



The Obstetric Patient: What Can We Manage, What Should We Triage Away?

The emergency physician often sees pregnant patients after the first trimester and during early labor. Many problems can be safely and effectively managed in the emergency department as long as certain principles of obstetric care are kept in mind. This course examines these issues and helps the participant decide which patients should be managed in the emergency department and which patients can be safely referred.

- Describe how the emergency physician safely manages intercurrent illnesses in the emergency department.
- Describe the critical stabilization needed in the emergency department for pregnancy-related problems such as seizures or vaginal bleeding.
- Identify which patients should be managed by an obstetrician and how transfer of care should be arranged.
- Discuss the medicolegal liability for triaging the obstetric patient.

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FACULTY

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Obstetric Emergencies; What We Keep, What We Send

1) 1st Trimester

a) Ectopic Pregnancy

- i) 16/1,000 people; heterotopic: 1/6,000; 1-8/100 in "assisted" reproduction
- ii) Diseased fallopian tube; common location: ampulla of fallopian tube
- iii) Think EcP in child-bearing age with abdominal pain & vaginal bleeding
- iv) Normal to enlarged uterus, ?adnexal mass, scant vaginal bleeding
- v) Pain before bleeding
- vi) CBC. T&S, HCG. Transvaginal ultrasound
- vii) Treatment
 - (1) Resuscitate
 - (2) OB consult/follow-up with serial HCGs
 - (3) Transfer if TUS or OB not available
 - (4) Methotrexate for unruptured <4cm EcP
 - (5) RhoGAM® if Rh-

b) Vaginal Bleeding & Miscarriage

- i) Chromosomal abnormalities account for 50-60%
- ii) Bleeding, tissue, os open or closed
- iii) Bleeding before pain
- iv) CBC. T&S, HCG
- v) TUS
 - (1) If cardiac activity seen. chance of miscarriage <5%
 - (2) Exam: os open or closed?
- vi) Treatment-serial HCGs & OB
 - (1) Osopen
 - (a) OB now. oxytocin 20u in 1 liter, D&E
 - (2) Os closed, no tissue passed
 - (a) OB follow-up. instructions
 - (3) Os closed, tissue passed, TUS:
 - (a) Empty uterus: OB follow-up
 - (b) Full uterus: OB now. D&E

c) Induced Abortion Complications

- i) Post-abortion triad
 - (1) Vaginal bleeding, abdominal pain, fever
- ii) Treatment
 - (1) Admit, hydrate, antibiotics, oxytocin
 - (2) RhoGAM®

d) Vomiting in Pregnancy

- i) Hyperemesis gravidarum: vomiting in pregnancy resulting in electrolyte abnormalities, ketonemia, & weight loss
- ii) Treatment
 - (1) D5NS or D5LR, CBC, SMA-7. U/A, ketones
 - (2) Admit if labs abnormal, otherwise discharge, progressive diet, antiemetics

2) 2nd & 3rd Trimesters

a) Preeclampsia

- i) Mild or severe with triad of hypertension, proteinuria, edema
- ii) Treatment
 - (1) OB consult
 - (2) Mild: bedrest, OB follow-up
 - (3) Severe: admit/transfer, hydralazine, labetalol, (ACE inhibitors, nitroprusside contraindicated) magnesium sulfate for eclampsia prophylaxis

