Research proposal

Assessment of Knowledge, Attitudes, and Practices Regarding Enhanced Recovery After Cesarean Section Among Healthcare Professionals in Northern State, Sudan:

A Cross-Sectional Study, 2026

By

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1. Introduction

1.1 Background

Globally, the average CS rate has been increasing steadily, with a current rate around 21 %. It is not anticipated these rates to drop in the foreseen future, with projections for 2030 suggesting a global CS rate reaching 30 %, with 38 million cesarean deliveries performed worldwide [1]. While CS rates vary significantly between countries, ranging from merely 5% in South Sudan to 58.9% in the Dominican Republic [2]. CS rates in Sudan increased steadily from 4.3% in 2006 to 6.7% in 2010 and 9.1% in 2014. During this period, CS rates varied considerably across regions showing higher rates in the Northern region (7–25%) and lower rates in Darfur (2–3%). Urban areas experienced rapidly increasing rates (6–14%), while rural areas showed negligible changes to absolute CS rates over time (5–7%). We also found geographic regions, maternal age, maternal education, receiving antenatal care, and birth order of the child were important determinants of CS in Sudan [3].

Caesarean delivery, one of the most common surgical procedures worldwide, presents unique challenges in postoperative recovery. The postoperative quality of life for mothers following caesarean delivery is often compromised by pain, immobility, and delayed return to daily activities. With the prevalence of caesarean deliveries ranging from 10% to 40% of live births, and countries like Brazil reporting rates as high as 60%, it underscores the importance of standardized protocols that ensure the physical well being and emotional health of the women pro-,intra- and post-operatively [4].

The impact of perioperative management on surgical outcomes cannot be overstated. Proper perioperative care can significantly reduce complications, shorten hospital stays, and improve patient satisfaction. Enhanced Recovery After Surgery (ERAS) pathways, specifically tailored for caesarean delivery, aim to address these issues by implementing evidence-based practices throughout the preoperative, intraoperative, and postoperative phases [5].

The ERAS pathway for caesarean delivery includes preoperative counseling, carbohydrate loading, optimized anesthesia, minimally invasive surgical techniques, and early mobilization [6]. These components collectively contribute to reducing surgical stress, enhancing pain management, and promoting quicker recovery. The primary purpose of the ERAS pathway is to standardize care, minimize variations in practice, and ultimately improve maternal and neonatal outcomes [7][8].

1.2 Problem statement

Medically unjustifiable caesarean section (CS) deliveries have risen rapidly in many developed countries over the last three decades. While many developing countries show rates beyond optimal levels, a few poorer countries still lack optimal obstetric care in relation to essential surgeries [3]. Despite this, studies demonstrate that healthcare professionals have not yet implemented many ERAS protocols for cesarean deliveries [9].

Enhanced recovery after surgery (ERAC) has been adopted in some maternity units and studied extensively in cesarean section (CS) in the last years, showing encouraging results in clinic practice. Growing global evidence that ERAC protocols improve maternal recovery by promoting earlier gastrointestinal function, mitigating postoperative discomfort, and reducing minor complications, all while ensuring safety [4]. However, the present evidence assessing the effectiveness of ERAS for CS remains weak, and there is a paucity in the published literature, especially in improving maternal outcomes.

Recent national empirical evidence highlights the severity of this issue within the country. In a cross-sectional study evaluating Sudanese doctors involved in elective abdominal and pelvic surgeries, Shamsaldeen et al. (2026) demonstrated that 62% of respondents had limited overall knowledge regarding ERAS, 38.8% were completely unfamiliar with formal guidelines, and 87.2% had never received formal ERAS training. Crucially, while a vast majority (80.3%) demonstrated a positive attitude and recognized the clinical benefits of ERAS, 58.1% had poor practice scores, and only 28.9% routinely applied ERAS principles in daily surgical care. This reveals a critical paradox in Sudan: healthcare providers hold highly favorable perceptions toward ERAS, but lack of training and absence of local guidelines severely restrict actual clinical implementation [3].

