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Antepartum Hemorrhage

Placenta Previa

Placenta Acreta

Placenta Abruptio

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AWHONN Annual Convention
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Disclosures

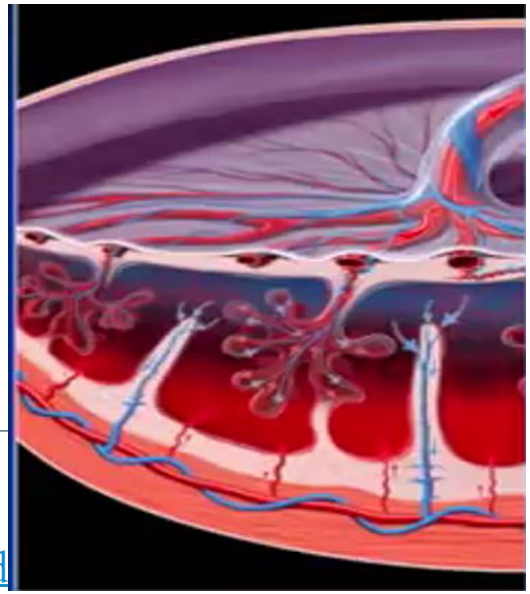
- I have no financial relationships with any commercial interests
- No relevant financial relationships exist

Objectives

- Discuss **abnormal conditions** that increase a pregnant woman's risk for hemorrhage
- Review the **physiological changes** of pregnancy that **mask** the severity of hemorrhage
- Describe the importance of **multidisciplinary care teams** aimed to provide comprehensive care
- List the **hemorrhage bundle** elements aimed to prevent hemorrhage and minimize maternal morbidity and death

Placenta Anatomy and Physiology:
Temporary – Time Limited – Disposable – Shared

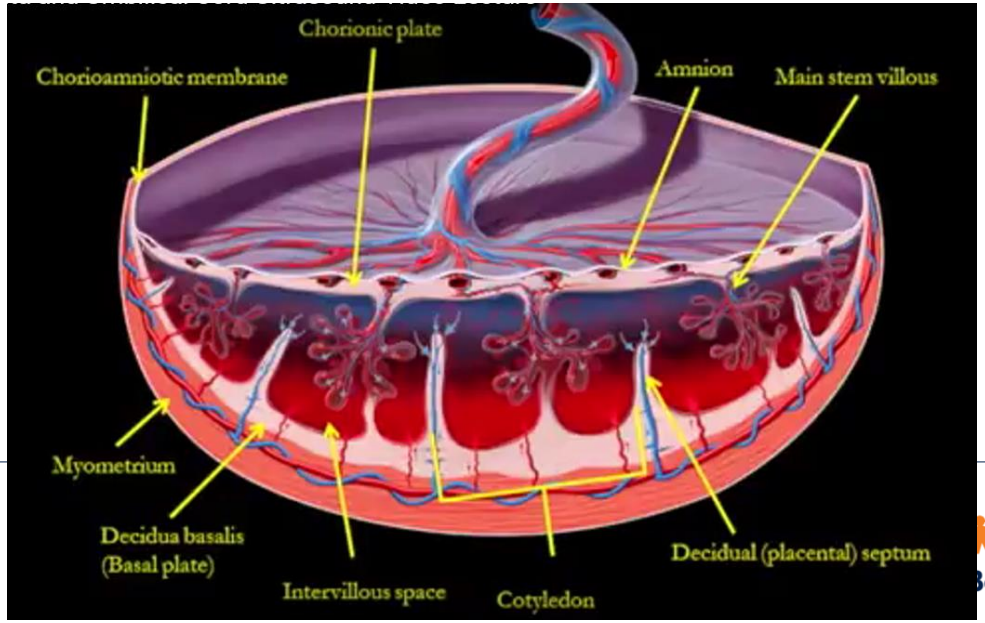
- Circulation by **17th day** of gestation
- Placenta completely develops and functions by **10th week** but continues forming until the **end of the 16th week** of gestation.
- 3 weeks after fertilization, small projections appear and form the chorionic villi.
- These villi erode the walls of the maternal blood vessels and open sinuses where maternal blood pools.
- It is a temporary endocrine organ and has a blood flow ***of 1000 mL per minute.***



www.open.ed

Placenta Anatomy and Physiology

- The maternal surface has **15-20 cotyledons** each containing major branches of the umbilical blood vessels.
- The **villi** hang in the **intervillous space** inside the uterine wall that is filled with mom's blood. This is where the exchange of nutrients, oxygen, and waste products occur.
- It serves as an organ for **respiration**, **nutrition**, **excretion**, and protection as well as secreting **hormones** to stabilize pregnancy.



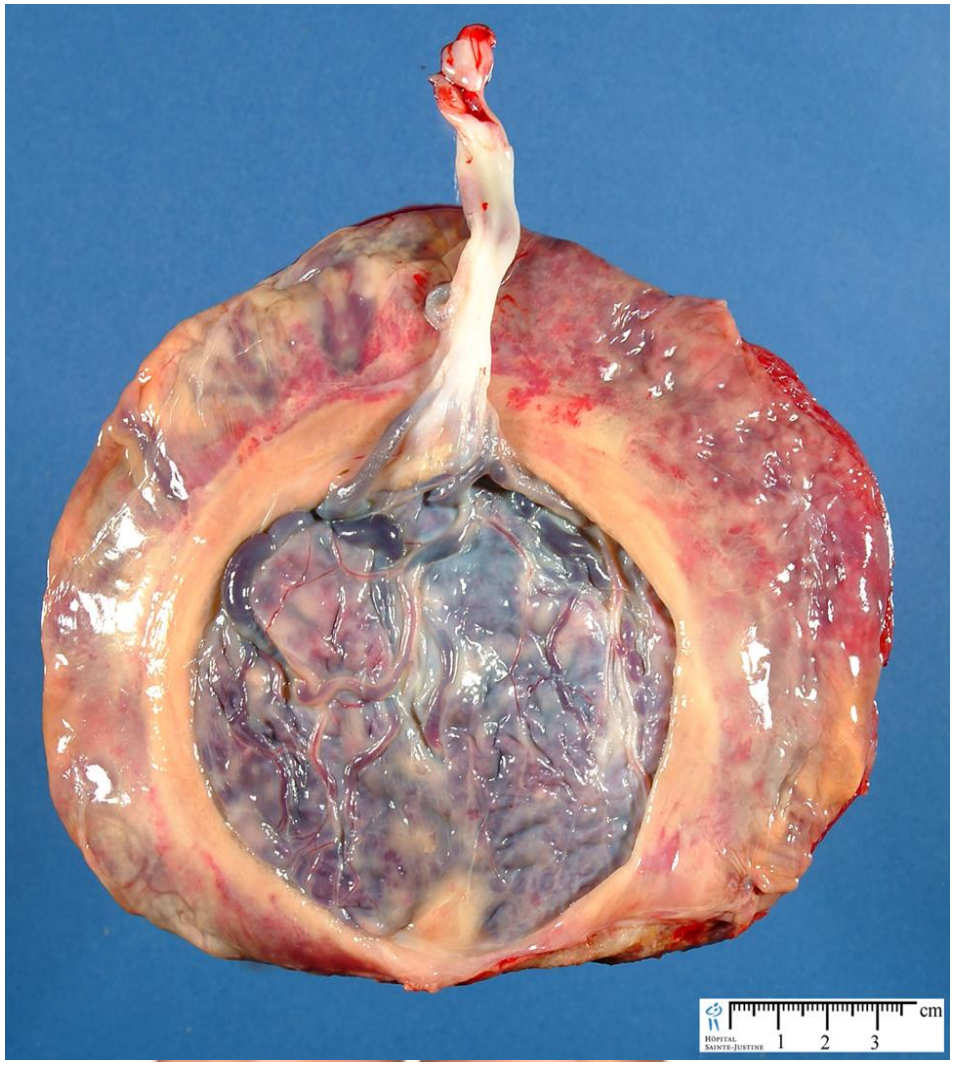
(Normal) Placenta "Stats" at Term

- Weight: 400-470 gm
- Diameter: 20-22 cm
- Thickness: 2.5 cm
- Umbilical cord length: 49-52 cm
- Umbilical cord thickness: 2.5 cm

stethnews.com

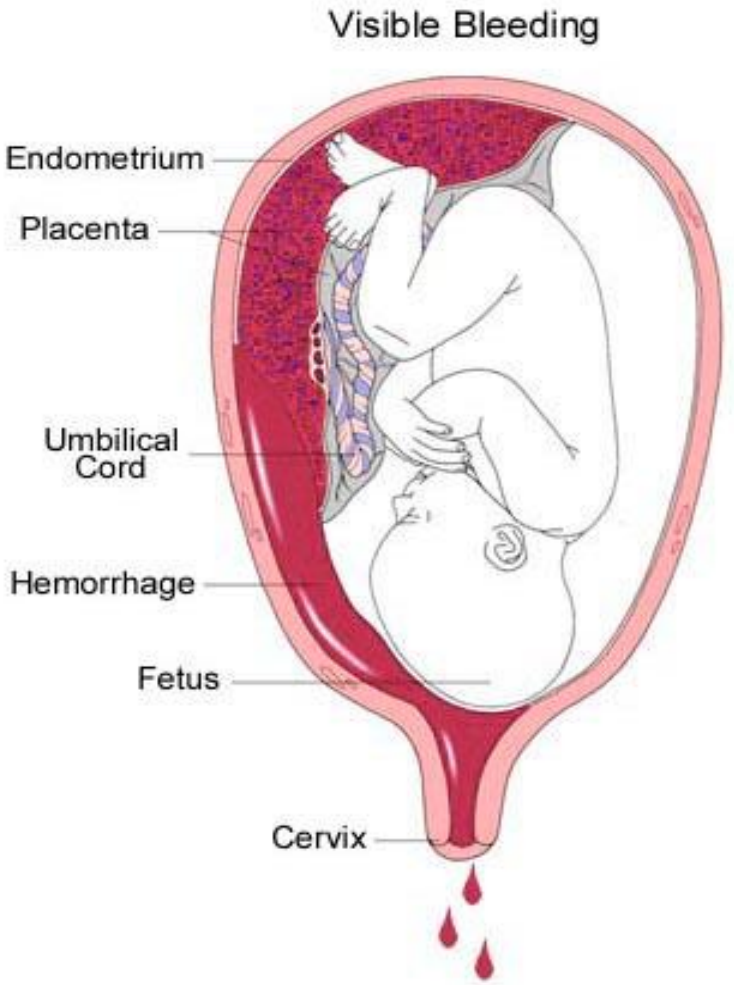
Abnormal Placentas

- Abnormal structures
- Abnormal shapes
- Placental malperfusions
- Extrachorialis placentas
- Infarcts/Calcifications
- Accreta family of abnormalities



Placental Abruption

- Premature separation of a normally implanted placenta
- Occurs in 1% of all births
- Abruption is a leading cause of antepartum hemorrhage



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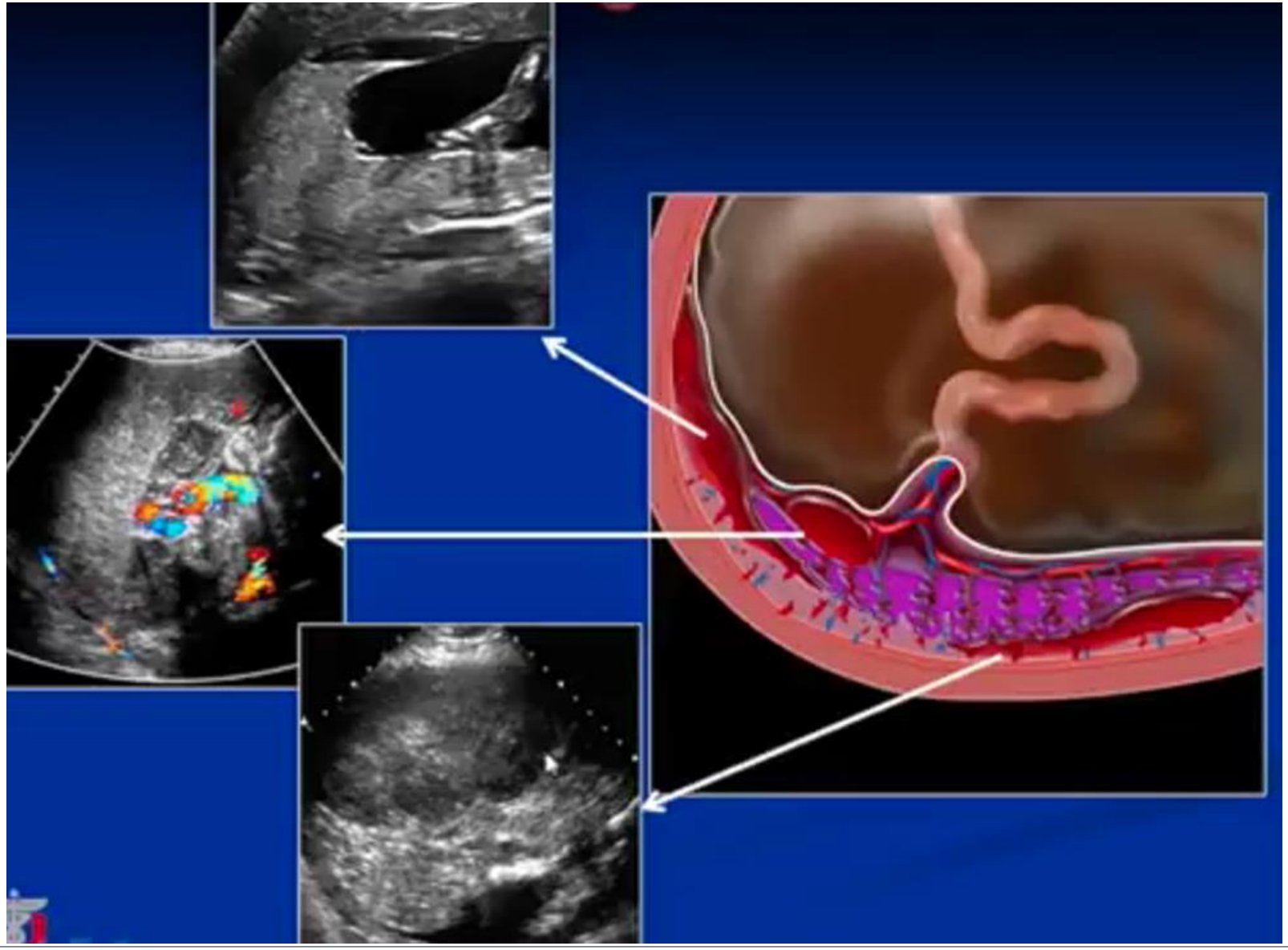
Oyelese Y et al 2006



https://www.youtube.com/watch?v=s729yinUGbY

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Placental Abruption

- Abruption can be occult or visible
- Abruption of more than 50% of the placenta is associated with fetal death

Abruption: Grading

0 Asymptomatic – a small clot is discovered

1 Vaginal bleeding, uterine **tetany** & tenderness possible, no signs of maternal shock or fetal distress

2 External vaginal bleeding may or may not be present, no signs of maternal shock, signs of fetal distress present

3 External bleeding may not be present. **Marked uterine tetany**, persistent abdominal pain, maternal shock and fetal demise present

Coagulopathy possible in up to 30% of cases

Konje JC, & Taylor DJ, High risk pregnancy 2000

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Risk Factors for Placental Abruption

- Prior abruption
- Smoking
- Cocaine use
- Trauma
- Hypertension

- Thrombophilias
- AMA
- PPROM
- Intrauterine infections
- Hydramnios (>2,000 ml)

Clinical Presentation of Placental Abruption

- What are the two hallmark signs and symptoms of placental abruption?

Diagnosis of Placental Abruption

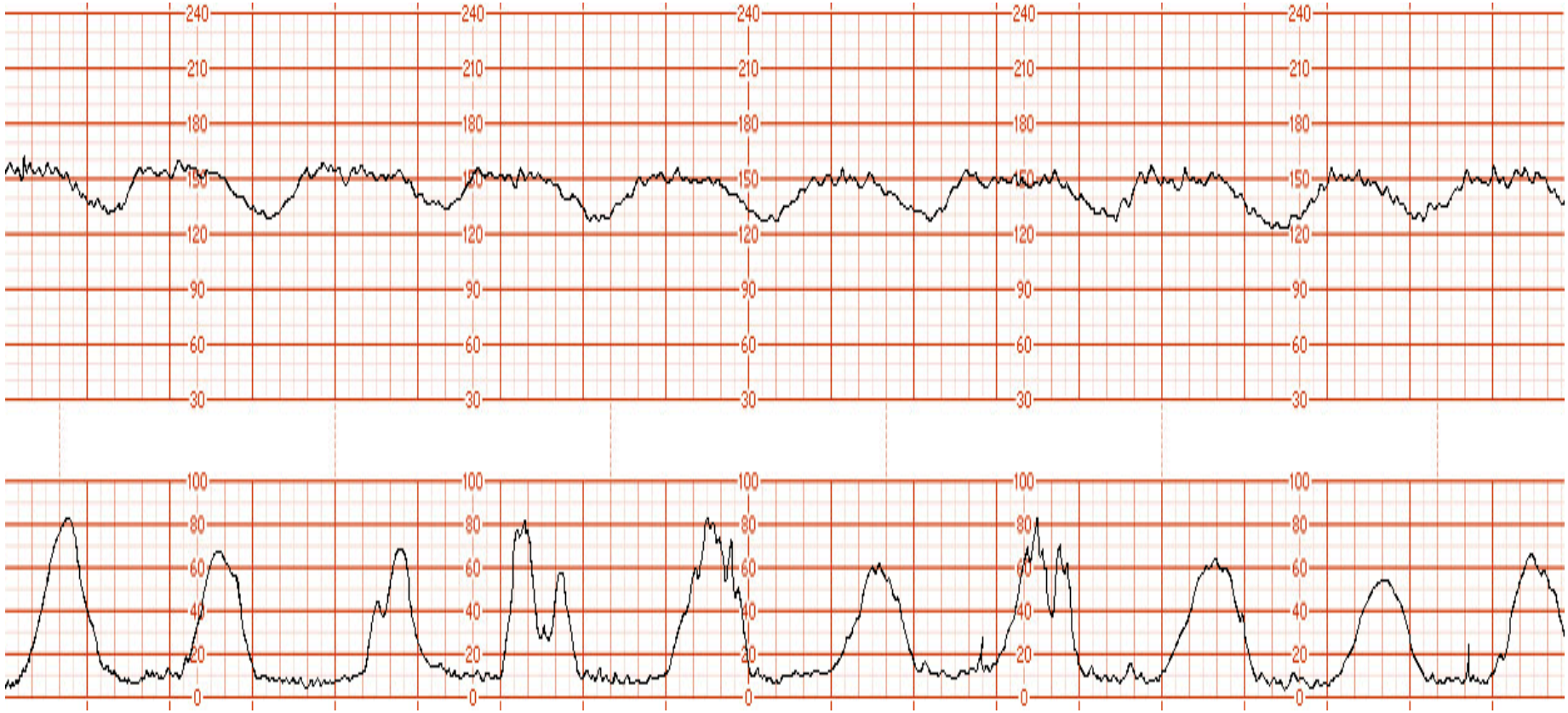
- Diagnosis is generally clinical
- U/S may or may not be helpful depending on the extent of the abruption and duration
  - An acute retroplacental or preplacental hemorrhage may not be detected on U/S
  - **If** abruption is not detected on U/S → it may be there
  - If abruption is detected on U/S → it's diagnostic

Management of Placental Abruption

- Management based on **fetal status** and **labor status**
- Initial evaluation should include:
  - Kleihauer-Betke Test?

    if RH negative → administer RhoGAM
  - Continuous fetal monitoring
  - Large bore IV, Type and crossmatch
  - Foley catheter??
- If the etiology is not trauma or cocaine, watch B/P, **pre-eclampsia** is the next leading cause of abruption

Fetal Monitoring



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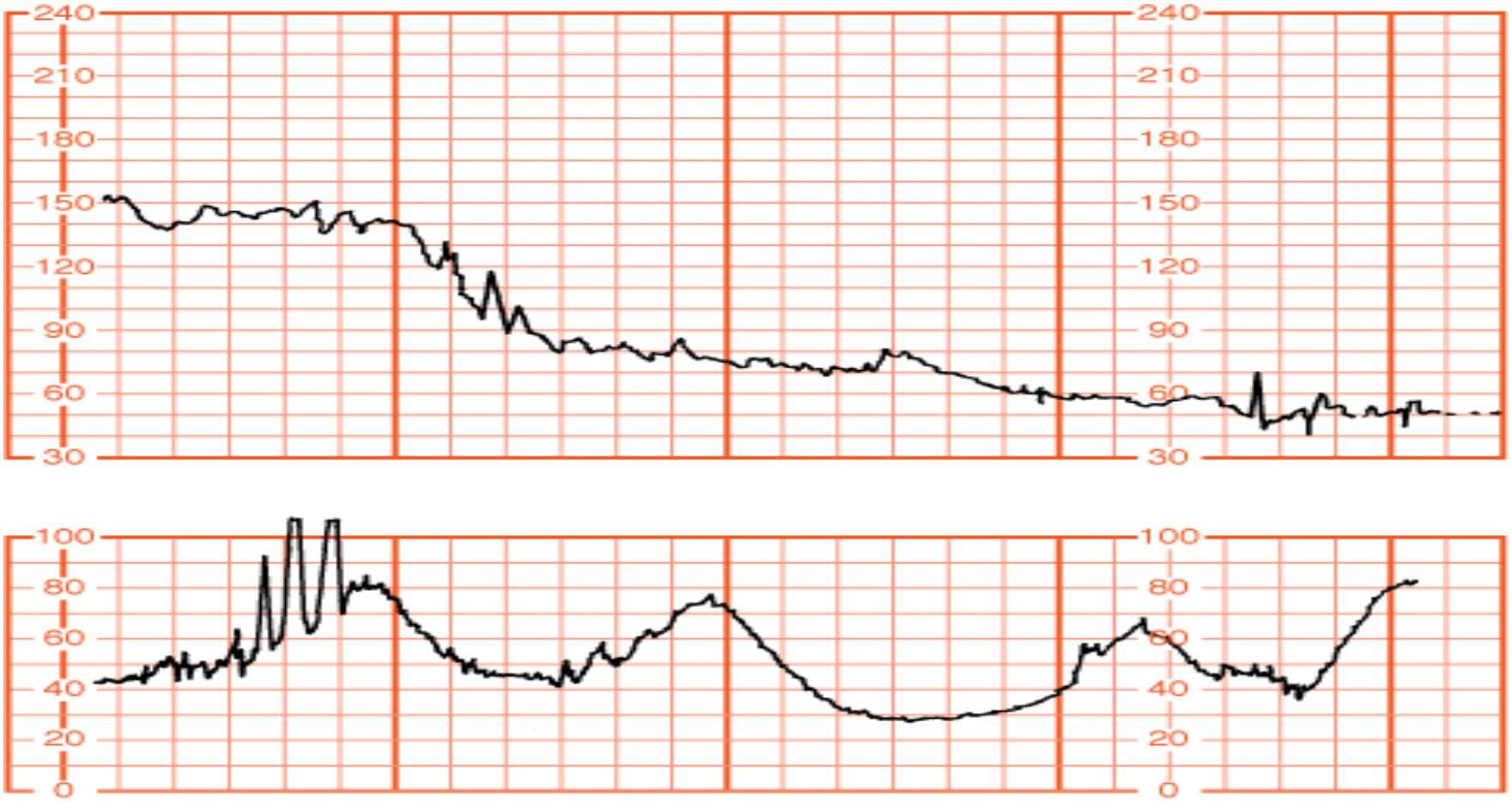
Fetal Monitoring



Source: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY: *Williams Obstetrics, 23rd Edition:* http://www.accessmedicine.com