b) Eclampsia

- i) preeclampsia with seizures: magnesium sulfate, deliver

- c) Vaginal Bleeding
 - i) Placenta **Previa**
 - (1) 3 types: total, partial, marginal
 - (2) Sudden vaginal bleeding
 - (3) Digital exam contraindicated, US to localize placenta
 - ii) Abruptio Placentae
 - (1) Blood vessels at placental bed spontaneously rupture
 - (2) Abdominal or back pain with or without bleeding
 - iii) Uterine Rupture
 - (1) Abdominal pain, bleeding into abdominal cavity
 - iv) Treatment of Vaginal Bleeding of 2nd & 3rd Trimester
 - (1) Resuscitate
 - (2) Establish gestational age
 - (3) Never do digital exam before ruling out placenta previa
 - (4) OB consult/transfer
- 3) Coexisting Medical Problems
 - a) Pneumonia: same treatment
 - i) Admit all with cough & chickenpox for IV **acyclovir**
 - b) Cystitis: given 7-10 days of antibiotics
 - c) Pyelonephritis: <20 weeks, no nausea/vomiting: IV **ceftriaxone**, discharge, OB follow-up
 - i) over 20 weeks: admit
 - d) Asthma: be more aggressive in status, intubate early
 - e) **Thromboembolism**: leading cause of maternal death, especially in postpartum
 - f) Appendicitis: appendix displaced, admit for serial exams
 - g) **Cholelithiasis**: operate in 2nd trimester
- 4) Trauma In Pregnancy
 - a) Don't forget the **RhoGAM®**
 - b) Minor & <20 weeks: x-rays. etc. **FHTs** with Doppler US
 - c) Major & <20 weeks: work on Mom first, then Doppler
 - d) Minor & >20 weeks: obtain x-rays. etc, serial **FHTs**, send to OB for fetal monitoring
 - e) Major & >20 weeks: admit/transfer:
 - i) >4 contractions/hour, ruptured membranes, vaginal bleeding, serious **materna** injury. fetal tachycardia
- 5) Transport&Transfer
 - a) Prehospital: better to deliver at scene than in ambulance
 - b) Do not transport if delivery anticipated in transfer; best to deliver, **then** transfer **both**
- 6) **Preterm** Labor:
 - a) any labor before 37 weeks
 - b) Treatment
 - i) Rule out placenta previa
 - ii) Membranes ruptured, cervix dilated >6cm, & >34 weeks: keep&deliver
 - iii) If baby's head is in vault: deliver
- 7) Resuscitation
 - a) Concentrate on Mom
 - b) **Perimortem** C-section
 - i) Maintain CPR throughout
 - ii) Vertical incision from 5cm below xiphoid to 2cm above pubis
 - iii) Blunt dissect through muscle to the peritoneum
 - iv) Enter peritoneum slightly below umbilicus, incise superiorly & inferiorly, watch bladder
 - v) Vertical incision from **fundus** of uterus to bladder reflection
 - vi) Deliver baby & placenta
 - vii) Quickly repair uterus with #0 or #1 absorbable; close peritoneum & fascia with non-absorbable; staple the skin. Antibiotics if Mom might survive.

Highlights

- **Introduction**
- **1st, 2nd, 3rd Trimester Emergencies**
- **Coexisting Medical Problems**
- **Trauma**
- **COBRA/EMTALA**
- **Labor, Precipitous Delivery, Resuscitation**

OB Emergencies; What We Keep, What We Send

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Introduction

The emergency physician (EP) is playing an increasing role in the health of women. As many as 25% of pregnant women receive no prenatal care,¹ thus the EP, not the obstetrician, is the healthcare provider for many pregnancy-related complications. During the past 50 years, a maternal mortality has decreased 20-fold, but still, 1/3 of these deaths are preventable. This handout will discuss some of the common pregnancy-related emergency department (ED) complaints, their treatment and disposition, and will review the legal implications of the transfer of the pregnant patient.

1st Trimester

Ectopic Pregnancy

An ectopic pregnancy (EcP) is defined as a pregnancy occurring outside the uterus.² They can occur anywhere but the most common site is in the fallopian tube. The incidence of ectopic pregnancy is rising and is estimated to now occur in 16 per 1,000 population. See Table 1 for a list of risk factors associated with EcP.

In the majority of cases, EcP is caused by mechanical interference with passage of a fertilized ovum most commonly due to diseased fallopian tube. The "lost

Pelvic inflammatory disease
Assisted reproduction
In-vitro fertilization
Tubal surgery
Tubal occlusion
Sterilization procedures
Diethylstilbestrol exposure

Table 1. Risk Factors for ectopic pregnancy.

common location of implantation is in the ampulla of the tube.

Any woman of childbearing age who presents to the ED with abdominal pain and vaginal bleeding has an EcP until proven otherwise. Patients often present with a history of amenorrhea. The pain is described as sudden, sharp, severe, and unilateral. The bleeding is generally scant. In addition, the EP should diligently assess the patient's menstrual and pregnancy history.

The physical exam of the patient suspected of having an EcP should begin with the vital signs. Shock was once the presenting symptom, but now only occurs in less than 5% of EcPs. Irritation of the peritoneum from blood may cause abdominal tenderness and guarding. A adnexal mass may be palpated and the uterus may be normal in size or enlarged. In IX, pain precedes bleeding.

A heterotopic pregnancy is the presence of both a intrauterine pregnancy and a EcP. It has been most often quoted to occur in 1 per 30,000, but is now estimated to occur in 1 per 6,000 in the general population. The incidence of heterotopic pregnancy rises to 1-8 per 100 in patients who have had assisted reproduction "I in-vitro fertilization".³

Laboratory tests should include a CBC, type and screen, and HCG. The BHCG and the use of transvaginal ultrasonography (TUS) have revolutionized the diagnosis and treatment of EcP. In normal gestations, the HCG increases by at least 66% every 2 days until 9-10 weeks gestation. Most EcPs have a slower increase in HCG, thus the usefulness of serial HCGs. Single progesterone level is controversial and is still under investigation. Culdocentesis is rarely performed nowadays with the advent of ultrasonography.