At Dongola Maternity Hospital, the primary referral maternity center in Northern Sudan, there is a complete paucity of baseline empirical data regarding the KAP of obstetricians, anesthesiologists, midwives, and surgical nurses toward ERAC protocols. Without assessing baseline provider readiness, identifying misperceptions, and recognizing institutional bottlenecks in this specific facility, any future attempt to introduce standardized ERAC pathways risks low compliance and failure. Therefore, evaluating the baseline KAP toward ERAC among healthcare providers at Dongola Maternity Hospital is an urgent prerequisite to designing targeted educational interventions, bridging practice gaps, and establishing context-appropriate clinical guidelines to optimize maternal surgical outcomes.

1.3 Justification

Enhanced recovery after surgery pathways provide a multidisciplinary, evidence-based approach to the care of surgical patients. They have been shown to decrease postoperative length of stay and cost in several surgical subspecialties, including gynecology, but have not been well-studied in obstetric patients who undergo cesarean delivery [10].

Most ERAS literature originates from high-income countries, with limited data published from Sub-Saharan Africa and conflict/resource-constrained settings. Conducting this study in Dongola provides valuable baseline data for regional maternity centers facing similar challenges. Furthermore, successful adoption of ERAC depends on the readiness, awareness, and daily clinical habits of healthcare teams [11].

As global maternal health guidelines shift toward protocolized perioperative care, maternity units face pressure to modernize practices. Assessing baseline KAP **now** prevents failed protocol implementation later and provides the empirical evidence needed to design immediate, targeted training programs.

1.4 Objectives

1.4.1 General objective

To assess the Knowledge, Attitude, and Practice (KAP) toward Enhanced Recovery After Surgery (ERAS) protocols for Cesarean section among healthcare providers at Dongola Maternity Hospital.

1.4.2 Specific objectives

1. To evaluate the level of knowledge regarding core Enhanced Recovery After Cesarean (ERAC) protocols (such as preoperative carbohydrate loading, short fasting intervals, multimodal analgesia, early oral intake, and early mobilization) among obstetricians, anesthesiologists, midwives, and surgical nurses at Dongola Maternity Hospital.
2. To determine the attitude and perception of healthcare providers toward the implementation, safety, and benefits of ERAC pathways in routine obstetric surgical care.
3. To assess current clinical practices regarding perioperative Cesarean section management at Dongola Maternity Hospital and compare them against evidence-based ERAC standards.
4. To determine the socio-demographic and professional factors (such as job title, years of clinical experience, or previous specialized training) associated with healthcare providers' knowledge and compliance with ERAC principles.
5. To determine the correlation between knowledge level, attitudes and practice regarding ERAC Protocols.

2. Literature review

2.1. Overview

Enhanced recovery after surgery (ERAS) is an innovative perioperative management approach designed to shorten the recovery time, improve patient safety and quality of care, and enhance overall satisfaction. Successful implementation of ERAS requires active collaboration between healthcare providers and patients to facilitate a timely return to daily activities. The ERAS protocol, originally developed for colorectal surgery, has gradually been expanded and adapted to other major surgeries, and more recently, to Cesarean deliveries. Enhanced recovery after Cesarean delivery (ERAC) presents unique challenges due to its distinct patient population, comprising relatively young women. Its dual focus on maternal recovery and neonatal well-being sets it apart from conventional ERAS protocols. Several components of the ERAC protocol have been adapted from the ERAS recommendations [12].

2.2. Core concept & key component

Enhanced Recovery After Surgery (ERAS) programs were initially developed to improve postoperative outcomes in colorectal surgery and have since been successfully implemented across multiple surgical disciplines [13].In obstetrics, this concept has been adapted in to the Enhanced Recovery After Cesarean(ERAC) protocol, which addresses the unique physiological demands of pregnancy, the psychosocial aspects of childbirth, and the importance of early maternal–infant interaction [14]. The ERAC protocol integrates a range of perioperative interventions, including preoperative patient education, minimized fasting with carbohydrate loading, standardized neuraxial anesthesia, multimodal opioid-sparing analgesia, early oral feeding, early ambulation, optimized fluid management, venous thromboembolism prophylaxis, and support for early breastfeeding and mother–newborn bonding [15]. Collectively, these measures aim to reduce postoperative pain, shorten length of hospital stay, lower complication rates, and enhance maternal satisfaction without compromising neonatal safety [16][17]. Several randomized controlled trials and observational studies have demonstrated favorable outcomes associated with ERAC complications. Secondary outcomes included maternal satisfaction, breastfeeding outcomes, readmission rates, and neonatal safety. Consequently, professional organizations such as the Enhanced Recovery After Surgery Society and the American College of Obstetricians and Gynecologists have endorsed ERAC principles as part of modern obstetric practice [18][19]. However, despite these recommendations, considerable variability exists in protocol components, adherence levels, and reported outcomes across institutions and healthcare systems. This heterogeneity underscores the need for a comprehensive synthesis of available evidence to clarify the effectiveness and reproducibility of ERAC protocols.

