

Should every scheduled cesarean birth use an Enhanced Recovery after Surgery (ERAS) pathway?

Standardization of surgical processes, with adjustment based on unique individual characteristics, improves outcomes



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Cesarean birth is one of the most common major surgical procedures performed in developed countries¹ with over 1,170,000 cesarean births in the United States in 2021.² Many surgeons and anesthesiologists believe that Enhanced Recovery after Surgery (ERAS) pathways improve surgical outcomes.^{3,4} Important goals of ERAS include setting patient expectations for the surgical procedure, accelerating patient recovery to full function, and minimizing perioperative complications such as severe nausea, aspiration, surgical site infection, wound complications, and perioperative anemia. The ERAS Society in 2018⁵⁻⁷ and the Society for Obstetric Anesthesia and

Perinatology (SOAP) in 2021⁸ proposed ERAS pathways for cesarean birth. Both societies recommended that obstetric units consider adopting an ERAS pathway compatible with local clinical resources. In addition, the American College of Obstetricians and Gynecologists (ACOG) has provided guidance for implementing ERAS pathways for gynecologic surgery.⁹ The consistent use of standardized protocols to improve surgical care in obstetrics should lead to a reduction in care variation and improve health equity outcomes.

The clinical interventions recommended for ERAS cesarean birth occur sequentially in the preoperative, intraoperative, and postoperative phases of care. The recommendations associated with each of these phases are reviewed below. It is important to note that each obstetric unit should use a mul-

tidisciplinary process to develop an ERAS pathway that best supports local practice given clinician preferences, patient characteristics, and resource availability.



Preoperative components of ERAS

Standardized patient education (SPE). SPE is an important component of ERAS, although evidence to

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support the recommendation is limited. At a minimum a written hand-out describing steps in the cesarean birth process, or a patient-education video should be part of patient education. The University of Michigan Medical Center has produced a 3-minute video for patients explaining ERAS cesarean birth.¹⁰ The University of Maryland Medical Center has produced a 2.5-minute video in English and Spanish, explaining ERAS cesarean birth for patients.¹¹ Some surgeons place a telephone call to patients the evening before surgery to help orient the patient to ERAS cesarean birth.

Breastfeeding education. An important goal of obstetric care is to optimize the rate of exclusive breastfeeding at birth. Breastfeeding education, including a commitment to support the initiation of breastfeeding within 1 hour of birth, may enhance the rate of exclusive breastfeeding. There are numerous videos available for patients about breastfeeding after cesarean birth (as an example, see: <https://www.youtube.com/watch?v=9iOGn85NdTg>).

Limit fasting. In the past, surgical guidelines recommended fasting after midnight prior to surgery. The ERAS Society recommends that patients should be encouraged to drink clear fluids up to 2 hours before surgery and may have a light meal up to 6 hours before surgery (Part 1).

Carbohydrate loading. Surgery causes a metabolic stress that is increased by fasting. Carbohydrate loading prior to surgery reduces the magnitude of the catabolic state caused by the combination of surgery and fasting.¹² SOAP and the ERAS Society recommend oral carbohydrate fluid supplementation 2 hours before surgery among non-diabetic patients. SOAP suggests 32 oz of Gatorade or 16 oz of clear

apple juice as options for carbohydrate loading. For diabetic patients, the carbohydrate load can be omitted. In fasting pregnant patients at term, gastric emptying was near complete 2 hours after consumption of 400 mL of a carbohydrate drink.¹³ In one study, consumption of 400 mL of a carbohydrate drink 2 hours before cesarean resulted in a 7% increase in the newborn blood glucose level at 20 min after delivery.¹⁴

Minimize preoperative anemia. Approximately 50% of pregnant women are iron deficient and approximately 10% are anemic in the third trimester.^{15,16} Cesarean birth is associated with significant blood loss necessitating the need to optimize red blood cell mass before surgery. Measuring ferritin to identify patients with iron deficiency and aggressive iron replacement, including intravenous iron if necessary, will reduce the prevalence of anemia prior to cesarean birth.¹⁷ Another cause of anemia in pregnancy is vitamin B12 (cobalamin) deficiency. Low vitamin B12 is especially common in pregnant patients who have previously had bariatric surgery. One study reported that, of 113 pregnant patients who were, on average, 3 years from a bariatric surgery procedure, 12% had vitamin B12 circulating levels < 130 pg/mL.¹⁸ Among pregnant patients who are anemic, and do not have a hemoglobinopathy, measuring ferritin, folic acid, and vitamin B12 will help identify the cause of anemia and guide treatment.¹⁹

Optimize preoperative physical condition. Improving healthy behaviors and reducing unhealthy behaviors preoperatively may enhance patient recovery to full function. In the weeks before scheduled cesarean birth, cessation of the use of tobacco products, optimizing activity and improving diet quality,

including increasing protein intake, may best prepare patients for the metabolic stress of surgery.