Once the HCG reaches a level of 1000mIU/ml, TUS demonstrates an intrauterine pregnancy. A transabdominal US reveals intrauterine pregnancies at levels of 6500mIU/ml "I greater. I" general, a TUS should reveal an intrauterine gestational sac by the 5th week, embryonic or fetal pole by the 6th week, and cardiac activity by the 7th week.

AND SO...

depending on the institution, stable patients with a EcP can be managed in the ED with the consultation of a obstetrician. Early on in pregnancies when menstrual periods have just been missed, patients can be followed as outpatients with serial HCGs every 48 hours until the HCG drops or reaches 1000mIU/ml. up to 50% of patients with EcP are misdiagnosed on their initial presentation to the ED. Keep in mind that delaying the TUS may increase the chances of significant morbidity. In one study, as many as 10% of ruptured EcPs occurred with an HCG of less than 100mIU/ml. If the patient is Rh negative, 300µg of Rh immune globulin (RhoGAM®) should be administered.

If the BHCG is >1000mIU/ml then TUS is recommended. EPs in outlying hospitals with limited radiologic support must consult an obstetrician "I make arrangements for transfer.

Stable patients with unruptured gestational sacs of less than 4cm by TUS can be treated with single-dose methotrexate. With the consultation of an obstetrician, patients are prescribed 50mg/m². This single dose is associated with fewer side effects and is the current accepted practice. Patients are followed on days 4 and 7 after therapy with serial HCGs. Patients will receive a second dose if there is a <15% decline in HCG.²

Unstable patients must be taken immediately to the operating room for laparoscopic surgery. If the absence of TUS, culdocentesis may help establish the need for an obstetrician instead of a general surgeon. Laparoscopy has reduced both mortality and cost.²

Vaginal Bleeding and Miscarriage

Vaginal bleeding occurs in up to 40% of pregnancies and half of these result in miscarriage, especially if the bleeding lasts more than 3 days. Miscarriage (AKA abortion) is a continuum that occurs in patients less than 20 weeks gestation. Threatened miscarriage (TM) is uterine bleeding without passage of tissue or cervical dilation. Inevitable miscarriage (IM) is uterine bleeding with cervical dilation without passage of tissue. Incomplete miscarriage (IcM) is the passage of part of the fetal tissue. Complete miscarriage is passage of tissue and closure of the cervix. Septic miscarriage is an infection during anytime of the miscarriage process. *Miscarriage* is an antiquated term which is now referred to as 1st or 2nd trimester fetal death.

Chemical and infectious agents are thought to be associated with an increased risk of miscarriage. Accounting for 50-60% of all miscarriages, chromosomal abnormalities is the most common cause.

Patients will present with a vaginal bleeding preceding pain. Bleeding may be described as minimal to voluminous with dots or time.

As in ECP, the vital signs should be scrutinized in patients with suspected TM. Nat, the abdomen should be examined. Fetal heart tones may be audible by Doppler ultrasound beginning at 12 weeks. This should be followed by a search for the source of bleeding. Is the bleeding from the walls of the vagina or from the cervix? A speculum exam will reveal the source of bleeding. Many times, blood clot and tissue must be removed in order to visualize the os. To assess for the integrity of the os, a finger or ring forceps should be gently inserted into the internal os. Free passage represents an open os. The uterus and adnexa should be palpated as well.

Laboratory tests should include CBC, HCG, and a type and screen. Always maintain a high index of suspicion for Ectopic. Ultrasonography plays an important

part in the diagnosis and management of TM. The overall rate of miscarriage when cardiac activity is demonstrated on TUS is 5%.

AND SO ...

... the management of miscarriage is dictated by the integrity of the cervical os. The patient with a closed internal os, with or without cardiac activity on TUS, can be managed as an outpatient with serial HCGs and OB consultation. Before leaving the ED, patients must receive Rh immune globulin and be given instructions to return to the ED if the bleeding becomes profuse and to bring in any passed tissue. Bedrest is widely prescribed but there is no evidence that limited activity will affect the outcome of TM.

Patients with a closed os and a history of passage of tissue "may have retained products." A TUS ultrasound will reveal uterine fullness and the patient may need dilation and evacuation. Furthermore, patients with excessive bleeding, pain or signs of sepsis should have OB consultation for admission.

The OB Service must be consulted for any patient who is unstable or who has an open internal cervical os representing either an IM or IcM. The obstetrician may request oxytocin be initiated in the ED; this is easily accomplished by placing 20u oxytocin in a liter of fluids.

Patients with miscarriage often have emotional difficulty in accepting the loss of their baby. Professional counseling or support groups should be offered.

