Arab Republic of Egypt
Egyptian Health Council
Egyptian Board of Anesthetics, Surgical Intensive Care and Pain Management

Guidelines for Anesthesia for Operative Caesarean Section Delivery

Prepared by

The "Guidelines Development Group" (GDG) of the Scientific Committee of the Egyptian Board of Anesthetics, Surgical Intensive Care and Pain Management.

Contents

Acknowledgements

The Guidelines for Anesthesia for operative Caesarean Section delivery - Edition 2025 - were prepared by the **Guidelines Development Group (GDG)** of the Egyptian Board of Anesthetics, Surgical Intensive Care and Pain Management group which reserves the right to determine the publication and distribution of the Guidelines. The Guidelines are subject to revision, and the updated versions will be published when needed, as warranted by the evolution of new-evidenced medical knowledge, new technology, and new practice trends. Although the Egyptian Board of Anesthetics, Surgical Intensive Care and Pain Management encourages Egyptian anesthesiologists to adhere to its practice guidelines to ensure high-quality patient care, we cannot guarantee any specific patient outcome. Anesthesiologists should exercise their own professional judgement in determining the proper course of action for any patient's circumstances. Egyptian Board of Anesthetics, Surgical Intensive Care and Pain Management assumes no responsibility or liability for any error or omission arising from the use of any information contained in its Guidelines to the Practice of Anesthesia for operative Caesarean Section delivery.

These Guidelines are intended to apply to all anesthesiologists in Egypt. The independent practice of anesthesia is a specialized field of medicine, which should be practiced by physicians with appropriate training who continue their education in the practice of anesthetics, surgical intensive care, pain management, perioperative care, and resuscitation.

All physicians applying for privileges in anesthesia should show satisfactory completion of specialist postgraduate training in anesthesiology certified by either the Egyptian Board training or the standard training in university programs to be able to provide these services. International medical graduates approved for licensure by provincial regulatory bodies should show training equivalent to the Egyptian standard. The only route to specialist recognition in anesthesiology in Egypt is through the "certification process" of "Egyptian Health Council" (EHC).

We would like to acknowledge the Anesthesia **Guidelines Development Group (GDG)** of the Egyptian Board of Anesthetics, Surgical Intensive Care and Pain Management.

Development Committee for adapting these guidelines

Chair of the GDG: Prof. Sanaa Abd El-Kareem Helmy, Faculty of Medicine, Cairo University.
Rapporteur of the GDG: Prof. Salah El-Sherif, Faculty of Medicine, Tanta University
Members of the GDG:

- Prof. Hala El-Gendy, Faculty of Medicine, Tanta University
- Prof. Hassan Mohamed, Faculty of Medicine, Cairo University
- Prof. Ghada Ali Faculty of Medicine, Menofia University
- Prof. Khaled Maghawry, Faculty of Medicine, Ain Shams University

Abbreviations

AAGBI: Association of Anaesthetists of Great Britain and Ireland
ACOG: American College of Obstetricians and Gynecologists
AHA: American Heart Association
ALS: Advanced Life Support
AoA: Association of Anaesthetists
APCHE II: Acute Physiology and Chronic Health Evaluation II)
ASA: American Society of Anesthesiologists.
ASRA: American Society of Regional Anesthesia
BMI: Body mass index
BP: Blood pressure
CPR: Cardio-pulmonary resuscitation
CS: Caesarean Section
CSE: Combined Spinal-Epidural.
CSF: Cerebro-spinal fluid
CTG: Cardiotocography
DAS: Difficult Airway Society
DIC: Disseminated intravascular coagulation
DM: Diabetes Mellitus
EBP: Epidural Blood Patch
ECG: Electrocardiogram
EHC: Egyptian Health Council
ERC: European resuscitation council
ESA: European Society of Anaesthesiology
FBC: Full blood count
FONA: Front of Neck Access
GA: General anaesthesia
GDG: Guidelines Development Group
GPS: Good Practice Statement.
GRADE: Grading of Recommendations Assessment, Development and Evaluation
HDP: Hypertensive Disorder in Pregnancy.
HELLP: Hemolysis, Elevated Liver enzymes and Low Platelet count
HTN: hypertension
IV: Intravenous
LA: Local Anesthetic
LAST: Local anaesthetic systemic toxicity
LSCS: Lower segment Caesarean section
LUD: Left uterine displacement
MAP: Mean arterial pressure
MHP: Massive Hemorrhage Protocol
MOEWS: Modified Obstetric Early Warning Score
MOEWS: Modified Obstetric Early Warning Score
MTP: Massive Transfusion Protocol
NIBP: Non-invasive blood pressure
NICE: National Institute for Health and Care Excellence
NMDA: N-methyl-D-aspartate
NSAID: Nonsteroidal Anti-inflammatory Drug
NYSORA: New York School of Regional Anesthesia
OAA: Obstetric Anaesthetists' Association

PCA: Patient-controlled Analgesia
PDPH: Post-dural Puncture Headache
RCoA: Royal College of Anaesthetists
RCOG: Royal College of Obstetricians and Gynecologists
RCT: Randomized Controlled Trials.
SAD: Supraglottic airway device
SOAP: Society for Obstetric Anesthesia and Perinatology
TAP: Transversus Abdominis Plane
UK: United kingdom
VTE: venous thromboembolism
WFSA: World Federation of Societies of Anesthesiologists
WHO: World Health Organization

Glossary

Basic Principles and Terminology

The following definitions are used For the purposes of these guidelines:

Anesthesiologist: the term anesthesiologist in this document is used to designate all licensed medical practitioners with privileges to administer anesthetics, surgical intensive care, pain management, perioperative care, and resuscitation.

Anesthetic: is the deliberate performance of any procedure to render a patient temporarily insensitive to pain or to the external environment so that a diagnostic or therapeutic procedure can be performed.

Anxiolytic: A drug used to relieve anxiety or to treat symptoms of anxiety, such as feelings of fear, dread, uneasiness, and muscle tightness, that may occur as a reaction to stress.

Coloading refers to administering IV fluids simultaneously with spinal anesthesia.

Neuraxial anesthesia: is defined as intrathecal, epidural or combined spinal epidural (CSE) administration of local anesthetics and/or opioids for anesthesia, treatment of postoperative pain or other acute pain problems.

Obstetric anesthesia refers to peripartum anesthetic and analgesic activities performed during labor and vaginal delivery, Caesarean delivery, removal of retained placenta, and postpartum tubal ligation.

Postdural puncture headache (PDPH): A severe headache that occurs after a lumbar puncture and is caused by a leak of cerebrospinal fluid (CSF) as a complication from spinal needle insertion.

Preloading: refers to administering a fixed volume of intravenous (IV) fluids (typically 500-1000 mL) before the induction of spinal anesthesia.

Executive Summary

These Guidelines deal with the cornerstone steps of anesthetic management of patients undergoing operative Caesarean Section delivery.

1. Peri-anesthetic Evaluation and Preparation for operative Caesarean delivery

1.1 History, Physical Examination and Lab tests

1.1.1 Conduct a focused Preanesthetic and Obstetric history, physical examination and review of Lab tests before providing anesthesia care for operative Caesarean delivery. (Strong)

1.1.2 Identify the indication for Caesarean Section (CS) and note the urgency of CS (Emergency, Urgent, Scheduled, or Elective). (Strong)

1.1.3 Record blood pressure at admission and assess clinical characteristics and wellbeing of the mother. (Strong).

1.1.4 Assess the Airway preoperatively. (Strong)

1.1.5 When a neuraxial anesthetic is planned, examine the patient's back. (Strong)

1.1.6 Discuss the Anaesthetic Management including complications of Regional Anaesthesia and Risks of General Anaesthesia (Strong).

1.2 Ensure a Group and Save blood sample has gone and ensure an electronic issue of blood is available on the morning of the CS. If there is no electronic issue available blood must be cross matched. (GPS)

1.3 Order individualized platelet count based on a patient's history (*e.g.*, preeclampsia with severe features), physical examination, and clinical signs. (Strong)

1.4 Fetal heart rate patterns should be monitored by a qualified individual before and after administration of neuraxial analgesia for CS. (Strong)

1.5 Aspiration Prevention (Prophylaxis)

1.5.1 Permit clear liquids up to 2 hours before elective CS. (Strong)

1.5.2 Solid foods should be avoided. If time permits, a fasting period for solids of 6 - 8 h before elective CS should be planned. (Strong)

1.5.3 All women for CS are to be given antacid for aspiration prophylaxis (nonparticulate Antacids, H_2-receptor Antagonists, and/or Metoclopramide). (Strong)

2. Anesthetic care and Requirements for Caesarean Delivery

2.1 Equipment, Facilities, and Support Personnel

2.1.1 Check all the Anesthetic equipment (2 machines and 2 intubation equipment) in main theatre and back up theatre. (Conditional)

2.1.2 Check Resources for the treatment of potential complications . (Strong)

2.1.3 Ensure that you know who your senior cover is and how to contact them. Call for help sooner rather than later and always notify the consultant of a serious labor ward emergency. (GPS)

2.1.4 At the start of each 24-hour emergency shift, ensure the availability of the Anaesthetic drugs, labelled and placed in the Anesthetic fridge. (Strong)

2.2 Type of Anesthesia: General, Epidural, Spinal, or Combined Spinal–Epidural Anesthesia

2.2.1 Uterine displacement (usually left displacement) should be maintained until delivery regardless of the anesthetic technique used. (Strong)

2.2.2 The decision to use a particular anesthetic technique for Caesarean delivery should be individualized. (Conditional)

2.2.3 Consider selecting neuraxial techniques in preference to general anesthesia for most Caesarean deliveries. (Strong)

2.2.4 General anesthesia may be the most appropriate choice in some circumstances when a rapid intervention is necessary. (Conditional)

2.3 Intravenous (IV) Fluid Preloading or Coloading with spinal anesthesia

2.3.1 Use IV fluid preloading or coloading to reduce the frequency of maternal hypotension after spinal anesthesia for Caesarean delivery. (Conditional)

2.3.2 Do not delay the initiation of spinal anesthesia in order to administer a fixed volume of IV fluid. (Conditional)

2.4 Vasopressors Use (Ephedrine or Phenylephrine) with neuraxial anesthesia

Use either IV ephedrine or phenylephrine for treating hypotension during neuraxial anesthesia. In the absence of maternal bradycardia, consider selecting phenylephrine because of improved fetal acid–base status in uncomplicated pregnancies. (Strong)

2.5 Consider selecting neuraxial opioids rather than intermittent injections of parenteral opioids for postoperative analgesia After neuraxial anesthesia for Caesarean delivery. (Conditional)

3. Neuraxial Block for Caesarean Section (Neuraxial Analgesia or Anesthesia in CS)

3.1 Management of thrombocytopenia for neuraxial block in patients with Caesarean Section

3.1.1 **A neuraxial block could be performed in an obstetric patient with isolated thrombocytopenia with a platelet count down to 70,000/uL (70 × 10⁹/L) , with no other associated signs of a qualitative defect or an active coagulopathy. (Conditional)**

3.1.2 Avoid a neuraxial technique if platelet count is less than 50,000/µL (50 × 10⁹/L). (Conditional)

3.2 Ensure optimal positioning of the mother, either the ideal lateral or ideal sitting position. (Conditional)

3.3 Consider the use of pencil-point spinal needles instead of cutting-bevel spinal needles to reduce the incidence of postdural puncture headache. (Conditional)

3.4 We recommend using the lowest palpable lumbar interspace for lumbar neuraxial procedure. (Strong)

3.5 Ensure that the neuraxial block is adequate to proceed with surgery. A dense motor block, absent cold sensation up to T4, no sharp sensation by applying a gentle pinch in the surgical area are appropriate. (Strong)

4. Epidural top up for Caesarean Section Delivery

4.1 For urgent Caesarean delivery, an indwelling epidural catheter may be used as an alternative to initiation of spinal or general anesthesia. (Conditional)

4.2 Assess if epidural is well-functioning to be topped up. If yes, proceed to top up. If no, remove and perform spinal anesthesia or general anesthesia. (Conditional)

5. Thromboprophylaxis

5.1 Thromboprophylaxis should be prescribed at least 4 hours after spinal anesthesia or after epidural catheter removal if the risk scoring for prophylaxis is triggered. (Conditional)

5.2 The dose for thromboprophylaxis after neuraxial block will be prescribed depending on the mothers booking weight unless there has been significant weight gain (>12 kgs). (Conditional)

6. Management of Postdural Puncture Headache (PDPH)

6.1 Use conservative treatments for patients with mild PDPH without associated cranial symptoms. (Conditional)

6.2 Epidural blood patch should be offered for patients with moderate and severe PDPH with associated cranial symptoms who are unresponsive to conservative management. (Strong)

7. The Use of Adjuvant Medications and Management of Intraoperative Pain During Cesarean Delivery Under Neuraxial Blocks.