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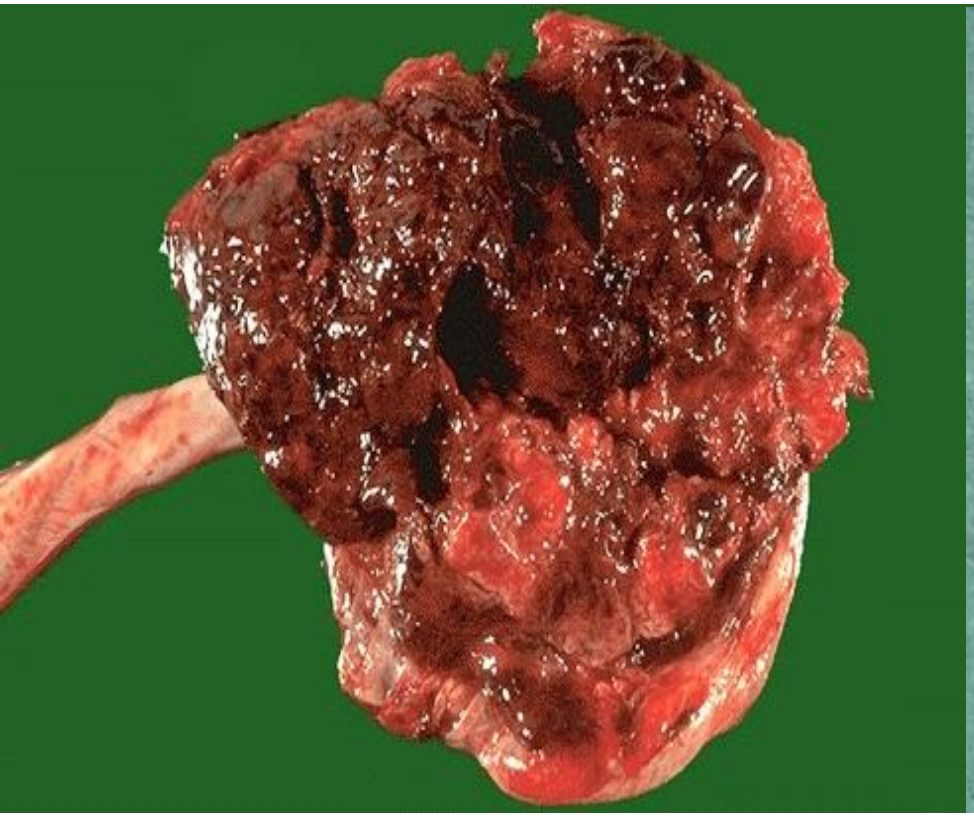
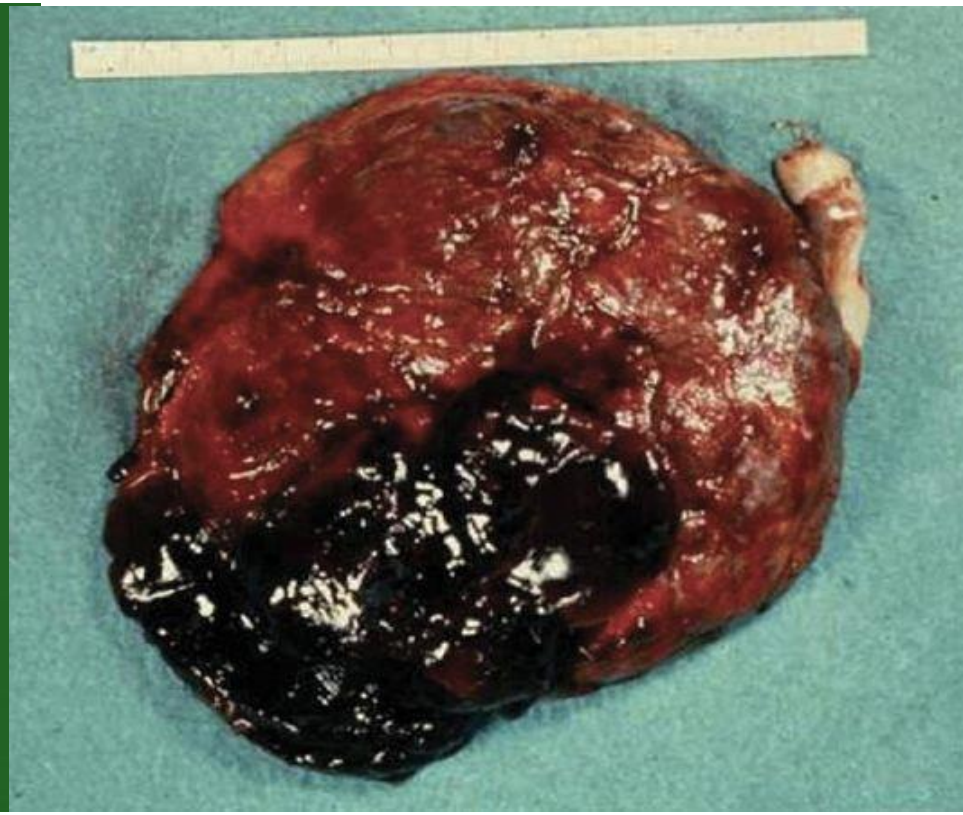
Chronic vs Traumatic Abruption



library.med.utah.edu



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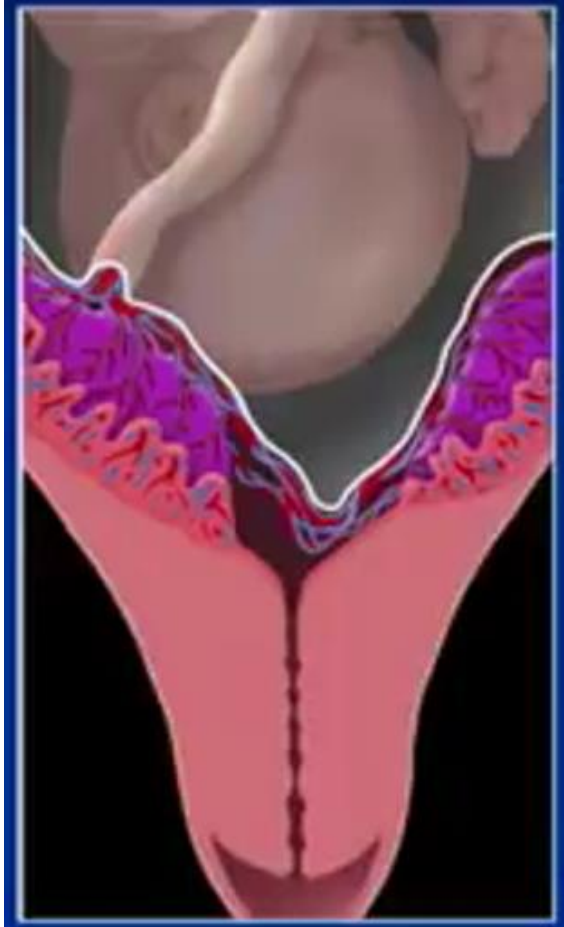
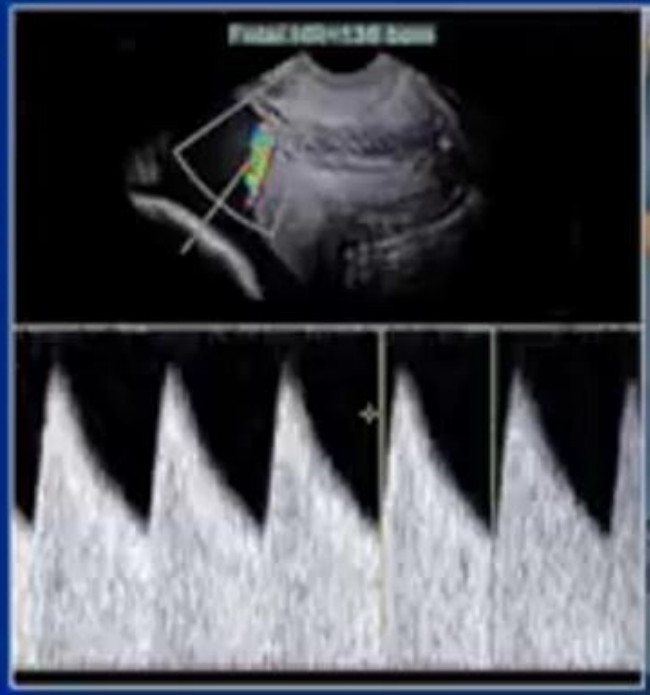
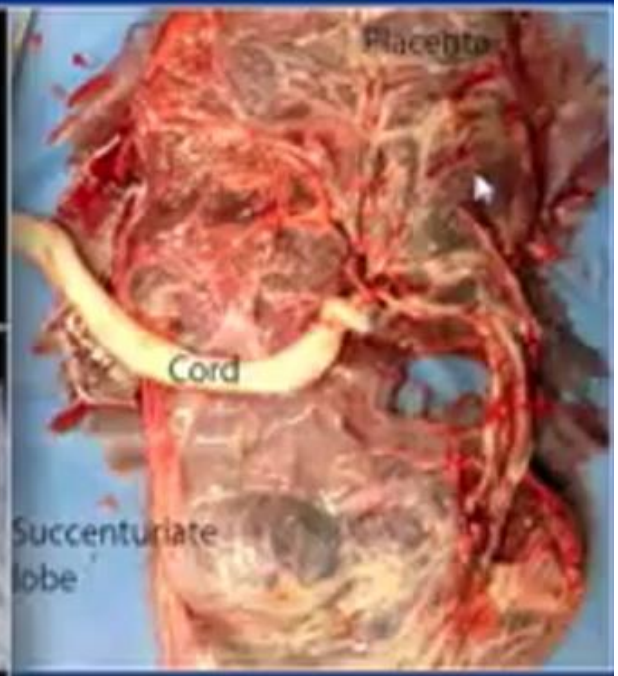
Vasa Previa







vasaprevia.com

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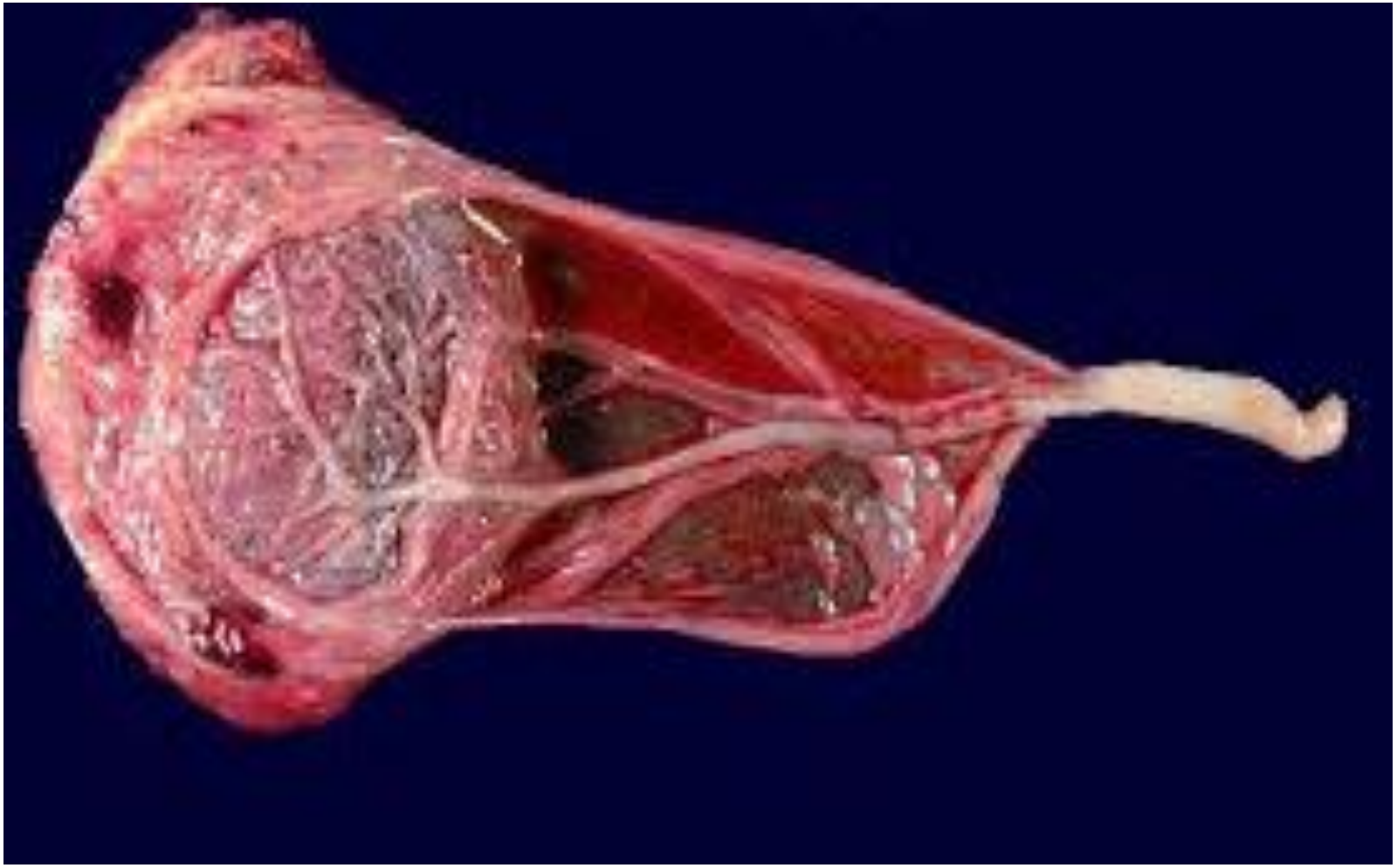
Vasa Previa

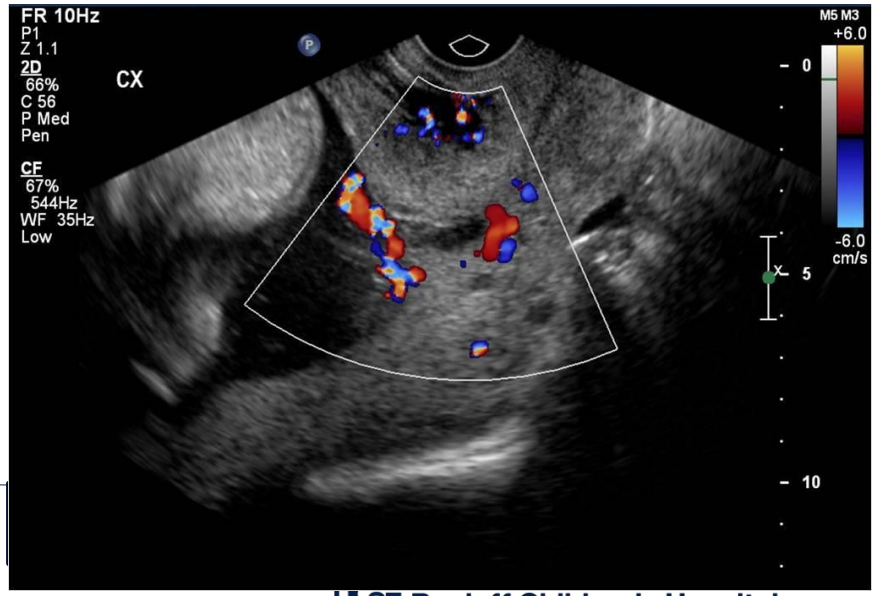
- Rare, potentially catastrophic complication.
- Often associated with a velamentous insertion of the umbilical cord.
- Fetal vessels run through the fetal membranes.
- Vessels are at risk of rupture with consequent fetal exsanguination.
- Affects 1:1,300 to 8,300 pregnancies.

Yikes!



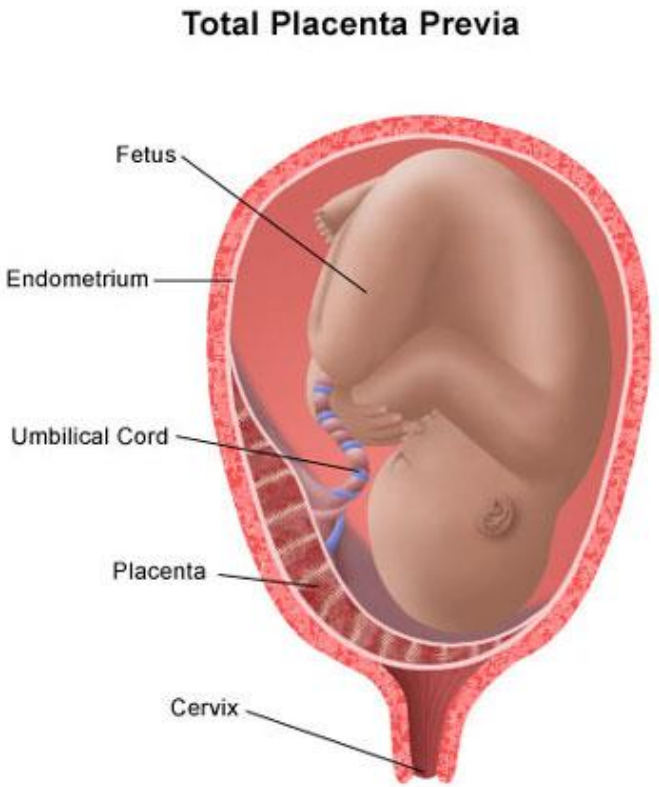
midwifemuse.wordpress.com

Velamentous Insertion



Placenta Previa

- Placenta previa refers to the presence of placental tissue overlying or proximate to the internal cervical os
- The main complication of placenta previa is bleeding
- Several forms of the disorder been described



Sakornbut E 2007

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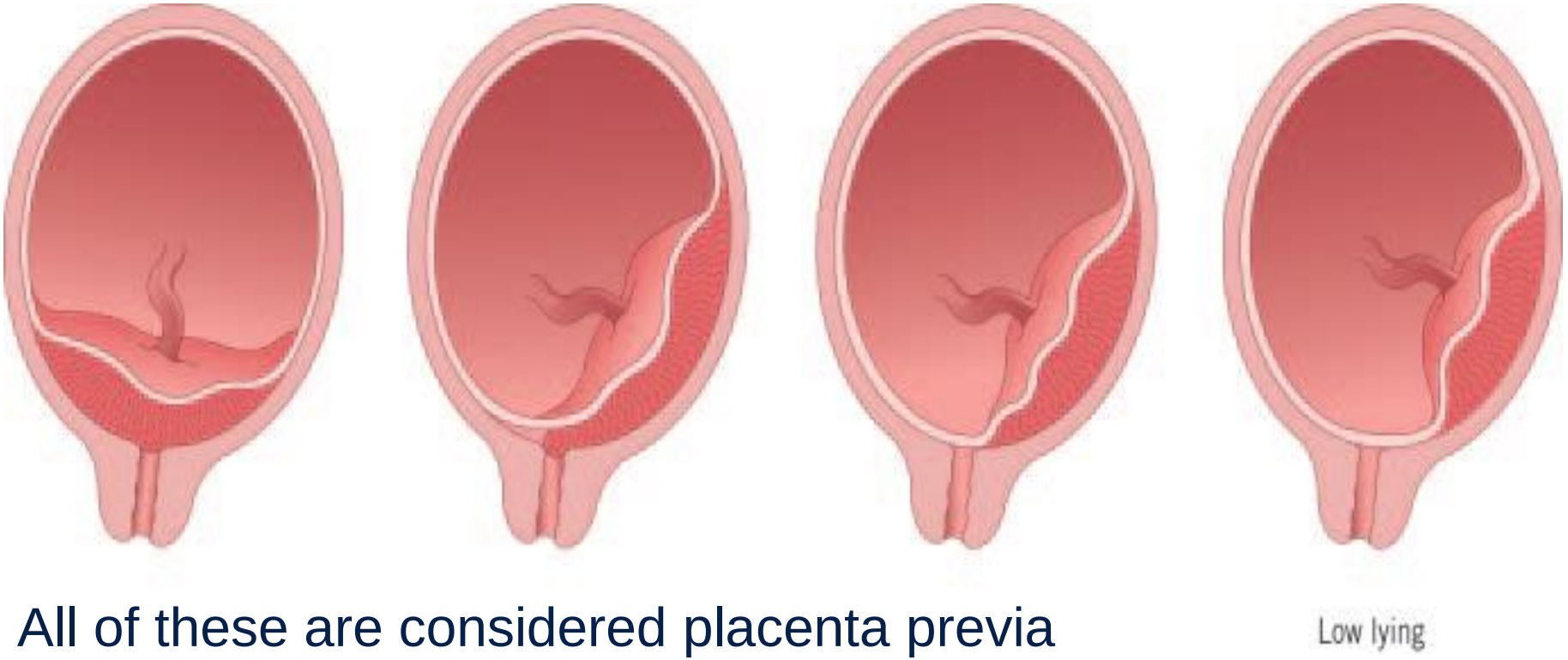
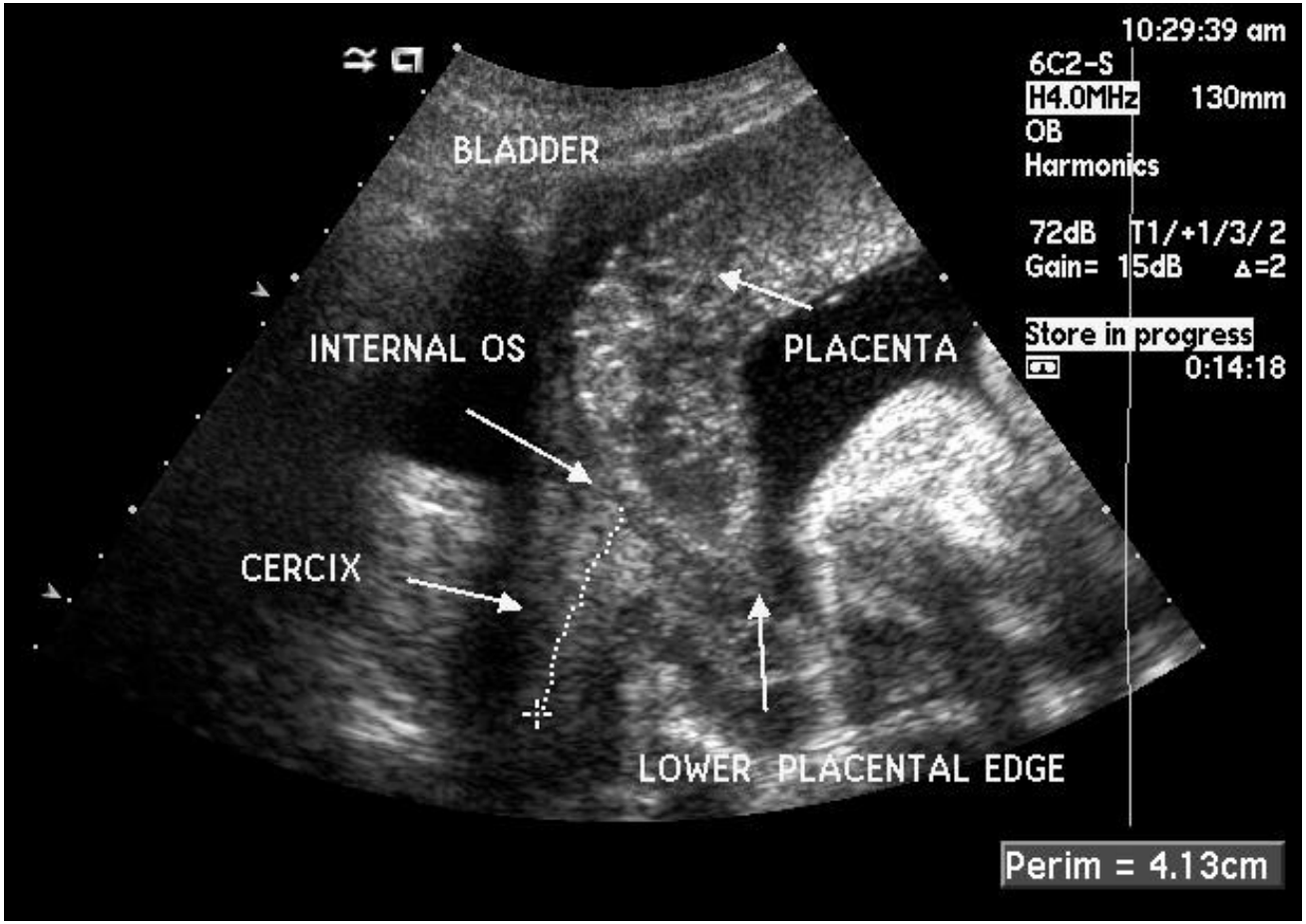
Types of Placenta Previa



All of these are considered placenta previa

Placenta Previa



Risk Factors for Placenta Previa

- What is the biggest risk factor for placenta previa?
  - Number of prior cesarean sections –
  - Incidence is 10% after 4 or more C/S
- Additional independent risk factors include:
  - Smoking
  - Residence at higher altitudes
  - Male fetus
  - Multiple gestation
  - Hx of uterine curettage
  - AMA and multiparity

Sakornbut E 2007

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Clinical Manifestations of Placenta Previa

- **Painless** vaginal bleeding in 70 to 80% of patients
- Only **10 to 20%** of women present with uterine **contractions** associated with bleeding
- Initial bleed @ 34 weeks
- Emergent or Scheduled C/S @ 36 weeks
- Absence of abdominal pain and uterine contractions is the **distinguishing feature** between placenta previa and placenta abruptio

Sakornbut E 2007

Acute Care Woman with Symptomatic Placenta Previa (24-37 weeks)

- Admit to L&D
- Two IVs with large bore needle (16-18 gauge)
- Stabilize X24 hours **if possible**
  - NPO
  - Strict bedrest
  - Continuous FHR monitoring
  - Type and screen
  - RhoGAM if RH negative
  - Steroids
  - Tocolytics are controversial

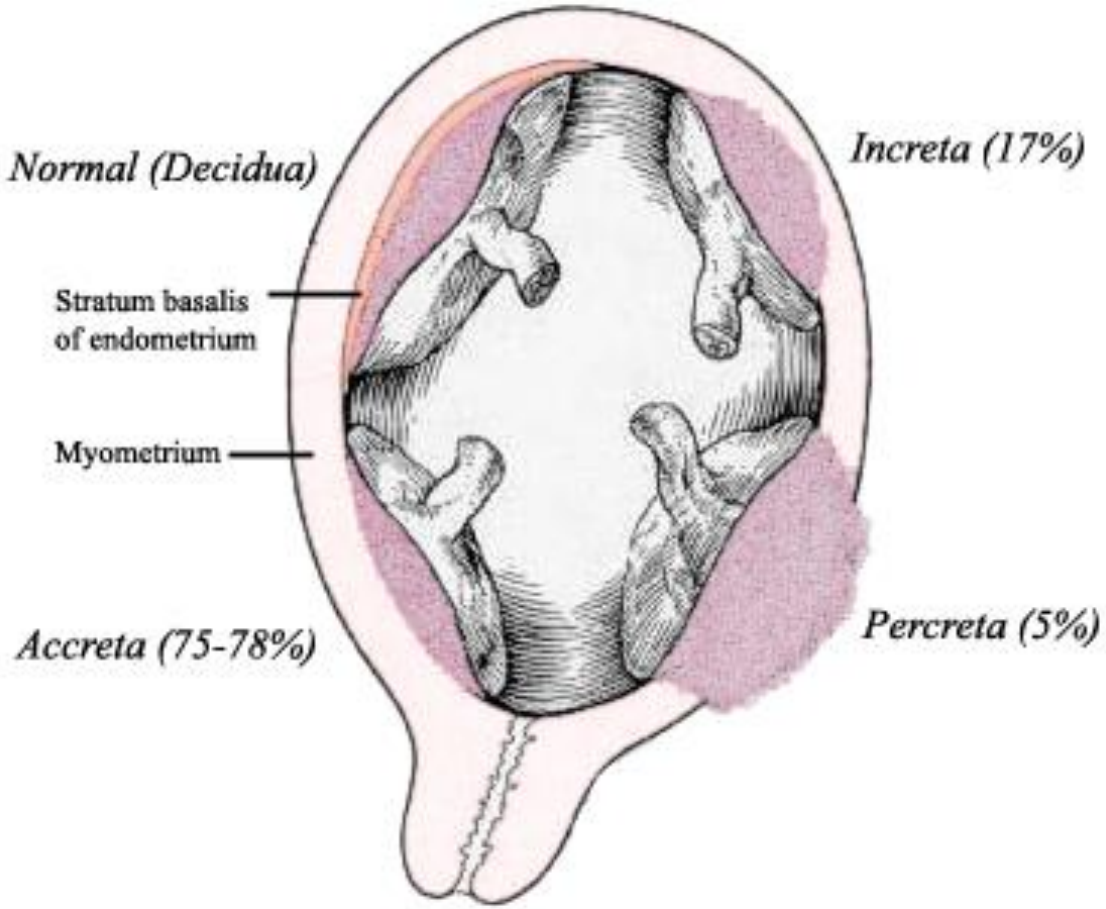
Indications for Delivery

- An abnormal fetal heart rate tracing unresponsive to standard measures
- Life threatening refractory maternal hemorrhage