Induced Abortion Complications

There are approximately 1.6 million abortions performed each year in the US. In the 1940s, "more than 1000 women died each year from induced abortion complications." Nowadays, the risk of death from induced abortion is 20 times lower than that of childbirth, and the rate of complications is less than 1 per 1000 abortions.⁴

Patients with induced abortion complications will present to the ED with the postabortal triad consisting of abdominal cramping, vaginal bleeding, and fever. This may be due to retained products without sepsis, failed abortion, hematometra, uterine perforation, ectopic pregnancy, and septic abortion.

AND SO...

... patients should receive fluid support and labs should include CBC, type and cross/screen. If septic abortion is suspected, blood cultures should be drawn and the patient should be given cefotetan 2g IV and gentamicin 2mg/kg IV. If significant bleeding is present, patients should be given high-dose oxytocin: 50u in 500cc of IV fluids over 3 hours. Patients with septic abortion and those with significant bleeding should be admitted.

Vomiting In Pregnancy

Nausea and vomiting and hyperemesis gravidarum are commonly seen in the first 12 weeks of pregnancy.⁶ Nausea occurs in 70% of pregnant patients and vomiting occurs in 50%. Only 1-2 percent will be severe enough to require admission. Hyperemesis gravidarum is defined as vomiting in pregnancy causing electrolyte imbalance or ketonemia and weight loss.

AND SO ...

... if patients appear dehydrated they should be given IV fluids, namely D5NS or D5LR, and IV antiemetics. Laboratory testing should include CBC, Electrolytes, s- ketones and urinalysis. If labs are negative, patients are diagnosed with "Nausea and Vomiting of Pregnancy" and are discharged home with Po liquids progressing to crackers and antiemetics. Patients with abnormal electrolytes, ketonemia, or weight loss greater than 5% of their prepregnancy weight have "Hyperemesis Gravidarum" and should be admitted.

2nd & 3rd Trimesters

Preeclampsia

In the US, preeclampsia is the 2nd "most common cause of maternal mortality in pregnancies beyond 20 weeks." It complicates approximately 5.10% of pregnancies.

Preeclampsia occurs after 20 weeks and is defined as either mild or severe. It is comprised of the triad hypertension, proteinuria, and edema. Mild preeclampsia is characterized by a systolic blood pressure of at least 140mmHg or a diastolic of at least 90mmHg on two separate occasions, 6 hours apart. Mild eclampsia is characterized by a proteinuria

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of at least 300mg/24hr or 1g/ml on two separate occasions, 6 hours apart. There will be generalized edema or weight gain of at least 5 pounds in 1 week See Table 2 for the diagnostic criteria for severe eclampsia.

The following are risk factors

BP >160 systolic, 110 diastolic
Proteinuria >5g/24hr
Oliguria <500cc/24hr
Cerebral or visual disturbances
Pulmonary edema
Epigastric or RUQ pain
Impaired liver function
Thrombocytopenia
Intrauterine growth retardation
Oligohydramnios
Elevated serum creatinine
Grand mal seizures

Table 2. Diagnostic criteria for severe eclampsia.

associated with the development of preeclampsia: nulliparity, age >40, African-American, family history, hypertension, chronic renal disease, antiphospholipid syndrome, diabetes mellitus, twins, and angiotensinogen gene T235.

HELLP Syndrome (hemolysis, elevated liver enzymes, and low platelets) is a variant of severe preeclampsia affecting 12% of women with preeclampsia. Patients with HELLP commonly p-t with epigastric or right upper quadrant pain.

Laboratory evaluation of preeclampsia includes CBC, liver function tests, type and screen, urinalysis, and a 24-hour urine collection.

AND SO...

consult OB on newly diagnosed patients with mild preeclampsia. They can be sent home with instructions to remain at bed rest. She should return if she develops headache, visual changes, abdominal pain, vaginal bleeding or senses decreased fetal movement. Follow-up care should be arranged in 3-5 days. Timing for the delivery is determined by fetal and maternal factors. If the fetus is less than 23 or greater than 37 weeks, delivery is considered. Otherwise, between 24 and 37 weeks, management is bed rest.

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Patients with severe hypertension should be admitted or transferred as they are at risk for maternal intracranial hemorrhage and placental abruption. Hydralazine 2.5mg IV should be given and repeated every 20 minutes (maximum: 40mg) until the BP is controlled. If the maximum dose of hydralazine is used, labetalol 20mg IV every 10 minutes for a maximum of 300mg can be given. Angiotensin converting enzyme inhibitors should not be given because of the potential fetal side effects of anuria and renal failure. Nitroprusside is also avoided because it crosses the placenta and may cause cyanide toxicity in the fetus.