T1. ***Key components of enhanced recovery after cesarean*** [20]

Preoperative	Intraoperative	Postoperative
Patient education	Prevent and treat spinal iduced hypotension	Early oral intake
	Maintain normothermia	Early mobilization
	Intra- and postop nausea and vomiting prophylaxis	Promote resting periods
Limited fasting interval	Optimal uterotonic administration	Early urinary catheter removal
	Multimodal analgesia	Venous thromboembolism prophylaxis
	Promote breastfeeding and maternal-infant bonding	Continue multimodal analgesia
Carbohydrate loading		Breastfeeding support
		Promote return of bowel function

2.3 ERAC Implementation in Low- and Middle-Income Countries (LMICs)

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 [21]. 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 [22]. However, there is a recommendation that the adoption of ERAC should be prioritised in LMICs despite the typical challenges these regions face [23]. 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 [24]. 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.

There are various barriers encountered while implementing ERAS and ERAC protocols in hospitals especially in developing counties. In Sudan, systemic and environmental shortfalls pose substantial challenges to the standardized implementation of clinical protocols. According to Abdelrahamn (2025), ongoing active conflict has caused widespread infrastructure deterioration, severe safety hazards, and physical accessibility limitations across health facilities. These physical disruptions are compounded by acute resource deficits and supply chain breakages, leaving healthcare workers with severe shortages of essential pharmaceuticals, surgical consumables, and routine operational funding necessary to maintain standardized care. Furthermore, mass internal population displacement has generated unprecedented demand surges at regional health centers, pushing facility capacity far beyond operational limits and straining already weakened administrative structures. Under these crisis conditions, the absence of centralized healthcare planning and formal institutional frameworks leaves health professionals operating under severe physical, financial, and psychological stress without adequate capacity-building support or structured guidelines [3].

2.4 The Role of Provider KAP in Protocol Adoption

The Knowledge, Attitude, and Practice (KAP) model provides a framework for understanding implementation barriers, suggesting that healthcare behaviors are fundamentally determined by providers' knowledge, perceptions, and attitude [25]. While evidence-based clinical guidelines provide the structural framework for care, the transition from traditional perioperative dogmas to protocolized ERAC principles is heavily influenced by healthcare providers' baseline awareness, perceptions, and ingrained clinical habits.

Empirical evidence from middle- and low-income settings highlights that while clinicians conceptually endorse modern recovery principles, significant operational and perception-based barriers hinder actual protocol adoption. In a cross-sectional study evaluating surgeons across governmental, private, and teaching hospitals in Palestine, Taher et al. (2026) demonstrated that providers possess high conceptual awareness and favorable attitudes toward core ERAS components, such as early mobilization (84.6%), early urinary catheter removal (82.5%), and intraoperative thermoregulation (80.4%). Furthermore, most surgeons recognized the clear clinical value of ERAS in improving patient satisfaction, minimizing surgical stress, and reducing postoperative complications [26]. Crucially, this pattern observed in Palestine directly applies to the Sudanese healthcare context as stated in previously mentioned study by Shamsaldeen et al.

3. Methods

3.1. Study Design & Setting

3.1.1. Study Design

A hospital-based descriptive cross-sectional study design will be employed to assess the knowledge, attitudes, and practices (KAP) regarding Enhanced Recovery After Cesarean (ERAC) protocols among healthcare professionals.

