isolation. A Turkish study found median scores of 86 and 68 to represent 'good' and 'poor' recovery, respectively, whereas an Israeli study identified mean scores of 46.7 and 26.3 for the same.[18,21] These differences likely reflect variations in socio-economic factors, patient characteristics, expectations, and standards of care. Its utility therefore lies in comparing individuals within the same population. A study in France established a MCID in ObsQoR-10 scores at 24 h postpartum of 5.0 (95% confidence interval: 2.3–7.8).[26] This remains the only MCID determination for ObsQoR-10 to date, and, while it can guide research design, it may not be applicable to other populations.

We demonstrated a significant improvement in ObsQoR-10 scores, with a median increase of nine between the pre- and

post-ERAC cohorts. Our study demonstrated a larger improvement than an Irish study, using the ObsQoR-11, which reported a median increase of three between pre- and post-ERAC groups.[27] They noted that the small change in scores likely reflected the existing high standard of care provided to the pre-ERAC cohort, evidenced by comparing their pre- and post-ERAC management where only modest changes were implemented. The marked improvement in recovery scores observed in this study can be attributed to significant evidence-based changes implemented across the perioperative continuum, following a suboptimal baseline standard of care.

We observed a significant reduction in postoperative opioid consumption at 24 h in the post-ERAC cohort. Despite reduced opioid use, patients scored better on the pain component of the ObsQoR-10. This is likely attributable to key changes from pre-ERAC care, which included the use of a long-acting intrathecal opioid, standardised initiation of multimodal analgesia in the operating room, and appropriate, scheduled non-opioid analgesics after operation. LOS was not different after ERAC at our institution. Our patients are discharged on the second postoperative day as a routine. Our facility protocol does not allow for earlier discharge as our patients often reside far away from the health facility and some do not have reliable transport to follow up timeously in the event of an emergency. As in our case, there are often factors apart from surgical recovery that confound LOS, and time to discharge readiness may be a more objective, reproducible outcome measure to utilise in future studies.[28]

While improvements in several process measures were observed post-ERAC implementation, most did not meet the benchmarks established by current society guidelines.[4–8] This can be attributed to several barriers encountered during protocol implementation. Our institution's high burden of emergency CS creates significant challenges for precise scheduling of elective cases. As a result, elective patients are required to fast from dinner the evening before surgery and refrain from solid intake on the day of the procedure to ensure readiness for theatre on short notice. This practice, while necessary, unintentionally prolongs fasting times. Addressing this issue will require operational adjustments to better accommodate the high surgical demand, which is constrained by current resource limitations. Measures such as delayed urinary catheter removal are likely driven by overburdened ward staff batching such tasks, limiting the ability to provide individualised care. These challenges highlight the need for targeted strategies to enhance protocol adherence and improve patient outcomes.

The use of long-acting intrathecal opioids for CS has been largely avoided in South African public healthcare because of the lack of appropriate postoperative monitoring required for potentially fatal side-effects such as delayed respiratory depression. The Society of Obstetric Anesthesia and Perinatology published a consensus statement in 2019 with monitoring recommendations to detect and prevent respiratory depression associated with neuraxial morphine for CS.[29] Their recommendations require no additional respiratory monitoring apart from routine postoperative monitoring in patients receiving 50 ug or less of intrathecal morphine.[29] This recommendation is supported by the South African Society of Anaesthesiologists and should be endorsed as standard analgesia post-CS in LMICs.[30] The addition of long-acting intrathecal morphine was likely a major factor in improving recovery and decreasing systemic postoperative opioid use in our study. Notably, the use of ultra-low dose intrathecal morphine during our study was not associated with an increased incidence of nausea and vomiting, which is a potential adverse effect at higher doses. Given its safety profile, we suggest the adoption of intrathecal morphine at this dose for CS in all settings where it was previously omitted because of inadequate postoperative monitoring facilities.

Enhanced recovery programmes provide benefits through cumulative marginal gains, where targeted adjustments in perioperative management collectively lead to potentially significant improvements in key outcome metrics associated with enhanced recovery. As evidenced by the Irish study, the impact of an enhanced recovery programme is contingent on the pre-existing standard of care.[27] As we continue to integrate these evidence-based practices, 'enhanced' recovery could soon represent 'normal' recovery. In LMICs, particularly among the poorest nations, surgical care often lags behind that of high-income countries. As McQueen and colleagues[12] highlighted, these settings offer the greatest potential for enhanced recovery programmes to generate significant and transformative impacts. Our study further supports this, demonstrating the positive effects of ERAC implementation in a resource-constrained environment.

This study has several limitations. Conducted at a single centre, it may not be generalisable to other populations. The observational design poses a risk of bias because of temporal variations in patient population and environmental conditions. The use of consecutive convenience sampling may have introduced selection bias. Additionally, the following metrics for evaluating ERAC implementation, as outlined by the CRADLE study, were not assessed: (1) re-admission rate; (2) unplanned outpatient visits; (3) maternal satisfaction with analgesia; (4) breastfeeding at discharge, and (5) pathway or bundle compliance.[14] No audits to assess protocol adherence were conducted during the study period; however, we acknowledge the importance of such audits and plan to integrate them into future programme revisions. These audits, together with enhanced stakeholder engagement, are anticipated to identify gaps and support further refinement of the protocol. We expect progressive improvement in patient outcomes as the protocol becomes fully implemented and optimised.

Despite its limitations, our study had several strengths. It is the first to use the ObsQoR-10 score to evaluate an ERAC programme, offering a more holistic, multidimensional assessment of recovery. This approach emphasises patient-centred outcomes, rather than institutional metrics such as LOS, which are typically reported. We demonstrated that implementing ERAC in our setting is feasible and can improve patient outcomes with minimal additional resource requirements.

Future studies are needed to determine the impact of ERAC programmes on meaningful outpatient recovery metrics and the impact of individual ERAC protocol interventions on ObsQoR-10 scores.

Conclusion

The implementation of a tailored ERAC program significantly improved ObsQoR-10 scores. This study, the first in Africa to evaluate ERAC for elective CS and globally using ObsQoR-10, highlights its potential in resource-limited settings. ERAC research should be more readily adopted in low-resource

settings, where the potential benefits are substantial, with a focus on addressing systemic barriers to implementation.

Authors' contributions

Conceptualisation: all authors.
Data collection: JAvN.
Data interpretation: JAvN, ZJ.
Final draft: all authors.
Revision of final draft: TK, ZJ.

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Declarations of interest

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Supplementary material

Supplementary material is available at *British Journal of Anaesthesia Open* online.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bjao.2024.100373.

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