Anesthesia considerations
All anesthetic agents may have risks to the fetus
No anesthetic agents have been shown to cause fetal harm at any gestation when used appropriately
Patients may have intravenous sedation before regional or general anesthesia.
  - Midazolam
  - Fentanyl
  - Small doses
Because gastric emptying is delayed in pregnancy, what length of time NPO ensures that the stomach is empty?

Decreased functional residual capacity
Rapid desaturation with hypoventilation
Provide oxygen whenever ventilation may be depressed.
Edema of upper airway
Increased risk of failed intubation
Communicate airway risks to anesthesia personnel
Obesity
Sleep apnea/CPAP use

Pre-anesthesia considerations
Pre-anesthesia care should include vital signs and a thorough history and physical examination
Like any other pre-anesthesia patient
Be aware of normal physiological alterations of pregnancy
Be alert for risk factors for complications

A 20-30 minute fetal heart tracing should be obtained to assess fetal status for gestations ≥ 24 weeks gestation.
  Auscultation of FHT should be obtained for pre-viable gestations

Pre-anesthesia history
Same as for any other pre-procedure patient!
Vital signs
Health history
Allergies (drug, food, and latex)
Medications
Physical assessment
Pain and comfort
Cognitive/mental/emotional status
Cultural/religious/family issues
Substance use
Anesthetic history
Lab work
Specialty consults
Discharge planning
Pre-procedure teaching/educational needs
Plan of care/disposition

**So how does this change for a pregnant patient?**
- Adds a little… but no more than you would for any other specialty patient!
- Vital signs- Be aware of slightly altered VS in OB patient
- Risk of DVT
- Health history- Might include pregnancy complications
  - (Preterm labor, postpartum hemorrhage)
- Allergies (drug, food, and latex)
- Medications
- Physical assessment- Add fetal assessment (Before? During? After?)
  - OB dept phone #?
- Pain and comfort
- Left/right tilt if > 20 weeks
- Cognitive/mental/emotional status- Patient concern for the baby?
- Cultural/religious/family issues
- Substance use (Surprise! Pregnant women use illicit drugs also…)
- Anesthetic history
- Lab work
- Prenatal lab results
  - Blood type/antibody screen/Rubella/RPR /Hepatitis B/HIV
  - Group Beta Strep cultures if 37+ weeks
- These may affect immediate infant care in the delivery room.
- Specialty consults- Who is her OB provider? Neonatology?
- Discharge planning-
  - D/C same day? Staying with you?
  - Further evaluation in other unit?
  - Pre-procedure teaching/educational needs
- PONV
- Approximate timetable for the procedure
- Anesthetic management
- Visitation
- Pain assessment & management immediately after
- Any other patient or family concerns
- Plan of care/disposition

Other considerations
- Prophylactic antibiotics should be administered as for any other surgical procedure.
- Consult with OB provider if any concerns about choice of antimicrobial agent

**Cerclage**
- First described in the 1950s
- Used in ~1% of pregnancies today
- Indications:
  - History-indicated (multiple prev PTB)
  - Ultrasound-indicated (shortening/funneling)
  - Exam-indicated (cervical dilatation- “rescue”)
- Cerclage placed at 14-20 weeks

- Risks- Bleeding, Infection, Preterm labor, PPROM, Cervical scarring

- Psychological implications
- Woman may have already experienced a perinatal loss
Or been told of risks of preterm delivery
May be very anxious

Anesthesia options:
Regional anesthesia more common, usually spinal, as procedure rarely > 30 minutes.
General anesthetic can be used.
Assess FHT pre- and post-op
Assess for cramping
Assess for bleeding
Assess for rupture of membranes
Assess pain
Assess frame of mind
Provide support
Usually placed as outpatient
May finish recovery in PACU or on OB unit
Discharge when meets criteria
Discharge teaching includes:
Nothing in the vagina
May or may not include activity modifications
Call for fever, cramps, bright red bleeding

Appendicitis
The most common non-obstetric surgical procedure
~1/1,500 pregnancies
No more common in pregnancy
Surgery may be delayed due to delay/difficulty in diagnosis.
Does pregnancy alter assessment?
Or due to a general reluctance to operate on a pregnant woman.
U/S abdomen frequently inconclusive
Spiral CT scan or MRI much more accurate

Your post-procedure “appy” may have:
Appendicitis
Ovarian cysts
Small bowel obstruction
“Abdominal pain”
> 40% of pregnant patients who have an appendectomy (2nd or 3rd trimester) have a normal appendix.
Caveat: delay in the diagnosis associated with significant complications
Fetal loss rate of ~10% with an unruptured appendix
Increases to 24% if the appendix ruptures