Patients with severe preeclampsia are also at risk for developing eclamptic seizures. For prophylaxis, magnesium sulfate 6g IV over 15 minutes followed by 2g IV per hour should be given. The same dosage is administered for the treatment of pregnancy patients presenting with a seizure. The definitive treatment for eclampsia is delivery.

Vaginal Bleeding

Placenta Previa

Placenta previa occurs when the placenta implants in the lower uterine segment.⁸ There are essentially three types:

1. Total- the placenta completely covering the os.
2. Partial- the placenta covering part of the os.
3. Marginal- the placenta approaches, but does not cover the os.

Patients present with sudden vaginal bleeding. Pain may be present. Bleeding is usually from maternal circulation and is due to a marginal separation of the placenta away from the uterus. The lack of myometria tissue in the lower uterus makes hemostasis difficult. Since the functional portion of the placenta is undisturbed, fetal compromise occurs when mother becomes hemodynamically unstable.

Digital exam is contraindicated as it may precipitate severe hemorrhage. Ultrasound helps to localize the placenta prior to any vaginal exam. Technical difficulties may be encountered in transabdominal ultrasound, such as false positives and artifact. Although digital exam is contraindicated, carefully

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performed TUS is safe. When the probe is placed just short of the cervix, TUS allows higher resolution scans which are helpful in differentiating the internal os from placental edges.

Abruptio Placentae

Abruptio placentae is the premature separation of the placenta from the uterus. It is a leading cause of fetal death and accounts for 14% of all stillbirths, and 35-50% of perinatal mortality due to problems of prematurity including respiratory distress syndrome, intraventricular hemorrhage and necrotizing enterocolitis.

Maternal hypertension is the greatest risk factor for abruptio placentae. Shearing forces or blunt trauma due to motor vehicle collisions may also result in abruptio placentae. Other risk factors include abruptio in prior pregnancies, advanced maternal age, multiparity, cigarette smoking, and cocaine use.

Abruptio placenta occurs after blood vessels at the placental bed spontaneously rupture. This results in fetal hypoxia. Depending on the location of the placenta, bleeding may be external or internal resulting in concealed hemorrhage.

Patients with abruptio placentae present with the sudden onset of intense abdominal or back pain with or without bleeding. Fetal heart sounds may be absent depending on the time elapsed of placental separation. There may be also signs of DIC such as mucosal bleeding, bruising, hematuria, or excessive bleeding after venipuncture.

Hemorrhage and DIC continue until the fetus and placenta are delivered. Vaginal delivery is preferred as caesarean section may increase maternal morbidity and should be performed unless absolutely necessary. Pads may provide a more objective estimate of bleeding. Concealed hemorrhage may be evaluated by serial measurements of fundal height.

Uterine Rupture

Uterine rupture is associated with 40% of maternal mortality, and in excess of 50% of fetal mortality. The most common risk factor is prior surgery on the uterus. Other risk factors include implantation abnormalities, invasive mole, grand multiparity, tetanic uterine contractions and blunt trauma.

The clinical presentation is varied and patients commonly present with localized abdominal pain. Fetal heart tones may be present or absent and bleeding is variable. Bleeding into the abdominal cavity is common and can cause fetal distress, maternal hypovolemia, and shock even with the slightest of vaginal bleeding. Patients with uterine rupture should immediately undergo laparotomy.

Bleeding From the Lower Genital Tract

After ruling out placenta previa, the vagina and cervix may be visualized with a speculum to reveal other sources of bleeding. "Bloody show" is normal and occurs during labor. The bleeding is due to the disruption of blood vessels supplying the cervix during progressive cervical dilation. Cervical polyps, cervical erosions, vulvar varicose veins, and cancer are other less common causes of bleeding.

AND SO...

the following are basic management principles that apply to any patient presenting with bleeding in the second half of pregnancy:

1. Immediately begin resuscitative efforts. Remember that there are two patients but mother always comes first because it may result in improved fetal status. Don't forget the RhoGAM®.
2. Establish gestational age from records or by fundal height as management decisions are dictated by fetal maturity.
3. *Never* do a digital vaginal or rectal exam before placenta previa is ruled out.
4. Consult OB for all cases of 2nd and 3rd trimester vaginal bleeding. Depending on fetal maturity, delivery may be warranted. If mother is stable, prepare to transfer to facility capable of caring for a premature neonate.

Coexisting Medical Problems

Pneumonia

The incidence of pneumonia in pregnancy is about 1 in 2000. The most common pathogens are *Streptococcus pneumoniae* and *Haemophilus influenzae*, but almost any pathogen has been reported.⁹

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Influenza and varicella are the most common viral pathogens. Although no congenital abnormalities are associated with maternal pneumonia, high fever and hypoxemia can pose risks to the fetus and may cause preterm labor.

The treatment of pneumonia in pregnancy is the same as in the general population.