- **7.1 Recommend the use of neuraxial "Adjuvant Medications" (epidural lidocaine, epinephrine, and lipophilic opioid) as adjuncts to manage the intraoperative pain during CS under neuraxial blocks. (Strong)**
- **7.2 Recommend conversion of neuraxial block to General Anesthesia when pain is refractory to appropriate adjuvants (Strong)**
- **7.3 Use of IV opioids, Ketamine, Dexmedetomidine, Midazolam or Anxiolytics in cases of inadequate analgesia during Caesarean section under neuraxial anesthesia.**
  - **7.3.1 Recommend short-acting opioids (e.g., fentanyl, remifentanil) as first-line IV agents (Strong)**
  - **7.3.2 Suggest ketamine or dexmedetomidine as a second line for analgesia and anxiolysis when opioids are insufficient (Conditional)**
  - **7.3.3 Suggest midazolam or dexmedetomidine for anxiolysis. (Conditional)**
- **7.4 Recommend against the use of volatile agents like sevoflurane without airway protection during Caesarean delivery under neuraxial anesthesia. (Strong)**

8. Post-operative care for Caesarean Section

- **8.1 WHO sign-out must be done before leaving theatre (Strong)**
- **8.2 Prescribe post-operative analgesia and thromboprophylaxis (if required). (Strong)**
- **8.3 Provide post operative analgesia during Spinal Anaesthetic by opioids (fentanyl and morphine). (Conditional)**
- **8.4 Provide epidural top-up by administration of morphine (1.0 mg) via epidural catheter for post operative analgesia. (Conditional)**
- **8.5 Analgesia following General anaesthesia will require a Patient-controlled Analgesia (PCA) post operatively and local anesthetic infiltration of the wound or Transversus Abdominis Plane (TAP) /iliac crest blocks depending on your experience. (Strong)**

9. Management of Airway Emergencies in Obstetrics

- **9.1 Maintain a difficult airway cart and strategy. (Strong)**
- **9.2 Implement the basic elements of the guidelines for the management of difficult and failed tracheal intubation. Follow ASA airway guidelines. (Strong)**
- **9.3 In case of "Cannot Ventilate, Cannot Oxygenate", prepare for urgent Front-of-Neck Access (FONA) while simultaneously remove the possible reversible causes. (Strong)**

10. Cardiopulmonary Resuscitation (CPR)

- **10.1 Initiate Cardiopulmonary resuscitation (CPR) with pregnancy-specific modifications of the Advanced Life Support (ALS) algorithm of the non-pregnant population. (Strong)**
- **10.2 Deliver the fetus within 4–5 minutes if circulation is not restored. (Strong)**
- **10.3 Start immediate, high-quality CPR in the event of cardiovascular collapse due to local anaesthetic systemic toxicity (LAST) with early lipid administration. (Strong)**

11. Hemorrhagic Emergencies at Caesarean Section

- **11.1 Ensure early recognition, immediate availability of resources to manage hemorrhagic emergencies and activation of a multidisciplinary team. (Strong)**
- **11.2 Ensure early activation of Massive Transfusion Protocol (MTP) and use balanced component therapy (Strong)**

Introduction

Anesthesiology is a dynamic specialty of medicine that fosters continuous improvements in anesthetic care for patients undergoing surgical and obstetric procedures. The following recommendations are aimed at providing basic guidelines to anesthetic practice for operative delivery with caesarean section. They are intended as a framework for reasonable and acceptable patient care and should be interpreted as such to allow for some degree of flexibility in different circumstances.

The delivery suite is a demanding place to work for all grades of anesthetists. You have to be ready to give anaesthesia at very short notice, occasionally without the opportunity to undertake a thorough anesthetic pre-assessment that you would usually perform.
The pressure to proceed with anesthesia particularly if there are fetal concerns can be very intense, but it is important to put the mother's wellbeing first at all times.
Most category 1 or ‘crash' Caesarean sections can be anticipated. The mothers have often been on the labor ward for some time. The key to success on the delivery suite is anticipating potentially challenging situations.

Purpose and Scope of the guidelines

The purpose of these guidelines is to assist anesthesiologists to enhance the quality of their anesthetic practice based on evidence for the care of Caesarean Section patients, leading to improve patient safety, improve in health indicators such as mortality and incidence and severity of anesthesia-related complications and to increase patient satisfaction.

These guidelines focus on the anesthetic management of pregnant patients **during operative Caesarean Section delivery**, and selected aspects of postpartum care and analgesia (*i.e.*, neuraxial opioids for postpartum analgesia after neuraxial anesthesia and postoperative analgesia after general anesthesia (GA) for Caesarean delivery), as well as management of emergencies related to operative Caesarean Section delivery. The intended patient population includes, but is not limited to, intrapartum and postpartum patients with uncomplicated pregnancies or with common obstetric problems.
The guidelines **do not apply to** patients undergoing surgery during pregnancy, gynecological patients, or parturients with chronic medical disease (*e.g.*, severe cardiac, renal, or neurological disease). In addition, these guidelines do not address (1) postpartum analgesia for vaginal delivery. (2) analgesia after tubal ligation, or (3) Pain relief during normal delivery.

Target Audience

These guidelines are intended for use by healthcare professionals working as Anesthesiologists. They also may serve as a resource for healthcare professionals such as anesthesia Nurses, obstetricians, perioperative care teams, policy makers, hospital managers, and other stakeholders who advise or care for patients who will receive anesthetic care during Caesarean section and the immediate postpartum period.
All physicians applying for privileges in anesthesia should show satisfactory completion of specialist postgraduate training in anesthesiology, standard training in the Egyptian Board program, University programs or equivalent.

METHODOLOGY

A comprehensive search for guidelines was done to identify the most relevant ones to consider for adaptation. For the literature review, potentially relevant clinical studies were identified *via* electronic and manual searches of the literature. The updated searches covered a 15-year period from January 1, 2010, to July 31, 2025. The inclusion/exclusion criteria that were followed in the search and retrieval of guidelines are adapted.

We selected guidelines only if they are:

- Evidence-based guidelines.
- National and/or international guidelines.
- Guidelines published from 2010 to 2025.
- Peer reviewed publications.
- Guidelines written in English language.

We Excluded guidelines that are:

- Written by a single author not on behalf of an organization as guideline to be valid and comprehensive, ideally requires multidisciplinary input.
- Published without references as the panel needs to know whether a thorough literature review was conducted and whether the current evidence was used in the preparation of the recommendations.

All retrieved Guidelines were screened and appraised using AGREE II instrument (www.agreetrust.org) by at least three members of the GDG. The panel decided on a cut-off point or ranked the guidelines (any guideline scoring above 50% on the rigor dimension was retained).

Guidelines used in the Adaptation Process:

The basic elements of the international guidelines for the anesthetic management in obstetrics published by international societies can be successfully implemented in the practice of obstetric anesthesiologists worldwide. The Guidelines Development Group (GDG) for the Egyptian Board of Anesthetics, Surgical Intensive Care, and Pain Management has adopted with modification:

1. Practice Guidelines for Obstetric Anesthesia. An Updated Report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia and the Society for Obstetric Anesthesia and Perinatology. Approved by the ASA House of Delegates on October 28, 2015. Anesthesiology Feb 2016; 124(2):270–300. (Reference No. 1)
2. Guidelines to the Practice of Anesthesia, Revised Edition 2025, Canadian Journal of Anesthesia, Volume 72, number 1 Can J Anesth/J Can Anesth https://doi.org/10.1007/s12630-024-02906-y (Reference No. 57)
3. Statement on Pain During Cesarean Delivery. Developed by: *Committee on Obstetric Anesthesia*. Original Approval: *October 18, 2023*. (Reference No. 62)
4. Statement on the Use of Adjuvant Medications and Management of Intraoperative Pain During Caesarean Delivery. ***Developed by:*** *Committee on Obstetric Anesthesia.* Original Approval: October 23, 2024. (Reference No. 64)

5. Statement on Neuraxial Analgesia or Anesthesia in Obstetrics. Committee of Origin: Obstetric Anesthesia (Approved by the ASA House of Delegates on October 12, 1988, and last amended on October 13, 2021). (Reference No. 40)
6. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: An updated report by the American Society of Anesthesiologists Task Force on Preoperative Fasting. ANESTHESIOLOGY 2011; 114:495–511. (Reference No. 18)
7. Society for Obstetric Anesthesia and Perinatology (SOAP) Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients With Thrombocytopenia (SOAP Thrombocytopenia Consensus Statement March 2021. (Reference No. 41)
8. American College of Obstetricians and Gynecologists (ACOG)**.** *Practice Bulletin No. 209: Obstetric Analgesia and Anesthesia.* Obstet Gynecol. 2019 Mar;133(3):e208–e225. ACOG(Reference No. 66)
9. *Statement on Optimal Goals for Anesthesia Care in Obstetrics.* American Society of Anesthesiologists. Developed By: Committee on Obstetrics and Anesthesia Last amended October 13, 2021 (original approval: October 17, 2007) (Reference No. 19)
10. Practice guidelines for management of the difficult airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology 2022; 118:251–70. (Reference No. 76)

Strength of Recommendations

The strength of a recommendation communicates the importance of adherence to the recommendation.

Strong Recommendations	The GDG found that the desirable effects of adherence to the recommendation outweigh the undesirable effects. This means that in most situations the recommendation can be adopted.
Conditional Recommendations	This means that the GDG found that there is: ▪ Greater uncertainty about the strength of evidence, or ▪ The recommendation may account for a greater variety in patient values and preferences, or ▪ The resource use makes the intervention suitable for some, but not for other locations. Conditional recommendations are still the best available evidence to date, and it can be adopted if it meets the conditions mentioned with it.
Good Practice Statement (GPS)	Statements based on expert opinion of respected authorities, and the guidelines development group.

Evidence level

Evidence Assessment

According to WHO Handbook for Guidelines, we used the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) approach to assess the quality of a body of evidence, develop and report recommendations. GRADE methods are used by WHO because these represent internationally agreed standards for making transparent recommendations.

Detailed GRADE information is available on the following sites:

- GRADE working group: http://www.gradeworkingroup.org
- GRADE online training modules: http://cebgrade.mcmaster.ca/
- GRADE profile software: http://ims.cochrane.org/revman/gradepro

Quality Definition Implications

Evidence is categorized as High, Moderate, Low and Very low.

Table 1: Quality and Significance of the Four Levels of Evidence in GRADE:

Quality	Definition	Implications
High	The guideline development group is very confident that the true effect lies close to that of the estimate of the effect.	Further research is very unlikely to change confidence in the estimate of effect
Moderate	The guideline development group is moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate
Low	Confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the true effect.	Further research is very likely to have an important impact on confidence in the estimate of effect and is unlikely to change the estimate
Very low	The group has very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of the effect.	Any estimate of effect is very uncertain

RECOMMENDATIONS

1. Peri-anesthetic Evaluation and Preparation for operative Caesarean delivery

1.1 History, Physical Examination and Lab tests

1.1.1 Conduct a focused Preanesthetic and Obstetric history, physical examination and review of Lab tests before providing anesthesia care for operative Caesarean delivery. (Strong, Moderate evidence)

Recommendation	**1.1.1 Conduct a focused Preanesthetic and Obstetric history, physical examination and review of Lab tests before providing anesthesia care for operative Caesarean delivery.**
Strength Benefit Direction	Strong. Clearly Beneficial.
Level of Evidence	Moderate (recommended by all major professional bodies*)
Remarks	Should include pre-anesthetic history, obstetric history, a baseline BP measurement, heart, and lung examination.

*This recommendation is uniformly endorsed by all major professional bodies, considered standard of care in obstetric anesthesia and failure to perform assessment is associated with preventable maternal and fetal harm**. American Society of Anesthesiologists (ASA)** *Practice Guidelines for Obstetric Anesthesia* recommends focused pre-anesthetic evaluation including history, physical examination, and review of indicated laboratory tests prior to cesarean delivery **[1]**. **RCOG & Society for Obstetric Anesthesia and Perinatology (SOAP)** *Obstetric Anesthesia Consensus Statements* emphasize preoperative assessment to identify maternal and fetal risk factors before operative delivery **[2]** . **The NICE Guidelines (UK)** requires anesthetic assessment before operative birth, including evaluation of comorbidities and relevant investigations **[3]**. **World Health Organization (WHO)** recommends preoperative clinical assessment as a core component of safe obstetric surgical care. This should include, but is not limited to, a maternal health and anesthetic history, a relevant obstetric history, a baseline blood pressure measurement, heart, and lung examination, consistent with the American Society of Anesthesiologists (ASA) "Practice Advisory for Preanesthetic Evaluation."

1.1.2 Identify the indication for Caesarean Section (CS) and note the urgency of CS (Emergency, Urgent, Scheduled, or Elective). (Strong, Moderate evidence)

Recommendation	**1.1.2 Identify the indication for Caesarean Section (CS) and note the urgency of CS (Emergency, Urgent, Scheduled, or Elective).**
Strength Benefit Direction	Strong recommendation. Beneficial.
Level of Evidence	Moderate **(**RCOG, NICE, well-conducted cohort studies, expert consensus and expert opinion*)
Remarks	Identifying the indication and urgency for CS is essential for safe anesthetic management.

***The use the Royal College of Obstetricians and Gynecologists (RCOG) **or** NICE classifications are important to guide timing and anesthetic approach. Opinions of consultants, RCOG, NICE and Cohort studies recommend identification of the reason for CS to help to tailor the anesthetic technique to urgency. Implications on the anaesthetic technique (Category 1 may necessitate a GA), and on management in terms of length of surgery, pre-eclampsia or estimated blood loss. Placental location must be known to ensure it

is not overlying the uterine scar of a previous CS, placenta previa (higher bleeding risk) or eclampsia (need for seizure control) influence the anesthetic choices **[2,3,4].**

Categories of Urgency of CS

- **Category 1: Emergency.** *Immediate threat to the life of the woman or fetus (decision to delivery 30 minutes)*, e.g., acute severe fetal bradycardia, uterine rupture, cord prolapse.
- **Category 2: Urgent.** *Maternal or fetal compromise which is not immediately life threatening (decision to delivery 90 minutes)*, e.g., sub optimal Cardiotocography, CTG or severe pre-eclampsia.
- **Category 3: Scheduled.** *No maternal or fetal compromise but needs early delivery (decision to delivery 24 hours)*, e.g., failed induction of labor, failure to progress.
- **Category 4: Elective.** *Delivery timed to suit woman and maternity staff* (planned elective LSCS).

