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George A. Macones, MD, Aaron B. Caughey, MD, PhD, Stephen L. Wood, MD, Ian J. Wrench, MB ChB, PhD, Jeffrey Huang, MD, Mikael Norman, MD, PhD, Karin Pettersson, MD PhD, William J. Fawcett, MBBS, FRCA, FFPMRCA, Medhat M. Shalabi, MD, Amy Metcalfe, PhD, Leah Gramlich, MD, Gregg Nelson, MD, PhD, R. Douglas Wilson, MD MSc

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Guidelines for Postoperative care in Cesarean Delivery: Enhanced Recovery After Surgery (ERAS) Society Recommendations (Part 3)

George A. Macones, MD [a] Aaron B. Caughey, MD, PhD [b]; Stephen L. Wood, MD [c];; Ian J. Wrench, MB ChB, PhD [d]; Jeffrey Huang, MD [e]; Mikael Norman, MD, PhD [f]; Karin Pettersson, MD PhD [g]; William J. Fawcett, MBBS, FRCA, FFPMRCA [h]; Medhat M. Shalabi, MD [i]; Amy Metcalfe, PhD [b]; Leah Gramlich, MD [j]; Gregg Nelson, MD, PhD [b]; R. Douglas Wilson, MD MSc [b]

[a]Department of Obstetrics & Gynecology, Washington University in St Louis, St. Louis, MO, United States

[b] Department of Obstetrics & Gynecology, Oregon Health & Science University, Portland, OR, United States

[c] Department of Obstetrics & Gynecology, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

[d] Sheffield Teaching Hospitals Trust, Royal Hallamshire Hospital, Glossop Road, Sheffield, United Kingdom

[e] Anesthesiologists of Greater Orlando, Orlando, FL, United States

[f] Division of Pediatrics, Department of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm, Sweden

[g] Division of Obstetrics, Department of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm, Sweden

[h] Department of Anaesthesia, Royal Surrey County Hospital, Egerton Road, Guildford, United Kingdom

[l] Departments of Anesthesiology and Intensive Care, Alzahra Hospital, Dubai, United Arab Emirates

[j] Department of Medicine, University of Alberta, Edmonton, Alberta, Canada

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* Corresponding author: George A. Macones, M.D. , Washington University in St Louis, School of Medicine; maconesg@wustl.edu

Fax 314 362 0041; Phone 314 362 7139

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Short title: ERAS cesarean- Part 3

AJOG at a Glance

1. Why was this study conducted?

   This Enhanced Recovery After Surgery Society guideline was created to support the most common surgical procedure in the industrialized healthcare world, the cesarean delivery. It has the goal to enhance the quality and safety of the cesarean delivery for improved maternal and fetal / neonatal outcomes through evaluation and audit.

2. Key Findings

   The broad Enhanced Recovery After Surgery Society cesearean delivery elements and recommendations (Parts 1-3) break down the surgical delivery process into a pathway that starts at 30-60 minutes prior to skin incision , for both scheduled and unscheduled cesarean deliveries, until hospital discharge along with a longer pathway that manages antenatal education, maternal co-morbidities, and immediate neonatal needs at delivery. This postoperative section

(Part 3) focuses on the time from the completion of cesarean until maternal discharge.

3. What does this add to what is known?

   This Enhanced Recovery After Surgery Society cesarean delivery guideline has taken the evidenced based knowledge created from the cesarean delivery research and has critically and with consensus published the information in a 3-part guideline that uses the Enhanced Recovery After Surgery Society principles and process for improved surgical quality and safety for obstetrical surgical deliveries.

Abstract

This Enhanced Recovery After Surgery (ERAS) Guideline for postoperative care in Cesarean Delivery (CD) will provide best practice, evidenced-based, recommendations for post-operative care with, primarily a maternal focus. The pathway process for scheduled and unscheduled CD, for this ERAS CD guideline, will consider time from completion of cesarean until maternal hospital discharge. The literature search (1966–2017) used Embase and PubMed to search medical subject headings including “Cesarean Section”, “Cesarean Delivery”, “Cesarean Section Delivery” and all post-operative ERAS® items. *Study selection allowed* titles and abstracts to be screened by individual reviewers to identify potentially relevant articles. Meta-analyses, systematic reviews, randomized controlled studies, nonrandomized controlled studies, reviews, and case series were considered for each individual topic. *Quality assessment and data analyses* evaluated the quality of evidence and recommendations were evaluated according to the GRADE system (Grading of Recommendations, Assessment, Development and Evaluation) as used and described in previous ERAS® Guidelines. The ERAS Cesarean Delivery guideline / pathway has created a pathway for postoperative care). Specifics include sham feeding, nausea and vomiting prevention, post-operative analgesia, nutritional care, glucose control, thromboembolism