- Bleeding after 34 weeks in the presence of known or suspected fetal pulmonary maturity – consider delivery
- Individualized management

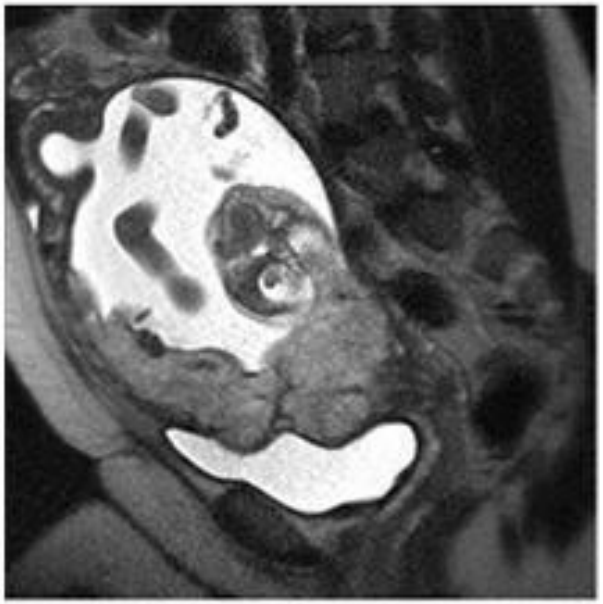
Placenta Accreta

- In placenta accreta, the placenta appears contiguous with the bladder wall

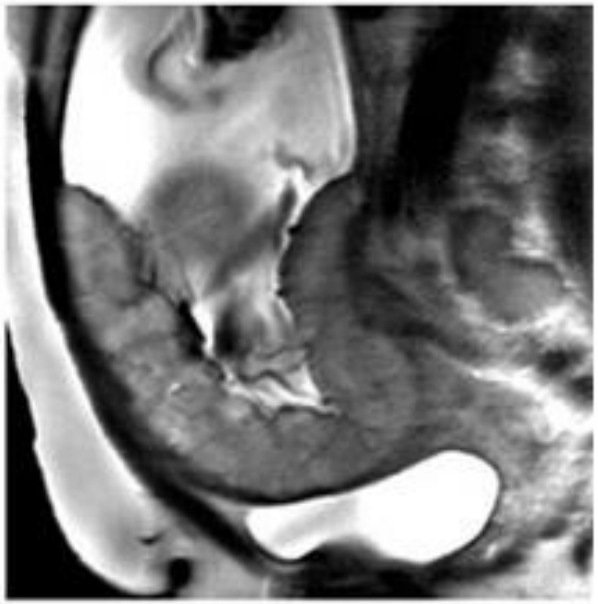


Placenta Accreta

MRI Helps Detect Placenta Accreta



MRI shows placenta overlying the cervix, with irregular outer contour and an abnormal appearance, indicating uterine invasion.



MRI shows placenta overlying the cervix, with a normal, smooth outer contour. There is no evidence of uterine wall invasion.

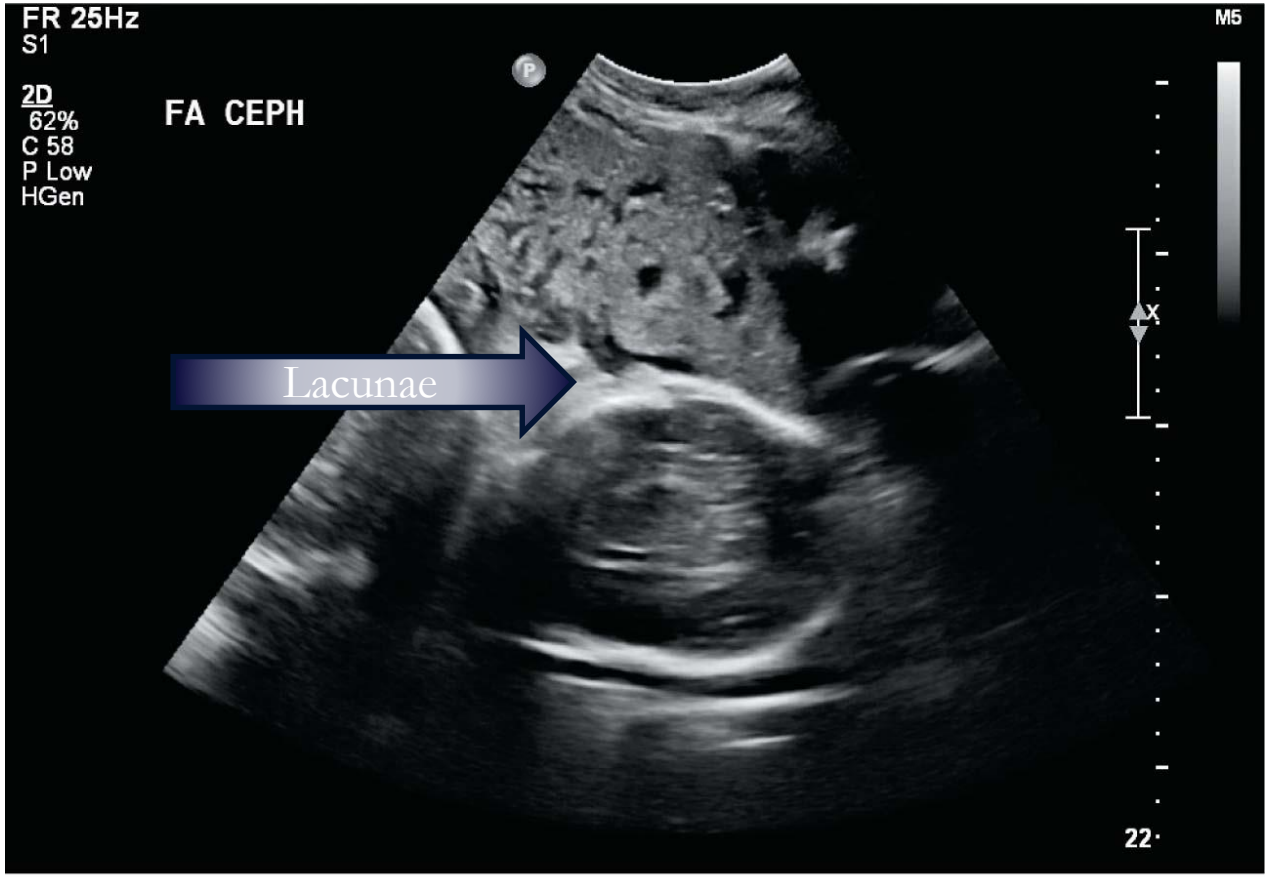


FIGURE 1 Ultrasound is an excellent screening test for accreta, with a sensitivity of 77%–93% and a specificity of 71%–91%.

Risk Factors for Placenta Accreta

- If placenta previa is present → 13% risk
- Placenta previa **plus**1 prior C/S → 25-30%
- Placenta previa **plus**1 ≥ 2 prior C/S → 50%
- Additional risk factors include: previous uterine surgery, previous D&C, previous multiple pregnancy, AMA, > 3 prior pregnancies

Creating a Multidisciplinary Placenta Accreta Program CNE

Christina Tussey & Carol Olson

ABSTRACT

Objective: To develop a formalized comprehensive placenta accreta (PA) program to improve maternal and neonatal outcomes associated with a PA birth.

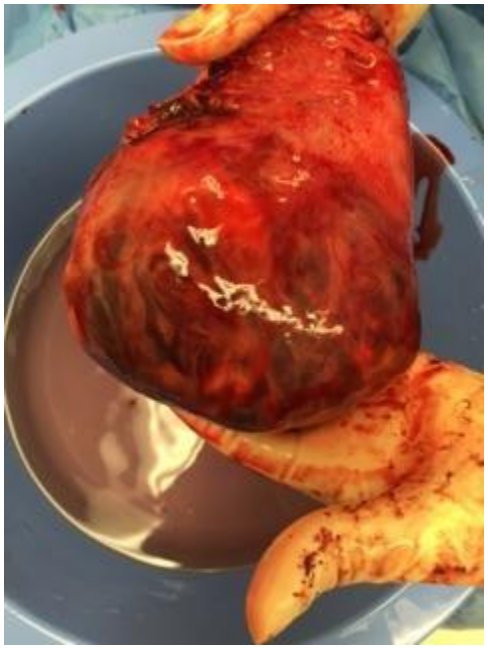
Design: To develop a clinically innovative PA program, gaps were identified and teams were created

BOX 3 PA EMERGENCY ORDER SET

1. Contact the obstetric provider and labor and delivery manager for patient assessment and recommendations upon active vaginal bleeding. If physicians determine woman needs to have surgery, transport woman to the main OR.
2. Respond to deteriorating condition (breathing/circulation) and/or to a full arrest.
3. Call specialty consults (trauma surgeon, anesthesia, urology, neonatologist, interventional radiology, and gynecologyoncology).
4. Response to woman needing blood:
   a. Call blood bank—Type and cross for 4 units. Have another 4 units on hold in blood bank.
   b. If no IV access already established, insert two 18-gauge peripheral IVs, one with blood tubing and normal saline.
   c. Call blood bank if a massive transfusion protocol needs to be activated per physician request (for every cross match: 1 unit of platelets, 1 unit of FFP, consider cryoprecipitate).
5. Call Main OR and speak to charge nurse (request hybrid room or room with C-arm capability).
   a. OR preop nurse/charge RN to confirm consents and conditions of admission signed.
   b. Call for cell saver perfusionist.
   c. Call for neonatal code cart.
   d. Have tranexamic acid and uterotonics available in OR.
6. Response to symptomatic hypotension:
   a. Lower head of bed to flat if position tolerated by woman.
   b. Initiate IV fluid bolus of 0.9% sodium chloride.
   c. Obtain a STAT hemoglobin and hematocrit.
7. Call NICU to bring isolette to main OR.
8. Transfer woman to OR on an OB gurney with stirrups.
9. Call pharmacy to obtain Factor VII if needed.

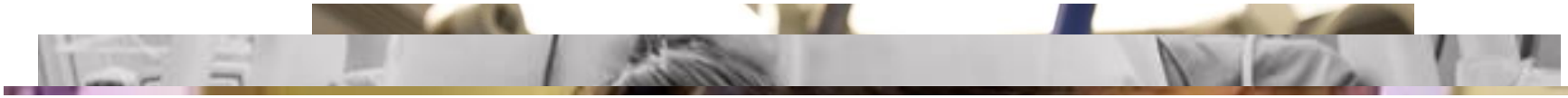
Physician Signature:_____

Note. FFP = fresh frozen plasma; IV = intravenous; OB = obstetric; OR = operating room; PA = placenta accreta; preop = preoperative; RN = registered nurse; STAT = immediate.



C-hyst required for this woman. First pregnancy, no history of uterine surgery. Cesarean was for "failure to progress." MD recognized issue, performed an unplanned C-hyst. Woman received only 2 units of blood products.

Kristin Terlizzi tells her story……



21 days later Kristen developed DIC and required emergency surgery to remove:

- placental tissue
- repair her bladder
- re-implant her ureter
- remove her uterus, cervix and appendix.

She hemorrhaged during surgery and required transfusion of 26 units of blood products

- Maternal death for women with placenta accreta can be as high as 1 in 16.

Because of the unpredictability of vaginal birth, I would prefer a scheduled cesarean section birth for myself or my partner

- Develop and conduct inter-professional and inter-disciplinary education around the short- and long-term risks of cesareans
- Patient/Family Support Bundle, Council on Patient Safety in Women's Health Care
- CMQCC Resource: Risk Considerations for Primary Cesarean
  - YouTube: Patient Story: Kristen Terlizzi

https://www.youtube.com/watch?v=RMnQZUqQhjU

Uterine/Placental Issues

- Prior myomectomy or classical cesarean section: Deliver ~ 36-37 weeks
- Placenta previa: Deliver ~ 37 weeks
- Placenta accreta: Deliver ~ 34-35 weeks
- Vasa previa: Deliver ~ 35 weeks

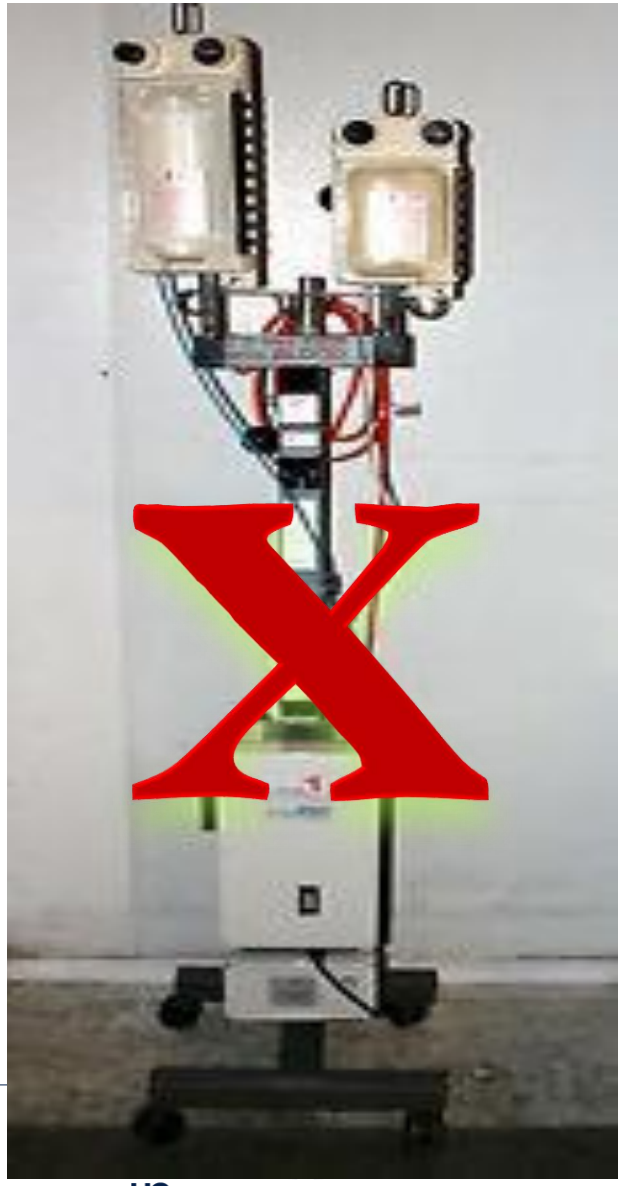
Placental Abnormalities Antenatal Testing

- Placenta previa
  - Weekly at 32 weeks
- Vasa previa
  - Weekly at 32 weeks (unless admitted)

Background Information

- Mary Smith
- 22 yo G_3P_0 at 39 weeks
  - Transfer to clinic at 36 weeks
  - Breech presentation, declined version, desired primary cesarean
  - OB Hx significant for D&C X's 2
    - 2^{nd} trimester Molar Pregnancy 2 years prior
  - BMI = 55 (Class III)
  - She is a Jehovah's Witness and has a signed refusal of blood products
    - She had given specific permission to allow for intraoperative cell saver blood and human albumin


NO BLOOD
ADVANCE DECISION TO REFUSE
SPECIFIED MEDICAL TREATMENT



Generally Refused	Possibly Accepted	Accepted
PRBC	Albumin	Crystalloid
FFP	Cryoprecipitate	Synthetic colloid
Platelets	Clotting factors	
Autologous banked blood	Hemoglobin based blood substitutes	Gelatins
	Cell salvage	DDAVP
	Hemodilution	EPO-alpha
	EPO-beta	Darbepoietin-alpha
	Recombinant factors (e.g. VIII and IX, rVIIa)	

Obstetric Mortality: Jehovah's Witness

- Women who are Jehovah's Witnesses have an estimated risk of 6 - 65 times increased risk for maternal death.
- 130 times increased for maternal death because of obstetric hemorrhage.

Messiah, N., et al., Arch Gynecol Obstet, 2007 Singla, A.K., et ., AJOG, 2001 :
Van Wolfswinkel M E, et. al., BJOG 2009

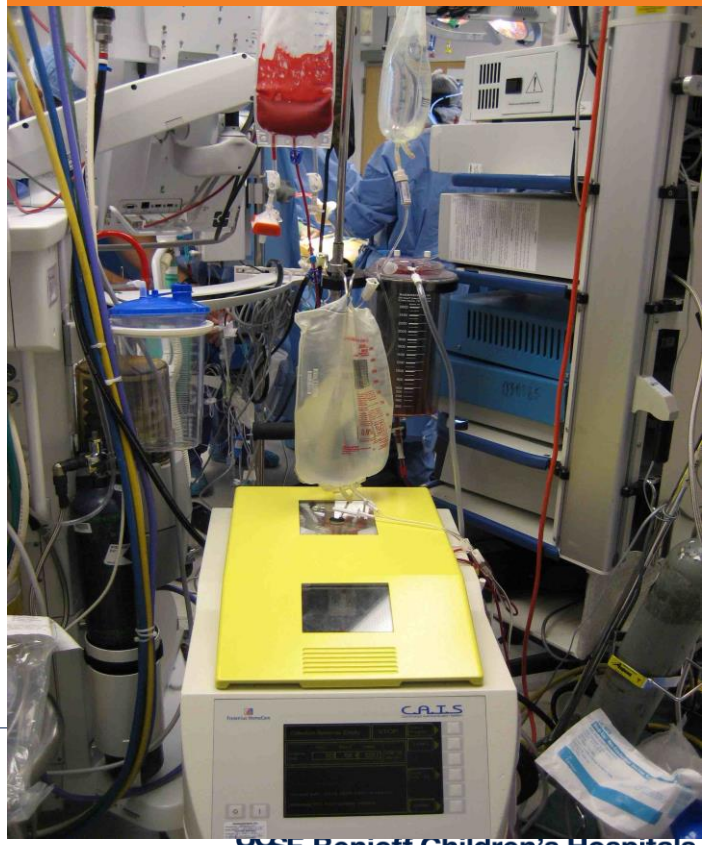
Possibly accepted for volume resuscitation

- Where are these items kept on you unit ?
- How long will it take to get to the patient ?
  - **Specialized staff**
  - **Main operating room**

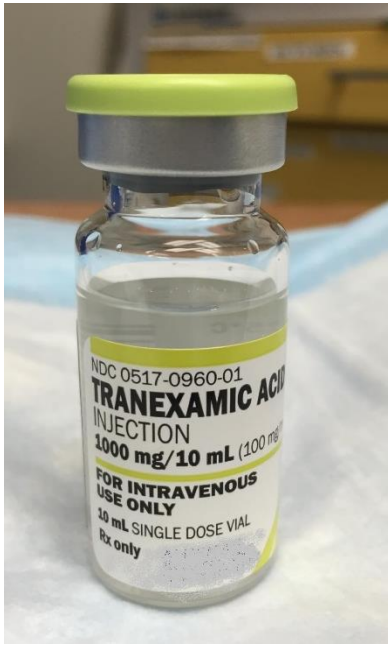
Hextend hetastarch

Albumin

Cell salvage



Tranexamic acid (TXA)



- For women with established PPH
  - Not responsive to medications or treatments
  - Considered an adjunct treatment
  - Most effective if used within first 3 hours
  - Dose: 1 gram – infuse with piggyback normal saline
  - may repeat in 30 minutes if bleeding persists

WOMAN Trial Collaborators. (2017) Effect of early TXA administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. *Lancet*, 389(10084), 2105–2116.

Postoperative Course

- Transfer to ICU
- Extubated POD #2
- Weak but stable
- Hbg 6.3, Hct 19.7
  - Iron—IV (sucrose)
  - Rh-Erythropoeitin
  - Heparin
- Discharged home POD #8

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Contributors to Patient Survival

- Availability of Cell Salvage
- Staff Communication in the OR
- Expert anesthesia staff to secure difficult airway and establish arterial line
- Obstetricians sequential use of procedures
- Ongoing assessment and evaluation of patient response to treatment

JEHOVAH'S WITNESS BLOOD PRODUCT AND TECHNIQUE INFORMED CONSENT/DECLINE CHECKLIST

My signature below indicates that I request no blood derivatives other than the ones which I have designated in this consent be administered to me during this hospitalization. My attending physician,_____M.D. has reviewed and fully explained to me, ***the risks and benefits*** of the following blood products and methods for alternative non-blood medical management and blood conservation available to me. My attending physician_____M.D. has also **fully explained to me the potential risks associated by not authorizing blood and / or non-blood management during this hospitalization.**

	ACCEPT	DO NOT ACCEPT
COMPONENTS OF HUMAN BLOOD		
Red Blood Cells	_____	_____
Fresh Frozen Plasma	_____	_____
Platelets	_____	_____
Cryoprecipitate	_____	_____
Albumin	_____	_____
Plasma Protein Fraction	_____	_____
INTRAVENOUS FLUIDS WHICH ARE NOT COMPONENTS OF HUMAN BLOOD		
Hetastarch	_____	_____
Balanced Salt Solutions	_____	_____
MEDICATIONS WHICH CONTAIN A FRACTION OF HUMAN BLOOD		
Rhogam	_____	_____
Erythropoeitin	_____	_____
Human Immunoglobulin	_____	_____
Tisseel	_____	_____
TECHNIQUES FOR BLOOD CONSERVATION / PROCESSING		
Hemodilution	_____	_____
Cell Saver	_____	_____
Autologous Banked Blood	_____	_____
Cardiopulmonary Bypass	_____	_____
Chest Drainage Autotransfusion	_____	_____
Plasmapheresis	_____	_____
Hemodialysis	_____	_____
Other_____	_____	_____

Hemorrhage

ACOG defines OB hemorrhage as:
cumulative blood loss ≥1000 mL
accompanied by s/sx of hypovolemia within 24 hrs after birth (including intrapartum blood loss) regardless of mode of birth.

- Even with proper management can occur in
  - **~ 4% of vaginal births and ~ 6% of cesarean birth**
  - As a result: 1/20 women will experience PPH
- Early or Primary (≤ 24 hr after birth)
  - **Highest risk in the first hour after delivery because large venous areas are exposed after placental separation**
- Late or Secondary (>24 hr to 6 weeks after)
  - **Caused by infection, placental site subinvolution, retained placental fragments, or coagulopathies (DIC)**

ACOG.(2017). Postpartum hemorrhage. Practice Bulletin No.183. *Obstetrics & Gynecology,* 130(4), e168-e186.