3.1.2. Study Settings

The study will be conducted across key public referral and district hospitals providing obstetric surgical services in the Northern State, Sudan.

Northern State is geographically vast, comprising seven administrative localities. To capture a representative cross-section of perioperative care across the state, the study targets the primary surgical and obstetric referral centers serving these localities, including:

- **Dongola Maternity Hospital (Dongola Locality – the principal specialized obstetric referral center in the state capital)**
- **Merowe Medical City / Hospital (Merowe Locality)**
- **Kareima Teaching Hospital (Merowe Locality)**
- **Alburgag Hospital (Alburgag Locality)**
- **Halfa Hospital (Wadi Halfa Locality)**

These facilities serve as the main surgical hubs for elective and emergency Cesarean deliveries across Northern State, equipped with operating suites, postoperative recovery units, and specialized obstetric, anesthesia, and nursing personn**el.**

3.2. Study Population

The target population consists of all eligible practicing healthcare professionals directly involved in the perioperative, intraoperative, and postoperative care of patients undergoing Cesarean sections at selected Maternity Hospital during the study period.

Which include:

1. Medical / Obstetric Staff: Obstetric Consultants, Specialists, Obstetric Registrars, Medical Officers, and House Officers.
2. Anesthesia Staff: Anesthesia Professionals holding master's degree, a Bachelor's degree, and Anesthesia Technicians holding a Diploma.
3. Nursing Staff: Registered Nurses holding a Bachelor's degree or Diploma assigned to the obstetric operating theater, postoperative recovery room, and postnatal surgical wards.

3.2.1. Inclusion Criteria

- All practicing physicians (consultants, Specialists, registrars, medical officers, and house officers) currently posted in the Department of Obstetrics and gynecology.
- All anesthesia personnel (master holder, BSc holders, and diploma holders) covering obstetric surgery.
- All registered nurses (BSc and diploma holders) assigned to the obstetric theater, recovery unit, or postnatal surgical wards.

3.2.2. Exclusion Criteria

- Nurse midwives (due to non-involvement in surgical Cesarean perioperative care in this facility).
- Healthcare professionals on extended official leave (e.g., annual, maternity, or sick leave) during the data collection period.
- Personnel unwilling to participate or returning incomplete questionnaires (< 80% completed).
- Healthcare professional with at least 3 months of continuous experience in the obstetrics and gynecology department at time of data collection.

3.3. Sample Size & Sampling Technique

3.3.1. Sample Size (n)

Given the non-probability convenience sampling approach, a formal sample size calculation formula was not applied. The sample size will consist of all eligible healthcare professionals who are available, accessible, and willing to participate across the selected hospitals in Northern State during the data collection period.

3.3.2. Sampling Technique

A Convenience Sampling Technique (a non-probability sampling method) will be utilized. Eligible healthcare professionals present during data collection visits at the participating hospitals will be invited to participate based on their accessibility and voluntary consent.

3.4. Data Collection Method

Data will be collected using a structured, self-administered questionnaire adapted from a previously published study [2], digitally recorded via Google Forms. Internal consistency will be tested using Cronbach's Alpha.

3.5. Data Management and Analysis

3.5.1. Data Management & Entry

Data will be manually cleaned, coded, checked for completeness, and entered into SPSS Statistics for Windows (Version 27.0).

3.5.3. Statistical Analysis

Both descriptive and inferential statistical analyses will be done. For the descriptive analysis, frequency distributions and proportions will be used to summarise categorical variables. Mean and range will be computed to summarise continuous variables.

For the inferential statistical analysis, both Chi-square test will be performed to first to assess association between independent variables. This will be followed by binary and multivariable logistic regression analysis to estimate odd ratios for factors that showed statistical association at the bivariate level. A 95% confidence level and statistical significance of $p < 0.05$ will be assumed in the regression analysis.

3.6. Ethical Considerations

Ethical approval will be formally requested and obtained from the Health Research Ethics Committee at the Ministry of Health, Northern State, Sudan, as well as the administration of Maternity Hospital a cross the state. Verbal informed consent will be obtained from each participant prior to conducting the interview. All participants will be informed of their right to decline or withdraw from the study at any point.

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