prophylaxis, early mobilization, urinary drainage, and discharge counseling.A number of elements of postoperative care of women undergoing cesarean delivery are recommended based on the evidence. As the ERAS Cesarean Delivery pathway (elements / processes) are studied, implemented, audited, evaluated, and optimized by the maternity care teams, there will be an opportunity for focused and optimized areas of care and recommendations to be further enhanced.

Keywords: cesarean delivery, enhanced recovery

Introduction [1-4]

Enhanced recovery after surgery (ERAS) is a standardized, perioperative care program that is now firmly embedded within multiple surgical disciplines including colorectal, urological, gynecological, and hepatobiliary surgery. ERAS

has been shown to result in both clinical benefits (reductions in length of stay, complications, and readmissions) and health system benefits (reduction in cost).[1, 2]

ERAS is a tool for process management, creating a focused care process. The use of audit and feedback, whereby clinicians are provided with comparative data to educate, change, and decrease the 'harmful' clinical variances that are identified in certain high volume clinical care processes and procedures that will increase quality of care, patient safety, and health outcomes.

This serialized ERAS Guideline for perioperative care in Cesarean Delivery will provide best practice recommendations for Part 1 antenatal / pre-operative[3], Part 2 intra-operative[4], and Part 3 post-operative phases (the focus of this document). While certain ERAS principles have been established for other abdominal / pelvic surgeries, this present ERAS Cesarean Delivery (ERAS CD) pathway will provide evidenced-based recommendations for the surgical pathway related to cesarean delivery with primarily, a maternal focus.

Methods [3-5]

Literature search

The author group was selected and vetted by the ERAS Society Guideline Committee in 2017 based on expertise in the area, and a consensus topic list was

determined. After the topics were agreed upon they were then allocated among the group according to expertise. The literature search (1966–2017) used Embase and PubMed to search medical subject headings including “Cesarean Section”, “Cesarean Delivery”, “Cesarean Section Delivery” and all post-operative ERAS® items. Reference lists of all eligible articles were crosschecked for other relevant studies.

Study selection

Titles and abstracts were screened by individual reviewers to identify potentially relevant articles. Meta-analyses, systematic reviews, randomized controlled studies, nonrandomized controlled studies, reviews, and case series were considered for each individual topic.

Quality assessment and data analyses

The quality of evidence and recommendations were evaluated according to the GRADE system (Grading of Recommendations, Assessment, Development and Evaluation) [5] as used and described in previous ERAS Guidelines (see Table 1) [3, 4]. Briefly, recommendations are given as follows: **Strong** recommendations indicate that the panel is confident that the desirable effects of adherence to a recommendation outweigh the undesirable effects. **Weak** recommendations indicate that the desirable effects of adherence to a recommendation probably

outweigh the undesirable effects, but the panel is less confident. Recommendations are based on the quality of evidence: high, moderate, low and very low, but also on the balance between desirable and undesirable effects. In some cases strong recommendations may be reached from low-quality data and vice versa. The Core ERAS CD Team (AC, GM, SW, GN, and RDW) reviewed the evidence in detail for each section and assigned both the recommendation and evidence level. Discrepancies were resolved by the lead and senior authors.

Post-Operative Cesarean Delivery Pathway *(Focused Elements)* [6-71]

ERAS-Sham feeding (chewing gum) after Cesarean Delivery (*Focused Element***)** [6,7]

Sham postoperative feeding, chewing gum, following abdominal surgery has been evaluated in multiple clinical trials and in a Cochrane review appeared to reduce the time to recovery of gastrointestinal function[6]. In a separate review of gum chewing post cesarean section 15 clinical trials were identified [7]. The regimens for gum chewing varied widely in studies- initiation from immediately post-op to up to 12 hours post op, duration of each session of 15 to 60 minutes, and number of sessions per day from 3 to >6. In 10 of these studies the comparator group was traditional delayed feeding until return of intestinal function (bowel sounds or

flatus). In two studies the comparator group had an early feeding policy. With gum chewing (using a variety of gum types and duration of chewing) the time to first report of flatus was 5.9 hours in early feeding trials and 7.8 hours in the traditional feeding trials. This was a 7 hour improvement in time to flatus compared to those who did not chew gum. Only 4 studies reported post-operative ileus and this was reduced with gum chewing OR=0.39 95%CI (0.19, 0.80). Hospital stay was not changed: -0.36 days 95%CI(-0.53, 0.18). Quality of evidence was rated low mainly due to lack of blinding. Applicability to all settings is limited as a high proportion of subjects had general anesthesia in many of the trials.