Intraoperative components of ERAS

Reduce the risk of surgical site infection (SSI) and wound complications. Bundles that include a preoperative antibiotic, chlorhexidine (or an alternative antibacterial soap) and clippers have been shown to reduce SSI.²⁰ Routine administration of preoperative antibiotics is a consensus recommendation and there is high adherence with this recommendation in the United States. Chlorhexidine-alcohol is the preferred solution for skin preparation. Vaginal preparation with povidone-iodine or chlorhexidine may be considered.⁶

Surgical technique. Blunt extension of a transverse hysterotomy may reduce blood loss. Closure of the hysterotomy incision in 2 layers is recommended to reduce uterine scar dehiscence in a subsequent pregnancy. If the patient has ≥ 2 cm of subcutaneous tissue, this layer should be approximated with sutures. Skin closure should be with subcuticular suture.⁶

Optimize uterotonic administration. Routine use of uterotonics reduces the risk of blood loss, transfusion, and postoperative anemia.

There is high adherence with the use of uterotonic administration after birth in the United States.^{6,8}

Ensure normothermia. Many patients become hypothermic during a cesarean birth. Active warming of the patient with an in-line IV fluid warmer and forced air warming over the patient's body can reduce the risk of hypothermia.⁸

Initiate multimodal anesthesia. Anesthesiologists often use intrathecal or epidural morphine to enhance analgesia. Ketorolac administration prior to completion of the cesarean procedure and perioperative administration of acetaminophen may reduce postoperative pain.⁸ The use of preoperative antiemetics will reduce intraoperative and postoperative nausea and vomiting.

Initiate VTE prophylaxis. Pneumatic compression stockings are recommended. Anticoagulation should not be routinely used for VTE prophylaxis.⁶



Postoperative components of ERAS

Patient education to prepare for discharge home when ready.

Patient education focused on home when ready is important in preparing the patient for discharge home.⁷ Completion of required newborn testing, lactation education, and

contraception planning plus coordination of newborn pediatric follow-up is necessary before discharge.

Support early return of bowel function. Early return of bowel function is best supported by a multimodal approach including initiation of clear fluid intake immediately following surgery, and encouraging consumption of a regular diet within 2⁷ to 4 hours⁸ following surgery. Gum chewing for at least 5 minutes 3 times daily accelerates return of bowel function.⁸ In a meta-analysis of 10 randomized studies examining the effect of gum chewing after cesarean, the investigators reported that gum chewing shortened the time to passage of flatus and defecation.²¹

Early ambulation. Sequentially advanced activity, starting with sitting on the edge of the bed, sitting in a chair, and ambulation within 8 hours of surgery, is recommended to facilitate faster recovery, reduce rates of complications, and enable transition to home.⁸

Early removal of the urinary catheter. It is recommended that the urinary catheter be removed within 12 hours after cesarean birth.⁸ Early removal of the urinary catheter increases patient mobility and reduces the length of hospitalization. Early removal of the urinary catheter may be associated with postoperative urinary retention and recatheterization in a small number of patients.

Prescribe routinely scheduled acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs) and ketorolac. A key component of ERAS cesarean birth is the standardized administration of nonopioid pain medicines, alternating doses of acetaminophen and an NSAID. ERAS cesarean birth is likely to result in a reduction in inpatient and postdischarge opioid use.²²⁻²⁴

Auditing and reporting adherence with components of ERAS

In clinical practice there may be a gap between a clinician's subjective perception of their performance and an independent audit of their clinical performance. ERAS pathways should be implemented with a commitment to performing audits and providing quantitative feedback to clinicians. Consistent use of measurement, feedback, and coaching can improve performance and reduce variation among individual clinicians. As an example, in one study of the use of a surgical safety checklist, 99% of the surgeons reported that they routinely used a surgical safety checklist, but the audit showed that the checklist was used in only 60% of cases.²⁵ Gaps between self-reported performance and audited performance are common in clinical practice. Audits with feedback are critical to improving adherence with the components of an ERAS pathway.

Three independent systematic reviews and meta-analyses report that ERAS pathways reduce hospital length of stay without increasing the readmission rate.²⁶⁻²⁸ One meta-analysis reported that ERAS may also reduce time to first mobilization and result in earlier removal of the urinary catheter.²⁶ ERAS pathways also may reduce postoperative complications, lower pain scores, and decrease opioid use.²⁷ The general consensus among quality and safety experts is that reducing variation through standardization of pathways is generally associated with improved quality and enhanced safety. ERAS pathways have been widely accepted in multiple surgical fields. ERAS pathways should become the standard for performing scheduled cesarean procedures. ●

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