1.1.3 Record blood pressure at admission and assess clinical characteristics and wellbeing of the mother. (Strong, High evidence).

Recommendation	**1.1.3 Record blood pressure at admission and assess clinical characteristics and wellbeing of the mother.**
Strength Benefit Direction	Strong. Beneficial.
Evidence	High evidence (RCTs and obstetric anesthesia guidelines*).
Remarks	Blood pressure measurements are routinely used as a screening tool for preeclampsia/eclampsia. Recording blood pressure at admission will act as a reference point for blood pressure management during CS. Early detection of conditions like preeclampsia**,** hypotension**,** or cardiac disease allows for optimized anesthesia planning and improves maternal-fetal outcomes.

* RCTs and obstetric anesthesia guidelines recommend recording blood pressure at admission which will act as a reference point for blood pressure (BP) management during CS. Measurements of BP are routinely used as a screening tool for preeclampsia/eclampsia **[5].** Certain patient or clinical characteristics (e.g., hypertensive disorders of pregnancy such as preeclampsia and hemolysis, elevated liver enzymes, and low platelet count syndrome, obesity, and diabetes mellitus) may be associated with obstetric complications **[1].** Assessment of clinical characteristics of the mother identifies risk factors for anesthesia-related complications (e.g., difficult airway, preeclampsia, hemorrhage). A retrospective study reported that the Modified Obstetric Early Warning Score (MOEWS) has an excellent ability to identify critically ill women early and is more effective than APACHE II (Acute Physiology and Chronic Health Evaluation II) and is a valuable tool for discriminating severe maternal morbidity **[6].**

1.1.4 Assess the Airway preoperatively. (Strong, High evidence)

Recommendation	**1.1.4 Assess the Airway preoperatively.**
Strength Benefit Direction	Strong. Clearly Beneficial.
Level of Evidence	High (ASA Difficult Airway Guidelines, Cochrane Database *)
Remarks	Identify high-risk airway. Prepare difficult airway equipment *Also, See difficult/failed tracheal Intubation.*

* Modern algorithms emphasize the importance of preoperative assessment of the airway **[7,8].** The guidelines for obstetric anesthesia of the American Society of Anesthesiologists especially emphasize the importance of preoperative examination of the airway in order to anticipate a difficult airway and take

appropriate preoperative measures **[9,10].** It is well recognized that there is a higher incidence of difficulty intubating in the obstetric population.

1.1.5 When a neuraxial anesthetic is planned, examine the patient's back. (Strong, Moderate evidence)

Recommendation	**1.1.5 When a neuraxial anesthetic is planned, examine the patient's back.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate (based on observational studies, expert opinion, and clinical consensus*)
Remarks	Identify anatomical landmarks, assess for potential difficulties (scoliosis, previous surgery), detect skin infection and contraindications.

*Evidence strongly supports a detailed pre-anesthetic back examination to identify potential difficulties, complications, or contraindications for neuraxial anesthesia, focusing on skin infections, spinal abnormalities (scoliosis, prior surgery), and assessing anatomical landmarks for correct needle placement **[11].**

1.1.6 Discuss the Anaesthetic Management including complications of regional Anaesthesia and Risks of General Anaesthesia. (Strong, Moderate evidence).

Recommendation	**1.1.6 Discuss the Anaesthetic Management including complications of regional Anaesthesia and Risks of General Anaesthesia.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate (based on ASA Guidelines, NICE Guidelines, Cochrane Reviews, Peer-reviewed anaesthesia literature*)
Remarks	Preanesthetic informed consent ensures the patient understands the proposed anesthetic plan, is aware of alternatives, benefits, and risks and participates in shared decision-making.

*According to the ASA guidelines, the consultants and ASA members both strongly agree that a communication system should be in place to encourage early and ongoing contact between obstetric providers, anesthesiologists, and other members of the multidisciplinary team **[1].** Recognition of significant anesthetic or obstetric risk factors should encourage consultation between the obstetrician and the anesthesiologist.

1.2 Ensure a Group and Save blood sample has gone and ensure an electronic issue of blood is available on the morning of the CS. If there is no electronic issue available blood must be cross matched. (GPS, Low evidence)

Recommendation	**1.2 Ensure a Group and Save blood sample has gone and ensure an electronic issue of blood is available on the morning of the CS. If there is no electronic issue available blood must be cross matched.**
Strength Benefit Direction	GPS Beneficial.
Evidence	Expert consensus*; insufficient comparative studies).

Remarks	A routine blood crossmatch is not necessary for healthy and uncomplicated parturients for vaginal or operative delivery.

*The ASA members agree, and the consultants strongly agree, that a routine blood crossmatch is not necessary for healthy and uncomplicated parturients for vaginal or operative delivery. Also, they agree that the decision whether to order or require a blood type and screen or crossmatch should be based on maternal history, anticipated hemorrhagic complications (*e.g.*, placenta accreta in a patient with placenta previa and previous uterine surgery), and local institutional policies **[1].**

1.3 Order individualized platelet count based on a patient's history (*e.g.*, preeclampsia with severe features), physical examination, and clinical signs. (Strong, Moderate evidence)

Recommendation	**1.3 Order individualized platelet count based on a patient's history (*e.g.*, preeclampsia with severe features), physical examination, and clinical signs.**
Strength Benefit Direction	Strong. Beneficial.
Evidence	Moderate (ASA Task Force*, Observational studies**; no predictive threshold).
Remarks	A routine platelet count is not necessary in the healthy parturient. Consider in preeclampsia or suspected coagulopathy.

*The consultants and ASA members strongly agree that the anesthesiologist's decision to order or require a platelet count should be individualized and based on a patient's history (e.g., preeclampsia with severe features), physical examination, and clinical signs **[1].**
** Some observational studies suggest that a platelet count may be useful for diagnosing hypertensive disorders of pregnancy, such as preeclampsia, hemolysis, elevated liver enzymes, and low platelet count syndrome. **[1,12,13].**

1.4 Fetal heart rate patterns should be monitored by a qualified individual before and after administration of neuraxial analgesia for CS. (Strong, Moderate evidence)

Recommendation	**1.4 Fetal heart rate patterns should be monitored by a qualified individual before and after administration of neuraxial analgesia for CS.**
Strength Benefit Direction	Strong. Beneficial.
Evidence	Moderate (ASA Task Force*, Observational studies**).
Remarks	Continuous electronic recording of fetal heart rate patterns may not be necessary in every clinical setting and may not be possible during placement of a neuraxial catheter.

*The consultants and ASA members agree that fetal heart rate patterns should be monitored by a qualified individual before and after administration of neuraxial analgesia for labor **[1].** Modern algorithms emphasize, and intrauterine assessment of the condition of the fetus in cooperation with the obstetrician team.
Observational studies indicate that fetal heart rate patterns may change after the administration of neuraxial anesthetics **[14].

1.5 Aspiration Prevention (Prophylaxis)

1.5.1 Permit clear liquids up to 2 hours before elective CS. (Strong, High evidence)

Recommendation	**1.5.1 Permit clear liquids up to 2 hours before elective CS.**

Strength Benefit Direction	Strong. Beneficial
Evidence	High: Based on ASA (US) **,** NICE (UK) **,** Cochrane Review and Society for Obstetric Anesthesia and Perinatology (SOAP)***,** multiple randomized controlled trials (RCTs) and systematic reviews.
Remarks	Examples of clear liquids include water, pulp-free juice, carbonated beverages, clear tea, black coffee, and sports drinks (without dairy or alcohol).

* Modern algorithms emphasize the checking of fasting status and antacid prophylaxis **[1].** According to ASA Guidelines **[15]** clear liquids up to 2 hours preoperatively are safe for uncomplicated patients undergoing elective procedures, including CS, with no increased aspiration risk. NICE Guidelines **[16]** advice similar recommendations for preoperative fasting. Cochrane Review **[17].** showed no evidence of increased adverse outcomes with clear liquids 2 hours prior to surgery. The volume of liquid ingested is less important than the presence of particulate matter in the liquid ingested **[1].**

1.5.2 Solid foods should be avoided. If time permits, a fasting period for solids of 6 - 8 h before elective CS should be planned. (Strong, High evidence)

Recommendation	**1.5.2 Solid foods should be avoided. If time permits, a fasting period for solids of 6 - 8 h before elective CS should be planned.**
Strength Benefit Direction	Strong. Beneficial.
Evidence	High **(S**upported by major anesthesia guidelines from ASA* and Royal College of Anaesthetists (UK), well-conducted observational studies, Clinical guidelines, Some randomized controlled trials; though fewer due to ethical considerations).
Remarks	Avoid solids during labor; restrict further in high-risk patients.

*The consultants, ASA and Royal College of Anaesthetists (UK) members strongly agree that the patient undergoing elective surgery (e.g., scheduled Caesarean delivery or postpartum tubal ligation) should undergo a fasting period for solids of 6 to 8 hours, depending on the type of food ingested (e.g., fat content). They also agree that laboring patients with additional risk factors for aspiration (e.g., morbid obesity, diabetes mellitus, and difficult airway) or patients at increased risk for operative delivery (e.g., non-reassuring fetal heart rate pattern) may have further restrictions of oral intake, determined on a case-by-case basis. Furthermore, they agree that solid foods should be avoided in laboring patients **[1].**

1.5.3 All women for CS are to be given antacid for aspiration prophylaxis (nonparticulate Antacids, H_2-receptor Antagonists, and/or Metoclopramide). (Strong, Moderate evidence)

Recommendation	**1.5.3 All women for CS are to be given antacid for aspiration prophylaxis (nonparticulate Antacids, H_2-receptor Antagonists, and/or Metoclopramide).**
Strength Benefit Direction	Strong Beneficial.
Evidence	Moderate (RCoA, ASA, NICE, OAA). RCTs, Observational studies and Meta-analyses *)
Remarks	Most indicated in patients at increased risk of aspiration (e.g., CS under GA, emergency Caesarean Section)

*This recommendation is widely supported by international anesthesia and obstetric societies**,** including Royal College of Anaesthetists (RCoA), American Society of Anesthesiologists (ASA) **[1],** National Institute for Health and Care Excellence (NICE), guidelines (UK) and Obstetric Anaesthetists' Association (OAA). This recommendation is based on clinical evidence supporting its benefit in lowering gastric acid volume and acidity, thereby minimizing the risk of acid aspiration pneumonitis during anesthesia.
*There are no large RCTs showing direct reductions in mortality from aspiration, but pharmacological effects (increased gastric pH, reduced volume) are well-documented. Data from observational studies and meta-analyses support the use of these medications in high-risk situations (like general anaesthesia in obstetrics) **[18].**

2. Anesthetic care and Requirements for Caesarean Delivery

2.1 Equipment, Facilities, and Support Personnel

2.1.1 Check all the Anaesthetic equipment (2 machines and 2 intubation equipment) in main theatre and back up theatre. (Conditional, Moderate evidence)

Recommendation	**2.1.1 Check all the Anaesthetic equipment (2 machines and 2 intubation equipment) in main theatre and back up theatre.**
Strength Benefit Direction	Conditional Beneficial.
Level of Evidence	Moderate (ASA guidelines, WFSA guidelines, RCoA guidelines, systematic reviews and prospective observational studies*)
Remarks	These recommendations fulfill professional standards and minimize medicolegal risk.

2.1.2 Check Resources for the treatment of potential complications. (Strong, High evidence)

Recommendation	**2.1.2 Check Resources for the treatment of potential complications**
Strength Benefit Direction	Strong Beneficial
Level of Evidence	High (ASA guidelines, WFSA guidelines, RCoA guidelines, systematic reviews and prospective observational studies*)
Remarks	These recommendations fulfill professional standards and minimize medicolegal risk.

*ASA Standards, WFSA standards and Royal College of Anaesthetists (UK) guidelines all recommend that regular checks of anaesthetic machines and airway/intubation equipment are critical to avoid preventable complications, ensure readiness for emergencies, and support safe delivery of anesthesia during Caesarean section **[19,20,21,22].** This is particularly important in obstetric settings due to the higher risk of difficult airway and rapid physiological changes.
Check Resources for the treatment of potential complications (*e.g.*, failed intubation, inadequate analgesia/ anesthesia, hypotension, respiratory depression, local anesthetic systemic toxicity, pruritus, and vomiting). The guidelines for obstetric anesthesia of the American Society of Anesthesiologists especially emphasize the importance of equipment for difficult intubation in the operating room for cesarean section **[9,10].** Equipment, facilities, and support personnel available in the labor and delivery operating suite should be comparable to those available in the main operating suite.

2.1.3 Ensure that you know who your senior cover is and how to contact them. Call for help sooner rather than later and always notify the consultant of a serious labor ward emergency. (GPS)

Recommendation	2.1.3 **Ensure that you know who your senior cover is and how to contact them. Call for help sooner rather than later and always notify the consultant of a serious labor ward emergency.**
Strength Benefit Direction	GPS Beneficial.
Level of Evidence	Low (RCOG**,** Expert Opinion / Clinical Experience*)
Remarks	Delays in calling senior staff are a well-documented factor in adverse outcomes and litigation in obstetrics.