Summary and Recommendation

1. Gum chewing appears to be effective and is low risk. It may be a redundant treatment if a policy for early oral intake is being used. However, it should be considered if delayed oral intake is planned. (Evidence Level- Low / Recommendation Grade –Weak).

Nausea and vomiting prevention (Focused Element) [8-22]

Nausea and vomiting (N/V) are common symptoms experienced during cesarean delivery, which happen during the surgery if the patient is awake or after the

procedure in the recovery room [8]. The overall incidence of nausea and vomiting during regional anesthesia for cesarean delivery is variable (21-79%) [8-17]. Maternal symptoms can potentially prolong the duration of the surgery and increase the risk of bleeding and surgical trauma. Nausea and vomiting can increase the potential risk of aspiration, which is a recognized cause of maternal mortality [18]. Nausea and vomiting reduced patient satisfaction and delayed discharge from hospital.

There are multiple causes of nausea and vomiting during cesarean delivery. Maternal hypotension from regional anesthesia is a common cause of N/V. Several approaches are currently used to minimize or prevent hypotension and likely to decrease the incidence of nausea and vomiting. A Cochrane review study (75 studies and 4624 women having spinal anesthesia for cesarean delivery) showed that colloid or crystalloid preloading, the IV administration of ephedrine or phenylephrine and lower limb compression (by bandages, stockings or inflatable boots) reduced the incidence of spinal anesthesia related hypotension [19].

Antiemetic agents have been used prophylactically during cesarean delivery under regional anesthesia and they are effective to prevent nausea and vomiting [20]. A multimodal approach to nausea and vomiting prevention is quickly becoming a standard of care. A Cochrane review study (41 studies and 5046 patients) demonstrated that 5-HT3 antagonists (e.g. ondansetron, granisetron), dopamine antagonists (e.g. metoclopramide, droperidol), and sedatives (e.g. midazolam,

propofol) were effective in reducing intra-operative nausea and vomiting [19]Corticosteroids (such as dexamethasone) were found to only reduce intraoperative N/V [8]. Anticholinergic agents (e.g. scopolamine) were effective at reducing postoperative nausea and vomiting [19]. Other interventions (opioids, supplemental oxygen, supplemental intravenous fluid, acupressure / acupuncture) did not reduce intraoperative nausea or postoperative nausea and vomiting [8].

A meta-analysis (33 trials with data from 3,447 patients) reported that combination regimens (5-HT is combined with either droperidol or dexamethasone) are significantly more effective than 5-HT3 alone [21]. The efficacy of combination antiemetic agents to prevent N/V in patients undergoing cesarean delivery was demonstrated in a randomized prospective study [22]. Tropisetron 2 mg and metoclopramide 20 mg are highly effective in preventing the N/V.

Summary and recommendation:

1. Fluid preloading, the IV administration of ephedrine or phenylephrine and lower limb compression are effective in reducing hypotension and the incidence of intraoperative and postoperative nausea and vomiting. (Evidence Level: Moderate/ Recommendation Grade: Strong)

2. Antiemetic agents are effective to prevent PONV during cesarean delivery. Multimodal approach should be applied to treat PONV. (Evidence Level: Moderate (multiple interventions) / Recommendation Grade: Strong)

Post-operative analgesia *(Focused Element)* [23-33]

Poor postoperative pain control may be detrimental to recovery for surgery of any kind. Pain may prolong recovery and delay discharge [23] as well as having a negative impact on rehabilitation [24]. For cesarean delivery, high pain scores have the potential to prevent early mobilization and the mother's efforts to be independent and to care for her newborn baby. Multimodal analgesia is a key component in managing postoperative pain as part of an enhanced recovery protocol [25] resulting in fewer side effects and faster postoperative recovery.