Chickenpox is thought to occur in less than 1 in 1,000 of pregnancies. Varicella pneumonia is much more severe in pregnancy and is associated with a higher mortality rate of up to 35%. Pregnant women with chickenpox and cough should be hospitalized and treated with intravenous acyclovir.

Cystitis

Urinary tract infections are the most common medical complication in pregnancy.⁹ The most common organisms are *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, and group B streptococci. These pathogens are sensitive to ampicillin, nitrofurantoin and sulfisoxazole for 7-10 days. There are limited data evaluating the efficacy of shorter courses of treatment.

Pyelonephritis

This affects 1-2.5% of all pregnant women. Pyelonephritis is diagnosed as in the general population. Urine cultures should be routinely obtained.

Pregnant patients under 20 weeks with pyelonephritis can be given IV ceftriaxone, and discharged with oral antibiotics with close OB follow-up. Patients over 20 weeks should be admitted for IV ceftriaxone and if sepsis is present, gentamicin may be added.

Asthma

Asthma is seen in about 4% of pregnancies. About 1/3 of pregnant women get worse, 1/3 get better, and 1/3 remain the same. Mild asthma is treated as in the general population with inhaled beta-2 agonists. More severe asthma will necessitate the use of inhaled or oral steroids. There are no adverse effects to the fetus with beta-2 agonists and steroids. Status asthmaticus must be diagnosed quickly and must be treated more aggressively because of the risk of hypoxia to the fetus.

Thromboembolism

The incidence of thromboembolism is increased during pregnancy and is the leading cause of maternal death. This is greatest in the postpartum period. Thromboembolism in pregnancy can be difficult to diagnose because many of the symptoms are also normal physiologic changes seen in pregnancy. The diagnosis and treatment of thromboembolism is the same as in the general population and heparin is the mainstay of therapy. The use of thrombolytics is controversial.

Acute Abdominal Pain

Appendicitis

Pregnant patients present with the same symptoms as in the general population. As the uterus grows, it displaces the location of the appendix. So, McBurney's Point becomes useless. In addition, leukocytosis with a left shift is physiologically normal in pregnancy. Patients are best treated with admission, serial examinations and allowing the surgeons and obstetricians to battle it out.

Cholecystitis

Acute cholecystitis requiring surgery occurs in 1 in 1,000 pregnancies. The diagnosis and treatment is the same. Cholecystectomy is recommended as recurrent attacks in pregnancy are common. The second trimester is the best time for a cholecystectomy as there is a decreased chance of preterm birth.

AND SO...

for the most part, many coexisting medical problems are treated the same, and maybe just a little more aggressively.

Trauma in Pregnancy

Approximately 7% of pregnant women will suffer some physical trauma during pregnancy and a multidisciplinary approach to management is frequently required.¹⁰

Blunt Trauma

Motor vehicle collisions account 50-65% of all cases of blunt trauma and domestic violence accounts for 20%.¹¹ The most common adverse effect is abruptio placentae which occurs in up to 3% of non-life threatening blunt trauma and up to 50% of life threatening trauma

Uterine rupture occurs in about 0.6% of severe direct abdominal trauma.

Penetrating Trauma

Knife and gunshot wounds are more common in urban settings. These decisions must immediately be made: whether to perform exploratory laparotomy, whether to deliver the fetus and by what route.

AND SO...

always start with the ABCs of trauma and remember that mother always comes first. In minor trauma, documenting fetal heart tones by Doppler ultrasound or visualization of the fetus by ultrasound may be all that is necessary in the fetus that is less than 20 weeks old. The management of major trauma involving a fetus less than 20 weeks old is directed solely at mother. If fetomaternal hemorrhage is suspected and mother is Rh negative, remember to give RhoGAM®.

Obstetricians must be called to the ED when there is major trauma involving a fetus greater than 20 weeks old. After initial stabilization, fetal monitoring should be initiated. Patients should be hospitalized if there is the presence of the following:

1. More than four uterine contractions in any 1 hour.
2. Rupture of amniotic membranes.
3. Vaginal bleeding.
4. Serious maternal injury.
5. Fetal tachycardia, late decelerations, nonreactive non-stress test.

Otherwise, definitive treatment such as suturing lacerations and x-rays should be done and the patient discharged with follow-up.

Transport and Transfer

Prehospital

In the prehospital setting, the majority of transports of pregnant patients are routine and uncomplicated.¹²

Although most deliveries are uncomplicated, patients who deliver in the prehospital setting or in the ED have a higher risk of complications. If delivery is imminent, then delivery is done at the scene. The paramedic need only insert a gloved hand in these two situations:

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1. Breech presentations in order to flex the fetal neck to assist in the delivery of the head.
2. Prolapsed umbilical cord to displace the cord from around the neck of the fetus.