*While this guidance is not based on randomized controlled trials, it reflects best practice and is supported by incident reporting systems and reviews of maternity-related adverse outcomes. RCOG recommends clear escalation pathways and timely consultant involvement **[23].**

2.1.4 At the start of each 24-hour emergency shift, ensure the availability of the Anaesthetic drugs, labelled and placed in the Anesthetic fridge. (Strong, Moderate evidence).

Recommendation	2.1.4 **At the start of each 24-hour emergency shift, ensure the availability of the Anaesthetic drugs, labelled and placed in the Anesthetic fridge.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate **(**Clinical practice guidelines, Expert consensus, Case reports and root cause analyses of critical incidents, limited RCTs*)
Remarks	Pre-checking and pre-labelling are encouraged as methods to reduce incidents.

* This practice is highly beneficial, with multiple patient safety advantages based on consensus guidelines and best practice recommendations from leading anesthetic and patient safety organizations. This is strongly endorsed by anesthetic safety frameworks, e.g. Association of Anaesthetists (AoA) **[24]**, Royal College of Anaesthetists (RCoA), Difficult Airway Society (DAS) **[25]** , and World Health Organization (WHO) Surgical Safety Checklist **[26].** The Association of Anaesthetists (AoA) recommends pre-preparation of emergency drugs and secure storage to reduce delays and errors. RCoA and Difficult Airway Society (DAS) emphasize immediate availability of rescue drugs during airway emergencies.

2.2 Type of Anesthesia: General, Epidural, Spinal, or Combined Spinal–Epidural Anesthesia:

2.2.1 Uterine displacement (usually left displacement) should be maintained until delivery regardless of the anesthetic technique used. (Strong, Moderate evidence)

Recommendation	2.2.1 **Uterine displacement (usually left displacement) should be maintained until delivery regardless of the anesthetic technique used.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate **(**ASA Guidelines, NICE (UK) guidelines and multiple observational studies*)
Remarks	It is advised to maintain left uterine displacement (LUD) during regional or general anesthesia for Caesarean delivery to prevent aortocaval compression and fetal compromise.

*American Society of Anesthesiologists (ASA) Guidelines **[1].** and NICE (UK) guidelines **[3].** recommend uterine displacement for all parturients in the supine position during anesthesia until delivery regardless of the anesthetic technique used. Chestnut's Obstetric Anesthesia (6th Ed.) **[27]** emphasizes physiological basis and clinical necessity of uterine displacement in obstetric care. This recommendation is based on multiple observational studies, physiological rationale, and expert consensus. While randomized controlled trials are limited due to ethical constraints, the physiological evidence is robust.

2.2.2 The decision to use a particular anesthetic technique for Caesarean delivery should be individualized. (Conditional, Moderate evidence)

Recommendation	**2.2.2 The decision to use a particular anesthetic technique for Caesarean delivery should be individualized.**
Strength Benefit Direction	Conditional Beneficial.
Level of Evidence	Moderate (well-conducted cohort studies, randomized controlled trials, and consistent expert consensus*)
Remarks	Individualizing anesthesia improves maternal and fetal safety and mother's satisfaction.

* Multiple studies show that no single anesthetic technique is superior in all clinical situations, reinforcing the need for individualization. This recommendation is widely supported by professional societies such as ASA (US) **[1]** and NICE (UK) **[3]** and clinical guidelines **[28]** due to the variety of patient factors that must be considered (e.g., urgency of the procedure, maternal comorbidities, fetal status, and patient preferences).

2.2.3 Consider selecting neuraxial techniques in preference to general anesthesia for most Caesarean deliveries. (Strong, High evidence)

Recommendation	**2.2.3 Consider selecting neuraxial techniques in preference to general anesthesia for most Caesarean deliveries.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High (ASA, NICE, Cochrane review, ACOG, well-designed cohort studies, systematic reviews, meta-analyses, and high-quality RCTs*).
Remarks	General anesthesia may still be needed in emergencies or contraindications to neuraxial block.

*American Society of Anesthesiologists (ASA) Practice Guidelines for Obstetric Anesthesia **[29]** and NICE (UK) guidelines **[3],** Cochrane Review **[30] and** the **American College of Obstetricians and Gynecologists (ACOG) [31] recommend** Neuraxial anesthesia (e.g., spinal, epidural, or combined spinal epidural) as the preferred technique for most Caesarean deliveries due to its safety profile and maternal outcomes. Strong recommendation is based on both clinical outcomes and expert consensus.

2.2.4 General anesthesia may be the most appropriate choice in some circumstances when a rapid intervention is necessary. (Conditional, Moderate evidence)

Recommendation	**2.2.4 General anesthesia may be the most appropriate choice in some circumstances, particularly when rapid intervention is necessary.**
Strength Benefit Direction	Conditional Beneficial

Level of Evidence	Moderate (Major textbooks in obstetric anesthesia, literature on individual complications, clinical experience and consensus*)
Remarks	Rapid intervention is necessary *e.g.*, in profound fetal bradycardia, ruptured uterus, severe hemorrhage, severe placental abruption, umbilical cord prolapse, and preterm footling breech.

*Consultants agree that GA is sometimes indicated in obstetric emergencies where rapid intervention is needed. The decision depends on the clinical scenario, maternal and fetal conditions, and the urgency of the procedure. The key factor in determining the choice of anesthesia depends on urgency, the condition of the mother and fetus, and the accessibility of different anesthetic techniques **[27,32].**

2.3 Intravenous (IV) Fluid Preloading or Coloading with spinal anesthesia

2.3.1 Use IV fluid preloading or coloading to reduce the frequency of maternal hypotension after spinal anesthesia for Caesarean delivery. (Conditional, Low evidence)

2.3.2 Do not delay the initiation of spinal anesthesia in order to administer a fixed volume of IV fluid. (Conditional, Low evidence)

Recommendation	**2.3.1 Use IV fluid preloading or coloading to reduce the frequency of maternal hypotension after spinal anesthesia for Caesarean delivery.** **2.3.2 Do not delay the initiation of spinal anesthesia in order to administer a fixed volume of IV fluid.**
Strength Beneficial Direction	Conditional. Coloading is generally beneficial. Preloading alone may have limited benefit.
Evidence	Low (Systematic review and meta-analysis equivocal*, RCTs and meta-analyses; inconsistent findings).
Remarks	Do not delay spinal anesthesia to administer a fixed volume.

* Systematic reviews are inconsistent regarding the frequency of maternal hypotension when IV fluid preloading or coloading for spinal anesthesia is compared with no fluids **[33].** Meta-analyses of RCTs are equivocal for maternal hypotension when IV fluid preloading is compared with coloading **[34].** Delayed initiation of spinal anesthesia for administering a fixed volume of IV fluids (e.g., preloading) can be inefficient and may not significantly improve outcomes.

2.4 Vasopressors Use (Ephedrine or Phenylephrine) with neuraxial anesthesia

Use either IV ephedrine or phenylephrine for treating hypotension during neuraxial anesthesia. In the absence of maternal bradycardia, consider selecting phenylephrine because of improved fetal acid–base status in uncomplicated pregnancies. (Strong, High evidence)

Recommendation	**2.4.1 Use either IV ephedrine or phenylephrine for treating hypotension during neuraxial anesthesia. In the absence of maternal bradycardia, consider selecting phenylephrine because of improved fetal acid–base status in uncomplicated pregnancies.**
Strength Benefit Direction	Strong Beneficial.
Evidence	High (ASA guidelines*, International Consensus Statement, Meta-analysis of RCTs**).

Remarks	Phenylephrine is generally preferred for treating hypotension during neuraxial anesthesia particularly in uncomplicated pregnancies and in the absence of maternal bradycardia,

*The consultants and ASA members strongly agree that IV ephedrine and phenylephrine both may be used for treating hypotension during neuraxial anesthesia **[1].** The strength of recommendation comes from clinical studies showing that phenylephrine use is associated with a more favorable maternal and fetal outcome when compared to ephedrine in most uncomplicated pregnancies. Specifically, phenylephrine is generally associated with improved fetal pH and reduced acidosis in both mothers and fetuses during neuraxial anesthesia for labor and Caesarean section. International Consensus Statement on Management of Hypotension at Caesarean Section (Anaesthesia 2018) **[35]** - consensus document that explicitly recommends α-agonist vasopressors (phenylephrine commonly favored) and discusses benefits/risks, monitoring and implementation.
Meta-analysis of double-blind RCTs reports lower frequencies of patients with hypotension when infusions of phenylephrine are compared with ephedrine; higher umbilical artery pH values are reported for phenylephrine when compared with ephedrine **[36,37].

2.5 Consider selecting neuraxial opioids rather than intermittent injections of parenteral opioids for postoperative analgesia After neuraxial anesthesia for Caesarean delivery. (Conditional, Moderate evidence)

Recommendation	**2.5 Consider selecting neuraxial opioids rather than intermittent injections of parenteral opioids for postoperative analgesia After neuraxial anesthesia for Caesarean delivery.**
Strength. Beneficial Direction	Conditional. Beneficial.
Evidence	Moderate (high-quality RCTs and systematic reviews/meta-analyses*).
Remarks	RCTs show better pain control with neuraxial opioids and fewer systemic side effects.

*High-quality randomized controlled trials (RCTs) and systematic reviews/meta-analyses generally support the use of neuraxial opioids (such as morphine or fentanyl) over parenteral opioids (such as IV morphine or hydromorphone) for postoperative analgesia after neuraxial anesthesia. The benefit of using neuraxial opioids for postoperative analgesia after Caesarean delivery is well-supported by high-level evidence and clinical practice guidelines. They provide longer-lasting pain relief**,** lower opioid consumption**,** and are associated with fewer systemic side effects compared to intermittent parenteral opioid injections **[38, 39].**

3. Neuraxial Block for Caesarean Section (Neuraxial Analgesia or Anesthesia in CS)

3.1 Management of thrombocytopenia for neuraxial block in patients with Caesarean Section

3.1.1 A neuraxial block could be performed in an obstetric patient with isolated thrombocytopenia with a platelet count down to 70,000/uL (70 × 10⁹/L) , with no other associated signs of a qualitative defect or an active coagulopathy. (Conditional, Low evidence)

3.1.2 Avoid a neuraxial technique if platelet count is less than 50,000/µL (50 × 10⁹/L). (Conditional, Low evidence)

Recommendation	**3.1.1 A neuraxial block could be performed in an obstetric patient with isolated thrombocytopenia with a platelet count down to 70,000/uL (70 ×**

	10^9/L) , with no other associated signs of a qualitative defect or an active coagulopathy. **3.1.2 Avoid a neuraxial technique if platelet count is less than 50,000/µL (50×10^9/L).**
Strength Benefit Direction	Conditional. Beneficial.
Level of Evidence	Low (Based on expert consensus*, and society guidelines (e.g., ASA Obstetric Anesthesia Consensus Statements - SOAP, and NYSORA**)
Remarks	A rapidly declining platelet count or abnormal coagulation profile would be more concerning than a low but stable platelet count.

*There isn't a large body of randomized controlled trials (RCTs) specifically on the threshold of 70,000/uL for neuraxial anesthesia. Most of the recommendations are based on retrospective studies and expert consensus **[40]**.

The ASA "Statement on Neuraxial Analgesia or Anesthesia in Obstetrics" (approved October 13, 2021) does *not* specify a minimum platelet count for neuraxial procedures in obstetric patients **[41]. The Society for Society of Obstetric Anesthesia and Perinatology (SOAP) Interdisciplinary Consensus Statement on Neuraxial Procedures in Obstetric Patients With Thrombocytopenia states: "Through a systematic review … the best available evidence indicates the risk of spinal epidural hematoma associated with a platelet count ≥ 70,000 × 10^6/L is likely to be very low in obstetric patients with thrombocytopenia **[40].** The SOAP 2021 task force statement further states that there is no defined "safe" lower limit, and for platelet counts between 50-70 × 10^9/L decisions must be individualized and suggests proceeding with neuraxial anesthesia in parturients with platelet count above 70,000/mm if there is no active bleeding. NYSORA (New York School of Regional Anesthesia) recommend a platelet count ≥70,000/uL as acceptable in the absence of other coagulation abnormalities **[42].**

In a pregnant patient with suspected qualitative defects or active coagulopathy, it may be reasonable to avoid a neuraxial technique or to seek expert hematologic consultation before proceeding with the neuraxial technique. There is insufficient evidence to recommend platelet transfusion prior to neuraxial procedures.

3.2 Ensure optimal positioning of the mother, either the ideal lateral or ideal sitting position. (Conditional, Low evidence)

Recommendation	**3.2 Ensure optimal positioning of the mother, either the ideal lateral or ideal sitting position.**
Strength Benefit Direction	Conditional. Beneficial.
Level of Evidence	Low (Systematic review, clinical studies *),
Remarks	The choice of position depends on the clinical situation, patient comfort, and the desired outcomes.

*Systematic reviews and clinical studies recommend both the lateral and sitting positions for optimal placement of neuraxial blocks. The choice of position depends on the clinical situation, patient comfort, and the desired outcomes. In clinical practice, the lateral position is usually the most commonly recommended in obstetric anesthesia, but sitting has also been well-studied and is effective in certain cases **[43].**

3.3 Consider the use of pencil-point spinal needles instead of cutting-bevel spinal needles to reduce the incidence of postdural puncture headache. (Conditional, Moderate evidence)

Recommendation	3.3 Consider the use of pencil-point spinal needles instead of cutting-bevel spinal needles to reduce the incidence of postdural puncture headache.
Strength Benefit Direction	Conditional Beneficial.
Evidence	Moderate (Meta-analysis of RCT, systematic reviews and clinical studies*).
Remarks	Postdural puncture headache (PDPH) can still occur even with pencil-point needles, due to other factors.