Etiologies of Obstetric Hemorrhage

Antepartum

- Uterine rupture
- Placental abruption
- Placenta Previa
- Vasa Previa

Intrapartum

- **Uterine rupture**
- **Placental abruption**

Postpartum

- Uterine atony
- Retained Placenta
- Lower genital tract lacerations (cervix, vagina, perineum)
- Upper genital tract lacerations (uterine rupture)
- Placenta accreta, increta, percreta
- Uterine inversion
- Inherited coagulopathy (Von Willebrand Disease)
- Acquired coagulopathy (abruption, AFE, retained dead fetus syndrome)

Hormones and Mediators

- Human Chorionic Gonadotropin
- Human Placental Lactogen
- Estrogen
- Progesterone
- Relaxin
- Prostaglandins
- Prolactin

Cardiovascular

Normal Cardiac Adaptation during Pregnancy

Cardiac Changes

Stroke Volume

↑ **30-50%**

Heart Rate

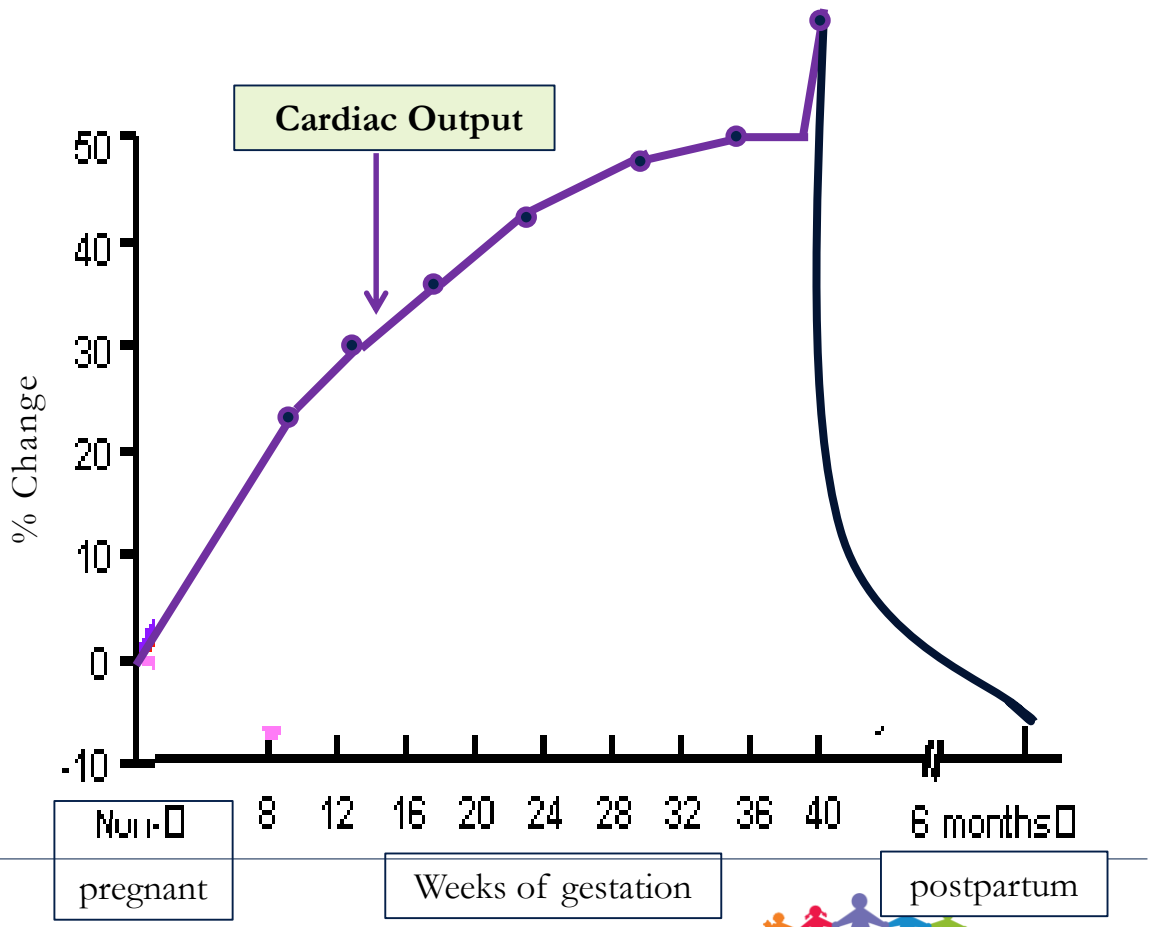
↑ 20% (~10-20 beats)

Anatomic Changes

↑ **Uterus**

Vascular Resistance

↓ **SVR** ↓ **PVR**



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Hematologic

Normal Hematologic Events Associated with Pregnancy

Blood Volume Changes

Total Volume

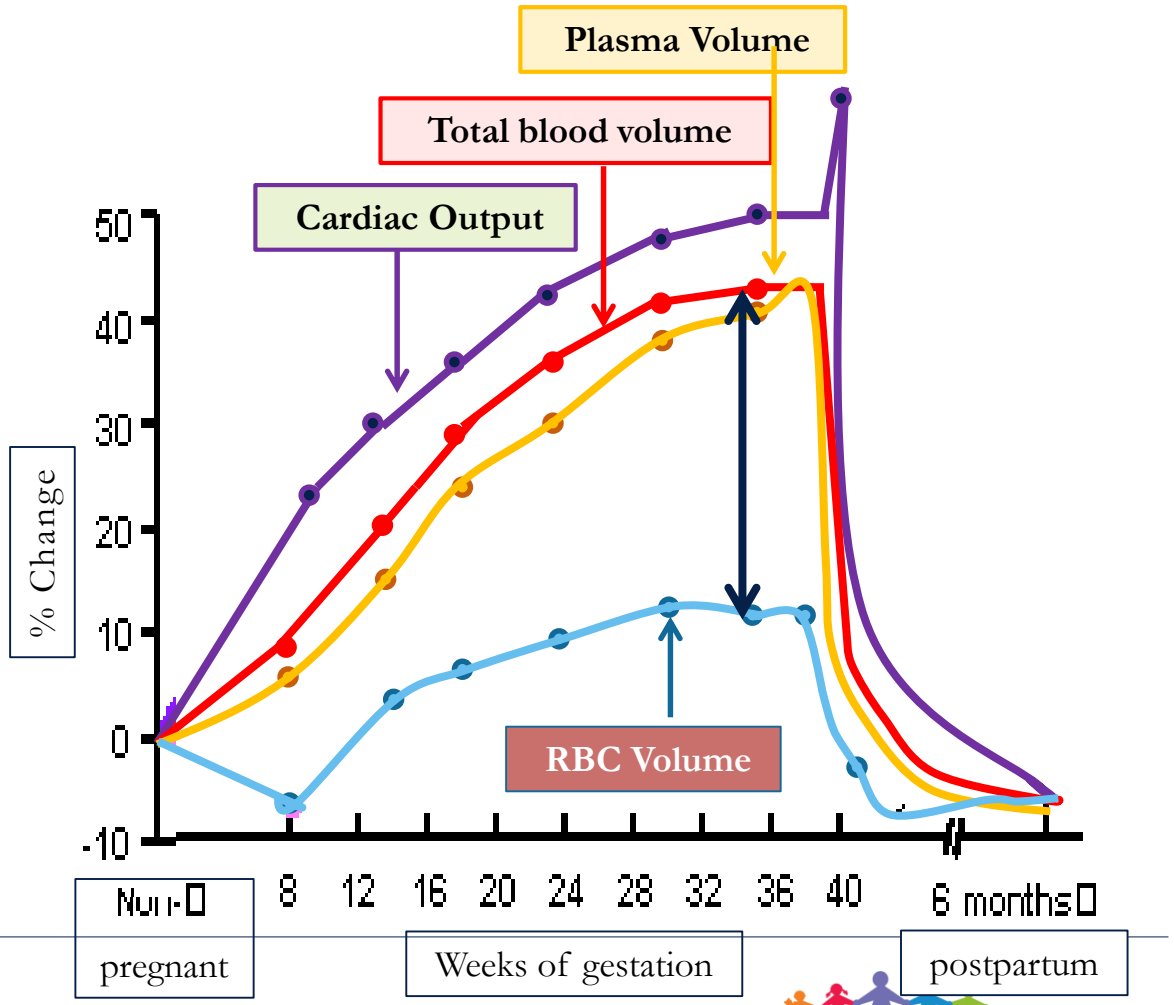
↑ 35% (~ 2,000ml)

Plasma Volume

↑ **50% (~ 1,600ml)**

RBC Mass

↑ 17% (~ 350mL)



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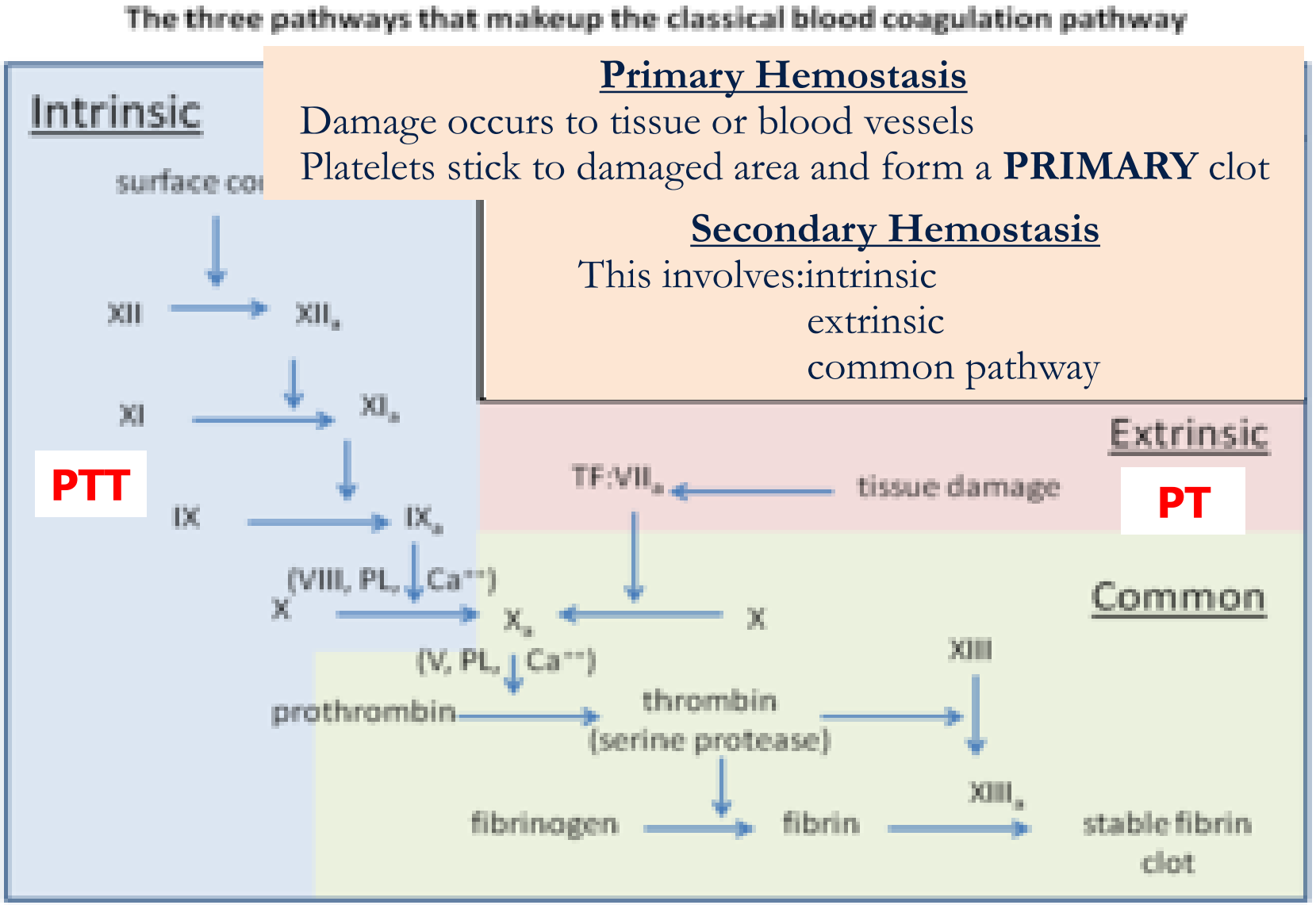
Hematologic continued:
Clotting Factors During Pregnancy

Parameter	Change
Fibrin	Increases 40% at term
Plasma fibrinogen	Increases 50% (300 – 600) mg/dl
Coagulation factors I, VII, VIII, X, XII	Increases markedly
Von Willebrand factor antigen	Increases markedly
Coagulation factor XI	**Decreases 60% - 70%**
Coagulation factor XIII	**Decreases slightly**
Coagulation factors II, V	Increases slightly or unchanged
Protein S (anticoagulant) activity	**Decreased**
Clotting and bleeding time	Unchanged
Prothrombin time	Increases slightly or unchanged
Partial plasma thromboplastin time	Increases slightly or unchanged
Fibrin degradation products	Increased (D–Dimer increased)
Platelets	Unchanged (150 K – 500K)

Hematologic

- ⇧ Factors V, VII, VIII, IX, X, XII
- ⇩ **Fibrinolysis**
- ⇧ Fibrinogen
- ⇧ Prothrombin



https://www.youtube.com/watch?v+R8JMfbYW2p4

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What is DIC?

- Underlying disorder
- Activates coagulation cascade
  - Blood clot formation
  - Coagulation factors become depleted
  - Results in uncontrolled bleeding
    - Death

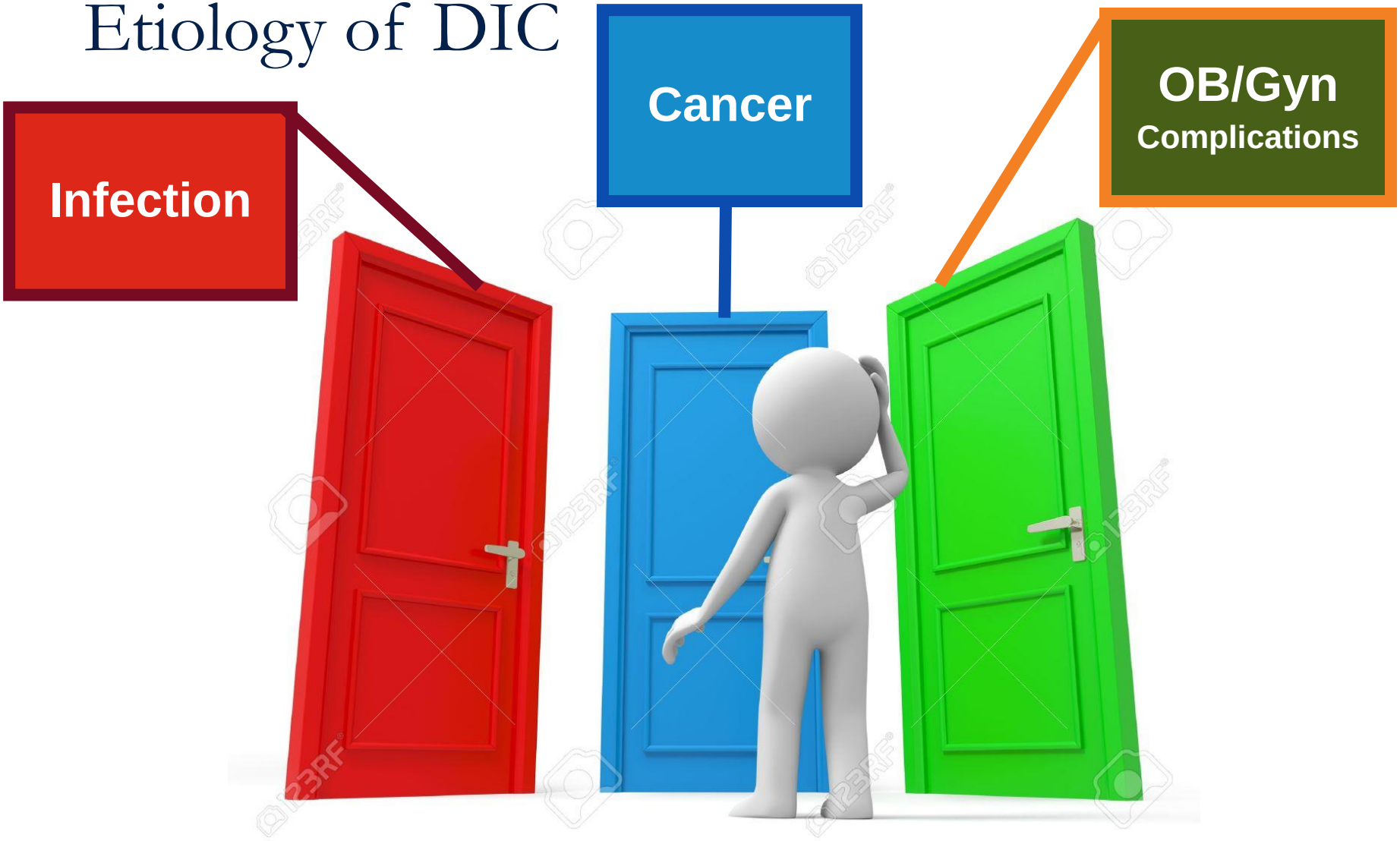
Disseminated Intravascular Coagulation

Society on Thrombosis and Hemostasis defines “DIC as:

*An **acquired** syndrome characterized by the **intravascular activation of coagulation** with loss of localization arising from different causes. It can originate from and cause damage to the **microvasculature** which if sufficiently severe **can produce organ dysfunction.***

- Accompany certain obstetrical conditions
- Varied clinical presentation and prognostic course
- **An “effect “ of** other disease processes
- Treatment will be focused on **removal of the causative agent**

Etiology of DIC



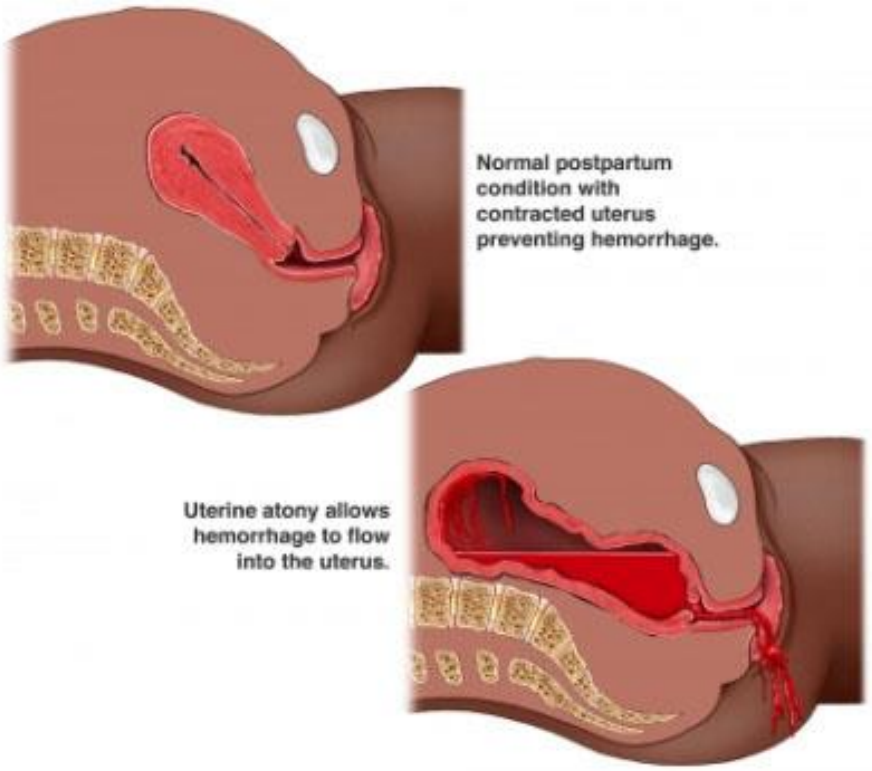
OB Complications

Placental Tissue

After Birth

- Coagulation is initiated to prevent hemorrhage at placentation
- Platelet plugs and fibrin clots for to provide hemostasis
  - Fibrinogen and platelet counts decrease

Fundal Massage



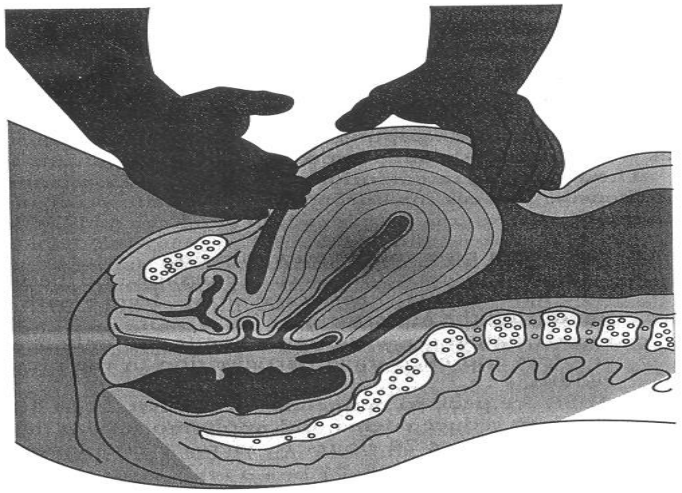
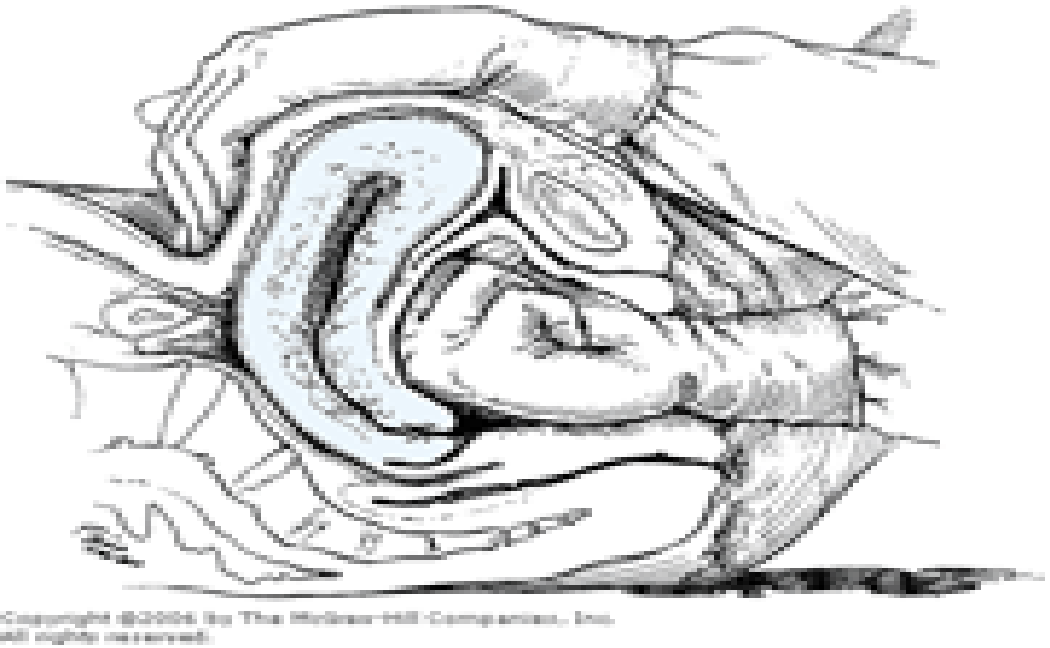


FIGURE 12–1. Fundal massage. The nurse uses two hands for fundal massage. One hand anchors the lower uterine segment just above the symphysis. The other gently massages the fundal area.

If patient has been supine blood clots may have collected

- **Push to express while supporting lower uterine segment**

Bimanual Uterine Compression



- Obtain help!
- Second large-bore intravenous catheter.
- Begin blood transfusions. In an extreme emergency, type O Rh-negative .
- Explore the uterine cavity manually.
- Thoroughly inspect the cervix and vagina after adequate exposure.
- Insert a Foley catheter to monitor urine output.