Post-cesarean delivery analgesia may be enhanced by a number of intraoperative interventions. Long acting intrathecal opioids such as morphine provide analgesia for several hours post cesarean delivery, although at the expense of a number of side effects including nausea, vomiting and pruritus [26,27]. In the absence of long acting intrathecal opioids the transversus abdominis plane field block provides excellent postoperative pain control.[28] A Cochrane review 29 of local analgesia

infiltration and abdominal nerve blocks found that they improved postoperative analgesia for cesarean delivery.

A review of oral analgesia for post cesarean delivery pain relief concluded that there was insufficient evidence to make recommendations regarding the safest and most effective form[30]. Nevertheless, the perioperative administration of NSAIDs is known to diminish postoperative pain for cesarean section [31]. Evidence in the obstetric population is less clear for paracetamol although a systematic review of studies which included those where patients underwent cesarean delivery found that the combination of NSAIDs and paracetamol was synergistic for postoperative pain [32]. A survey of practice surrounding cesarean delivery in the UK found that almost all units were using postoperative paracetamol and NSAIDs [33]. This combination is cheap, effective, easy to administer and opioid sparing leading to fewer opioid related side effects [25] and is thus compatible with ERAS regimens.

Summary and recommendation:

1. Multimodal post-operative analgesia including regular NSAIDs and paracetamol is recommended for enhanced recovery for cesarean delivery. (Evidence Level: Moderate / Recommendation Grade: Strong)

Perioperative nutritional care *(Focused Element)* [34-41]

There are multiple randomized controlled trials [34-41] on the subject of early feeding from countries across the world with differing cultural norms dating back over 15 years. Early feeding is defined variably as feeding as early as 30 minutes [34] and to up to 8 hours after cesarean delivery[35]. The largest trial looking at early feeding randomized 1154 patients to conventional feeding within 18 hours or early feeding within 2 hours and demonstrated a reduction in thirst and hunger, and improved maternal satisfaction, ambulation, and length of stay with no impact on readmissions or gastrointestinal symptoms or infections[38]. The findings of this trial are similar to those in other trials which demonstrate similar or enhanced satisfaction, earlier resumption of solid food, accelerated return of bowel activity, reduced length of stay, with no evidence of higher complication rates related to wound healing or infection.[34-41] A systematic review and meta-analysis of seventeen studies also supported these findings[41]. One study did document increased nausea with early resumption of diet, but this was this was self-limited [34]. Descriptions of post-operative diets varies. The post-operative diet should provide more servings of milk, fruit, vegetables and calories to support breast feeding. That diet should provide adequate fiber to prevent constipation.

Summary and recommendation

1. A regular diet within the 2 hours after cesarean delivery is recommended.

(Evidence Level: High / Recommendation Grade: Strong)

Peri-operative Glucose Control *(Focused Element)* [42-53]

Insulin resistance is a common physiologic change in pregnancy. There are various controversies about the peri-partum management of diabetic patients [42].

Diabetes in pregnancy is associated with adverse outcomes including an increase in morbidity and mortality for both the mother and fetus [43,44]. Patients with diabetes who undergo surgery have increased complications, particularly wound infections, length of hospital stay and death [45]. Patients with undiagnosed diabetes are at greater risk, with a dose-response relationship between the level of capillary blood glucose (CBG) and composite adverse events [46]. Conversely, strict control of hyperglycemia can help to reduce surgical site infections (SSI) [47].

The level of control of CBG is a complex area and for non-obstetric patients the ideal range is probably 6-10 mmol/L [48]. Lower limits of 4-7 mmol/L are recommended at the time of delivery to reduce fetal hypoglycemia [49] which will often require variable rate insulin infusions (VRII) formerly known as a sliding scale. As a result, these standards have been challenged and a higher upper limit of 8 mmol/L is suggested by Modi et al [50], as there is little further risk of fetal hypoglycemia. Moreover, CBG meters have been shown to have, at least, a 15%

error permitted by the Food and Drug Administration (USA), with a measured CBG of 4mmol/L that could be as low as 3.4 mmol/L thereby putting mothers at risk of severe maternal hypoglcemia, < 2.8 mmol /L [48].