*Meta-analysis of RCTs and systematic review and clinical studies **[44,45].** indicates that the use of pencil-point spinal needles reduces the frequency of postdural puncture headache (PDPH) when compared with cutting-bevel spinal needles. PDPH can still occur even with pencil-point needles, albeit less frequently, and depends on other factors such as needle size, technique, patient characteristics, and skill of the practitioner.

3.4 We recommend using the lowest palpable lumbar interspace for lumbar neuraxial procedure. (Strong, Moderate evidence)

Recommendation	3.4 We recommend using the lowest palpable lumbar interspace for lumbar neuraxial procedure.
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate evidence (ASA guidelines for Obstetric Anesthesia*, Expert consensus**, systematic reviews, imaging studies (MRI/X-ray correlations), cadaveric studies, and observational studies***)
Remarks	The main justification is to reduce the risk of spinal cord injury with minimal downside, so provides better access to the epidural and spinal spaces without risking damage to the conus medullaris.

***ASA** Practice Guidelines for Obstetric Anesthesia **[41]** emphasize the careful interspace selection particularly in parturients with avoidance of high lumbar puncture, recommending selecting the lowest palpable interspace to avoid complications. The spinal cord usually ends at L1/L2 but may extend to L2 or L3 and there can be tethering to the dura. ** Expert consensus (**Chestnut's Obstetric Anesthesia** (6th ed.) advises selecting L3–4 or lower, erring caudally due to landmark inaccuracy **[27].**
***Evidence comes mainly from systematic reviews, imaging studies (MRI/X-ray correlations), cadaveric studies, and observational studies for most of the recommendations to use the lowest palpable lumbar interspace for lumbar neuraxial procedure **[46].** Although there is solid clinical experience to support this, high-level randomized controlled trials (RCTs) specifically comparing lumbar interspaces in terms of procedural outcomes are limited.

3.5 Ensure that the neuraxial block is adequate to proceed with surgery. A dense motor block, absent cold sensation up to T4, and no sharp sensation by applying a gentle pinch in the surgical area are appropriate. (Strong, High evidence)

Recommendation	3.5 Ensure that the neuraxial block is adequate to proceed with surgery. A dense motor block, absent cold sensation up to T4, and no sharp sensation by applying a gentle pinch in the surgical area are appropriate.
Strength Benefit Direction	Strong. Beneficial.

Level of Evidence	High (Randomized controlled trials (RCTs) and systematic reviews*)
Remarks	The goal is to achieve a dense motor block, absent cold sensation up to T4 and an absence of sharp sensation by applying a gentle pinch in the surgical area

*Randomized controlled trials (RCTs) and systematic reviews of RCTs **[47, 48].** support the assessment of sensory and motor block to ensure the adequacy of neuraxial anesthesia. Achieving a dense motor block with absent cold sensation up to T4 and no sharp sensation in the abdomen is not only appropriate but necessary for ensuring the adequacy of a neuraxial block for surgery.

4. Epidural top up for Caesarean Section Delivery

4.1 For urgent Caesarean delivery, an indwelling epidural catheter may be used as an alternative to initiation of spinal or general anesthesia. (Conditional, Low evidence)

4.2 Assess if epidural is well-functioning to be topped up. If yes, proceed to top up. If no, remove and perform spinal anesthesia or general anesthesia. (Conditional, Low evidence)

Recommendation	**4.1 For urgent Caesarean delivery, an indwelling epidural catheter may be used as an alternative to initiation of spinal or general anesthesia.** **4.2 Assess if epidural is well-functioning to be topped up. If yes, proceed to top up. If no, remove and perform spinal anesthesia or general anesthesia.**
Strength Benefit Direction	Conditional. Beneficial.
Level of Evidence	Low (ASA C*ommittee*, well-designed cohort, case-control studies or expert opinion *)
Remarks	Top-up can be beneficial if the epidural catheter is functioning and the block is not insufficient, allowing for a smoother transition to anesthesia.

* The ASA Committee on Standards and Practice Parameters; Task Force on Obstetric Anesthesia **[1]** states that a well-functioning labor epidural catheter may be used for surgical anesthesia in urgent Caesarean delivery and emphasizes early assessment and prompt conversion if inadequate. Evidence from well-designed cohort or case-control studies showed that the use of epidural anesthesia for Caesarean delivery has been well-documented in literature **[49]**. It is generally safe when properly managed, but the top-up procedure may take longer to work than spinal anesthesia **[49]**. In cases of urgent C-section, evidence from expert opinion favors spinal anesthesia or general anesthesia over epidural top-up due to faster onset and more reliable block **[50]**.

5. Thromboprophylaxis

5.1 Thromboprophylaxis should be prescribed at least 4 hours after spinal anesthesia or after epidural catheter removal if the risk scoring for prophylaxis is triggered. (Conditional, Moderate evidence)

Recommendation	**5.1 Thromboprophylaxis should be prescribed at least 4 hours after spinal anesthesia or after epidural catheter removal if the risk scoring for prophylaxis is triggered.**
Strength Benefit Direction	Conditional Beneficial.
Level of Evidence	Moderate (ASRA guidelines, European Society of Anaesthesiology (ESA) guidelines, RCOG Green-top Guideline No. 37a*)

Remarks	Four hours is generally recommended based on available guidelines and expert consensus, but this should be adjusted based on the patient's risk of thromboembolic events.

*__ASRA guidelines__ recommend at least 4 hours should elapse after the removal of the epidural catheter before initiating pharmacological thromboprophylaxis (e.g., low-molecular weight heparin) **[51].** They emphasize balancing the risk of bleeding with thromboembolic events and stress individualized patient assessment. **European Society of Anaesthesiology (ESA)** guidelines on perioperative venous thromboembolism prophylaxis also support a ≥4-hour window after neuraxial catheter removal before LMWH administration to initiate thromboprophylaxis **[52].** They also highlight the importance of patient risk stratification and careful monitoring. **RCOG Green-top Guideline No. 37a** recommend that LMWH should not be given for at least 4 hours after spinal anesthesia or after epidural catheter removal **[53].** These Concordant recommendations regarding ≥4-hour delay after neuraxial catheter removal before LMWH administration for perioperative thromboprophylaxis and neuraxial anesthesia have shown the benefits of waiting post-procedure to administer anticoagulants to mitigate bleeding risk. This guideline is primarily drawn from guidelines that prioritize preventing hematomas while balancing the risk of thromboembolic events. However, the literature on the optimal time frame is still debated, with most recommendations based on expert consensus. Some evidence supports this timing based on theoretical considerations of bleeding risk after neuraxial procedures, but the literature is not universally conclusive on the exact timing. Justification comes from consistent recommendations across multiple authoritative bodies and the longstanding clinical practice with extensive post-marketing safety data for LMWH. No randomized controlled trials specifically randomize timing of LMWH vs neuraxial catheter removal due to ethical constraints.

5.2 The dose for thromboprophylaxis after neuraxial block will be prescribed depending on the mothers booking weight unless there has been significant weight gain (>12 kgs) (Conditional, Moderate)

Recommendation	**5.2 The dose for thromboprophylaxis after neuraxial block will be prescribed depending on the mothers booking weight unless there has been significant weight gain (>12 kgs)**
Strength Benefit Direction	Conditional Beneficial.
Level of Evidence	Moderate (High-quality RCTs or systematic reviews, NICE, RCOG, ACOG*, case-control studies or expert opinions and lower-quality RCTs or cohort studies)
Remarks	If the dose is **under-prescribed** or **over-prescribed**, there could be risks, such as increased bleeding or insufficient anticoagulation, so this recommendation would need to be carefully monitored.

*The recommendation for the dose of thromboprophylaxis after a neuraxial block, based on the mother's booking weight and adjusted for significant weight gain, would be evaluated for its benefit**,** evidence strength, and references to substantiate it. This would likely be backed by the **level of** evidence from **systematic reviews or clinical studies**, with relevant guidelines such as those of the National Institute for Health and Care Excellence (NICE) **[54]**, the Royal College of Obstetricians and Gynecologists (RCOG) **[55].** and the American College of Obstetricians and Gynecologists (ACOG) **[56].**
Adjusting thromboprophylaxis dose based on weight (including for significant weight gain) may reduce the risk of thrombosis in at-risk patients. Overweight or obese women may be at higher risk of developing venous thromboembolism (VTE) after childbirth or Caesarean section. By accounting for weight gain, it ensures that the mother receives an appropriate therapeutic dose, potentially preventing complications.

6. Management of Postdural Puncture Headache (PDPH)

6.1 Use conservative treatments for patients with mild PDPH without associated cranial symptoms. (Conditional, Low evidence)

Recommendation	**6.1 Use conservative treatments for patients with mild PDPH without associated cranial symptoms.**
Strength Benefit Direction	Conditional. Beneficial.
Level of Evidence	Low (ASA task force on Obstetric Anesthesia, Guidelines to the Practice of Anesthesia, National Library of Medicine, Obstetric Anesthetists' Association, ASA Statement on PDPH*)
Remarks	Conservative treatments include a combination of bed rest and hydration, oral simple analgesics, a single 300-mg dose of oral caffeine, and reassurance.

***ASA Task Force** on Obstetric Anesthesia **[1]**, **Guidelines to the Practice of Anesthesia**, Revised 2025 **[57]**, **National Library of Medicine** last update on 2025 **[58]** and **Obstetric Anesthetists Association [59]** all recommend that Mild postdural puncture headache may be managed conservatively with hydration, oral analgesics, caffeine, and observation. Evidence is mostly based on clinical experience and moderate-quality studies. **ASA Statement on PDPH** Management states "Initial conservative therapy is appropriate for mild PDPH" **[60].** For mild PDPH without associated cranial symptoms**,** conservative treatments are generally beneficial and form the first line of management. While evidence is mostly based on clinical experience and moderate-quality studies, the overall consensus supports conservative care as an appropriate approach.

6.2 Epidural blood patch should be offered for patients with moderate and severe PDPH with associated cranial symptoms who are unresponsive to conservative management. (Strong, Moderate evidence)

Recommendation	**6.2 Epidural blood patch should be offered for patients with moderate and severe PDPH with associated cranial symptoms who are unresponsive to conservative management.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate (well-designed cohort or case-control studies or extrapolated evidence from randomized controlled trials*).
Remarks	Currently epidural blood patch is the most effective treatment for PDPH especially when conservative methods fail (complete or partial relief is between 50% - 80%)

* Epidural blood patch should be offered for patients with moderate and severe PDPH with associated cranial symptoms who are unresponsive to conservative management as per the Statement on Post-Dural Puncture Headache Management Approved by the ASA House of Delegates on 2021 **[60].** Based on consistent findings from well-designed cohort or case-control studies or extrapolated evidence from randomized controlled trials **[61].** it was shown that epidural blood patch (EBP) is currently the most effective treatment for postdural puncture headache (PDPH) with associated cranial symptoms who are unresponsive to conservative management (hydration, caffeine, analgesics, rest) or with symptoms that are interfering with activities of daily living. It provides rapid and often complete relief of symptoms in most cases **[57].**

7. The Use of Adjuvant Medications and Management of Intraoperative Pain During Caesarean Delivery Under Neuraxial Blocks.

7.1 Recommend the use of neuraxial "Adjuvant Medications" (epidural lidocaine, epinephrine, and lipophilic opioid) as adjuncts to manage the intraoperative pain during CS under neuraxial blocks. (Strong, Moderate evidence)

Recommendation	**7.1 Recommend the use of neuraxial "Adjuvant Medications" (epidural lidocaine, epinephrine, and lipophilic opioid) as adjuncts to manage the intraoperative pain during CS under neuraxial blocks.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate (Committee on Obstetric Anesthesia, RCTs, systematic reviews, Cohort studies, and clinical trials*)
Remarks	Epinephrine causes vasoconstriction that decreases vascular absorption of lidocaine leading to longer duration.

* Statement on Pain During Cesarean Delivery developed by *Committee on Obstetric Anesthesia on **2023*** **[62],** evidence from RCTs, systemic reviews, Cohort and clinical studies **[27].** demonstrate that the use of adjuncts such as lidocaine, epinephrine, and lipophilic opioids during cesarean delivery under neuraxial anesthesia is clinically beneficial**.** These agents improve intraoperative anesthesia quality, enhance maternal comfort, and reduce the need for systemic analgesia or conversion to general anesthesia.

7.2 Recommend conversion of neuraxial block to General Anesthesia when pain is refractory to appropriate adjuvants (Strong, High evidence)

Recommendation	**7.2 Recommend conversion of neuraxial block to General Anesthesia when pain is refractory to appropriate adjuvants**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High **(**Practice Guidelines for Obstetric Anesthesia, Committee on Obstetric Anesthesia, AAGBI Guidelines, randomized trials, high-quality observational studies, and expert consensus*).
Remarks	Timely decision-making protects both the mother and the fetus and maintains the integrity of anesthetic and surgical care.

*Practice Guidelines for Obstetric Anesthesia **[1]** and Statement on Pain During Cesarean Delivery Developed by: Committee on Obstetric Anesthesia on 2023 **[62]** recommend that if intraoperative pain is not controlled despite appropriate use of supplemental medications and techniques (e.g., opioids, ketamine, nitrous oxide, or local infiltration) conversion to GA should be performed. Association of Anaesthetists of Great Britain and Ireland (AAGBI) Guidelines **[63],** state that continuing surgery with inadequate analgesia can result in psychological trauma; conversion to GA is preferred if regional anesthesia fails.