Physiology Review: Hemostasis

Failure or deficiencies in any of the components can lead to varying degrees of uncontrolled hemorrhaging or clotting

Primary components:

- Vascular endothelium
- Circulating platelets
- Circulating proteins

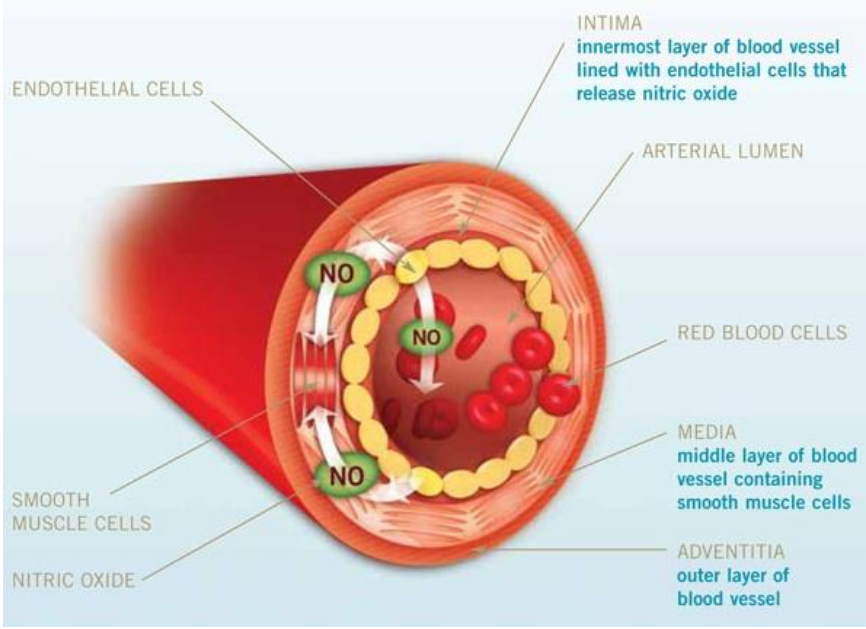
Vascular System: Blood Vessels

Daily Function

- Endothelium
  - Controls vessel permeability
  - Controls blood flow rate
    - vasoconstriction
  - Produces and releases substances that inhibit or stimulate platelets, coagulation, and fibrinolysis

Endothelium

Anatomy



- Endothelium
- Single layer of endothelial cells, lining vessels
- Coated by glycocalyx (protein and mucopolysaccarides)
- Protects basement membrane
- Negatively charged, repels circulating proteins and platelets
- Secretes substances to keep the blood vessel in a nonreactive environment

Vascular System

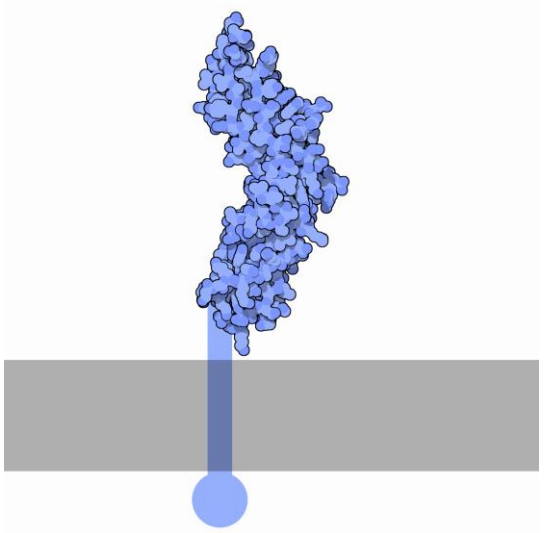
Anatomy of the blood vessels

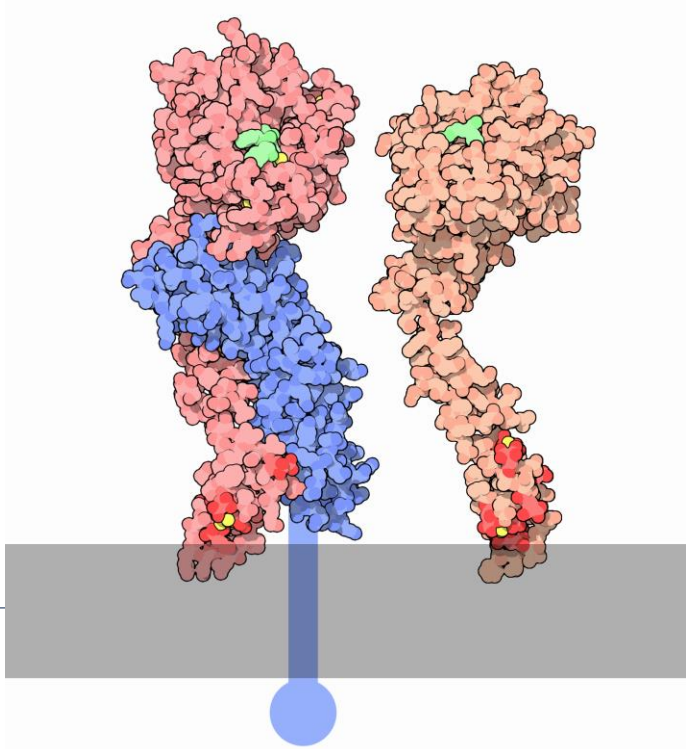
- Subendothelium
  - Smooth muscle and connective tissue with collagen fibers
  - Basement membrane
    - Collagen – stimulates platelets
    - Tissue Factor (TF) – activates coagulation & fibrin formation
  - Connective tissue
    - Elastic fibers – provide support around vessels

Coagulation Cascade Pathway

The Role of Tissue Factor

- Tissue damage
- Tissue factor is released
  - Tissue factor is a protein found tissue
  - Factor VII binds with Tissue factor
    - Signal factor X, thrombin,



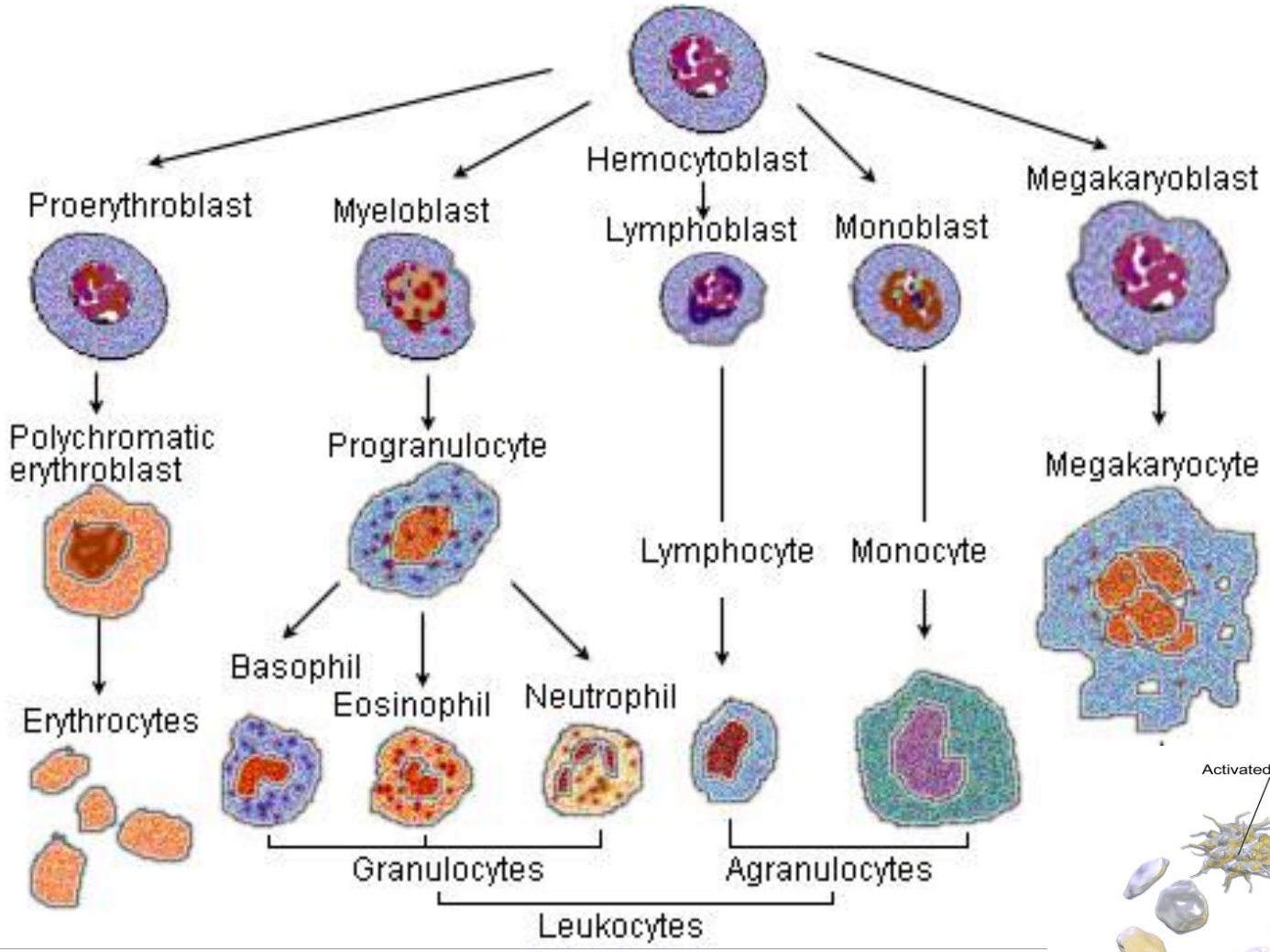


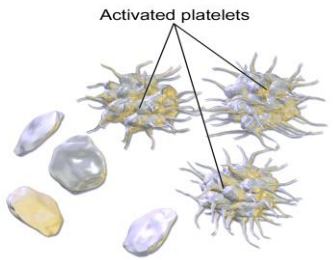
Hemostatic Trigger

Once vessel damage occurs, action begins!

- Arteries and arterioles vasoconstrict
- Smooth muscle cells contract to reduce blood flow
- The endothelium becomes thrombogenic
  - Platelets and coagulation proteins are activated
  - VWF is secreted
  - Fibrinolysis initiated

Bone Marrow Stem Cells





Platelets: The 3A's

- Role of Platelets in Hemostasis

- **Platelet Adhesion**
  - Injury
  - Platelets contact subendothelium
  - vWF
  - Fibrinogen
  - Platelets bind with subendothelium

- **Platelet Activation**
- Adhere and activate
- Change shape
- Release proteins and coag factors
- Localized vasoconstriction

- Platelet Aggregation
- Platelet agonists attract more platelets
- Activated platelets combine with adhered platelets
- Thrombin
- Fibrinogen
- **Platelet plug formed**

https://www.youtube.com/watch?v+R8JMfbYW2p4

https://www.youtube.com/watch?v+R8JMfbYW2p4

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Pathophsiology of DIC

1. **Disseminated Fibrin Thrombi**
   - Obstructed blood flow
   - End organ ischemia / necrosis

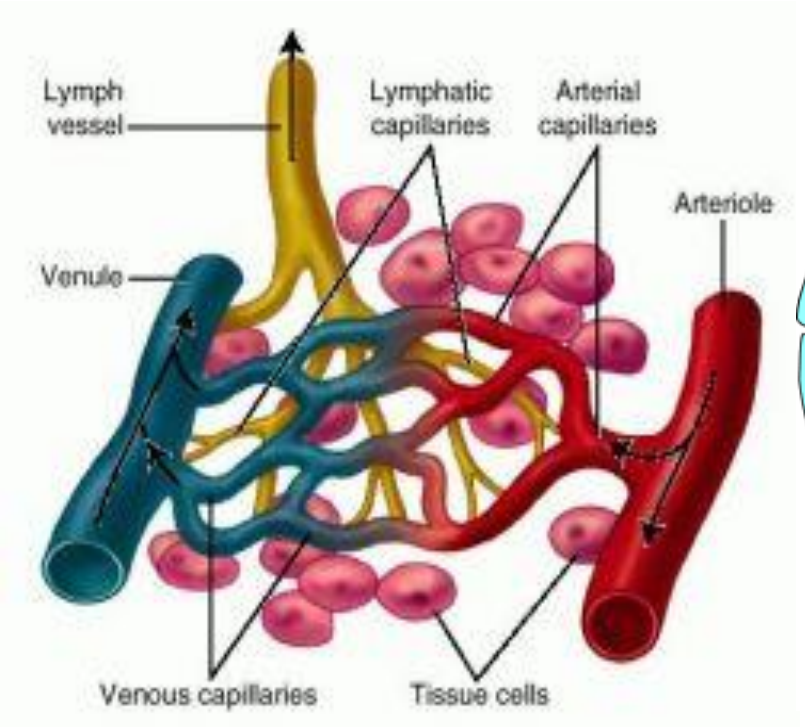
2. **Activation of kinin system**
   - Vascular permeability
   - Hypotension
   - Shock

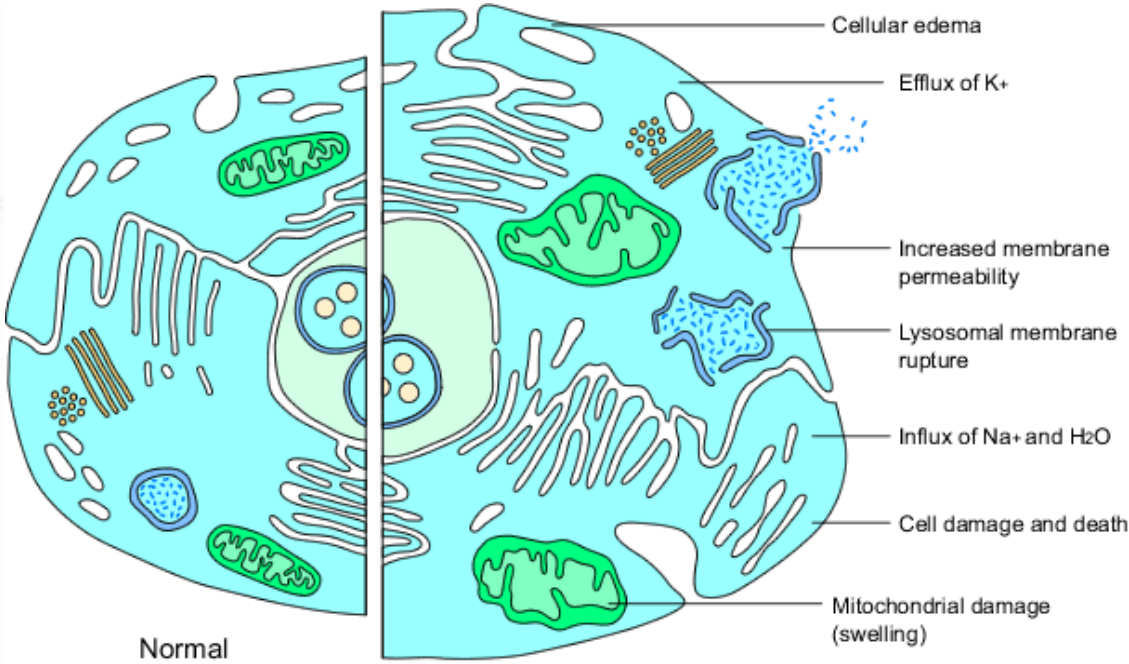
Pathophsiology of DIC

3. **Activation of the complement system**
   - Red cell and platelet lysis
   - ↑ vascular permeability
   - Shock
4. **Release of cytokines (IL 1 & 6) and TNF**
5. **Plasma-induced lysis of fibrin**
   - FDP's
   - Depletion of Coag factors
   - Hemorrhage and shock

Pathophysiology of Hypovolemic Shock

- Tissue hypoperfusion → metabolic acidosis → inflammatory mediators → tissue and vascular injury → multiple organ failure





The Nurse Detective

Etiology of DIC

Underlying OB conditions associated with DIC

Intrauterine Fetal Demise	25%
Placental abruption	37%
PPH / Hypovolemia / MBT	29%
Severe Pre E / HELLP	14%
Acute Fatty Liver	8%
Amniotic Fluid Embolism	6%
Sepsis	6%

100 %

Intrauterine Fetal Demise 25%

Mechanism

- Release of
  - Necrotic tissue and Thromboplastin
- ⇩ Plasma fibrinogen
- FDP's circulate

Diagnosis

- U/S ⇨ Confirm fetal demise
- Baseline coagulation tests
  - Platelet count
  - PT
  - aPTT
  - Fibrinogen

Management

- Deliver fetus and placenta
- If DIC is Present
  - Volume
  - Blood products
  - Supportive care

Placental Abruption 37%

Mechanism

- Release of procoagulant substances
- Activation of fibrinolytic enzyme pathway

Diagnosis

- Vaginal bleeding
- Abdominal pain
- Uterine tenderness
- Uterine contractions
- Coagulation tests

Management

- Delivery v/s Expectant
- If DIC is Present
  - Volume
  - Blood products
  - Supportive care

Clinical Presentation

- Peripheral cyanosis
- Renal impairment
- Drowsiness
- Confusion
- Coma
- Cardiorespiratory failure
- Large and small vessel thrombosis
- Ischemia
- End organ damage

Bleeding from unrelated sites

- Venipuncture sites
- Epistaxis
- Ecchymosis
- Purpura
- Petechiae
- Hematomas

Diagnosis of DIC

- Obvious with massive hemorrhage
- Lab tests
  - CBC, Plts
  - Fibrinogen, FDP's
  - PT, aPTT
  - D Dimer
- Rotem

Risk Factors for PPH

Maternal Hx

- **High parity**
- **History of PPH**
- **Previous uterine surgery**

Labor Factors

- **Chorioamnionitis**
- **Rapid or prolonged labor**
- **Augmented labor**
- **Preeclampsia**
- **Prolonged third stage**

Pregnancy Factors

- **Uterine overdistension**
  - Macrosomia
  - Polyhydramnios
  - Multiple gestation
- ***Placental abnormality***
  - Previa
  - Accreta
  - Abruption

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RISK ASSESSMENT

LOW	MEDIUM	HIGH
No previous uterine incision	History of previous PPH	Placenta previa/Low lying placenta
No known bleeding disorder	Prior cesarean birth(s) or uterine surgery	Suspected placenta accreta
No history of PPH	Multiple gestation	Active bleeding (greater than show) on admission
≤ 4 previous vaginal births	Large uterine fibroids	Hematocrit < 30
Singleton pregnancy	Chorioamnionitis	Known coagulopathy
	Magnesium sulfate	Active anticoagulation therapy
	Preeclampsia	Platelets <100,00
	Rapid or prolonged labor	EBL on admission >1500
	Antibody positive on prenatal type & screen	Other factors designated by physician
□ Verify Type & Screen on prenatal record □ Send HOLD CLOT on admission □ Order T&S if not on available on record	□ Order Type & Screen on admission □ Review hemorrhage protocol	□ Order Type & Crossmatch X 2 unit on admission □ Review hemorrhage protocol □ Notify anesthesia and blood bank of patient risk

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CMQCC Toolkit Version 2.0

OB Hemorrhage Emergency Management

Stage 2 – Continued bleeding ≤1,500ml

Meds/ Procedures

- 2nd IV access 18 gauge

Blood Bank

- Send additional Labs
- DIC Panel

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CMQCC Toolkit Version 2.0

OB Hemorrhage Emergency Management

Stage 3 – Blood loss >1,500ml or **2 units PRBC's** or **unstable VS** or **suspicion of DIC**

Meds/ Procedures

- Activate MTP

Blood Bank

- Transfuse aggressively
- Near 1:1 PRBC to FFP
- 1 PLT apheresis pack (per 4-6 units PRBC's)

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Clinical Signs of Hypovolemia

CMQCC OB Hemorrhage Emergency Management

Cumulative blood loss of 500 -999 mL

- **Should trigger increased supervision and intervention**

Amount of Blood Loss	Clinical Signs
• 1000 mL	• Slight BP △, HR, RR UO normal
• 1500 mL	• Narrow PP, HR >100, diaphoretic
• 2000 mL	• ↓ BP, Narrow PP, HR > 120, pale cool, restlessness
• ≥ 2500 mL	• Profound Hypotension, HR >140, RR > 40, ↓ UO, anuria

Laboratory Diagnosis of DIC

- All of the routine screening tests of coagulation yield grossly abnormal results

Laboratory Test	Value
Platelets	Decreased
Fibrinogen	Less than 200
Fibrin Split Products	Increased
PT & aPTT	Initially increased

1st and 2nd Line Uterotonics

- Pitocin (oxytocin) 10 U/mL
  - **10-40u in 500 -1L NS or LR IV or 10 units IM if no IV access**
  - Onset of action - 5 minutes
  - Side Effects: **N&V**, ↓ Na^{++}, water intoxication (prolonged use)
  - Contraindications: allergy
  - Avoid rapid IV infusion - **hypotension , ↑ HR**

- Methergine (methylergonovine) .2 mg/mL
  - **0.2mg IM every 2-4hr**
  - Onset of action IM 2-5 minutes / PO 5-10 minutes
  - Side Effects: HTN, N&V, chest pain, myocardial infarction
  - Contraindications: HTN, Preeclampsia
  - Relative contraindications: recent use of ephedrine or macrolide antibiotics, or azole antifungal medications

Prostaglandins

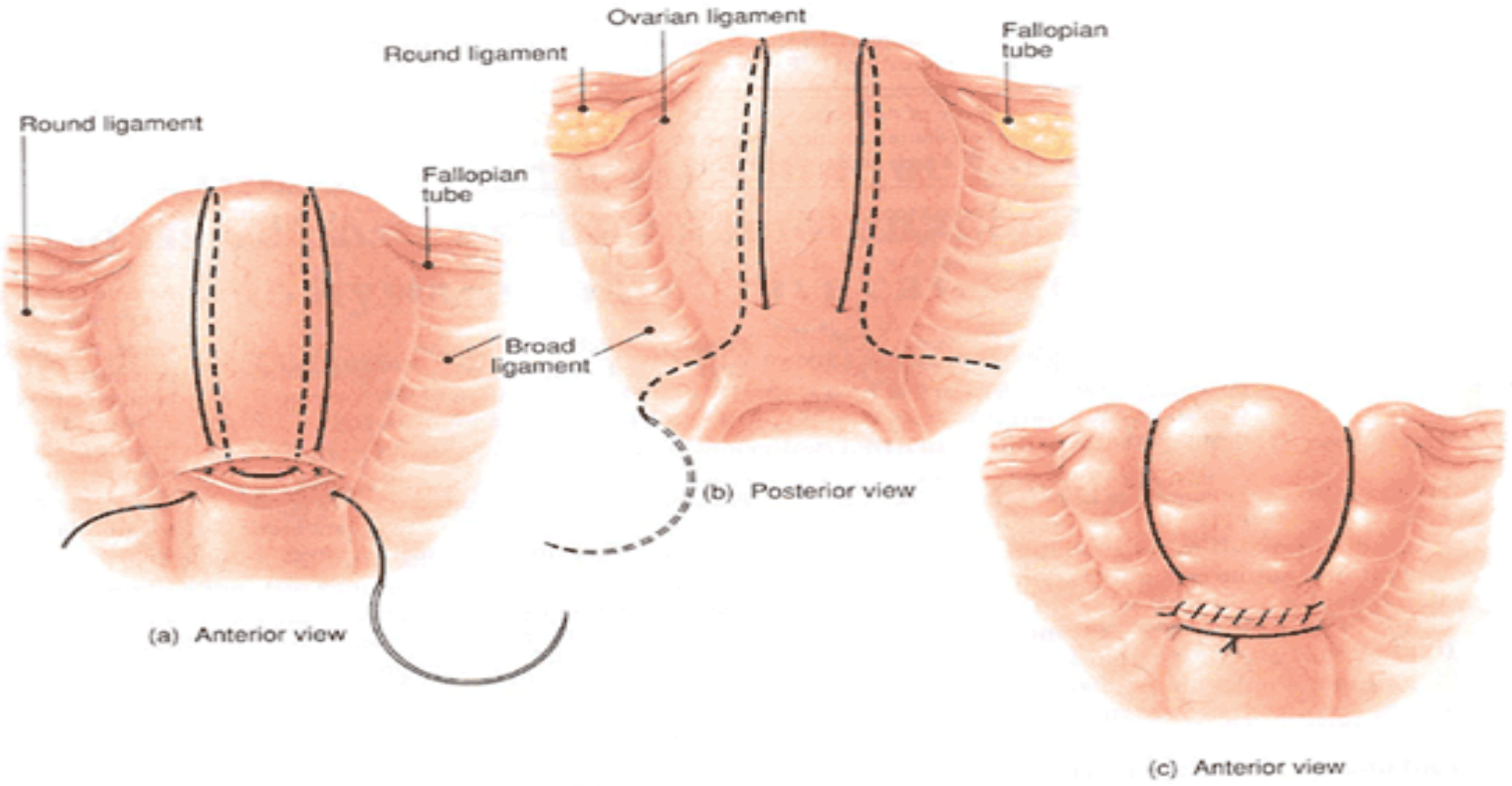
- Cytotec (misoprostol) PGE_1 analogue
  - **600-800 mcg sublingual or oral** **100 or 200 mcg tablets** **(1 time!)**
  - **Onset of action varies when given PR**
  - **Side effects: fever, chills/rigors/shivering, headache, N&V, diarrhea**
  - Contraindications: allergy,
    - caution use with history of asthma
    - **does not exacerbate bronchospasm associated with Hemabate.**

- Hemabate (carboprost) PGFα 250 mcg/mL
  - **250mcg IM every 15-90 min (max 8 doses = 2 mg)**
  - **Refrigerate**
  - Side effects: N&V, diarrhea, fever, chills, bronchospasm, hypertension
  - Contraindications: allergy,
    - Caution in women with asthma, active cardiac, pulmonary, hepatic disease

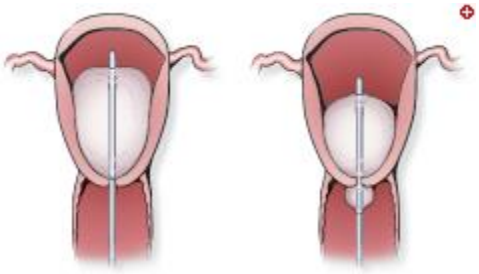
Other techniques when meds don't work!