Interhospital Transportation

There are two types of transportation: one-way and two-way. One-way transportation originates at the transferring facility. Many times EMS crews are inexperienced and lack the skill and expertise of a transport team. Frequently, physicians and nurses unfamiliar with transport medicine are required to accompany the patient.

Two-way systems have dedicated transport teams that are experienced and carry special equipment. However, there is a delay in the patient's arrival at the receiving institution.

There are many factors to be considered before transferring a patient including personnel availability, weather conditions, traffic limitations, and cost. If it appears that delivery is likely to occur during transport, the best approach is to deliver and then transport both mother and baby.

Indications for Transport

Transport should be considered if there is a significant chance of maternal or fetal risk that cannot be adequately addressed at the referring institution.¹¹ Table 3 lists conditions possibly requiring transport. Transport should be arranged as soon as the decision to transfer is made.

Care During Transport

Patients must be transported in the left lateral tilt position and be given oxygen and fluids. Fetal heart tones must be determined at least every 15 minutes by Doppler ultrasound and after every uterine contraction. If magnesium and terbutaline are given, mother's vital signs and deep tendon reflexes must be assessed at least every 30 minutes. If a neonate is present, his vital signs, color, activity and oxygen saturation should be determined at least every 30 minutes.

COBRA/EMTALA

There is an anti-patient-dumping legislation in the Consolidated Omnibus Reconciliation Act known as the

Emergency Medical Treatment and Active Labor Act." This law was passed to address problems occurring in the interhospital transfer of patients. The law requires that the transferring physician must speak with a physician at the receiving hospital who then must accept the patient." A medical screening exam must be done prior to the transfer and evaluation and stabilization should be

Obstetric complications:

Premature rupture of membranes
Premature labor
Severe preeclampsia or eclampsia
Hypertensive crisis
Multiple gestation
Third trimester bleeding

Medical Complications

Serious infections
Severe heart disease
Poorly controlled diabetes
Thyrotoxicosis
Deteriorating renal disease
Drug overdose
Other: sickle cell anemia, blood dyscrasia, liver disease, malignancy

Surgical Complications

Major trauma
Acute abdominal emergencies

Fetal Conditions

Anomalies requiring surgery
Rh disease
Congenital malformations
Fetal arrhythmia or bradycardia
Intrauterine growth restriction
Severe oligohydramnios
Vaginal breech delivery

Table 3. Conditions requiring transport.

done to ensure that, within reasonable medical probability, no harm will come to the patient and that that transfer will outweigh the risks. If necessary interventions at the referring lower-level facility are beyond its capabilities, the patient can be transferred to a higher level facility without stabilization. Risks and benefits of the transfer, the name of the receiving physician, the options for transfer and the reason for the mode

chosen, and the capabilities the receiving institution has over the referring institution should be documented by the referring physician. By law, the sending physician is responsible for the patient until they reach the receiving institution. Failure to comply with COBRA can result in fines for both the referring physician and referring hospital.

AND SO...

... recognize the need to transport and comply with COBRA/EMTALA.

Preterm Labor

Approximately 10% of pregnancies end in preterm labor and is defined as delivery before 37 weeks.¹⁴ Patients who experience preterm labor before 34 weeks are at high risk for poor infant outcome. The symptoms of preterm labor are listed in Table 4. Multiple gestation, history of preterm birth, drug use, and UTI symptoms are risk factors for preterm labor.

Menstrual-like cramps

Low, dull backache

Pelvic pressure

Sudden increase in vaginal discharge

Vaginal spotting or staining

Painful uterine contractions, occurring 4 or more per hour

Table 4. Symptoms of preterm labor.

For the most part, patients in preterm labor can easily be transferred to the care of an obstetrician, but certain conditions must be met.

After ruling out placenta previa, patients should undergo a sterile speculum exam if there is a history of leaking fluid. Many advise to obtain cultures for *Chlamydia* and *Neisseria gonorrhea*. Vaginal fluid should be placed on nitrazine paper and a pH >6.5 indicates likely amniotic fluid. Fluid placed on a microscopic slide that then demonstrates ferning is also indicative of amniotic fluid. If membranes are ruptured, the cervix should be visually measured in order to prevent infection. If membranes are not ruptured, a sterile digital exam is performed to measure cervical dilation, effacement, and the presenting part.

If membranes are ruptured, the cervix is dilated to more than 6cm, and the pregnancy is over 34 weeks, delivery is imminent. Equipment and personnel trained in delivery should accompany the patient during the quick transport to Labor and Delivery. If the baby's head is palpated in the vault, prepare to receive.