7.3 Use of IV opioids, Ketamine, Dexmedetomidine, Midazolam or Anxiolytics in cases of inadequate analgesia during Caesarean section under neuraxial anesthesia.

7.3.1 Recommend short-acting opioids (e.g., fentanyl, remifentanil) as first-line IV agents (Strong, High evidence)

Recommendation	7.3.1 **Recommend short-acting opioids (e.g., fentanyl, remifentanil) as first-line IV agents.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High (based on *Committee on Obstetric Anesthesia*, ASA Guidelines, randomized controlled trials, systematic reviews*)
Remarks	Short-acting opioids result in rapid and effective pain relief; minimal neonatal depression if used judiciously.

*According to Statement on Pain During Cesarean Delivery **[62]** and Statement on the Use of Adjuvant Medications and Management of Intraoperative Pain During Caesarean Delivery **[64]** *developed by:* Committee on Obstetric Anesthesia, ASA Guidelines on Obstetric Anesthesia **[41]** and on randomized controlled trials and systematic reviews in cases of inadequate analgesia during Caesarean section under neuraxial anesthesia (e.g., spinal, epidural, or combined spinal-epidural), IV short-acting opioids (e.g., fentanyl, remifentanil) as first-line are commonly used due to their rapid onset and short duration of action, which allow titration and reduce neonatal exposure.

7.3.2 Suggest ketamine or dexmedetomidine as a second line for analgesia and anxiolysis when opioids are insufficient (Conditional, Moderate evidence)

Recommendation	7.3.2 **Suggest ketamine or dexmedetomidine as a second line for analgesia and anxiolysis when opioids are insufficient**
Strength Benefit Direction	Conditional . Potentially Beneficial
Level of Evidence	Moderate (based on Committee on Obstetric Anesthesia, ASA Practice Guidelines, small RCTs, observational studies*)
Remarks	Effective in opioid-resistant cases; however, risk of maternal sedation and fetal exposure must be considered.

*ASA Practice Guidelines for Obstetric Anesthesia **[1],** Statement on Pain During Cesarean Delivery **[62]** and Statement on the Use of Adjuvant Medications and Management of Intraoperative Pain During Caesarean Delivery **[64]** developed by: *Committee on Obstetric Anesthesia,* RCTs and observational studies suggest that ketamine NMDA **(**N-methyl-D-aspartate) receptor antagonism is useful for pain refractory to opioids and preserves respiratory drive. Dexmedetomidine is an α2-agonist that provides sedation, analgesia, and anxiolysis without significant respiratory depression. Dexmedetomidine (10 mcg boluses, 0.5 mcg/kg loading dose over 10 minutes, and/or 0.5 – 1 mcg/kg/hr infusion) provides both analgesia and anxiolysis with minimal respiratory depression **[65].**

7.3.3 Suggest midazolam or dexmedetomidine for anxiolysis. (Conditional, Low evidence)

Recommendation	7.3.3 **Suggest midazolam or dexmedetomidine for anxiolysis.**
Strength Benefit Direction	Conditional Situational Benefit
Level of Evidence	Low (ACOG Committee Opinions, limited high-quality data in obstetric populations*)
Remarks	May help highly anxious patients but caution due to neonatal sedation risks (especially with midazolam).

*ACOG Committee Opinions and limited high-quality data **[66]** suggest that Midazolam, a benzodiazepine, is effective for anxiety but has concerns about neonatal sedation. In a randomized controlled trial, Midazolam (0.01 – 0.02 mg/kg) provides anxiolysis without impacting maternal memory formation or

neonatal outcomes (Apgar score, neurobehavioral scores, and continuous oxygen saturation) **[67].** Dexmedetomidine may be preferable due to less neonatal impact and dual analgesic-anxiolytic properties.

7.4 Recommend against the use of volatile agents like sevoflurane without airway protection during Caesarean delivery under neuraxial anesthesia. (Strong, Moderate evidence)

Recommendation	**7.4 Recommend against the use of volatile agents like sevoflurane without airway protection during Caesarean delivery under neuraxial anesthesia.**
Strength Benefit Direction	Strong. No - Not beneficial without airway protection.
Level of Evidence	Moderate (ACOG and ASA/ SOAP Practice Guidelines for Obstetric Anesthesia*)
Remarks	The risks outweigh benefits when using volatile anesthetics like sevoflurane in patients under neuraxial block without a secured airway.

***** ACOG **and ASA and SOAP Practice Guidelines for Obstetric Anesthesia** documents on Caesarean delivery anesthesia recommend against the use of volatile agents like sevoflurane without airway protection during Caesarean delivery under neuraxial anesthesia. Volatile agents depress respiratory drive and can lead to airway compromise**.** Without secure airway protection (e.g., endotracheal intubation or supraglottic airway), the use of volatile anesthetics poses a significant risk of aspiration, hypoventilation, and hypoxia. Furthermore, volatile agents cross the placenta, potentially affecting the neonate (e.g., neonatal respiratory depression) **[1,27,66].**

8. Post-operative care for Caesarean Section

8.1 WHO sign-out must be done before leaving theatre (Strong, High evidence)

Recommendation	**8.1 WHO sign-out must be done before leaving theatre**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High (WHO surgical safety checklist*)
Remarks	Reduces morbidity and improves team communication and patient safety.

*WHO surgical safety checklist – sign-out ensures that all instruments/swabs are accounted for, and post-operative concerns are addressed before patient leaves the operating theatre **[68].**

8.2 Prescribe post-operative analgesia and thromboprophylaxis (if required). (Strong, Moderate evidence)

Recommendation	**8.2 Prescribe post-operative analgesia and thromboprophylaxis (if required).**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate (NICE Guideline, RCOG Green-top Guideline*)
Remarks	Thromboprophylaxis may include LMWH and mechanical methods (e.g. compression stockings)

* According to NICE Guideline and RCOG Green-top Guideline post-operative analgesia (e.g. paracetamol, Nonsteroidal Anti-inflammatory Drug (NSAIDs), opioids) is vital for pain control. Thromboprophylaxis is recommended based on individual risk factors (e.g. obesity, immobility, history of VTE) **[69,70].**

8.3 Provide post operative analgesia during Spinal Anaesthetic by opioids (fentanyl and morphine). (Conditional, High evidence)

Recommendation	8.3 **Provide post operatively analgesia during Spinal Anaesthetic by opioids (fentanyl and morphine).**
Strength Benefit Direction	Conditional. Beneficial.
Level of Evidence	High (ASA Practice Guidelines for Obstetric Anesthesia, review articles*)
Remarks	If intra-thecal opioids have been administered the patient must stay on LDU for 2 hours. A green intra thecal sticker must be put on the prescription chart.

* As per ASA Practice Guidelines for Obstetric Anesthesia, and review articles, opioids (e.g. intrathecal morphine 100–200 mcg, fentanyl 10–25 mcg) are commonly administered during spinal anaesthesia for extended post-op pain relief **[1].** Intrathecal opioids Provides up to 24 hours of pain relief. Monitor for respiratory depression is required, particularly with intrathecal morphine.

8.4 Provide epidural top-up by administration of morphine (1.0 mg) via epidural catheter for post operative analgesia. (Conditional, Moderate evidence)

Recommendation	8.4 **Provide epidural top-up by administration of morphine (1.0 mg) via epidural catheter for post operative analgesia.**
Strength Benefit Direction	Conditional. Beneficial.
Level of Evidence	Moderate (NICE Clinical Guidelines, **OAA/AAGBI** Obstetric Anaesthetists' Association and Association of Anaesthetists of Great Britain and Ireland. *)
Remarks	Remember to remove the epidural catheter after the CS.

*According to NICE Clinical Guidelines and OAA/AAGBI (Obstetric Anaesthetists' Association and Association of Anaesthetists of Great Britain and Ireland) – *Obstetric Anaesthesia Guidelines* suggest diamorphine (2.5–5 mg) via epidural offers extended pain relief post-CS when used as part of a top-up **[69,70].** This provides effective analgesia with fewer systemic side effects. You should monitor for nausea, pruritus, and respiratory depression. However, if diamorphine is unavailable, you can use morphine injection (1 mL:10 mg) is diluted with 0.5% glucose and sodium chloride infusion solution to achieve a concentration of 1 mg/mL and subsequently administered through the epidural catheter 5 min prior to the end of the surgical procedure.

8.5 Analgesia following General anaesthesia will require a Patient-controlled Analgesia (PCA) post operatively and local anesthetic infiltration of the wound or Transversus Abdominis Plane (TAP) /iliac crest blocks depending on your experience. (Strong, High evidence)

Recommendation	8.5 **Analgesia following General anaesthesia will require a Patient-controlled Analgesia (PCA) post operatively and local anesthetic infiltration of the wound or Transversus Abdominis Plane block (TAP)/iliac crest blocks depending on your experience.**
Strength	Strong

Benefit Direction	Beneficial.
Level of Evidence	High (Cochrane Review, NICE CS guidelines (CG132), ACOG, RCoA – clinical guidelines*)
Remarks	Use TAP or iliac crest blocks depending on your experience.

*According to recommendations from NICE, ACOG clinical guidelines and Cochrane Review for patients undergoing CS under general anaesthesia, Patient-controlled Analgesia (PCA) combined with local wound infiltration or Transversus Abdominis Plane (TAP)/ iliac crest blocks provide effective, evidence-based multimodal analgesia **[3,71,72]**. The strength of recommendation is strong, particularly when spinal opioids are not used.

9. Management of Airway Emergencies in Obstetrics

9.1 Maintain a difficult airway cart and strategy. (Strong, High evidence)

Recommendation	**9.1 Maintain a difficult airway cart and strategy.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High (based on ASA guidelines*, guidelines for obstetric anesthesia**, Difficult Airway Society and the Obstetric Anaesthetists' Association, expert consensus, and observational studies).
Remarks	Implementation is required especially in facilities with surgical obstetric services.

*The consultants and ASA members strongly agree that labor and delivery units should have personnel and equipment readily available to manage airway emergencies consistent with the ASA Practice Guidelines for Management of the Difficult Airway, to include a pulse oximeter and carbon dioxide detector.
The guidelines for obstetric anesthesia of the American Society of Anesthesiologists especially emphasize the importance of equipment for difficult intubation in the operating room for Caesarean section, and the importance of preoperative examination of the airway in order to anticipate a difficult airway and take appropriate preoperative measures **[73]. Case reports suggest that the availability of equipment for the management of airway emergencies may be associated with reduced maternal, fetal, and neonatal complications.
In a multicenter study of more than 14,000 GA for CS, an overall risk of difficult intubation of 1:49 and a risk of failed intubation of 1:808 were observed **[74]** The Difficult Airway Society and the Obstetric Anaesthetists' Association guidelines for the management of failed intubation recommend the use of second-generation supraglottic airway devices as a rescue airway strategy when failed intubation occurs. This practice is now widely accepted and embedded in routine teaching and clinical practice **[75].**

9.2 Implement the basic elements of the guidelines for the management of difficult and failed tracheal intubation. Follow ASA airway guidelines. (Strong, High evidence)

Recommendation	**9.2 Implement the basic elements of the guidelines for the management of difficult and failed tracheal intubation. Follow ASA airway guidelines.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High (based on ASA guidelines, Difficult Airway guidelines, audits, and expert consensus*)

Remarks	Adopt ASA algorithm, train staff, and perform regular simulation drills

*The guidelines for obstetric anesthesia of the American Society of Anesthesiologists emphasize the importance of applying basic elements of the guidelines for the management of difficult and failed tracheal intubation and the algorithm in case of obstetric failed tracheal intubation with exit strategy options. New algorithms recommend intubation of pregnant women with a video-laryngoscope, especially in morbidly obese patients and during failed intubation **[76,77,78].**

9.3 In case of "Cannot Ventilate, Cannot Oxygenate", prepare for urgent Front-of-Neck Access (FONA) while simultaneously remove the possible reversible causes. (Strong, Moderate evidence)

Recommendation	**9.3 In case of "Cannot Ventilate, Cannot Oxygenate", prepare for urgent Front-of-Neck Access (FONA) while simultaneously remove the possible reversible causes.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate but widely accepted (Observational studies, Simulation data, Case series and reports, Expert consensus from airway societies*)
Remarks	Performing FONA promptly is potentially life-saving and critical when other airway management strategies have failed.

*In case of failed endotracheal intubation and impossibility of ventilation and oxygenation of the patient by facemask or supraglottic airway device (SAD), it is necessary to prepare the patient for urgent Front of Neck Access (FONA) while simultaneously trying to remove the possible reversible causes such as laryngospasm or insufficient muscle relaxation **[76,77,78].** In the case of a prolonged state of 'cannot ventilate, cannot oxygenate', the cardiac arrest algorithm is initiated, and in the case of a pregnancy over 20 weeks of gestation, a 'perimortem Caesarean section' should be performed.

10. Cardiopulmonary Resuscitation (CPR)

10.1 Initiate Cardio-pulmonary Resuscitation (CPR) with pregnancy-specific modifications of the Advanced Life Support (ALS) algorithm of the non-pregnant population. (Strong, High evidence)

Recommendation	**10.1 Initiate Cardio-pulmonary Resuscitation (CPR) with pregnancy-specific modifications of the Advanced Life Support (ALS) algorithm of the non-pregnant population.**
Strength Benefit Direction	Strong. Beneficial.
Evidence	High (ERC guidelines, AHA Guidelines, Consultants and ASA Guideline-based consensus; limited direct obstetric CPR studies*).
Remarks	Maintain Left Uterine Displacement (LUD); chest compression performed slightly higher, ensure immediate access to resuscitation equipment.