For patients receiving insulin for Type I diabetes mellitus, the major issue is to never stop all insulin as ketoacidosis may develop rapidly. The manipulation of peri-operative insulin is complex with a small evidence base for patients undergoing cesarean delivery. Generally, the dose of once daily long acting insulins are reduced by 20% with more frequent injections of short acting or mixtures reduced by 50%. CBG are measured on admission to hospital. The aim is to return the patient to normal insulin with food as soon as possible after surgery. The use of continuous subcutaneous insulin (CSSII) pumps are increasing in usage and will often be advised to reduce the basal infusion by 10-20% and omitting the bolus dose prior to meals [51]. The use of the VRII is still popular for patients on insulin or with significant hyperglycemia (>12 mmol/L), but is associated with a number of serious side effects including hyperglycemia and hypoglycemia, hyponatremia and hypokalemia. It requires appropriate fluids to run along aside the insulin with 5% dextrose and 0.45% Saline with additional KCl. Hourly CBG monitoring is required with 20% glucose (50-100 ml) available to treat hypoglycemia [52,53].

Cesarean deliveries are best carried out under a regional technique where possible. Not only does it avoid the risk of general anesthesia, but in addition regional anesthesia will considerably obtund the 'stress' response (including the hyperglycemic response) to surgery. CBG is optimally measured every 30 min from induction of general anesthesia until the mother is fully conscious. [49]

Oral carbohydrate preloading is an area of controversy for patients with impaired glucose control. Whilst the patient may benefit from the advantages of preloading (such as reduced length of stay and may reduce complications for some surgeries) and in particular a reduction in insulin resistance, there are no large trials to support or refute its use in women with diabetes. The majority of diabetic care providers would not support its use in diabetic patients fearing worsening of glucose control. Patients should nevertheless be scheduled early in the day (particularly those requiring insulin) with minimal fasting to reduce the risk of dehydration, acidosis and ketosis

Following delivery of the fetus, maternal insulin requirements fall rapidly and CBG should be checked if the patient is receiving insulin. There is a further risk of hypoglycemia during best feeding too. Patients with gestational diabetes should discontinue therapy and those with Type II diabetes mellitus can continue with metformin and glibenclamide even if breastfeeding [49]. The neonate is at risk of

severe hypoglycemia post-delivery and there needs to be assessment by a pediatrician regarding whether or not admission to a neonatal unit is appropriate.

Finally these patients require counseling, advice (diet, weight control and exercise) and follow-up to minimize the impact of poor glucose control on their future health such as worsening of glucose control and cardiovascular disease.

Summary and Recommendations

1. Tight control of capillary blood glucose postoperatively is recommended. (Evidence Level: Low/Recommendation Grade: Strong)

Prophylaxis against thromboembolism (Focused Element) [54,55]

Pregnant and post-partum women are at an increased risk of venous thromboembolism (VTE). A variety of modalities are available to reduce the risk of post-cesarean delivery thromboembolic disease including mechanical methods (graduated compression stockings, intermittent pneumatic compression) and pharmacological methods (unfractionated heparin, low molecular weight heparin).

A recent Cochrane review assessed the efficacy of some strategies for post cesarean delivery thromboprophylaxis. In the comparison of heparin (either LMWH or UFH) to placebo/no treatment, there were no differences in

symptomatic thromboembolic events (RR 1.30, 95% CI.39-4.27), symptomatic pulmonary embolism (RR 1.10, 95% CI 0.25-4.87), or symptomatic deep vein thrombosis (RR 1.74, 95% CI 0.23-13.31). Importantly, in this meta-analysis, there were few studies that enrolled a relatively small number of patients, and these were generally not of high methodological quality. In addition, there were no included studies that compared mechanical to pharmacological thrombo-prophylaxis, or mechanical methods to placebo/no treatment [54].

One recent study from a large health system compared rates of post-cesarean pulmonary embolism deaths in the time period before a universal policy for pneumatic compression stockings to the time period after implementation. There was a significant reduction in death from post-cesarean delivery pulmonary embolism between these 2 time periods (7/458,097 cesarean births before implementation versus 1/456,880 cesarean births after implementation, p=0.038) [55].

Summary and recommendation:

1. Pneumatic compression stockings should be used to prevent thromboembolic disease in patients undergoing cesarean delivery. (Evidence Level: Low / Recommendation Grade: Strong)

2. Heparin should not be routinely used for VTE prophylaxis in post-cesarean patients. (Evidence Level: Low / Recommendation Grade: Weak)

Early Post Cesarean Delivery mobilization (Focused Element) [56]

Early mobilization theoretically can improve a number of short-term outcomes after surgery including rapid return of bowel function, reduced risk of thrombosis, and decreased length of stay. There are no available data to judge whether early mobilization improves outcomes after cesarean delivery [56].