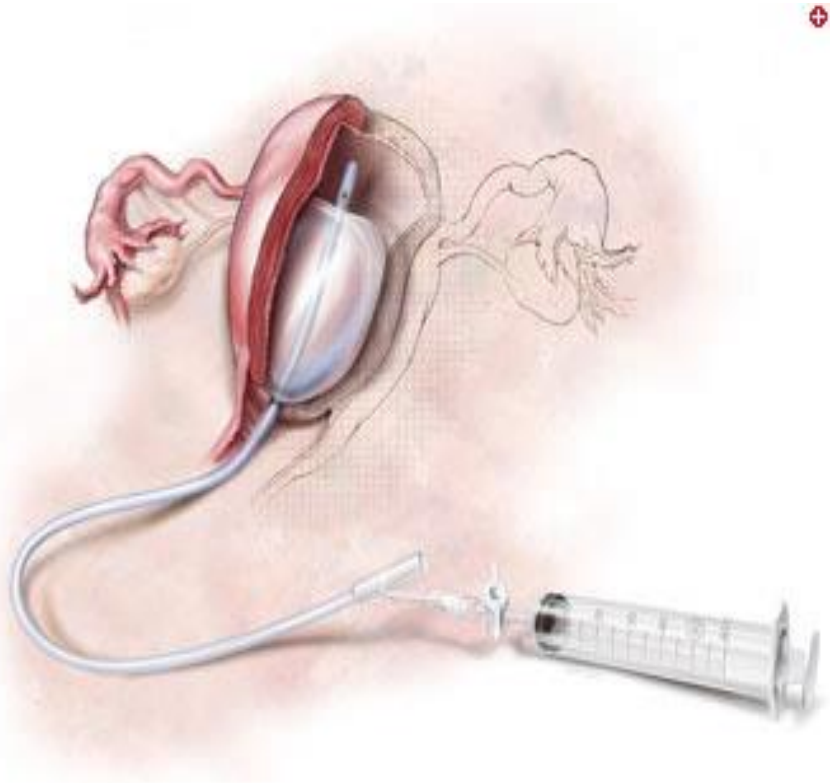
The B-Lynch

Uterine compression suture technique



Intrauterine Balloon





Doumouchtsis SK et al., 2007

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Uterine Balloon Hysterotomy Insertion

- Use Ultrasound guidance to determine cc's needed
- Sterile Normal Saline
- Never use air to inflate the balloon
- Average filling volume 250-300cc (500cc's max)
- Document the amount of Normal Saline used
- Vaginal Packing (arm band) / Secure tubing
- Connect to closed system / Foley bag

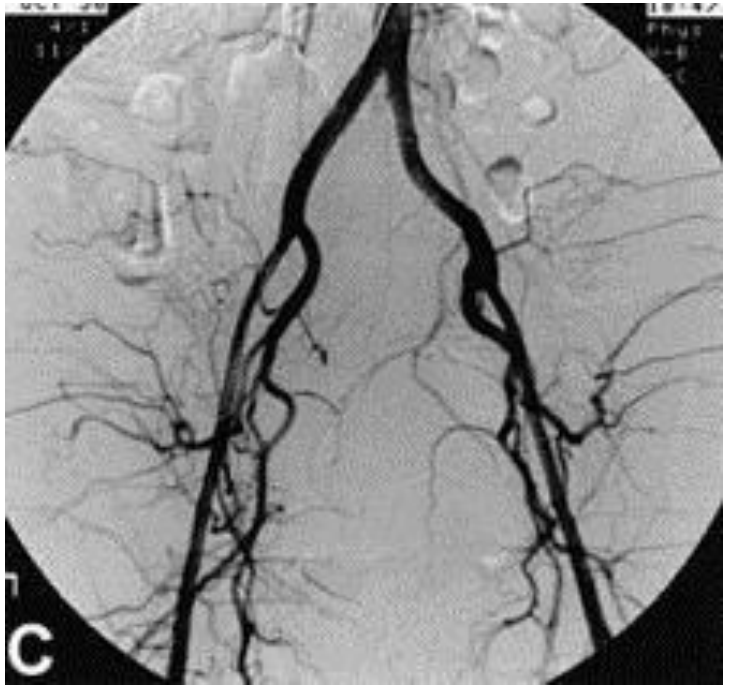
Doumouchtsis SK, et al Obstet Gynecol Surv 2007 Dabelea V, et al Am J Perinatol 2007

"Intrauterine Balloon Should be First Step after Failure of Medical Therapy"

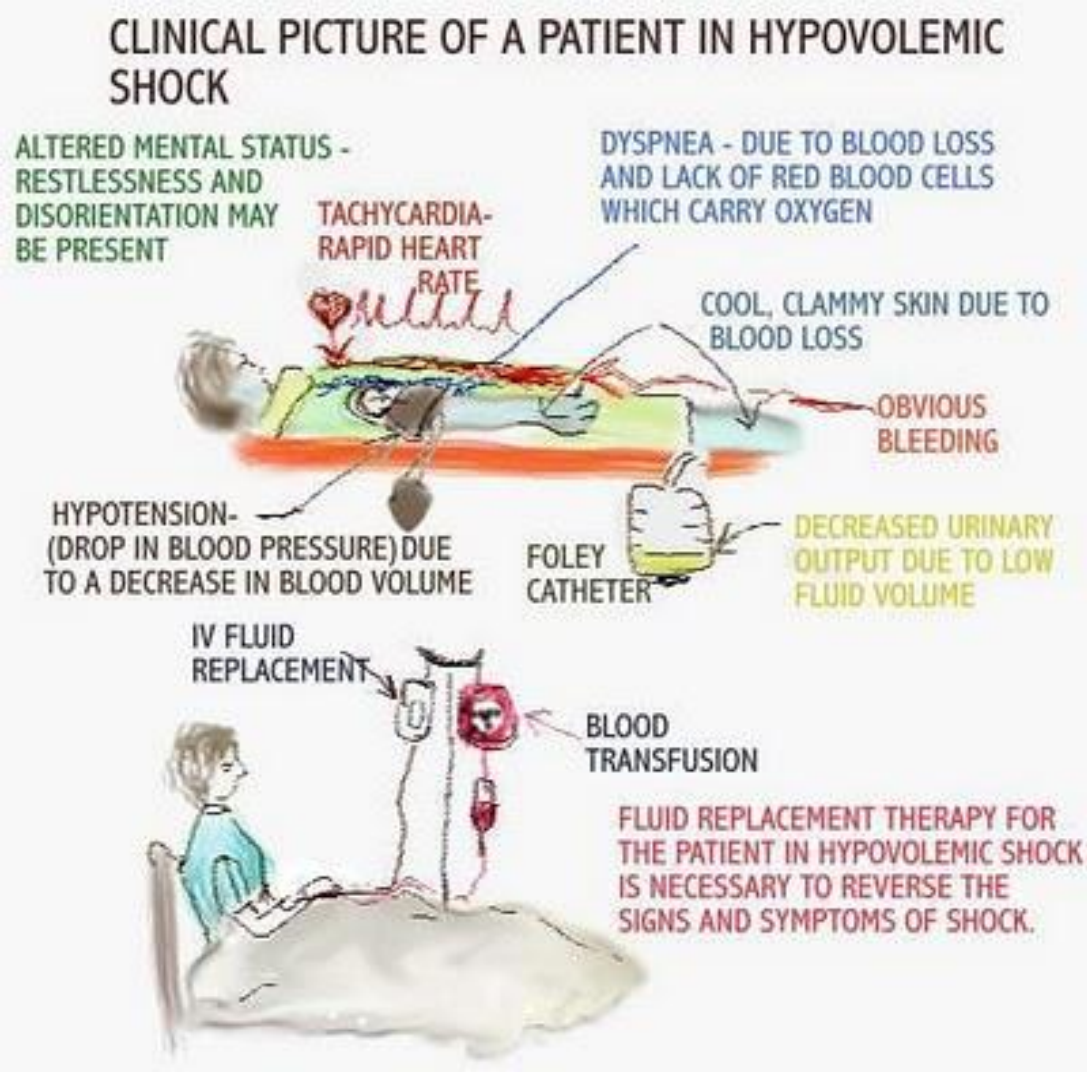
- High success rate not different than other approaches
- Low-tech, fast, inexpensive, easy to utilize on any L&D Unit
- Least morbidity of any "next step"
- Can be used as "Tamponade Test" to temporize, determine needs and mobilize other resources

Additional Hemorrhage Management

- **Intervention Radiology**
- **Uterine artery embolization**
- **Collateral circulation**
- **Ongoing assessment**



Signs and Symptoms of Shock



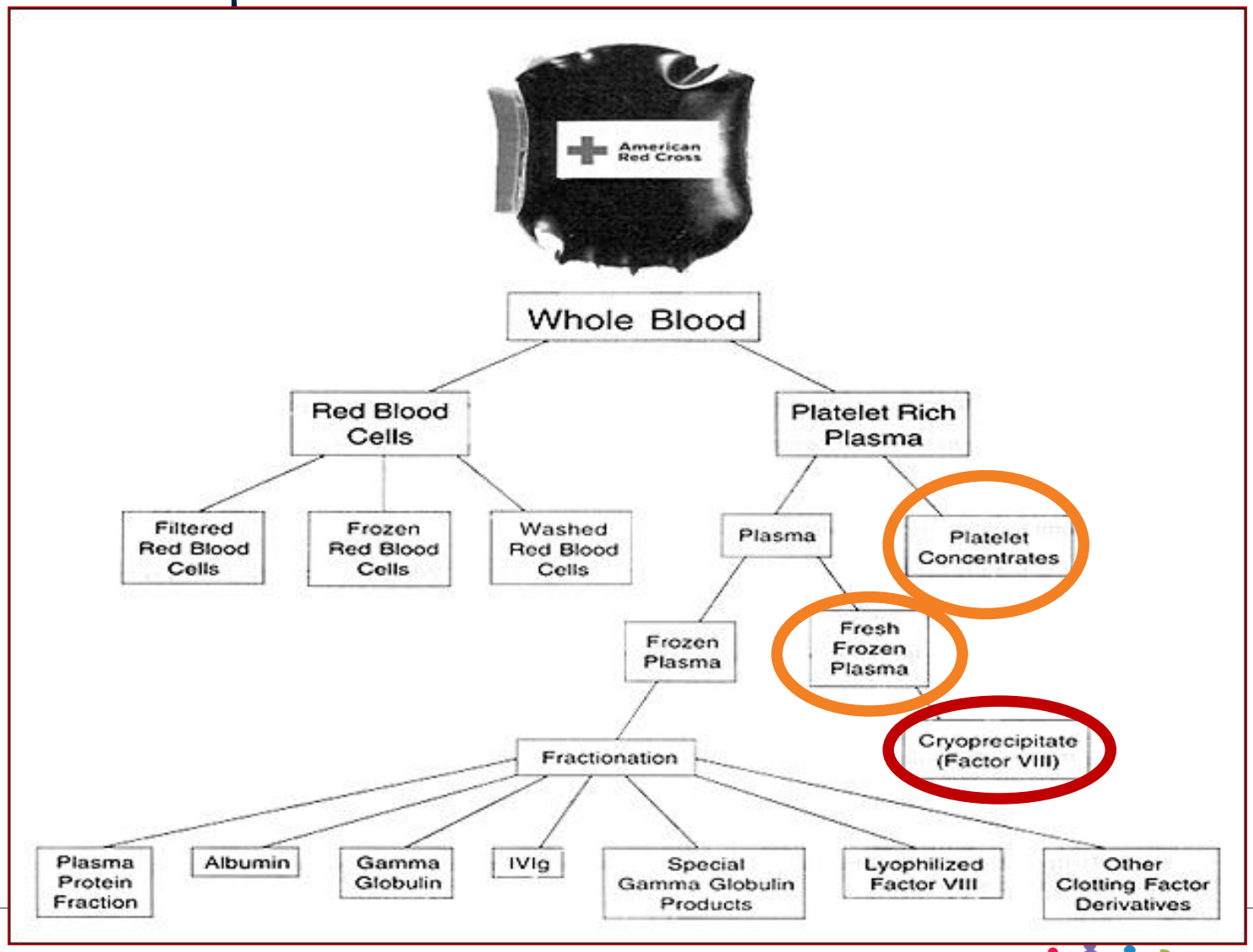
- **Anxiety, restlessness**
- **Nausea**
- **A rapid, weak, thready pulse**
- **Cool, clammy, mottled skin**
- **Rapid shallow respirations**
- **Hypothermia**
- **Thirst and dry mouth**
- **Fatigue**
- **Distracted look in the eyes**
- **Tachycardia**
- **Narrow Pulse Pressure**
- **Hypotension**

Blood Products and Equipment

California Maternal Quality Care Transfusion Guidelines

- For massive ongoing hemorrhage
- Resuscitation transfusion not based on labs but clinical condition
- AVOID coagulopathy
- Transfuse with uncrossed PRBCs until crossed blood available
- Goal minimum ratio of PRBC:FFP of 6:4
- One unit platelets (single platelet pheresis pack) given for every 4-6 units of PRBCs : FFP
- Guidelines consistent with practice guidelines of the American Society of Anesthesiologists

Blood Components



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Blood Component Therapy

Product	Volume (mL)	Contents	Effect (per unit)
Packed Red Blood Cells	240	RBC, WBC, plasma	↑ hematocrit 3% & Hgb 1 g/dl
Platelets	50	Platelets, RBC,WBC, plasma	↑ platelet count 5,000-10,000 mm^3 per unit
Fresh Frozen Plasma	250	Fibrinogen, antithrombin III, factors V & VIII*	↑ fibrinogen by 10mg/dl
Cryoprecipitate	40	Fibrinogen, factors VIII & XIII and Von Willebrand	↑ fibrinogen by 10mg/dl

* slightly decreased amounts of factor V and factor VIII ACOG 2006

Packed Red Blood Cells (PRBCs)

- Single unit of PRBCs will increase Hct by 3-4%

- Uncrossed O neg blood can be used as a substitute while waiting for crossmatching if needed

Fresh Frozen Plasma (FFP)

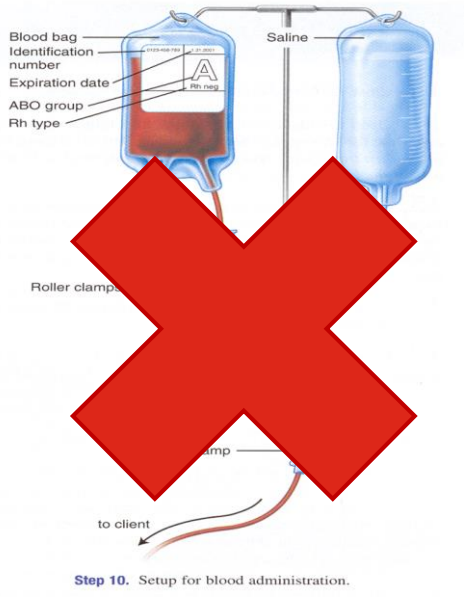
- Contains nearly all the coagulation factors with smaller amounts of factor V and factor VIII
- Can be used up to 24 hours after thawing and for up to 5 days if relabeled “thawed plasma”
- PRBCs and FFP recommended together for massive hemorrhage
- Ratio of 1.5/1 or

  1/1 FFP/PRBCs is recommended

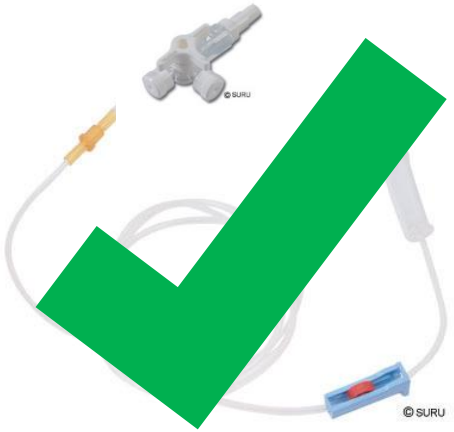
Platelets

- Recommended when platelet count is 50,000 - 100,000 u/L
- Single Donor Apheresis
- Equivalent of 6 units of platelet concentrates
- Should increase the platelet count by 40-50,000 u/L (transient)

How are Platelets administered?



Step 10. Setup for blood administration.



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Cryoprecipitate

- Priority for women with Fibrinogen levels < 80
- 10 unit pack (or 1 adult dose) raises Fibrinogen 80-100 mg/dl
- Best for DIC with low fibrinogen and don't need volume replacement
- Caution: 10 units come from 10 different donors, so infection risk is proportionate
- 35 -45 minute thaw time

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Other products used in hemorrhage

- **Desmopressin (DDAVP)**
  - FDA approved for patients with von Willebrand disease and some types of hemophilia
- Off label use of **recombinant rFVIIa** group
  - Only as a **"rescue"** agent
  - 90 mcg/kg IV over 3-5 minutes
  - **Correct for:**
    - Acid-base imbalance
    - Hypothermia
    - Hypocalcemia
    - Hyperkalemia
    - Transfuse needed blood products

Severe Hemorrhage

+

Rapid crystalloid infusion

+

Cool operating room temperature

=

Hypothermia

The Lethal Triad
Coagulopathy: Why?

- Dilutional
  - Transfusion of crystalloid and packed cells devoid of clotting factors
  - A problem once 1 – ½ total blood volume replaced
- Hypothermia
  - Significantly decreases platelet function: even if counts are adequate
- Acidemia
  - Occurs with massive hemorrhage due to hypovolemia, peripheral tissue hypoxia: as hydrogen ion concentration increases, enzyme functions involved in coagulation pathway stop functioning

---

- VERY DIFFICULT TO REVERSE!

Rapid Infuser / Blood Warmer

- Location
- Use
- Equipment

“Hot Line”

“Bair Hugger”

Four Major Recommendations for California Birth Facilities:

- Improve *readiness* to hemorrhage by implementing standardized protocols (general and massive).
- Improve *recognition* of OB hemorrhage by performing on-going objective quantification of actual blood loss during and after all births.
- Improve *response* to hemorrhage by performing regular on-site multi-professional hemorrhage drills.
- Improve *reporting* of OB hemorrhage by standardizing definitions and consistency in coding and reporting.

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Improve *recognition…*

Perform on-going objective quantification of actual blood loss during and after all births *(record output on a flow sheet)*

- **Training and quantification of how blood loss is estimated – put up posters**
- **Measurement of actual blood**
  - **Fluid in canisters, under buttocks drapes**
  - **Weigh saturated items**
  - **and subtract dry weight**

Escalation

- An abnormal parameter requires:
  - Prompt reporting to a physician or other qualified clinician
  - Prompt bedside evaluation by a physician or other qualified clinical provider **with the ability to activate resources** in order to **initiate** emergency diagnostic and therapeutic interventions as needed

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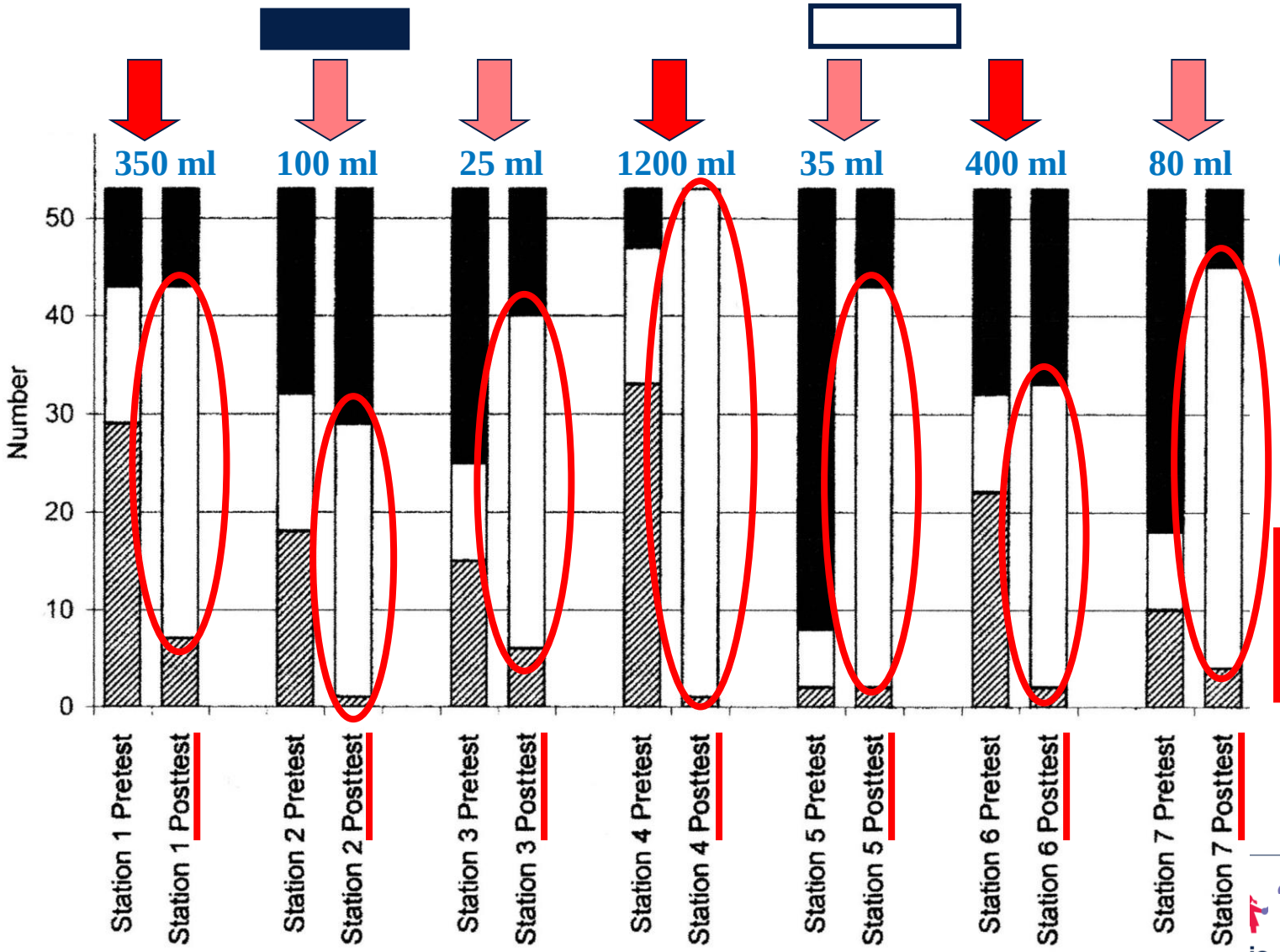
Estimation of Blood Loss Before and After Training



Small vol. often over estimated

Large vol. often under estimated

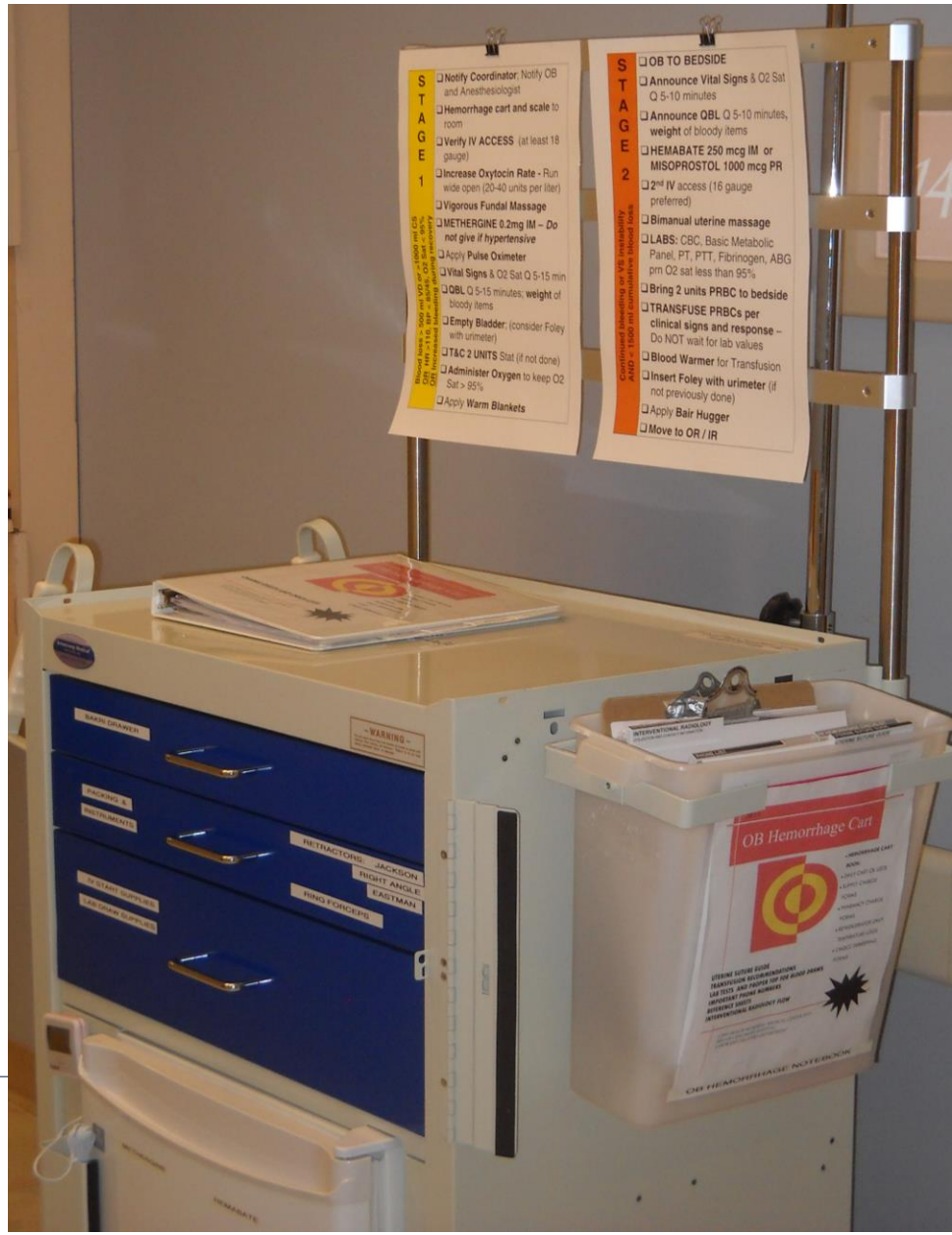
Both improve markedly with training!

Dildy: Obstet Gynecol 2004:104:601-6

Informational Webinar AWHONN's Postpartum Hemorrhage (PPH) Project January 2014 s

OB Hemorrhage Cart: 2014

- Quick access to emergency supplies
- Refrigerator for meds
- Establish necessary items and par levels
- Label drawers/compartments
- Include checklists
- Develop process for checking and restocking
- Educate nursing and physician staff



McNulty, 2014

Obstetric Hemorrhage Cart: Labor and Delivery

- IV start
  - 16 gauge angiocaths
  - Baseline blood tubes
    - Red top, blue top, tiger top
- IV pressure bags
- Foley with attached urometer
- Bakri balloon with syringe
  - 500 cc fluid for filling
  - Foley bag for drainage collection
- Kerlex roll
- Vaginal pack
- Right angle retractors
- Eastman vaginal retractors
- Ring forceps x 4

Obstetric Hemorrhage Cart: OR

- IV start
  - 16 gauge angioc aths
  - Blood draw tubes
    - Red top, blue top, tiger top
- IV pressure bags
- Foley with urometer
- Sutures for B-lynch and modified B-lynch techniques
  - #1 Vicryl, standard x 2
  - #1 Monocryl, 36” long on curved 90 mm blunt needle
- Laminated 8 x 11” diagram
  - B-Lynch technique
  - Modified B-Lynch technique
- Hunter’s curette
- Right angle retractors
- Eastman vaginal retractors
- Ring forceps x 4
- Short Allis tissue forceps x 2
- Bakri balloon
  - 500 cc fluid for filling
  - Bag for drainage collection
- Kerlex roll
- Vaginal pack

The Importance of IV Gauge!

Get 2nd Line In Before Vasoconstriction Develops!