* ERC guidelines, AHA (American Heart Association) Guidelines and the consultants and ASA members strongly agree that: basic and advanced life-support equipment should be immediately available in the operative area of labor and delivery units and if cardiac arrest occurs during labor and delivery, initiate

standard resuscitative measures with accommodations for pregnancy such as left uterine displacement and preparing for delivery of the fetus **[79,80].**

Cardiac arrest is rare in pregnancy, estimated to occur 1 in 30,000 deliveries. Resuscitation in the pregnant patient requires modifications from ALS in the non-pregnant population. Relief of Aorto-caval compression by a maternal pelvis tilt to the left greater than 15 degrees is recommended. If the tilt exceeds 30 degrees, then chest compressions will not be effective. Chest compressions are performed slightly higher on the sternum due to the gravid uterus. Do not apply pressure over the top of the abdomen or bottom tip of the sternum. A firm surface is required to perform effective CPR. Remember that cardiac arrhythmias may be very refractory to treatment.

10.2 Deliver the fetus within 4–5 minutes if circulation is not restored. (Strong, High evidence)

Recommendation	**10.2 Deliver the fetus within 4–5 minutes if circulation is not restored.**
Strength Benefit Direction	Strong. Beneficial.
Evidence	High (based on ERC guidelines and AHA guidelines, Consultants and ASA Guideline-based consensus, observational data, expert consensus*)
Remarks	Caesarean section should commence within 4 mins of cardiac arrest and delivery accomplished by 5 mins

*Peri arrest/perimortem Caesarean section-prompt Caesarean delivery is recommended by the European resuscitation council (ERC) as a resuscitative procedure for cardiac arrest in the near-term pregnancy. It is stated that a Caesarean section should commence within 4 mins of cardiac arrest and delivery accomplished by 5 mins. **[79]**

Also, the American Heart Association (AHA) has stated that in cases of cardiac arrest, 4 to 5 minutes is the maximum time rescuers will have to determine whether the arrest can be reversed by Basic Life Support and Advanced Cardiac Life Support interventions. **[80]** Delivery of the fetus may improve cardiopulmonary resuscitation of the mother by relieving aortocaval compression. The American Heart Association further notes that "the best survival rate for infants more than 24 to 25 weeks in gestation occurs when the delivery of the infant occurs no more than 5 minutes after the mother's heart stops beating **[81].**

10.3 Start immediate, high-quality CPR in the event of cardiovascular collapse due to local anesthetic systemic toxicity (LAST) with early lipid administration. (Strong, Moderate evidence)

Recommendation	**10.3 Start immediate, high-quality CPR in the event of cardiovascular collapse due to local anaesthetic systemic toxicity (LAST) with early lipid administration.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	Moderate (ASRA guidelines, observational studies, case reports, simulation studies, and expert consensus*)
Remarks	Ensure immediate recognition of LAST symptoms, Start high-quality CPR without delay, administer 20% lipid emulsion therapy early, and **a**void vasopressin, calcium channel blockers, or beta-blockers**,** which may worsen toxicity.

* As recommended by the ASRA guidelines this is lifesaving and a standard part of resuscitation guidelines. It is based on observational studies, case reports, simulation studies, and expert consensus. Although randomized controlled trials are not feasible for this emergency condition, the cumulative evidence strongly supports the use of CPR. Use of lipid emulsion therapy (Intralipid) is a mainstay, but CPR bridges the gap until the LA (Local Anesthetic) is redistributed or neutralized **[82,83].**

11. Hemorrhagic Emergencies at Caesarean Section

11.1 Ensure early recognition, immediate availability of resources to manage hemorrhagic emergencies and activation of a multidisciplinary team. (Strong, High evidence)

Recommendation	**11.1 Ensure early recognition, immediate availability of resources to manage hemorrhagic emergencies and activation of a multidisciplinary team.**
Strength Benefit Direction	Strong. Beneficial.
Level of Evidence	High (ASA members consensus, WHO Consolidated guidelines + implementation studies*)
Remarks	Predefined team, hemorrhage cart, checklists, clear escalation and single-call activation — critical to shorten time to definitive treatment and blood products. Anesthetist usually co-leads activation.

*The consultants, ASA members and WHO Consolidated guidelines strongly agree that institutions providing obstetric care should have resources available to manage hemorrhagic emergencies Studies with observational findings and case reports suggest that the availability of resources for hemorrhagic emergencies may be associated with reduced maternal complications. The consultants and ASA members recommend early recognition and immediate activation of a multidisciplinary Obstetric Hemorrhage / Massive Hemorrhage Protocol (MHP) when ongoing major bleeding **[84,85,86]**

11.2 Ensure early activation of Massive Transfusion Protocol (MTP) and use balanced component therapy (Strong, High evidence)

Recommendation	**11.2 Ensure early activation of Massive Transfusion Protocol (MTP) and use balanced component therapy**
Strength Benefit Direction	Strong. Beneficial.
Evidence	High (ASA guidelines, Expert consensus, WHO guidelines, implementation and Observational studies*)
Remarks	Use balanced component therapy (early RBC, FFP, platelets; local ratio or goal-directed), Large-bore IVs, blood warming and rapid infusers, Tranexamic acid, Fibrinogen

*The consultants and ASA members expert consensus and WHO guidelines recommend immediate activation of a multidisciplinary Obstetric Hemorrhage / Massive Hemorrhage Protocol (MHP) when ongoing major bleeding. Recommendation to use local Massive transfusion protocol (MTP). Many units use balanced packs; trauma evidence supports ~1:1:1; obstetric protocols vary — e.g., ACOG/RCOG recommended component guidance. Anesthetist coordinates blood warming, rapid infusers, and IV access **[87].**

Implementation Considerations

1. Checking of the anesthetic machine should be done first thing in morning.
2. Checking of Airway Management equipment.
3. An Anesthetic assistant should be available.
4. Emergency drugs must be instantly available.
5. Monitoring equipment should be available (ECG, NIBP, Pulse oximeter) prior to induction.
6. Fetus heart sounds should be monitored on CTG.
7. Aorto-caval compression is avoided by placing the mother in a 15-degree left lateral tilt.
8. Antibiotic prophylaxis should be given prior to knife to skin where practicable.
9. WHO Checklist must be done.

Research Gaps

Literature review shows insufficient research data that need further studies for:

- Type of anesthesia indicated for elective or emergency CS for patients with Preeclampsia/Eclampsia.
- A specific platelet counts predictive of neuraxial anesthetic complications (has not been determined).
- Role of Antibiotic prophylaxis for prevention of postpartum sepsis/septic shock.
- Choice of adjuvant medications (neuraxial, IV, inhalational) administered for inadequate neuraxial blocks.
- The role of thromboprophylaxis.
- Management of intraoperative massive hemorrhage during CS in low-resource centers.
- Observational studies evaluating safety, feasibility, and outcomes of adjuvant use (e.g., ketamine, dexmedetomidine) in resource-constrained environments.
- Prospective studies assessing patient-reported outcomes and long-term psychological sequelae in women experiencing intraoperative pain under neuraxial anesthesia.

Clinical Indicators for Monitoring

- Percentage of women given aspiration prophylaxis (**target 100% of women**).
- Percentage of CS (Elective and Emergency) done under neuraxial anesthesia.
  Numerator: number of women operated with neuraxial anesthesia.
  Denominator: total number of women admitted for CS delivery.
- Percentage of CS (Elective and Emergency) done under general anesthesia.
  Numerator: number of women operated under general anesthesia.
  Denominator: total number of women admitted for CS delivery.
- Percentage of CS requiring GA due to inadequate neuraxial block. (Target: < 2%).
  Numerator: number of women requiring GA due to inadequate neuraxial block.
  Denominator: total number of women given neuraxial block for CS delivery.
- Percentage of CS under neuraxial anesthesia where adjuvant medications (neuraxial, IV, inhalational) were administered for inadequate neuraxial blocks. (Target: ≥ 90% in cases with reported discomfort).
  Numerator: number of women under neuraxial anesthesia given adjuvant medications

(neuraxial, IV, inhalational)
Denominator: total number of women given neuraxial block for CS delivery

- Incidence of Postdural puncture headache (PDPH).
  Numerator: number of women who complained of (PDPH) after neuraxial block for CS delivery.
  Denominator: total number of women given neuraxial block for CS delivery.

Update of the Guideline

The Guidelines of this current version (Year 2025) are subject to revision, and the updated versions will be published when needed, as warranted by the evolution of new-evidenced medical knowledge, new technology, and new practice trends.

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Guidelines Development Contributors and Participants

Contributors and Participants:
The Guidelines Development Group (GDG) of the Egyptian Board of Anesthesia, Surgical Intensive Care, and Pain Management.

Annexes

Annex I: Evidence-to-Decision tables

1. Fasting for Solids Before Elective Cesarean:

Criterion	Judgment
Problem	Aspiration risk during anesthesia.
Benefit	Reduces gastric volume and acidity.
Risk/Harm	Minimal; may cause discomfort if prolonged fasting.
Certainty of Evidence	High **(S**upported by major anesthesia guidelines from ASA* and Royal College of Anaesthetists (UK), well-conducted observational studies, Clinical guidelines, Some randomized controlled trials; though fewer due to ethical considerations).
Values & Preference	High value on safety; patients may prefer shorter fasting.
Resource Use	No additional cost.
Equity	Standardized across populations.
Acceptability	High among clinicians; variable among patients.
Feasibility	High; easily integrated into pre-op protocols.
Recommendation	Strong recommendation for 6–8 hours of fasting for solids.

2. Uterine Displacement:

Criterion	Judgment
Problem	Aortocaval compression reduces maternal cardiac output.
Benefits	Improves maternal hemodynamics and fetal perfusion.
Risk/Harm	Minimal; may be uncomfortable or logistically challenging.
Certainty of Evidence	Moderate **(**ASA Guidelines, NICE (UK) guidelines and multiple observational studies)
Values & Preference	High value on fetal safety
Resource Use	No cost; simple intervention.
Equity	Universally applicable
Acceptability	High
Feasibility	High; easily implemented.
Recommendation	Strong recommendation to maintain uterine displacement until delivery.

3. Neuraxial versus GA:

Criterion	Judgment
Problem	GA increases maternal risk and neonatal depression; neuraxial preferred.
Benefit	Improved Apgar scores, reduced maternal mortality, and better pain control.
Risk/Harm	Neuraxial may fail or be contraindicated in emergencies.
Certainty of Evidence	High (ASA, NICE, Cochrane review, ACOG, well-designed cohort studies, systematic reviews, meta-analyses, and high-quality RCTs).
Values & Preferences	High value on maternal safety and neonatal outcomes.
Resource Use	Neuraxial is cost-effective and widely available.
Equity	Promotes safer care across diverse populations.
Acceptability	High among clinicians and patients.
Feasibility	High; standard practice in most settings.
Recommendation	Strong recommendation for neuraxial over GA when feasible.

4. Fluid Preloading or Coloading:

Criterion	Judgment
Problem	Strong recommendation to maintain uterine displacement until delivery.
Benefits	It may reduce the incidence of hypotension.
Risk/Harm	Equivocal benefit; risk of fluid overload in some patients.
Certainty of Evidence	Low (Systematic review and meta-analysis equivocal, RCTs and meta-analyses; inconsistent findings).
Values & Preferences	Moderate value on the prevention of hypotension.
Resource Use	Low cost; widely available.
Equity	Accessible in most settings
Acceptability	High among clinicians.
Feasibility	High; easily integrated into workflow.
Recommendations	Conditional recommendation for preloading or coloading.

5. Use of Phenylephrine for Hypotension in Caesarean Section:

Criterion	Judgment
Problem	Hypotension during neuraxial anesthesia is common and can affect fetal perfusion.
Benefit	More stable maternal BP; improved fetal acid-base status vs. ephedrine.
Risk/Harm	Risk of maternal bradycardia; requires monitoring.
Certainty of Evidence	High (ASA guidelines, International Consensus Statement, Meta-analysis of RCTs).
Values & Preferences	High value on fetal safety and maternal stability.
Resource Use	Readily available; cost-effective.
Equity	Widely accessible.
Acceptability	High among anesthesiologists.

Feasibility	High; easily implemented.
Recommendation	Strong recommendation for phenylephrine as a first-line vasopressor.

6. <u>Vasopressor Use: Phenylephrine vs. Ephedrine</u>:

Criterion	Judgment
Problem	Hypotension affects maternal and fetal outcomes.
Benefits	Phenylephrine improves fetal acid-base status; both drugs restore BP.
Risk/Harm	Phenylephrine may cause bradycardia; ephedrine may worsen fetal acidosis.
Certainty of Evidence	High (ASA guidelines, International Consensus Statement, Meta-analysis of RCTs).
Values & Preferences	High value on fetal safety and maternal stability.
Resource Use	Widely available and inexpensive.
Equity	Standard across institutions.
Acceptability	High among anesthesiologists.
Feasibility	High; routinely used.
Recommendation	Strong recommendation for phenylephrine as a first-line agent.