Early mobilization is often part of a surgical bundle- "fast track" or "enhanced recovery after surgery" (i.e. ERAS). These bundles include extensive pre-operative counseling, improved pre-operative nutrition, improved pain relief along with rapid post-operative diet resumption, in addition to the early mobilization. This bundle of care has not been evaluated in post-cesarean delivery patients. Additionally, there are no randomized controlled trials of this process in gynecologic patients. A recent Cochrane review of this bundled approach in colorectal surgery patients included 4 small randomized trials of low quality. Complications were reduced with ERAS process, though not due to a reduction in major complications. The review concluded that quantity and quality of the data in this population are low, and that ERAS should not be universally adopted based on these data. It is

important to note that, in addition to these studies being done on patients very different than obstetrical patients, the effects of the individual components of the bundle cannot be separated analytically[56].

Summary and recommendation:

1. Early mobilization after cesarean delivery is recommended. (Evidence level: Very Low / Recommendation grade: Weak)

Post Cesarean Delivery Urinary drainage (Focused Element) [57-66]

Urinary catheter placement during cesarean delivery is a widely accepted practice. It is generally believed that bladder drainage can measure urinary output, reduce urinary system injuries, and decrease postoperative urinary retention [57]. However, urinary tract infection (UTI) is one of the most common complications after cesarean delivery [58-61]. Indwelling urinary catheters can increase the incidence of UTI, urethral pain, and difficult voiding. These complications result in delayed ambulation, prolonged hospital stay, and increased costs.

In 2003, Ghoreishi [57] conducted a prospective study with 270 patients undergoing cesarean delivery. The results indicated that placement of a urinary catheter during cesarean delivery did not improve surgical exposure of the lower uterine segment or reduce injury to the urinary tract [57]. Patients without indwelling urinary catheters

had a shorter mean ambulation time, and length of hospital stay [57]. In a non-randomized clinical trial with 344 patients, Senanayake [62] demonstrated that there was low incidence of postoperative urinary retention after cesarean delivery in patient without an indwelling urinary catheter.

In a prospective study[63], 420 patients undergoing elective cesarean delivery were randomized into an un-catheterized group or a catheterized group (the catheter was removed 12 hours postoperatively). The study reported that mean time to patient ambulation, first postoperative voiding, oral rehydration, bowel movement and length of hospital stay were significantly less in the un-catheterized group ($P<0.001$). Even though the urinary catheter was removed 12 hours after surgery, the incidence of UTI was significantly higher (5.7% vs 0.5%) ($P<0.001$). A systemic review (two RCTs and one NRCT) concluded that urinary catheter usage is associated with higher rates of UTIs [64]. Urinary catheter does not reduce postoperative urinary retention or decrease intraoperative surgical difficulties [64].

In another prospective randomized clinical trial of immediate (n=150) versus 12 hours (n=150) removal urinary catheter in women undergoing elective cesarean section, the incidence of postoperative bacteriuria, dysuria, burning on the micturition, urinary frequency and urgency, the time till the first voiding, mean postoperative ambulation time, and length of hospital stay were significantly lower in immediate urinary catheter removal group [65].

A Cochrane review (five RCTs with 1065 patients) [66] showed that use of urinary catheters in patients undergoing cesarean delivery was associated with increased time to first voiding, higher incidence of discomfort due to catheterization, delayed postoperative ambulation, prolonged stay in hospital.

Summary and recommendation:

1. In women who do not need ongoing strict assessment of urine output, urinary catheter should be removed immediately after cesarean section, if placed during surgery. (Evidence level: Low / Recommendation Grade: Strong)

Post-Operative / Post-Partum Mother Pathway *(Focused Element)* [67-71]

Discharge Counseling *(Focused Element)* [67-71]

There is limited research on specific optimal discharge counselling for women following cesarean delivery. However, active surveillance of post-discharge complications following cesarean delivery suggests that surgical site infections occur in approximately 10% of patients, over 80% of which develop following discharge [67], indicating a need for women to be provided with comprehensive information on the normal discharge course, signs and symptoms of infection, activity restrictions, and instructions on when to seek medical attention. The

Perceived Readiness for Discharge After Birth Scale is a validated tool that may help clinicians identify patients at increased risk of problems following discharge [68]. Web based opportunities have been explored but there is not extensive support data at present [69].