Gauge	Gravity Flow	Flow with Rapid Infuser
20	65 ml/min	
18	140 ml/min	250 ml/min
16	190 ml/min	350 ml/min
14	300 ml/min	500 ml/min

National Partnership for Maternal Safety: Consensus Bundle on Obstetric Hemorrhage

Elliott K. Main, D. and D. Bingham,

Goffman, B. Scavone, L. Kane Low,

P. Fontaine, J. Gorlin, D. Lagrew,

and B. Levy 2015

- Safety Bundle organized into 4 domains:
  1. Readiness
  2. Recognition and prevention
  3. Response
  4. Reporting and Systems Learning

CMQCC
CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE

California Partnership for Maternal Safety

PATIENT SAFETY BUNDLE

OBSTETRIC HEMORRHAGE

READINESS

Every unit

- ✓ Hemorrhage cart with supplies, checklist, instruction cards and posters
- ✓ Immediate access to hemorrhage medications (kit or equivalent)
- ✓ Establish a response team – who to call when help is needed
- ✓ Establish massive and emergency release transfusion protocols/policies (type O negative/uncrossmatched)
- ✓ Unit education on processes, unit-based drills (with post-drill debriefs)

RECOGNITION & PREVENTION

Every patient

- ✓ Assessment of hemorrhage risk (prenatal, on admission, prior to delivery and post birth)
- ✓ Measurement of cumulative blood loss (formal, as quantitative as possible)
- ✓ Active management of 3rd stage of labor

RESPONSE

Every hemorrhage

- ✓ Unit-standard, stage-based on QBL, obstetric hemorrhage emergency management plan with checklists
- ✓ Support program for patients, families, and staff for all significant hemorrhages

REPORTING/SYSTEMS LEARNING

Every unit

- ✓ Establish a culture of huddles for high risk patients and post-event debriefs to identify successes and opportunities
- ✓ Multidisciplinary review of significant hemorrhages for systems issues
- ✓ Monitor outcomes and process metrics in perinatal quality improvement committee

This bundle was developed by the Council On Patient Safety in Women's Health Care, National Partnership for Maternal Safety 2014

COUNCIL ON PATIENT SAFETY IN WOMEN'S HEALTH CARE
safe health care for every woman

The Maternal Safety Bundle for Obstetric Hemorrhage

- Proactive approach
- Includes 13 elements
- Establishes resources
- Manage OB Hemorrhage

OB Hemorrhage Checklist

Draft 1.2

Prenatal Assessment & Planning

☐**Identify and prepare for patients with special considerations:** Placenta Previa/Accreta, Bleeding Disorder, or those who Decline Blood Products

☐**Screen and aggressively treat severe anemia:** if oral iron fails, initiate IV Iron Sucrose Protocol to reach desired Hgb/Hct, especially for at risk mothers.

Admission Assessment & Planning

erify Type & Antibody Screen from prenatal record
f not available,
☐Order Type & Screen (lab will notify if 2nd clot needed for confirmation)
f prenatal or current antibody screen positive (if not low level anti-D from Rho-GAM),
☐Type & Crossmatch 2 units PRBCs
All other patients,
☐Send Clot to blood bank

Evaluate for ***Risk Factors*** (see below)
If medium risk:
☐Order Type & Screen
☐Review Hemorrhage Protocol
If high risk:
☐Order Type & Crossmatch 2 units PRBCs
☐Review Hemorrhage Protocol
☐Notify OB Anesthesia
Identify women who may decline transfusion
☐Notify OB provider for plan of care
☐Early consult with OB anesthesia
☐Review Consent Form

Ongoing Risk Assessment

☐**Evaluate for development of additional risk factors in labor**:
- Prolonged 2nd Stage labor
- Prolonged oxytocin use
- Active bleeding
- Chorioamnionitis
- Magnesium sulfate treatment

☐**Increase Risk level** (see below) **and convert to Type & Screen or Type & Crossmatch**

☐**Treat multiple risk factors as High Risk**

Admission Hemorrhage Risk Factor Evaluation

Low (Clot only)	Medium (Type and Screen)	High (Type and Crossmatch)
No previous uterine incision	Prior cesarean birth(s) or uterine surgery	Placenta previa, low lying placenta
Singleton pregnancy	Multiple gestation	Suspected Placenta accreta or percreta
≤4 previous vaginal births	>4 previous vaginal births	Hematocrit <30 AND other risk factors
No known bleeding disorder	Chorioamnionitis	Platelets <100,000
No history of PPH	History of previous PPH	Active bleeding (greater than show) on admit
	Large uterine fibroids	Known coagulopathy

STAGE 0: All Births: Prevention & Recognition of OB Hemorrhage

Active Management of Third Stage
- ☐ Oxytocin infusion: 10-20 units oxytocin/1000ml solution titrate infusion rate to uterine tone; or 10 units IM; do not give oxytocin as IV push
- ☐ Vigorous **fundal** massage for at least 15 seconds

Ongoing Quantitative Evaluation of Blood Loss
- ☐ Using formal methods, such as graduated containers, visual comparisons and weight of blood soaked materials (**1gm = 1ml**)

Ongoing Evaluation of Vital Signs

If: Cumulative Blood Loss >500ml vaginal birth or >1000ml C/S -OR-
Vital signs >15% change or HR ≥110, BP ≤85/45, O2 sat <95% -OR-
Increased bleeding during recovery or postpartum,
proceed to STAGE 1

Draft 1.2

STAGE 1: OB Hemorrhage

Cumulative Blood Loss >500ml vaginal birth or >1000ml C/S -OR-
Vital signs >15% change or HR ≥110, BP ≤85/45, O2 sat <95% -OR-
Increased bleeding during recovery or postpartum

MOBILIZE	ACT	THINK
Primary nurse, Physician or Midwife to: ☐ Activate OB Hemorrhage Protocol and Checklist **Primary nurse** to: ☐ Notify obstetrician (in-house and attending) ☐ Notify charge nurse ☐ Notify anesthesiologist	**Primary nurse**: ☐ Establish IV access if not present, at least 18 gauge Increase IV Oxytocin rate, 500 mL/hour of 10-40 units/1000mL solution); Titrate infusion rate to uterine tone ☐ Continue vigorous fundal massage ☐ Administer Methergine 0.2 mg IM per protocol (if not hypertensive); give once, if no response, move to alternate agent; if good response, may give additional doses q 2 hr ☐ Vital Signs, including O2 sat & level of consciousness (LOC) q 5 minutes ☐ Weigh materials, calculate and **record** cumulative blood loss q 5-15 minutes ☐ Administer oxygen to maintain O2 sats at >95% ☐ Empty bladder: straight cath or place Foley with urimeter ☐ Type and Crossmatch for 2 units Red Blood Cells STAT (if not already done) ☐ Keep patient warm **Physician or midwife:** ☐ Rule out retained Products of Conception, laceration, hematoma **Surgeon (if cesarean birth and still open)** ☐ Inspect for uncontrolled bleeding at all levels, esp. broad ligament, posterior uterus, and retained placenta	Consider potential etiology: • Uterine atony • Trauma/Laceration • Retained placenta • Amniotic Fluid Embolism • Uterine Inversion • Coagulopathy • Placenta Accreta **Once stabilized:** Modified Postpartum management with increased surveillance

If: Continued bleeding or Continued Vital Sign instability, and <1500 mL cumulative blood loss proceed to STAGE 2

UTEROTONIC AGENTS for POSTPARTUM HEMORRHAGE

Drug	Dose	Route	Frequency	Side Effects	Contraindications	Storage
Pitocin® (Oxytocin) 10 units/ml	10-40 units per 1000 ml, rate titrated to uterine tone	IV infusion	Continuous	Usually none Nausea, vomiting, hyponatremia ("water intoxication") with prolonged IV admin. ↓ BP and ↑ HR with high doses, esp IV push	Hypersensitivity to drug	Room temp
Methergine® (Methylergonivine) 0.2mg/ml	0.2 mg	IM (**not** given IV)	-Q 2-4 hours -If no response after first dose, it is unlikely that additional doses will be of benefit	Nausea, vomiting Severe hypertension, esp. with rapid administration or in patients with HTN or PIH	Hypertension, PIH, Heart disease Hypersensitivity to drug **Caution** if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/possible cerebral hemorrhage	Refrigerate Protect from light
Hemabate® (15-methyl PG F2a) 250mcg/ml	250 mcg	IM or intra-myometrial (**not** given IV)	-Q 15-90 min -Not to exceed 8 doses/24 hrs -If no response after several doses, it is unlikely that additional doses will be of benefit.	Nausea, vomiting, Diarrhea Fever (transient), Headache Chills, shivering Hypertension Bronchospasm	Caution in women with hepatic disease, asthma, hypertension, active cardiac or pulmonary disease Hypersensitivity to drug	Refrigerate
Cytotec® (Misoprostol) 100 or 200mcg tablets	800-1000mcg	Per rectum (PR)	One time	Nausea, vomiting, diarrhea Shivering, Fever (transient) Headache	Rare Known allergy to prostaglandin Hypersensitivity to drug	Room temp

STAGE 2: OB Hemorrhage

Continued bleeding or Vital Sign instability, and <1500 mL cumulative blood loss

MOBILIZE

Primary nurse (or charge nurse):
- ☐ Call obstetrician to bedside
- ☐ Call Anesthesiologist
- ☐ Activate Response Team:
  PHONE #:_____
- ☐ Notify Blood bank of hemorrhage; order products as directed

Charge nurse:
- ☐ Notify Perinatologist or 2nd OB
- ☐ Initiate OB Hemorrhage Record
- ☐ If selective embolization, call-in Interventional Radiology Team and second anesthesiologist
- ☐ Notify nursing supervisor
- ☐ Assign single person to communicate with blood bank
- ☐ Call medical social worker or assign other family support person

ACT

Team leader (OB physician):
- ☐ Additional uterotonic medication: Hemabate 250 mcg IM [if not contraindicated] **OR** Misoprostol 800-1000 mg PR
  - Can repeat Hemabate up to 3 times every 20 min; (note-75% respond to first dose)

Do not delay other interventions (see right column) while waiting for response to medications
- ☐ Bimanual uterine massage
- ☐ Move to OR (if on postpartum unit, move to L&D or OR)
- ☐ Order 2 units PRBCs and bring to the bedside
- ☐ Order labs STAT (CBC/Plts, Chem 12 panel, Coag Panel II, ABG)
- ☐ **Transfuse PRBCs based on clinical signs** and response, **do not wait** for lab results

Primary nurse:
- ☐ Establish 2nd large bore IV, at least 18 gauge
- ☐ Assess and announce Vital Signs and cumulative blood loss q 5-10 minutes
- ☐ Set up blood administration set and blood warmer for transfusion
- ☐ Administer meds, blood products and draw labs, as ordered
- ☐ Keep patient warm

Second nurse (or charge nurse):
- ☐ Place Foley with urimeter (if not already done)
- ☐ Obtain portable light and OB procedure tray or Hemorrhage cart
- ☐ Obtain blood products from the Blood Bank
- ☐ Assist with move to OR (if indicated)

Blood Bank:
- ☐ Determine availability of thawed plasma, fresh frozen plasma, and platelets; initiate delivery of platelets if not present on-site
- ☐ Consider thawing 2 FFP (takes 30 min), use if transfusing >2 units PRBCs
- ☐ Prepare for possibility of massive hemorrhage

THINK

Sequentially advance through procedures and other interventions based on etiology:

Vaginal birth
If **trauma (vaginal, cervical or uterine):**
- Visualize and repair

If **retained placenta**:
- D&C

If **uterine atony** or lower uterine segment bleeding:
- Intrauterine Balloon

If **above measures unproductive:**
- Selective embolization (Interventional Radiology if available & adequate experience)

C-section:
- B-Lynch Suture
- Intrauterine Balloon

If **Uterine Inversion**:
- Anesthesia and uterine relaxation drugs for manual reduction

If **Amniotic Fluid Embolism**:
- Maximally aggressive respiratory, vasopressor and blood product support

If **vital signs are worse than estimated or measured blood loss**: possible uterine rupture or broad ligament tear with internal bleeding; **move to laparotomy**

Once stabilized: Modified Postpartum management with increased surveillance

Re-Evaluate Bleeding and Vital Signs
If cumulative blood loss >1500ml, >2 units PRBCs given, VS unstable or suspicion for DIC, proceed to STAGE 3

STAGE 2: OB Hemorrhage

Continued bleeding or Vital Sign instability, and <1500 mL cumulative blood loss

MOBILIZE

Primary nurse (or charge nurse):
- ☐ Call obstetrician to bedside
- ☐ Call Anesthesiologist
- ☐ Activate Response Team: **PHONE #:**_____
- ☐ Notify Blood bank of hemorrhage; order products as directed

Charge nurse:
- ☐ Notify Perinatologist or 2nd OB
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- ☐ If selective embolization, call-in Interventional Radiology Team and second anesthesiologist
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- ☐ Keep patient warm

Second nurse (or charge nurse):
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- ☐ Obtain portable light and OB procedure tray or Hemorrhage cart
- ☐ Obtain blood products from the Blood Bank
- ☐ Assist with move to OR (if indicated)

Blood Bank:
- ☐ Determine availability of thawed plasma, fresh frozen plasma, and platelets; initiate delivery of platelets if not present on-site
- ☐ Consider thawing 2 FFP (takes 30 min), use if transfusing >2 units PRBCs
- ☐ Prepare for possibility of massive hemorrhage

THINK

Sequentially advance through procedures and other interventions based on etiology:

Vaginal birth

If **trauma (vaginal, cervical or uterine):**
- Visualize and repair

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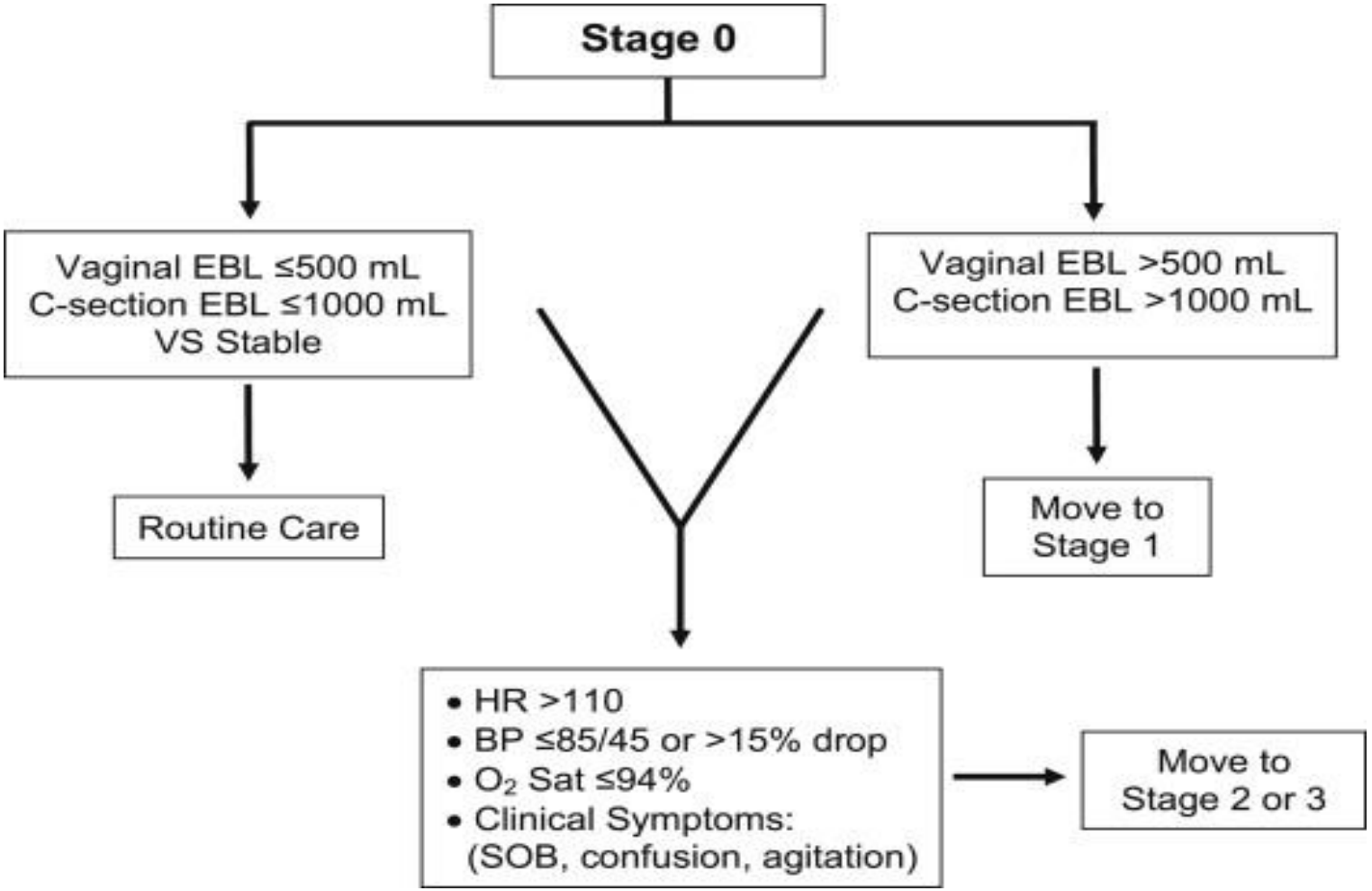
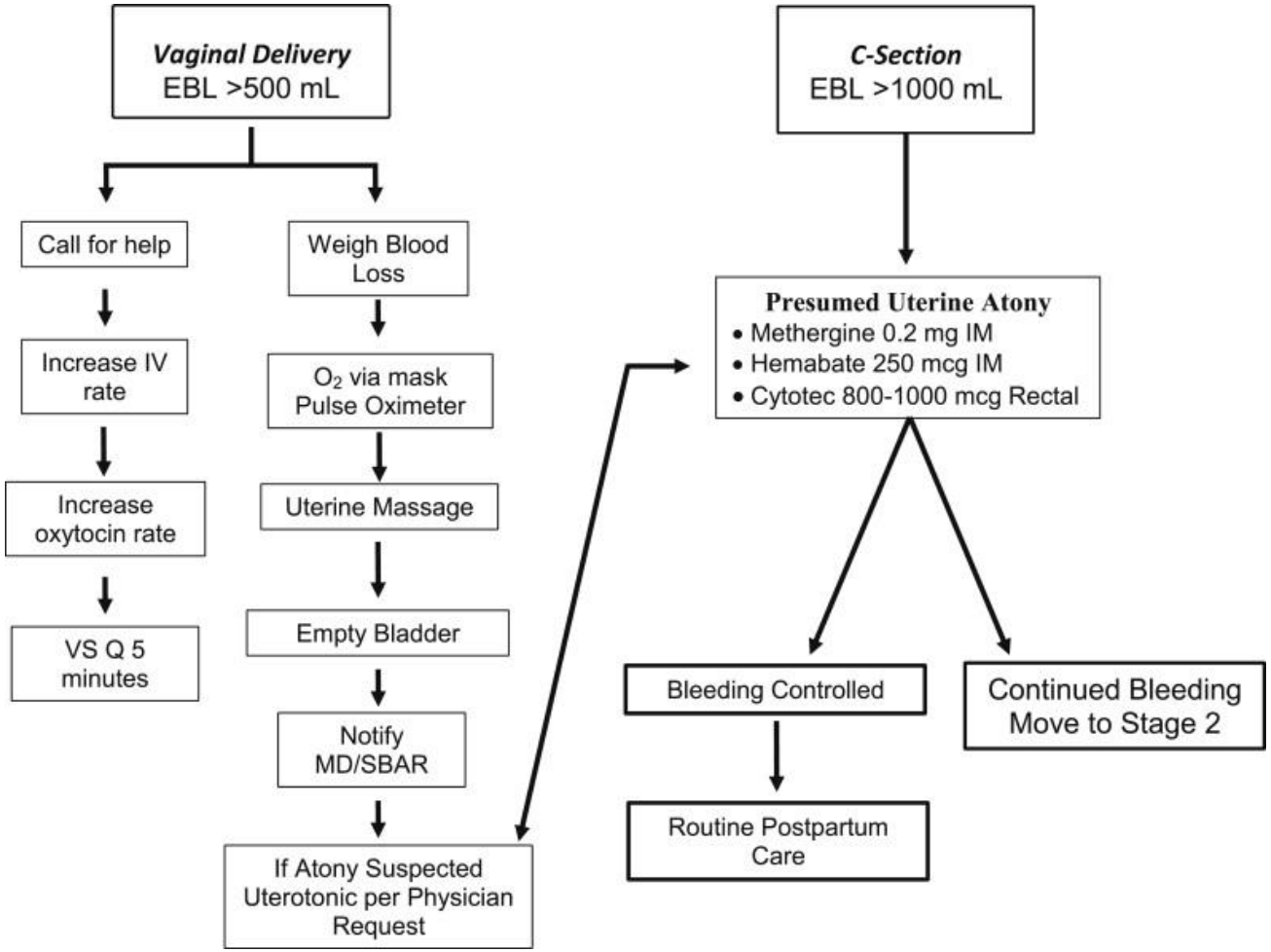


Laurence E. Shields , Suzanne Wiesner , Janet Fulton , Barbara Pelletreau

American Journal of Obstetrics and Gynecology, 2014
http://dx.doi.org/10.1016/j.ajog.2014.07.012