Laparoscopy is acceptable in pregnancy
Earlier mobility
Earlier passage of flatus
Less need for pain meds
Shorter hospital stay
Based on operator skill/diagnosis/gestation
No difference between scope & open for birth weight, growth restriction, infant survival, & fetal malformations.
Increased risk for preterm delivery for either approach
Coordination between OB and OR
FHT continuous or intermittent
Depends on gestation
Assess fetal activity
Ensure good IV access
Left tilt (or right)
NPO
Compression boots
Oxygen as needed to maintain sat > 95%
Watch/assess for contractions

All post-op assessments
Care of the mother/fetus postoperatively is continuity of care.
Upon arrival and at standard intervals thereafter, assessment includes:
Consciousness
Ventilation & oxygenation
Blood pressure
Heart rate/rhythm
Level of regional anesthesia (if applicable)
Pain level
Surgical site
Fetal status
Signs of labor
Vital signs & nursing assessments per institution/unit guidelines
Pain management per institution guidelines
Assess fetal activity
FHT monitoring per orders
Assess for c/o contractions or cramps
Assess for rupture of membranes
Assess for vaginal bleeding

Other risks: Preterm Labor
Incidence of preterm birth after non-obstetric surgery overall ~21%, mostly after appendectomy
~11% in second trimester
If you suspect patient is having ctns, call OB dept!

Other risks: PPROM
Preterm Premature Rupture of Membranes
Rupture prior to 36 weeks gestation
If you suspect patient has broken her water, call OB dept!

Post-op pain management
The need for pain relief is a major concern when caring for ANY patient.
Avoid non-steroidal anti-inflammatory drugs (NSAIDS) because of side effects in pregnancy.
Category B drug until the third trimester, then becomes a category D.
Oligohydramnios
Closure of the ductus arteriosus
NSAIDS decrease platelet aggregation
Both the pregnant woman and fetus at risk for bleeding
NSAIDS also decrease renal perfusion = output

Pregnant surgical patient may take:
- Acetaminophen (Tylenol)
- Tylenol/Codeine
- Tylenol/Oxycodone (Percocet)
- Morphine
- Hydromorphone (Dilaudid)
- Fentanyl

Cesarean delivery (CD)
The cesarean delivery rate has risen to >30% in some countries, increasing the possibility that the perianesthesia nurse will be caring for this type of patient.

Why a Cesarean Birth?
The most common reasons for cesarean delivery
- Prior cesarean delivery
- Dystocia
- Non-reassuring fetal heart tracing
- Malpresentation
- Placental abnormalities

Why More Cesarean Births?
Other factors which contribute to rising cesarean delivery include:
- Increasing maternal age
- Fewer forceps-assisted deliveries
- Increasing labor inductions
- Rising rates of maternal obesity
- Suspected macrosomia
- Elective cesarean delivery

Pre-anesthesia considerations
The nurse preparing the woman for cesarean delivery should assess vital signs and conduct a thorough history and physical examination
Like any other pre-anesthesia patient
Be aware of normal physiological alterations of pregnancy
Be alert for risk factors for complications

Pre-anesthesia history
- Gravida and para
- Allergies (drug, food, and latex)
- Medications
- Magnesium sulfate, anticoagulants, or vasoactive drugs.
- Prenatal lab results
- Blood type and antibody screen
- Rubella (german measles) status
- RPR (syphilis)
- Hepatitis B
- HIV
- Group Beta Strep cultures
These may affect immediate infant care in the delivery room.

Significant history of pulmonary, cardiac, or coagulation problems
May influence fluid management and/or choice of anesthetic
- Coagulopathy
Inherited as a Factor V Leiden mutation
Thrombocytopenia due to preeclampsia
A result of anticoagulant therapy use during pregnancy for a history of deep venous thrombosis
Pre-procedure anemia
Document and communicate to the anesthesiologist & nurse anesthetist.
Time of last oral intake

Complications of this pregnancy or previous pregnancies.
The perianesthesia nurse should pay particular attention to patient reports of previous and/or current pregnancy complications
Postpartum hemorrhage
Preeclampsia

Other considerations
Safety, support, and education for the mother and fetus.
Left or right lateral tilt
Placement of an 18 gauge intravenous catheter provides access for hydration and potential blood therapy in case of increased blood loss.
Pre-operative blood work – usually baseline complete blood count (CBC)
Sometimes a blood type and screen (T & S) or coagulation testing may be warranted based on patient history or condition.
Within one half-hour prior to surgery, 30 ml sodium citrate to reduce the acidity of stomach contents.
Notify the anesthesiologist & nurse anesthetist of pertinent medical and obstetrical history.
Foley to keep the bladder empty during surgery.
When time permits/for mother’s comfort, catheter may be placed after regional anesthesia
Shaving the abdomen or pubic hair no longer SOC
Prophylactic antibiotics should be administered within 60" prior to delivery to decrease wound infection, regardless if the cesarean delivery was elective or emergent.
Patient teaching before delivery reassures the patient and her support people.
Information on an approximate timetable for the delivery
Anesthetic management
Pain assessment & management immediately postpartum
Breastfeeding
Any other patient or family concerns
An unplanned cesarean delivery increases the patient’s stress level; the presence of a support person is beneficial to patient and family. Visitation should balance patient care, safety, and family desires.