Looking at what can be learned from other areas, a systematic review of 30 RCTs evaluating discharge planning across multiple patient groups and medical specialties found that overall discharge planning may lead to a small reduction in length of stay, a reduced risk of readmission for some patient groups, and increased satisfaction for both patients and health professionals [70]. When focusing exclusively on surgical patients, two trials reported a non-significant reduction in length of stay (-0.06 days, 95% CI: -1.23, 1.11), one trial reported a non-significant difference in readmission rates (+3%, 95% CI: -7%, 13%) [70]. Additionally, a prospective before-and-after study of 1,219 patients found that compliance with discharge instructions in the emergency department was increased from 26.2% to 36.2% (OR=1.59, 95% CI: 1.2-2.1) with the provision of standardized written information that included information on the diagnosis, medication dosage and length of treatment, potential medication side effects, and the suggested time and location of out-patient clinic follow-up [71].

Summary and Recommendations:

1. Standardized written discharge instructions should be used to facilitate discharge counselling. (Evidence Level: Low / Recommendation Grade: Weak)

Comment

The ERAS Cesarean Delivery guideline / pathway has created a pathway (for scheduled and unscheduled surgery starting from 30-60 minutes prior to skin incision to maternal discharge) with 5 pre-operative elements (8 recommendations); 4 intra-operative elements (9 recommendations); 9 post-operative elements (11 recommendations- the focus of this document); and one neonatal element (6 recommendations).

The maternity clinical care area has complex pathways but there are increasing risk management factors related to obstetrical co-morbid medical, genetic, surgical, and lifestyle factors. More prospective and quality assessment / improvement research, evaluation, audit and collaboration will be required for enhancing the maternal and fetal health outcomes, quality and safety.

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Table 1 GRADE system for rating quality of evidence [5]

Evidence level	Definition
High quality	Further research is unlikely to change confidence in estimate of effect
Moderate quality	Further research is likely to have important impact on confidence in estimate of effect and may change the estimate
Low quality	Further research is very likely to have important impact on confidence in estimate of effect and likely to change the estimate
Very low quality	Any estimate of effect is very uncertain

Table 1b. GRADE system for rating strength of recommendations [5]

Recommendation strength	Definition
Strong	When desirable effects of intervention clearly outweigh the undesirable effects, or clearly do not
Weak	When trade-offs are less certain – either because of low quality evidence or because evidence suggests desirable and undesirable effects are closely balanced

Table 2

Guidelines for postoperative care in Cesarean Delivery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations

Item	Recommendation	Evidence level	Recommendation Grade
Post-operative Pathway			
Chewing gum after Cesarean Section (focused element)	1. Gum chewing appears to be effective and is low risk. It may be a redundant treatment if a policy for early oral intake is being used. However, it should be considered of delayed oral intake is planned.	Low	Weak
Nausea and vomiting prevention (focused element)	1. Fluid preloading, the IV administration of ephedrine or phenylephrine and lower limb compression are effective to reduce hypotension and the incidence of intraoperative and postoperative nausea and vomiting. 2. Antiemetic agents are effective to prevent PONV during cesarean delivery. Multimodal approach should be applied to treat PONV.	Moderate (multiple interventions) Moderate	Strong Strong

Post-operative analgesia (focused element)	1. Multimodal analgesia including regular NSAIDs and paracetamol is recommended for enhanced recovery for cesarean delivery.	Moderate	Strong
Peri-operative nutritional care (focused element)	1. A regular diet within the 2 hours after cesarean delivery is recommended.	High	Strong
Peri-operative Glucose Control (focused element)	1. Tight control of capillary blood glucose is recommended.	Low	Strong
Prophylaxis against thromboembolism (focused element)	1. Pneumatic compression stockings should be used to prevent thromboembolic disease in patients undergoing cesarean delivery. 2. Heparin should not be routinely used for VTE prophylaxis in post-cesarean patients.	Low Low	Strong Weak
Early Post Cesarean Delivery mobilization (focused element)	1. Early mobilization after cesarean delivery is recommended.	Very Low	Weak
Post Cesarean Delivery Urinary drainage (focused element)	1. Urinary catheter should be removed immediately after cesarean delivery, if placed during surgery.	Low	Strong
Post-Operative / Post-Partum Mother Pathway			

Discharge Counselling (focused element)	1. Standardized written discharge instructions should be used to facilitate discharge counselling.	Low	Weak

Statement of Authorship

We are using the Statement of Authorship from Parts 1 and 2, which was part of the original submission.