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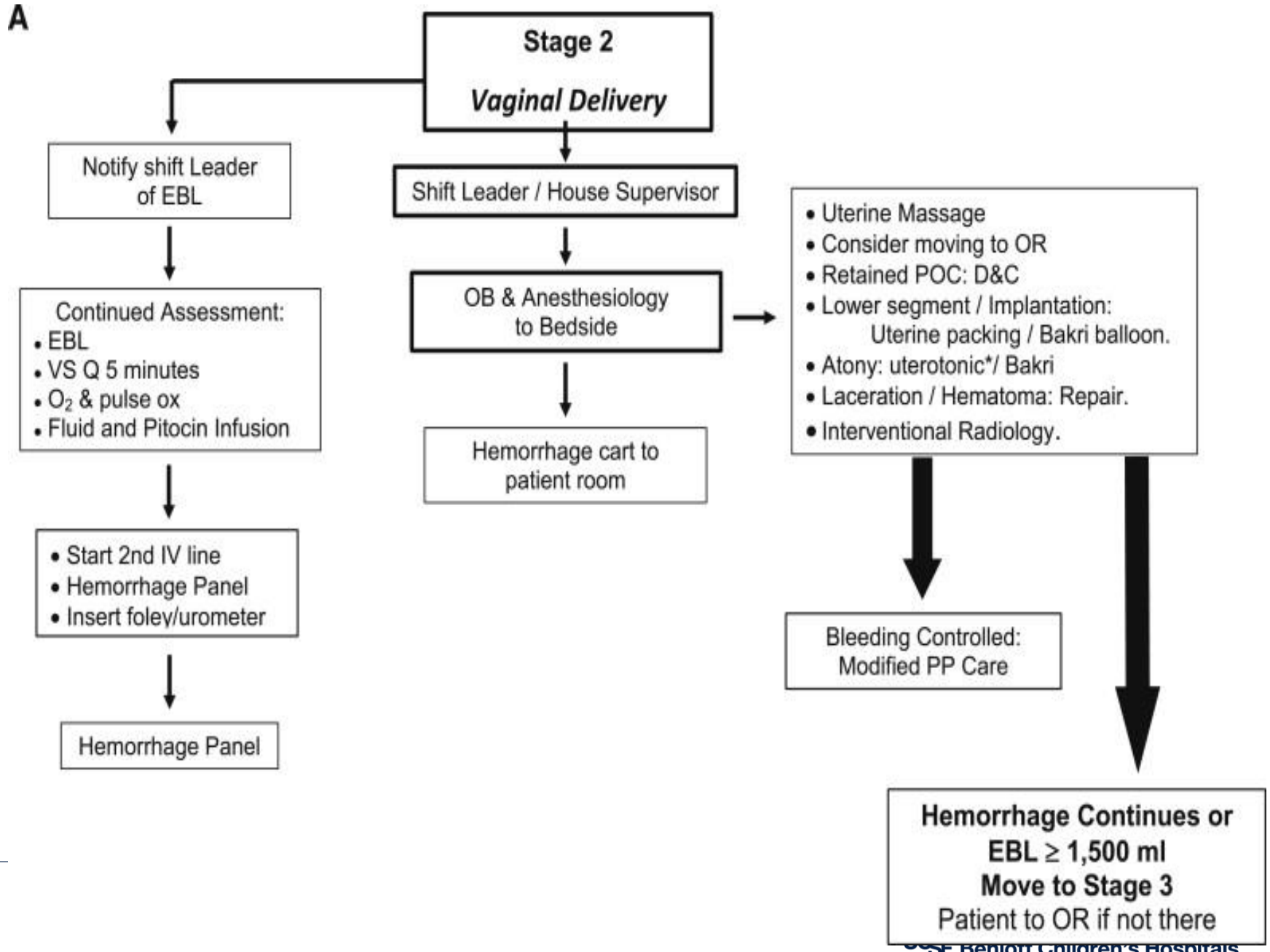
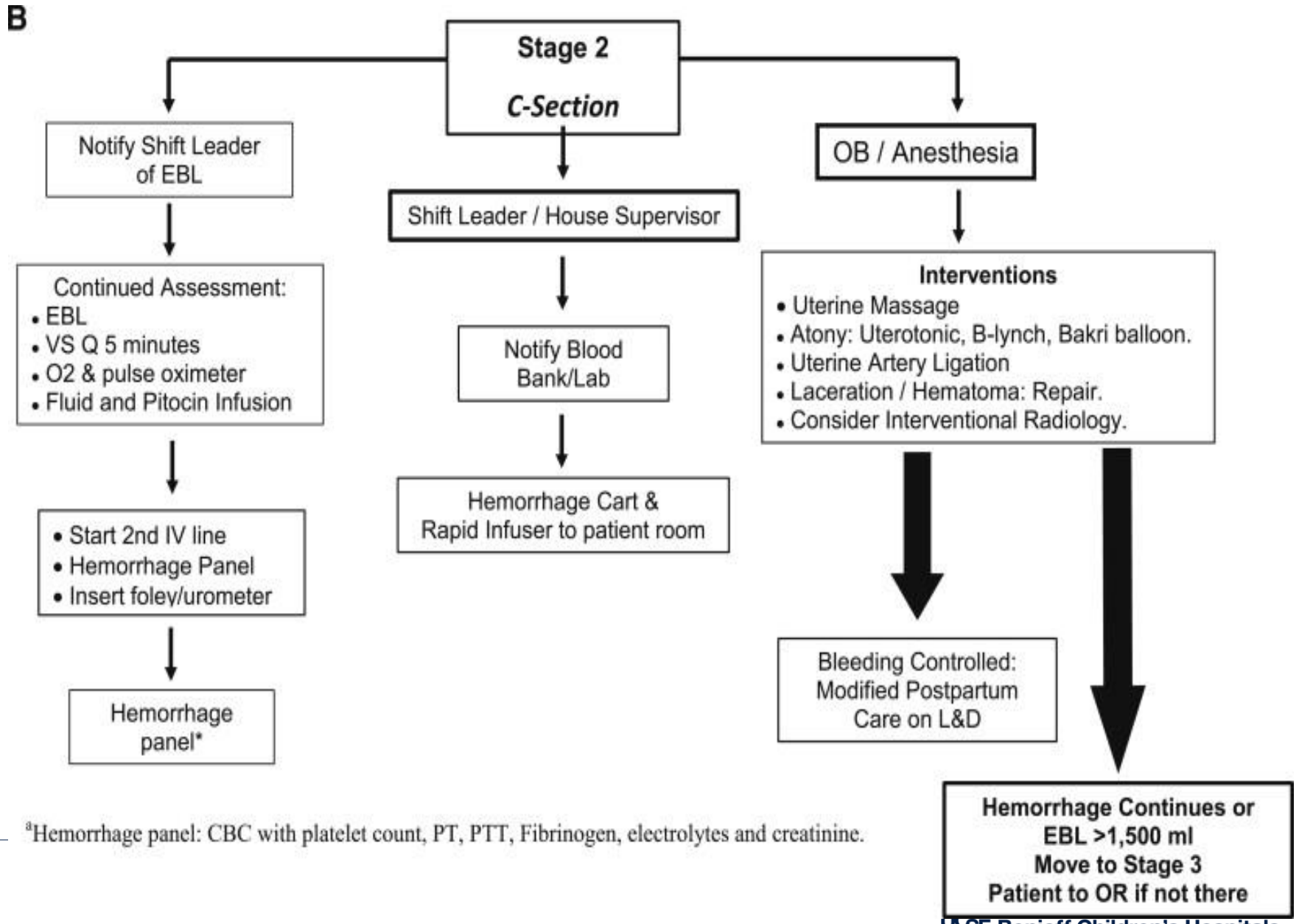
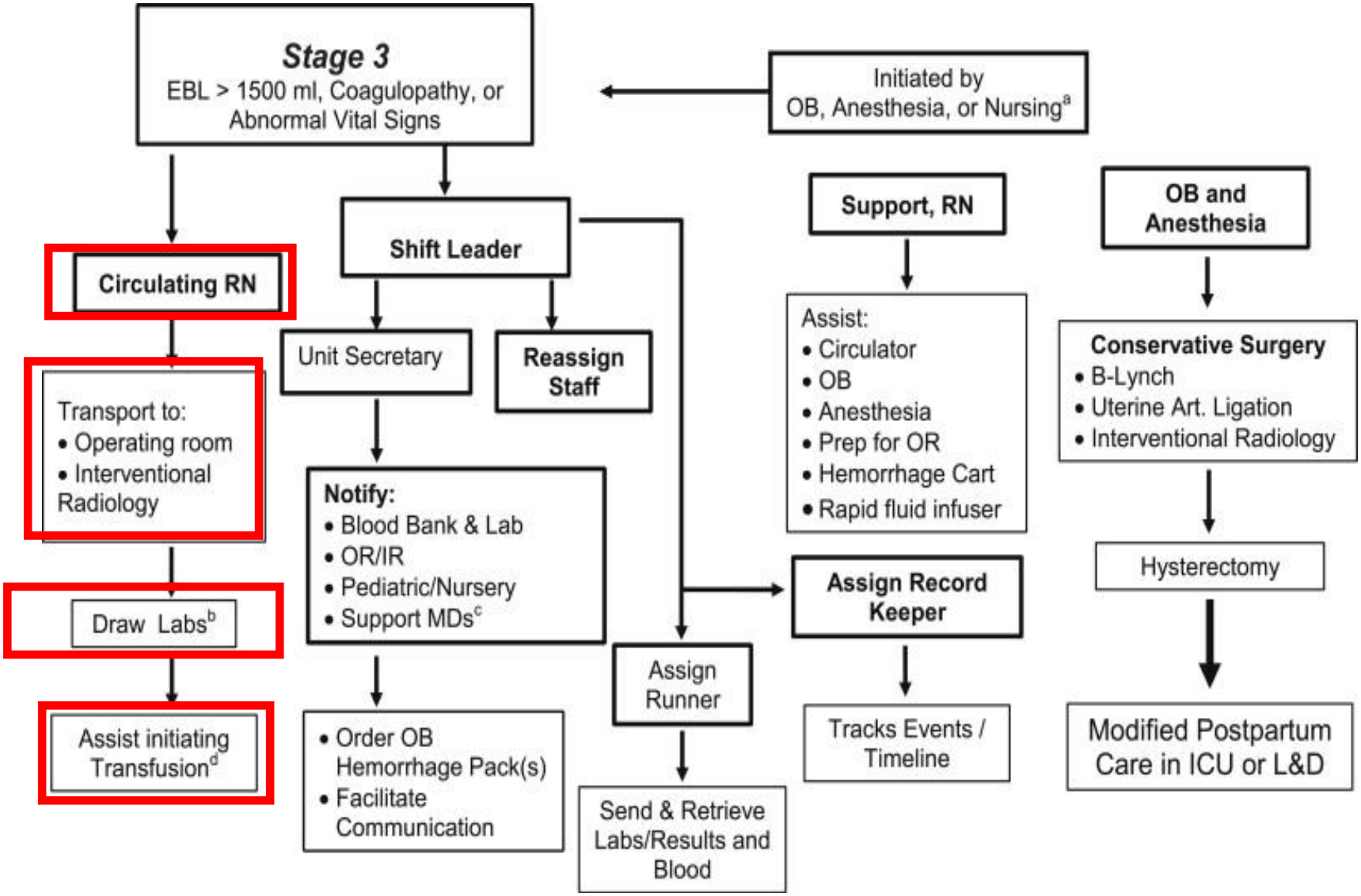

A
Stage 2
Vaginal Delivery
Notify shift Leader of EBL
Shift Leader / House Supervisor
Continued Assessment:
• EBL
• VS Q 5 minutes
• O_2 & pulse ox
• Fluid and Pitocin Infusion
OB & Anesthesiology to Bedside
• Uterine Massage
• Consider moving to OR
• Retained POC: D&C
• Lower segment / Implantation: Uterine packing / Bakri balloon.
• Atony: uterotonic*/ Bakri
• Laceration / Hematoma: Repair.
• Interventional Radiology.
• Start 2nd IV line
• Hemorrhage Panel
• Insert foley/urometer
Hemorrhage cart to patient room
Bleeding Controlled: Modified PP Care
Hemorrhage Panel
Hemorrhage Continues or EBL ≥ 1,500 ml
Move to Stage 3
Patient to OR if not there



[a]Hemorrhage panel: CBC with platelet count, PT, PTT, Fibrinogen, electrolytes and creatinine.



Laurence E. Shields , Suzanne Wiesner , Janet Fulton , Barbara Pelletreau

American Journal of Obstetrics and Gynecology, 2014

CMQCC - California Partnership for Maternal Safety
OBSTETRIC HEMORRHAGE DEBRIEF FORM

The debrief form provides an opportunity for obstetric service teams to review the sequence of events, successes and barriers to a swift and coordinated response to obstetric hemorrhage.

Goal: Debrief all obstetric hemorrhages (up to five) per month that include the following triggers:

- 1000 *(1500)* ml blood loss – Stage 2 *(3)* hemorrhage *(will depend on the frequency of events at your hospital, to be determined by your own institution)*
- Administration of ***second*** dose of any uterotonic medication (methergine, hemabate, misoprostol)
- Use of uterine tamponade balloon or B-lynch suture
- Administration of blood products

Instructions: Complete debrief form as soon as possible after event as described above. During debrief, obtain input from as many participants as possible.

Date: Time: Submitted by:

RECOGNITION	
Was patient assigned a hemorrhage risk? ☐Low ☐Medium ☐High ☐Not done	**Volume of Blood Lost**_____ **Method:** ☐Formal quantification ☐Visual estimation ☐Both
RESPONSE	
Supplies/cart: Identify opportunities for improvement: ☐Appropriate supplies available ☐Equipment ☐ Medications ☐Blood products ☐ Procedure ☐ Device(s)working properly? ☐ Yes ☐No ☐Other issues?:	**Blood products** Available without delay? ☐Yes ☐No Adequate blood product volume available? ☐ Yes ☐No
TEAMWORK	
Timely Team response? ☐Yes ☐No **All roles filled?** ☐Primary Physician ☐Primary Nurse ☐Charge Nurse ☐Secondary Nurse ☐Documentation ☐Runner ☐Anesthesia **Role clarity?** ☐Yes ☐No **Was there a clear leader?** ☐ Yes ☐No Was there clear communication? ☐ Yes ☐No	

Participants (Name, Role):

Issue(s) or Recommendation(s)

ff Children's Hospitals

Severe Maternal Morbidity

2015 TJC issues new statement

- Definition of sentinel event reporting
  - A patient safety event (not related to the natural course of the patient's illness or underlying condition) that reaches a patient and results in any of the following:
    - Death
    - Permanent harm
    - Severe temporary harm
      - For OB:
        - 4 or more units of blood
        - Admission to ICU

Severe Maternal Morbidity

Adverse Outcome Review

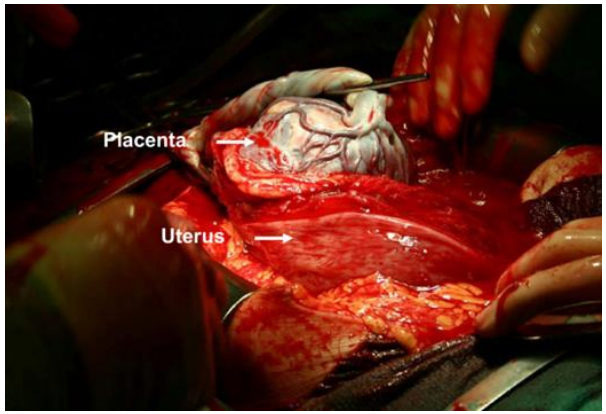
- Why do it?
  - Finger point, blame, punish
  - Learn, improve future outcomes
- ACOG, AWHONN, SMFA –
- Recommend all severe morbidity whether sentinel or not:
  - Undergo review process:
    - thorough, credible, multidisciplinary, comprehensive

AWHONN
PROMOTING THE HEALTH OF WOMEN AND NEWBORNS

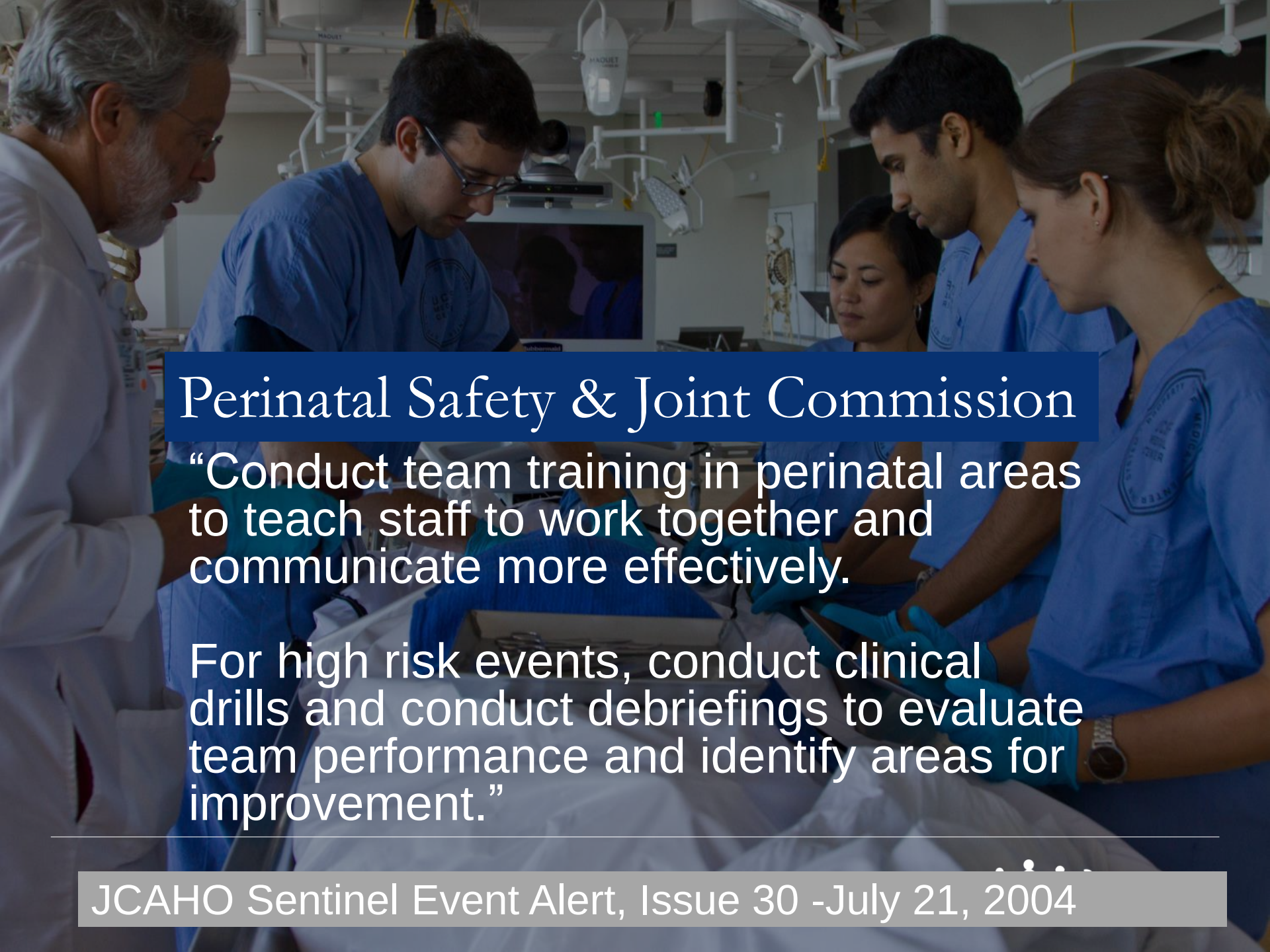
Society for Maternal·Fetal Medicine

UCSF Benioff Children's Hospitals

Case Examples



- Example #1
- A G4P3 woman with known placenta accreta underwent cesarean birth during which expected, but profound, bleeding occurs, requiring 4 units of packed red blood cells. She was monitored in the ICU overnight with a subsequent unremarkable postpartum stay and was discharged.
- Comment
- Meets Criteria for Hospital Review (4 units of PRBC's and ICU admit)
  - IR, GYN/Onc Surgeon
- Does not meet criteria for TJC sentinel event reporting
  - Placenta accreta underlying condition results in expected blood loss



Perinatal Safety & Joint Commission

"Conduct team training in perinatal areas to teach staff to work together and communicate more effectively.

For high risk events, conduct clinical drills and conduct debriefings to evaluate team performance and identify areas for improvement."

JCAHO Sentinel Event Alert, Issue 30 -July 21, 2004

Distribute Work Load Optimally

- Avoid the “one woman band”
- Delegate tasks
  - “Mary: please get the hemorrhage cart”
  - “Sandy, call Dr. Wilcox and ask her to come for a bedside evaluation now”
- Utilize staff in the area of expertise
  - Respiratory Therapists - airway
  - Nursing Supervisor - recorder

Where do we go from here

- Immediate post-op plan
  - Treat anemia
  - Care of newborn

- Long term patient follow-up
  - Negative impact on patient
    - **Hemorrhage during childbirth**
    - **Unexpected hysterectomy**
    - **Near death experience**

Postpartum Care / Patient Satisfaction
Hemorrhage

- Thompson, et al. (2011). Women's experiences of care and their concerns and needs following a significant primary postpartum hemorrhage. *Birth*
- Australia 206 Women Primary PPH >1500 mL
- Written questionnaire 1st week and 2 and 4 months
- 4 Themes:
    1. Adequacy of care
    2. Emotional response
    3. Future Implications
    4. Concern for the baby

- Findings suggest pay particular attention to informational and emotional need of women who experience significant PPH

Traumatic Childbirth

"process that involves actual or threatened serious injury or death to the mother or her infant. The birthing woman experiences intense fear, helplessness, loss of control and horror".

- Dehumanizing experience
  - High level of medical interventions, extreme pain
- Stripped of their dignity
- Powerless
- Lack of caring and support from perinatal staff
- Fear of dying

Beck, C. Birth Trauma: In the eye of the beholder. Nursing Research (2004a).

Traumatic Childbirth

- **Unexpected Project Survivors Forum San Jose**
- **4/30/14**
- **8AM - 5PM**

UCSF Benioff Children's Hospitals

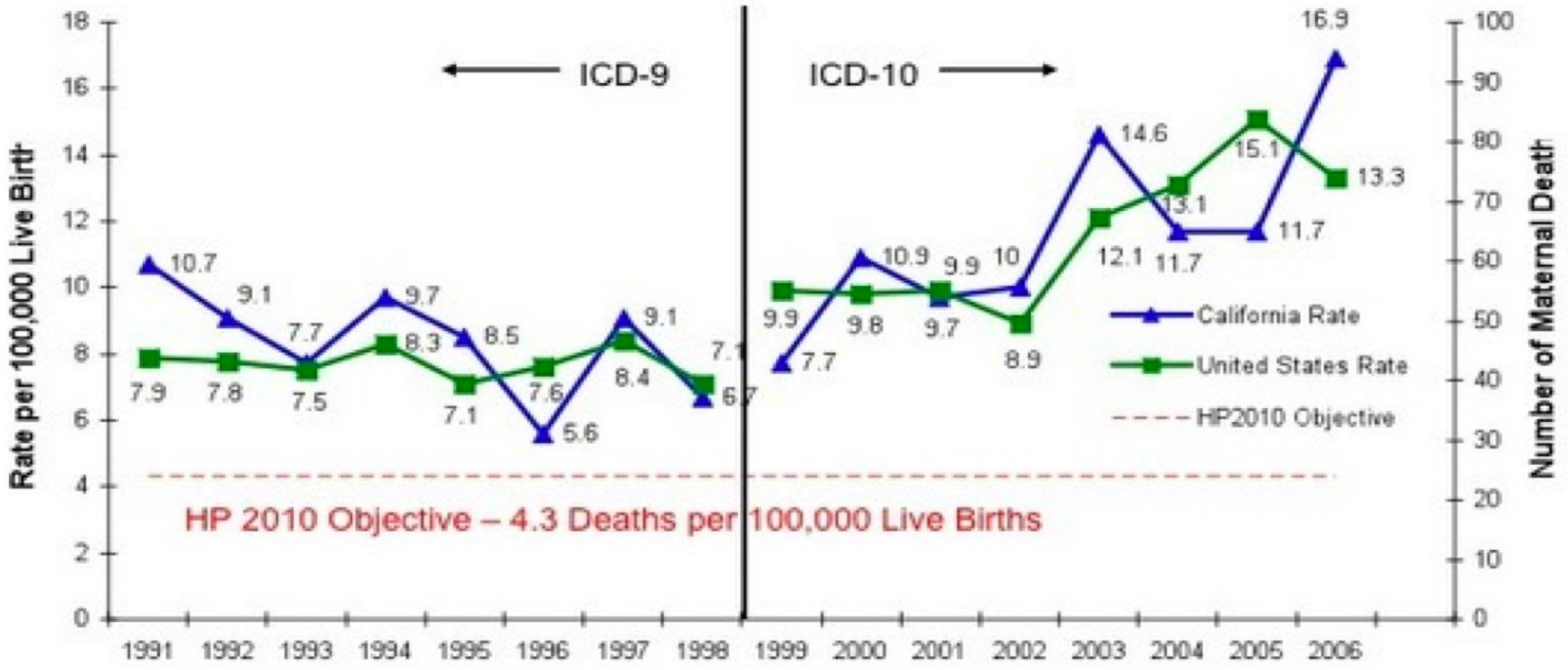
WHAT CAN WE LEARN FROM WOMEN'S ACCOUNTS?

- How they experienced their symptoms
- How they experienced the health care system & the care they received
- What information they were given & what they sought
- How they understand their experience in the context of their lives & relationships
- What maternity clinicians & hospitals can do better for women & their families

Summary

- Abnormal placentation bears a serious risk of maternal hemorrhage.
- Quantification of blood loss is essential for accurate assessment during hemorrhage.
- Nurses play an essential role during maternal hemorrhage to risk assess, recognize, and correctly respond during an emergency.
- Attention to risk, rapid recognition, escalation and mobilizing a multidisciplinary team during a postpartum crisis will optimize women's survival during childbirth.
- Implementing hemorrhage drills to enhance reliability in your system will promote safety.

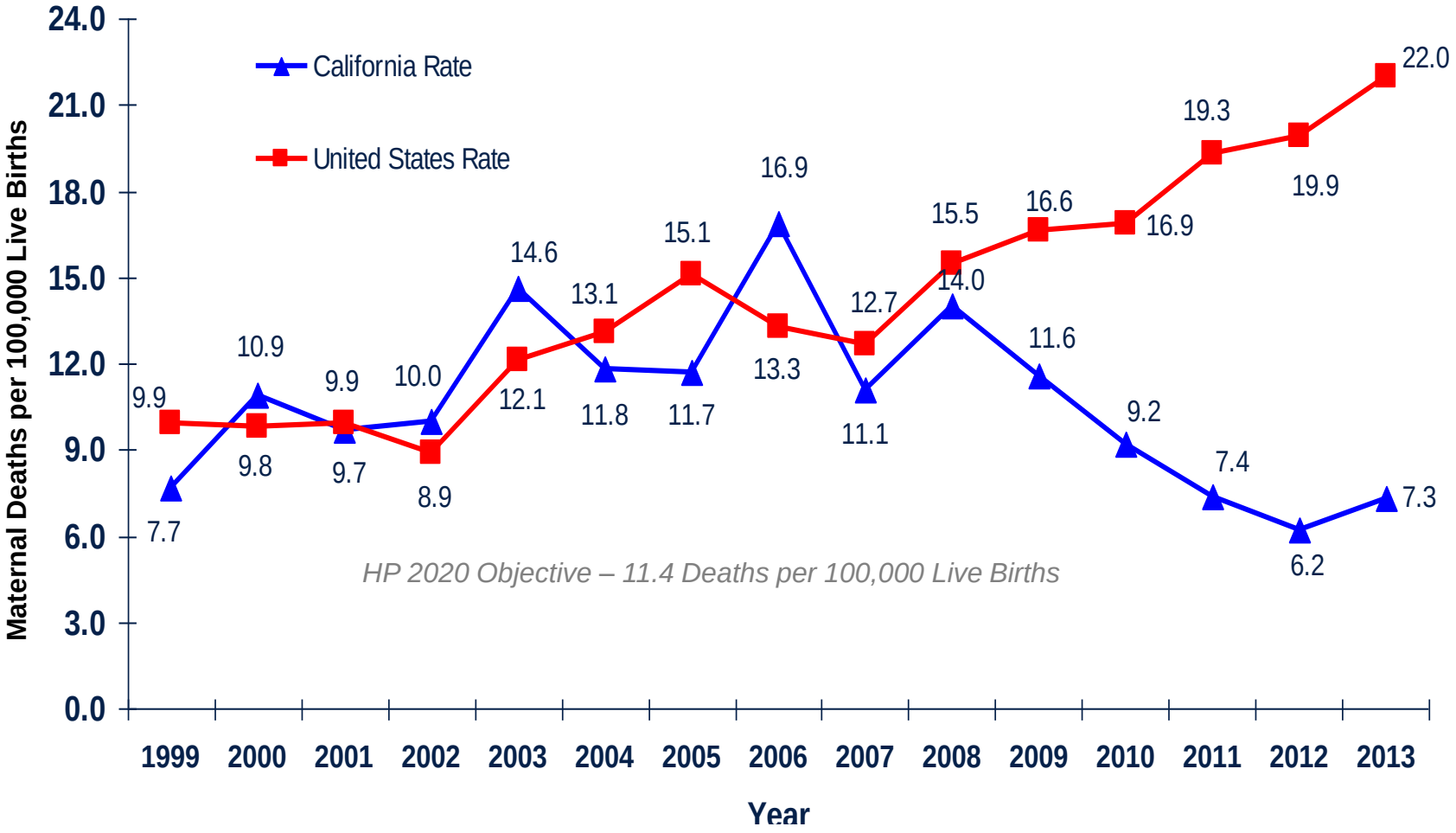
Maternal Mortality Rate
California Residents and United States: 1991-2006



SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1991-2006. Maternal mortality for California (deaths ≤ 42 days postpartum) calculated using ICD-9 cause of death classification (codes 630-638, 640-648, 650-676) for 1991-1998 and ICD-10 cause of death classification (codes A34, O00-O95,O98-O99) for 1999-2006. United States data and HP2010 Objective were calculated using the same methods. The break in the trend line represents the change from ICD-9 to ICD-10. Produced by California Department of Public Health, Maternal, Child and Adolescent Health Program, June 2009.

www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_44.htm

Maternal Mortality Rate, California and United States; 1999-2013



SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2013. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95,O98-O99). United States data and HP2020 Objective use the same codes. U.S. maternal mortality data is published by the National Center for Health Statistics (NCHS) through 2007 only. U.S. maternal mortality rates from 2008 through 2013 were calculated using CDC Wonder Online Database, accessed at http://wonder.cdc.govon March 11, 2015. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, March, 2015.

Nurses are a valuable source of information and support for women and their families

UCSF Benioff Children's Hospitals

Thank You!

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