The initial treatment of preterm labor consisting of bed rest and fluids is effective in 30% of patients. However if contractions continue, tocolysis may be required. Terbutaline 0.25mg SQ can be repeated every hour until contractions stop or until the maternal heart rate reaches 140. The next step is a 4-6g IV bolus of magnesium sulfate over 20 minutes followed by a 2g per hour IV infusion. Mothers should be examined for loss of tendon reflexes which shortly precede respiratory and cardiac arrest. Glucocorticoids can be given to help promote fetal lung maturity in preterm patients. Dexamethasone is given 6mg every 6 hours for four doses. Some physicians prefer calcium channel blockers instead of terbutaline. The initial dose is 10mg sublingually every 20 minutes for a maximum of 40mg during the first hour. It can then be repeated 20mg every 6 hours.

AND SO...

... preterm babies have better outcomes when delivered at higher care institutions. It is extremely important to discuss the care of the patient during transport with an obstetrician, preferably at the receiving hospital. If a woman is transported in active labor, personnel trained in emergency delivery and in fetal monitoring should accompany her.

Delivery in the ED

Once the cervix is fully dilated, the pregnant patient will have an

uncontrollable urge to push. The cervix should be checked for full dilation before allowing mother to push or serious cervical lacerations can occur. Multiparas should stay in the ED or delivery will take place in the elevator in route to L&D.

Childbirth has occurred without assistance throughout history. The most important function in assisting the delivery of a baby is to recognize complications and to improve and correct the situation.¹⁵ Unfortunately the scope of this lecture prevents further elaboration.

AND SO...

breathe with mother and relax. If the membranes are ruptured, the cervix is fully dilated and mom needs to push, stay in the ED and deliver, otherwise expeditiously take Mom to L&D. If delivery is imminent, encourage Mom to push, breathe deeply, and to relax as well. When baby's head emerges, suction out the nostrils and mouth and aid in the delivery. Apply gentle downward traction to deliver the anterior shoulder and gentle upward traction to deliver the posterior shoulder. Remember the baby will be slippery and should be dried off and placed in a warm blanket on Mom's abdomen. The cord should be double clamped and cut with sterile scissors. The baby should be assessed and Apgar score should be measured. (See Table 5.)

Resuscitation

The resuscitation of the mother should precede all other measures. The life of the fetus is second.¹⁶ The great majority of cardiac arrests in pregnant women will be from nonresuscitable causes and thus the EP must be ready to deliver the fetus during CPR. If there is a chance of maternal survival, the 4-minute rule is followed. Resuscitation is attempted for 4

Sign	0	1	2
Heart rate	absent	<100/min	>100/min
Respiratory effort	absent	weak cry	strong cry
Muscle tone	limp	some flexion	good flexion
Reflex irritability	no response	some motion	cry
Color	blue, pale	body pink, extremities blue	pink

Table 5. The Apgar Score

minutes and if pulses are not palpated, the fetus should be delivered

During the perimortem c-section, maternal resuscitative efforts should be continued. A perimortem c-section may improve maternal survival by improving cardiac output.

The resuscitation of the pregnant patient under 24 weeks is exactly the same as in other patients. However, after 24 weeks, there are a few important things to remember. All pregnant patients, responsive or not, should be placed in the left lateral tilt position. Unresponsive patients should immediately be intubated and obstetrics and pediatrics called to the ED. CPR should begin as soon as pulses disappear. Individuals performing CPR should pay attention to proper positioning and to the vector of compressions; this is difficult when the patient is in the left lateral tilt position

As stated above, perimortem c-section should be performed within 4 minutes of maternal cardiac arrest. The great majority of infant survival occurs with delivery within 5-10 minutes after cardiac arrest. The following guidelines should be followed when performing a perimortem c-section:

1. No need to prep the abdomen.
2. Continue CPR and ventilations.
3. If a obstetrician is standing there, let him do it. Otherwise, make a midline vertical incision 5cm below the xiphoid to 2 cm above the pubis or at the hairline. The incision should be made deep through subcutaneous tissue and fascia
4. Blunt dissect through the rectus muscles. Enter the peritoneum slightly below the umbilicus and incise superiorly and inferiorly. Watch the bladder! The uterus should come into view.
5. Make a vertical incision from the fundus down to the reflection of the bladder. Deliver the baby, dry it and resuscitate it as you would an emergency delivery and remove the baby. Don't forget to deliver the placenta and clean out the inside of the uterus.
6. Continue CPR Quickly repair the uterus with #0 or #1 Vicryl or Dexon in a running stitch Then dose the peritoneum and fascia with running Prolene. Staple the skin,

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don't worry about the subcutaneous tissue.

7. If Mom might survive, don't forget antibiotics.

AND SO...

don't hesitate in your decision to perform a perimortem c-section. And do the c-section quickly.

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