Immediate Post-cesarean Care
Phase I recovery of the mother begins with the same assessments as any other post abdominal surgical patient.
Airway patency
Respiratory rate and quality
Oxygenation
Blood pressure
Heart rate & EKG
Level of consciousness
Temperature
Skin color
Intake and output
Level of regional anesthesia
Pain level  
Nausea  
Surgical site  
All are assessed per ASPAN and institution guidelines.

Additional assessments will include the tone and position of the fundus (the top of the uterus), amount and color of lochia (the blood flow from the uterus after birth), and maternal-infant bonding.  
Fundal tone and height are assessed with one hand supporting the lower uterus, placed approximately over the bladder, and the second hand feeling and massaging the fundus. The uterine muscle contracts after delivery to control bleeding after placental separation. External uterine massage by the nurse and endogenous release of oxytocin both help maintain hemostasis. The uterus should always feel firm to touch when assessed. During recovery time in PACU, the fundus will be located approximately at the umbilicus. This may be documented as “Firm @ U” meaning “Firm at the level of the Umbilicus.” After a premature delivery, the initial fundal height may be one or two centimeters (cm) below the umbilicus. If a woman has fibroids (benign myometrial tumors), her fundal height may be one or two cm above the umbilicus.

After delivery of the placenta, the mother has vaginal blood flow called lochia caused by the sloughing of the decidual lining of the uterus after birth. Immediately after delivery, flow is red in color (lochia rubra) and usually covers about 1/3-1/2 of a perineal pad, but not enough to saturate a pad. When massaging the fundus during assessment, lochia flow is noted and documented as a scant, small, moderate, or heavy amount. Also note the presence of free flowing blood or clots.

Fundus and lochia assessments are performed  
Q 15 minutes the first hour after delivery  
Q 30 minutes the second hour after delivery  
Q 1-4 hours until discharge  
Scant/Small/Moderate/Heavy

Shivering  
Postpartum cesarean delivery patients may shiver after delivery regardless of anesthetic used. This shivering may be severe and may be attributed to a variety of causes, not all fully understood. Assess the mother’s temperature per institution guidelines. If normothermic, provide passive insulation. Warm blankets help to relax the muscles and provide comfort. If the patient is <36º C, initiate active warming measures. Administration of IV meperidine may be warranted to decrease severe or persistent shivers.

PONV  
Cesarean delivery patients are at risk for post-operative nausea and vomiting (PONV)  
Age, gender, abdominal surgery.  
Patient teaching pre- and post-operatively  
Anti-emetics such as metoclopramide, 5-HT₃ agonists, promethazine, and antihistamines are acceptable for the postpartum breastfeeding woman.
Treating PONV decreases time to discharge and increases comfort and satisfaction for the patient. If anti-emetics have not been ordered, be an advocate!

Pain Management
Unlike other abdominal surgical procedures, there is pain not only from the surgical procedure, but also from fundal assessments post-procedure and uterine contractions. Pain should be assessed per ASPAN guidelines.

There are many options for pain management after cesarean delivery, but this varies depending on the anesthesiologist, nurse anesthetist, obstetrician, and the institution. Think multimodal comfort measures!

- Patient-controlled epidural analgesia
- Single dose injected epidural or spinal analgesia
- Extended-release morphine liposome (Depodur)
- Morphine sulfate (Duramorph)
- Intravenous patient-controlled analgesia (PCA)
- Elastomeric infusion device

Combination of anti-inflammatory and opioid medications via intravenous and oral routes are possibilities.

None of these options is contraindicated for the breastfeeding mother.

Complementary measures such as relaxation breathing, positioning, heat or cold, pillows

Educate your patient and her support people

1-10? Faces?
Remember cultural/religious influences and language barriers.
Adequate pain management facilitates breastfeeding and maternal-infant bonding.

Discharge from PACU
Patients may be discharged from the PACU when standard institution-based criteria are met.

- stable vital signs
- fundus should be firm, midline, @ U
- lochia moderate without clots

Care should be individualized to each patient.

A mother whose infant is transported to the Neonatal Intensive Care Unit (NICU) may desire to visit her infant before standard post-delivery assessments are completed.

