Pregnancy is a Disease Process: Dealing with the sick 3rd trimester mom.

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Objectives:
• Discuss the physiologic changes to the cardiopulmonary system that occur in the 3rd trimester
• Review plan for dealing with the acutely unwell 3rd trimester patient
• Describe the technique of resuscitative hysterotomy
Pregnancy is a Disease process: Care of the sick 3\textsuperscript{rd} trimester mom.

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- US ICU admit rate for pregnant patients <1%  
- Mortality rate for critically ill pregnant women is 30%  
- Pregnant women we interact with:  
  - Accidents and injuries  
  - Obstetric causes of maternal illness  
  - Non-obstetric causes of maternal illness

FIX MOM, FIX THE BABY

Physiologic derangements of pregnancy: Perfusion, and Diffusion

Perfusion:  
- Placenta uses 25% of cardiac output in 3\textsuperscript{rd} trimester  
- Cardiac output increases by 50% in pregnancy  
- Cardiac output = Heart rate x Stroke Volume  
  - Most of the increase in Cardiac Output comes from increased Heart Rate  
- Maternal Blood volume increases by 2000cc, with more plasma than red cells contributing to the increase. This causes anemia of pregnancy  
- There is a decrease in systemic vascular resistance which causes a decrease in both systolic and diastolic blood pressure

SUPINE HYPOTENSION SYNDROME  
- When gestation >20 weeks, if mom lays supine, uterus / fetus can compress IVC +/- aorta, causing a drop in cardiac output of 30%

Diffusion:  
- Minute ventilation increases by 50% (Minute ventilation = stroke volume x resp rate)  
- There is a decrease in total lung capacity of 5%, mostly from decrease in  
  Functional reserve capacity of 20% (expiratory reserve volume, and residual volume)  
- Decreased FRC causes a decreased safe apnea duration with increased risk of peri-intubation hypoxemia
Increased minute ventilation caused baseline HCO3- level and pCO2 levels to be lower than normal.

OPTIMAL VITAL SIGNS (unknown!)
- SBP > 100
- MAP > 65
- SBP > 80% of pre-pregnancy SBP

- PaO2 70mmHg or higher
- Sats >95% (when paCO2 drops below 60 mmHg blood is shunted away from placenta)
- paCO2 30-32 (normally 35-45)
- A normal paCO2, or ETCO2 could be an indication of fatigue

GENERAL APPROACH:
- Fluid / blood / labs: SAME
- Xray / CT / Ultrasound: SAME
- Meds: SAME (except Quinolones, ACE inhibitors, Amiodarone)

INITIAL INTERVENTIONS FOR THE SICK MOM: TOLD
- T: Tilt (towels under right hip, or manually displace uterus)
- O: Oxygen, aim for sat greater than 95%, but lower than 100%
- L: Lines above the diaphragm (increased IVC pressure)
- D: Dates / delivery. Know when the baby will be coming out.
  - Greater than 20 weeks, mom experiencing physiologic insults of preg.
  - At 20 weeks, uterus is at the level of the umbilicus
  - Greater than 24 weeks, pregnancy is potentially viable

THE CRASHING PATIENT:

Airway:
- Decreased FRC causes a decrease in safe apnea duration
- Excellent positioning will be needed for intubation
- Pregnant airway is like a burn airway
  - Increased subQ fat
  - Increased mucosal edema
  - Hyperemic mucosa

- RSI drugs: There is no evidence, use what you are familiar with
- ETT tube size: Go down in size by 0.5
• DL vs VL: Use what you are best at

Vent settings:

• PEEP 7-10 cm (use a PEEP valve during CPR, and between attempts at tube
• Use ideal body weight for vent settings
• Aim for pCO2 30-32 (not 35-45)
• Leave patient sitting up (30 degrees), this decreases aspiration / vent. Assoc. pneumonia, and makes them easier to ventilate

BP goals:

• SBP > 80% of normal for patient
• SBP > 100 mmHg, MAP > 65 mmHg
• Pressors: Minimal evidence, OB anesthesia uses ephedrine and phenylephrine
  o Levophed / Norepinephrine is still an acceptable choice

CPR

• Rate / joules / meds: SAME (except for Amiodarone)
• Remove scalp electrode before defibrillation
• Move higher on the chest (baby pushes mediastinal structures higher)

WHY IS YOUR PATIENT CRASHING?

BEAU CHOPS mnemonic:

• B: Bleeding, (vaginal bleeding, consider DIC for extreme hemorrhagic shock)
• E: Embolism, Pulmonary, or amniotic. Consider the presentation, and recent history. PE treatment is the same, Amniotic fluid embolism care is supportive (intubation, pressors, time)
• A: Anesthetic complications
• U: Uterine Atony. The uterus needs to contract after delivery to help stop the post partum bleeding

• C: Cardiac. MI / Ischemia / Dissection / Cardiomyopathy. History, EKG, consider echo
- **H: Hypertension**: Eclampsia / Pre eclampsia. Recent edema / hypertension, seizures, previous history. Early magnesium, and early delivery
- **O: Other**. H’s and T’s. Relevant ones: Hydrogen ions (acidosis), Hyper / Hypo K, Hypo / Hyper glycemia. Consider the history, look at an EKG, and empirically treat, or test where appropriate. Tablets / Toxins, Tamponade, Tension Pneumothorax.
- **P: Placenta previa, Placental abruption**. Previa: Placenta is over cervix, causes massive bleeding when cervix starts to dilate. Placental abruption is when placenta tears away from uterine wall. Severe pain, possible vaginal bleeding, hard to diagnose definitively on ultrasound.
- **S: Sepsis**. Consider this in women with no / poor prenatal care, or those who are immediately post partum.

**PERI MORTEM C SECTION / RESUSCITATIVE HYSTEROTOMY**

- Last effort to save mom +/- fetus.
- Improves intra-arrest cardiac output by 60-80%, decreases IVC compression, decreases uterine blood flow
  - <20 weeks: No perimortem c section
  - 20-24 weeks: Peri mortem c section may help mom
  - >24 weeks: Peri mortem c section may help mom, +/- baby

- 7 steps;
  - Prep and sterilize abdomen
  - Midline incision: Top of uterus to pubic symphysis
  - Dissect through abdominal wall, including peritoneum
  - Vertical incision through uterus (don’t cut the baby)
  - Deliver fetus, clamp cord, deliver placenta
  - Close uterus and abdominal wall to avoid blood loss

Cliff Reid: How to be a hero talk. (google this, and listen to the whole thing!)