7. <u>Neuraxial Opioids for Postoperative Analgesia</u>:

Criterion	Judgment
Problem	Postoperative pain affects recovery, bonding, and mobility.
Benefits	Improved analgesia; reduced need for systemic opioids.
Risk/Harm	Risk of pruritus, nausea, and respiratory depression.
Certainty of Evidence	Moderate (high-quality RCTs and systematic reviews/meta-analyses).
Values & Preferences	High value on effective pain control and opioid-sparing strategies.
Resource Use	Cost-effective; widely available.
Equity	Promotes standardized pain management.
Acceptability	High among patients and clinicians.
Feasibility	High; standard practice.
Recommendation	Conditional recommendation for neuraxial opioids post-CS.

8. <u>Use of Pencil-Point Spinal Needles</u>:

Criterion	Judgment
Problem	Postdural puncture headache is a common complication.
Benefit	Significantly reduces headache incidence.
Risk/Harm	None; technique-dependent.
Certainty of Evidence	Moderate (Meta-analysis of RCT, systematic reviews and clinical studies).
Values &	High value on minimizing complications.

Preferences	
Resource Use	Slightly higher cost; widely available.
Equity	Promotes safer care across settings
Acceptability	High among anesthesiologists.
Feasibility	High; requires training and stocking.
Recommendation	Conditional recommendation for pencil-point needles.

9. Use of Neuraxial Adjuvants (e.g., lidocaine, epinephrine, and fentanyl) for management of Intraoperative Pain During CS:

Criterion	Judgment
Problem/ Intervention	. Inadequate analgesia under neuraxial anesthesia during CS. . Epidural administration of lidocaine ± bicarbonate/epinephrine; lipophilic opioids.
Benefits	Rapid onset of analgesia; avoids conversion to GA; improves maternal comfort.
Risk/Harm	Risk of systemic toxicity, sedation, pruritus, nausea; rare neonatal respiratory depression
Certainty of Evidence	Moderate (Committee on Obstetric Anesthesia, RCTs, systematic reviews, Cohort studies, and clinical trials)
Values & Preferences	High value is placed on avoiding GA and maintaining maternal awareness during delivery.
Resource Use	Low to moderate; agents are generally available and inexpensive.
Equity	High potential to reduce disparities in pain management if protocols are standardized.
Acceptability	High among clinicians and patients when explained clearly.
Feasibility	High in settings with epidural access and trained staff.
Recommendation	Strong recommendation to use neuraxial adjuvants as first-line for breakthrough pain

10. Conversion to GA for management of Intraoperative Pain during CS:

Criterion	Judgment
Problem/ Intervention	- Refractory pain during CS despite adjuvant use. - Conversion to GA.
Benefits	Definitive pain control; avoids psychological trauma.
Risk/Harm	Increased maternal morbidity: aspiration risk, neonatal depression.
Certainty of Evidence	High (Practice Guidelines for Obstetric Anesthesia, Committee on Obstetric Anesthesia, AAGBI Guidelines, randomized trials, high-quality observational studies, and expert consensus).
Values & Preferences	Patients value pain relief and safety; some may prefer to remain conscious.
Resource Use	High; requires GA resources.
Equity	Risk of disparities if patient complaints are dismissed.
Acceptability	Acceptable when indicated and discussed.

Feasibility	Feasible in equipped ORs with trained staff.
Recommendation	Strong recommendation to convert to GA when pain is refractory and the patient accepts.

11. Use of IV Adjuvants (e.g., fentanyl, ketamine, dexmedetomidine) for management of Intraoperative Pain during CS:

Criterion	Judgment
Problem/ Intervention	- Breakthrough pain or anxiety during cesarean delivery under neuraxial anesthesia. - IV administration of short-acting opioids, ketamine, dexmedetomidine.
Benefits	Rapid relief of pain and anxiety; may prevent GA conversion.
Risk/Harm	Sedation, respiratory depression, hallucinations, bradycardia; neonatal effects possible.
Certainty of Evidence	High (based on *Committee on Obstetric Anesthesia*, ASA Guidelines, randomized controlled trials, systematic reviews)
Values & Preferences	Patients value pain relief and maintaining consciousness; preferences vary.
Resource Use	Moderate; requires monitoring and availability of agents.
Equity	May improve access to pain relief if protocols are inclusive and patient-centered.
Acceptability	Variable: requires clear communication and consent.
Feasibility	Feasible with trained staff and monitoring equipment.
Recommendation	Strong recommendation to use IV adjuvants based on patient needs and context.

Obstetric Emergencies:

12. Airway Emergencies:

Criterion	Judgment
Problem	Failed intubation and airway compromise are major risks in obstetric anesthesia.
Benefits	Difficult airway cart and strategy reduce morbidity and mortality.
Risk/Harm	Minimal; risk if equipment is unavailable or staff untrained.
Certainty of Evidence	High (based on ASA guidelines, guidelines for obstetric anesthesia, Difficult Airway Society and the Obstetric Anaesthetists' Association, expert consensus, and observational studies).
Values & Preferences	High value on maternal safety and airway control.
Resource Use	Moderate; requires stocking and training.
Equity	Promotes safer care across institutions.
Acceptability	High among anesthesiologists.
Feasibility	High; requires protocol and simulation.
Recommendation	Strong recommendation for airway emergency preparedness.

13. <u>Cardiopulmonary Resuscitation (CPR)/Maternal Arrest</u>:

Criterion	Judgment
Problem	Cardiac arrest in pregnancy requires a rapid, specialized response.
Benefits	Uterine displacement and timely cesarean delivery improve maternal and fetal outcomes.
Risk/Harm	Minimal if protocols are followed; delay increases mortality.
Certainty of Evidence	High (ERC guidelines, AHA Guidelines, Consultants and ASA Guideline-based consensus; limited direct obstetric CPR studies).
Values & Preferences	High value on maternal and fetal survival.
Resource Use	Moderate; requires trained teams and equipment.
Equity	Standardizes emergency response across settings.
Acceptability	High among obstetric and anesthesia teams.
Feasibility	High with drills and protocols.
Recommendation	Strong recommendation for pregnancy-specific CPR and timely delivery.

14. <u>Hemorrhagic Emergencies</u>:

Criterion	Judgment
Problem	Obstetric hemorrhage is a leading cause of maternal morbidity and mortality.
Benefits	Rapid access to blood products, cell salvage, and infusion tools improves survival.
Risk/Harm	Minimal if protocols are followed; risk of transfusion reactions or delays if systems are inadequate.
Certainty of Evidence	High (ASA members consensus, WHO Consolidated guidelines + implementation studies)
Values & Preferences	High value on maternal survival and timely intervention.
Resource Use	Moderate; requires blood bank coordination and equipment.
Equity	Improves care in high-risk populations.
Acceptability	High among clinicians.
Feasibility	High with institutional support.
Recommendation	Strong recommendation to maintain hemorrhage response resources.

Annex II: ASA-PS: Obstetric Setting

ASA-PS Classification	Obstetric -Setting
ASA I	
ASA II	**Normal pregnancy, well controlled gestational hypertension (HTN), controlled preeclampsia without severe features, diet-controlled gestational Diabetes Mellitus (DM).**
ASA III	**Uncontrolled preeclampsia, gestational DM with complications or high insulin requirements, thrombophilia requiring anticoagulation.**
ASA IV	**Preeclampsia-complicated by HELP or Organ dysfunction, peripartum cardiomyopathy with EF < 40%, uncorrected/decompensated heart.**
ASA V	**Uterine rupture**

Appendix: Statement on Optimal Goals for Anesthesia Care in Obstetrics

Developed By: Committee on Obstetrics and Anesthesia
Last Amended: October13, 2021 (original approval: October 17, 2007)

Optimal Goals for Anesthesia Care in Obstetrics

Committee of Origin: Obstetrical Anesthesia

This joint statement from the American Society of Anesthesiologists (ASA) and the American College of Obstetricians and Gynecologists (ACOG) has been designed to address issues of concern to both specialties. Good obstetric care requires the availability of qualified personnel and equipment to administer general or neuraxial anesthesia both electively and emergently. The extent and degree to which anesthesia services are available varies widely among hospitals. However, for any hospital providing obstetric care, certain optimal anesthesia goals should be sought. These include:

1. Availability of a licensed practitioner who is credentialed to administer an appropriate anesthetic whenever necessary. For many women, neuraxial anesthesia (epidural, spinal, or combined spinal epidural) will be the most appropriate anesthetic.
2. Availability of a licensed practitioner who is credentialed to maintain support of vital functions in any obstetric emergency.
3. Availability of anesthesia and surgical personnel to permit the start of a cesarean delivery within 30 minutes of deciding to perform the procedure.
4. Because the risks associated with trial of labor after cesarean delivery (TOLAC) and uterine rupture may be unpredictable, the immediate availability of appropriate facilities and personnel (including obstetric anesthesia, nursing personnel, and a physician capable of monitoring labor and performing cesarean delivery, including an emergency cesarean delivery) is optimal. When resources for immediate cesarean delivery are not available, patients considering TOLAC should discuss the hospital's resources and availability of obstetric, anesthetic, pediatric and nursing staff with their obstetric provider[1]; patients should be clearly informed of the potential increase in risk and the management alternatives. The definition of immediately available personnel and facilities remains a local decision based on each institution's available resources and geographic location.
5. Appointment of qualified anesthesiologist to be responsible for all anesthetics administered. There are many obstetric units where obstetricians or obstetrician-supervised nurse anesthetists administer labor anesthetics. The administration of general or neuraxial anesthesia requires both medical judgment and technical skills. Thus, a physician with privileges in anesthesiology should be readily available.

Persons administering or supervising obstetric anesthesia should be qualified to manage the infrequent but occasionally life-threatening complications of neuraxial anesthesia such as respiratory and cardiovascular failure, toxic local anesthetic convulsions, or vomiting and aspiration. Mastering and retaining the skills and knowledge necessary to manage these complications require adequate training and frequent application.

To ensure the safest and most effective anesthesia for obstetric patients, the Director of Anesthesia Services, with the approval of the medical staff, should develop and enforce written policies regarding provision of obstetric anesthesia. These include:

1. A qualified physician with obstetric privileges to perform operative vaginal or cesarean delivery should be readily available during administration of anesthesia. Readily available should be defined by each institution within the context of its resources and geographic location. Neuraxial and/or general anesthesia should not be administered until the patient has been examined and the fetal status and progress of labor evaluated by a qualified individual. A physician with obstetric privileges who concurs with the patient's management and has knowledge of the maternal and fetal status and the progress of labor should be

responsible for midwifery back up in hospital settings that utilize certified nurse midwives/ certified midwives as obstetric providers.

2. Availability of equipment, facilities, and support personnel equal to that provided in the surgical suite. This should include the availability of a properly equipped and staffed recovery room capable of receiving and caring for all patients recovering from neuraxial or general anesthesia. Birthing facilities, when used for labor services or surgical anesthesia, must be appropriately equipped to provide safe anesthetic care during labor and delivery or postanesthesia recovery care.
3. Personnel, other than the surgical team, should be immediately available to assume responsibility for the depressed newborn. The surgeon and anesthesiologist are responsible for the mother and may not be able to leave her to care for the newborn, even when a neuraxial anesthetic functioning adequately. Individuals qualified to perform neonatal resuscitation should demonstrate:
    - 3.1 Proficiency in rapid and accurate evaluation of the newborn condition, including Apgar scoring.
    - 3.2 Knowledge of the pathogenesis of a depressed newborn (acidosis, drugs, hypovolemia, trauma, anomalies, and infection), as well as specific indications for resuscitation.
    - 3.3 Proficiency in newborn airway management, laryngoscopy, endotracheal intubations, suctioning of airways, artificial vertilation, cardiac massage, and maintenance of thermal stability.

In larger maternity units and those functioning as high-risk centers, 24-hour in-house anesthesia, obstetric and neonatal specialists are usually necessary. Preferably, the obstetric anesthesia services should be directed by an anesthesiologist with special training or experience in obstetric anesthesia. These units will also frequently require the availability of more sophisticated monitoring equipment and specially trained nursing personnel.

A survey jointly sponsored by ASA and ACOG found that many hospitals in the United States have not yet achieved the goals mentioned previously. Deficiencies were most evident in smaller delivery units. Some small delivery units are necessary because of geographic considerations. Currently, approximately 34% of hospitals providing obstetric care have fewer than 500 deliveries per year.[2] Providing comprehensive care for obstetric patients in these small units is extremely inefficient, not cost-effective and frequently impossible. Thus, the following recommendations are made:

1. Whenever possible, smaller units should consolidate.
2. When geographic factors require the existence of smaller units, these units should be part of a well-established regional perinatal system.

The availability of the appropriate personnel to assist in the management of a variety of obstetric problems is a necessary feature of good obstetric care. The presence of a pediatrician or other trained physician at a high-risk cesarean delivery to care for the newborn or the availability of an anesthesiologist during active labor and delivery when TOLAC is attempted and at a breech or multifetal delivery are examples. Frequently, these physicians spend a considerable amount of time standing by for the possibility that their services may be needed emergently, but may ultimately not be required to perform the tasks for which they are present. Reasonable compensation for these standby services is justifiable and necessary.

A variety of other mechanisms have been suggested to increase the availability and quality of anesthesia services in obstetrics. Improved hospital design, to place labor and delivery suites closer to the operating rooms, would allow for safer and more efficient anesthesia care, including supervision of nurse anesthetists. Anesthesia equipment in the labor and delivery area must be comparable to that in the operating room.

Finally, good interpersonal relations between obstetricians and anesthesiologists are important. Joint meetings between the two departments should be encouraged. Anesthesiologists should recognize the special needs and concerns of the obstetrician and obstetricians should recognize the anesthesiologist as a consultant in the management of pain and life-support measures. Both should recognize the need to provide high quality care for all patients.

References

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