If she meets discharge criteria, she may be released from the PACU early and transported to the NICU.

Conversely, some patients may not recover complete lower extremity function in the usual time frame or may have abnormal vital signs; these patients should remain in the PACU for further evaluation.

Watch out!
Assess the post-cesarean delivery patient for signs of complications such as internal bleeding and wound dehiscence, similar to any other abdominal surgical patient.

Remain alert for heavy postpartum bleeding or hemorrhage that may result from uterine atony or from retained placental fragments.

Postpartum hemorrhage
- Occurs in ~5% of deliveries
- >500 mls vaginal or > 1000 mls Cesarean
- Estimates are not reliable
- Major cause or morbidity/mortality
If the patient’s fundus is either boggy (soft) or unusually high (two or three cms above the umbilicus when previously @ U), and/or lochia flow is very heavy, with or without clots, massage the fundus, and reassess the lochia and vital signs.

If repeat assessments show no improvement, reassess vital signs and notify the obstetrician. If the obstetrician needs to perform an internal exam, often a painful procedure, support the patient during the exam and advocate for pain medication if the delivery anesthesia has already worn off.

Medications
Oxytocin (Pitocin®)
- Produces uterine contractions
- 10-20 units in 1000cc IV fluid
- Infused at up to 500cc/hr
- Faster may cause hypotension or cardiac dysrhythmias

Methylergonovine (Methergine®)
- Ergot alkaloid
- Contracts smooth uterine muscle
- 0.2 mg IM, may be repeated after 2-4 hours
- Onset of action 2-5 minutes
- Duration ~3 hours
- Relatively contraindicated for patients with hypertension

Carboprost (Hemabate®)
- Similar to prostaglandin F$_{2\alpha}$
- Produces uterine contraction
- 250 mcg IM
- May repeat every 15-90 minutes up to 2 mg
- Can cause fever, vomiting, and diarrhea
- Use with caution in patients with asthma

Misoprostol (Cytotec®)
- Synthetic prostaglandin E$_1$ analog
- Induces uterine contractions
- Orally or rectally
- Rapid absorption (effects in 3-4 minutes)
- Dosing usually 1000 mcg rectally once (off label use)
- Can cause fever, nausea & vomiting, diarrhea

Watch out!
If bleeding is heavy enough for the obstetrician to request a CBC while the patient remains in PACU, consider placing a second large bore IV and ask about coagulation studies as well. Also provide education and support during and after care. On rare occasions, a mother may need to return to the operating room to remove adherent placental tissue (placenta accreta), to search for internal bleeding, and possibly for hysterectomy.

The 4 T’s
Tone
Abnormal uterine contractility or atony
Trauma
Lacerations or general shock trauma
Tissue
Retained products of conception
Thrombin
Abnormalities of coagulation

Uterine atony (80% of PPH)
Boggy fundus & free flowing lochia

Risk factors
Uterine overdistention
Large baby or multiples (twins, triplets, or more)
Hydramnios (too much amniotic fluid)
Leiomyomas (fibroids)
Think Starling’s law for cardiac contractility
Grand multiparity
(having delivered 5 or more babies)
Prolonged labor
Very rapid labor
Receiving magnesium sulfate during labor
Large dose of oxytocin during labor
Preeclampsia
General anesthesia (halogenated agents)

History of postpartum hemorrhage
External massage
Breastfeeding
Contact OB
Oxytocic medications

Physical Management
External uterine massage (nursing)
Explore uterine cavity (physician)
Bimanual compression of uterus (physician)
Vaginal/uterine packing

Surgical/interventional Management
B-Lynch stitch
Angiographic pelvic embolization
Interventional Radiology dept
Tamponade
Hysterectomy

Nursing considerations
Maintain Normothermia (Cold people don’t clot!)
Monitor labs
Assign a nurse solely to communicate with blood bank
Keep up with Intake & Output
Provide oxygen
Assess breath sounds regularly
Vital signs Q 5-15 minutes
Continue patient and family teaching and communication throughout resuscitation
Even in a hospital which usually performs cesarean deliveries in Labor & Delivery (L & D), a woman might be scheduled for a cesarean delivery in a regular operating room (OR) due to additional surgical needs, such as known extensive bowel adhesions, planned hernia repair, or removal of a tumor after infant delivery.

This will require planning and teamwork between the perianesthesia nurse and the L & D nurse.

Unusual situations
Considerations include choosing the best location for pre- and post-operative care, obtaining medications perhaps not usually kept in the OR, providing a neonatal warmer and resuscitation equipment, and personnel to care for the mother and infant.

Facilitate communication between the obstetric unit and the PACU, by obtaining the L&D phone number and an L&D staff nurse who would be available for infant care, consults or unanticipated needs.

References


