

Maternal & Postpartum Hemorrhage

GOAL: IMPROVE PATIENT OUTCOMES BY EARLY IDENTIFICATION AND TREATMENT

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No Disclosures



- University of Nebraska-Lincoln
 - ▶ Bachelor's Degree Biochemistry
- University of Nebraska Medical Center
 Medical Degree

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▶ Residency





Omaha Metro Area Population: ~1 million

"Only in Nebraska will you get stuck behind a giant tractor taking up both lanes...



...Honestly, it's not for everyone."



<u>Hemodynamics</u>

- Non-Pregnant: ~65-70 mL/kg
- Pregnant Woman at Term: ~100 mL/kg (40-50% ↑ over baseline)
 - ▶ RBC's increase 20-30%
 - Plasma increases 40-50%
 - ► ↓↓ blood viscosity → improved placental perfusion and lower cardiac workload
 - Larger circulating blood volume can lead to a physiologic anemia and/or thrombocytopenia
 - The bleeding patient may have already started out anemic/thrombocytopenic

Pregnant women can lose up to <u>1200-1500 mL</u> before becoming symptomatic

Hemorrhage: Old Definition



Hemorrhage: New Definition



Blood loss with signs/symptoms of hypovolemia

 Despite new definition, EBL >500 mL in a vaginal delivery should be considered abnormal and warrants further investigation

-**OR**-

Hemorrhage Definitions Cont.

- Maternal/Obstetrical Hemorrhage: Before delivery
 - Trauma, placental abruption, placenta previa
- <u>1° PPH</u>: After delivery (up to 24 hours)
- <u>2° PPH</u>: >24 hours to 12 weeks postpartum
 - ▶ 1% of pregnancies
 - Placental subinvolution, retained POC, infection, inherited coagulation defects (vWf or factor deficiency)

Pre-Birth Hemorrhage Risk Factors

- ► History of PPH (~10% risk of recurrence)
- ► Grand multiparity (≥5 deliveries)
- Known coagulopathy (congenital or acquired, use of anticoagulants during pregnancy)
- Abnormal Placentation (placenta accreta spectrum, placenta previa, vasa previa)
- Induction or augmentation of labor
- ► Magnesium Sulfate
- ▶ Previous Cesarean Section
- Family history of OB hemorrhage
- Placenta previa or low-lying placenta
- ► Unsuccessful TOLAC → RLTCS
- ► Uterine fibroids
- ►HELLP

- ► Over distension of the uterus
 - Multiple gestation
 - ▶ Polyhydramnios
 - ▶Fetal Macrosomia
- Prolonged Labor (First stage >18 hours, second stage >2 hours)
- Pre-eclampsia and related disorders
- ▶ Fetal demise
- Chorioamnionitis or maternal temperature (>100.4°F)
- ►Hematocrit <30
- ► Platelets <100,000
- Suspected placental abruption

Post-Birth Hemorrhage Risk Factors

- Precipitous delivery
 - ► Labor onset to delivery <3 hours
- Operative vaginal delivery
- Cesarean Delivery
- Shoulder Dystocia
- Difficult placental extraction
- Uterine Inversion
- Concealed Abruption
- Cervical and vaginal lacerations

Signs and Symptoms

- Excessive Bleeding
- Hypotension (shock)
- Tachycardia
- Diaphoresis
- Syncope
- Pallor
- Nausea/Vomiting
- Acute renal failure
- DIC

- Hypoxia
- Lightheadedness
- Weakness
- Palpitations
- Confusion
- Coma
- Oliguria
- Respiratory Distress Syndrome
- Death

Unstable VS

- BP ≤ 85/45
- Pulse ≥ 110
- O2 sat <95%
- UOP <30ml/hr

Late: Sheehan's Syndrome (Pituitary necrosis)

Assessing the Cause of Postpartum Hemorrhage





Tone

- Lower uterine segment atony (most common cause \rightarrow 70-80% of cases)
 - Macrosomia, shoulder dystocia
 - Multiple gestation
 - Polyhydramnios
 - Long labor or rapid labor/delivery
 - History of uterine atony
- Fibroid uterus
- Uterine inversion
- General anesthesia

Trauma

- Lacerations (cervical, periurethral, vaginal, perineal, episiotomies)
- Hematomas (may not be visible on exam CT scan)
- Uterine rupture
- Operative vaginal delivery

Tissue

- Retained tissue (placental fragments, blood clots)
- Placenta accreta spectrum

Thrombin

- Pre-eclampsia
- Severe infection/sepsis
- Medications: Heparin or Lovenox
- Coagulopathies: thrombocytopenia, von Willebrand's, hemophilia, factor deficiency
- HELLP
- DIC
- Amniotic fluid embolism

Atony → Lower Uterine Segment Massage







Medications

Oxytocin	Cytotec (Misoprostol)	Methergine	Hemabate
 10 units IM -OR- 30 units/500 mL NS Side Effects: SIADH, nguseg/yomiting 	• 600-1000 mcg PR x1 -OR- 400-1000 mcg PO x1	 0.2 mg IM Repeat q2-4 hours x 5 doses 	 250 mcg IM Repeat q15 min x 8 doses
	 <u>Side Effects</u>: diarrhea, nausea/vomiting headaches, fever <u>PO Doses >600 mcg</u>: significant side effects 	 <u>Contraindications</u>: hypertensive disorders <u>Side Effects</u>: nausea/vomiting 	 <u>Contraindications</u>: asthma, active hepatic, cardiac or pulmonary disease <u>Side Effects</u>: diarrhea, nausea/vomiting, bronchospasm

<u>TXA</u>

- Antifibrinolytic agent
- Effective in reduction of mortality if given within the <u>first 3 hours</u> of the event
- In an emergent situation with limited resources/medications, TXA may be used first line
 - ▶ Route: IV or PO
 - ► IV: 1g over 10-20 minutes
 - May give additional dose after 20 minutes
 - <u>Contraindications</u>: hx DVT/PE, Factor V Leiden, etc.

Tranexamic Acid in 0.7% Sodium Chloride Injection

> 1,000 mg per 100 mL (10 mg per mL)

For Intravenous Infusion Only.

Each mL contains 10 mg of Tranexamic Acid, USP 7 mg of Sodium Chloride, USP in Water for Injection, USP. pH 6.5 – 8.0.

DOSAGE: See prescribing information for complete information on dosing and administration.

CAUTIONS: Check for minute leaks by squeezing bag firmly. Do not use unless solution is clear. Do not add supplemental medication. Must not be used in series connections.

STORAGE: Store at 20°C to 25°C (68°F to 77°F); excursions permitted to 15°C to 30°C (59°F to 86°F).

Rx Only Sterile, Unpreserved, Nonpyrogenic

FDA approved in 2009 for PPH



Mechanical Options (Tamponade Techniques)

Bakri Balloon



**Place Foley, remove devices/packing after 12-24 hours (max 24 hours) **Intrauterine Foley may also be used for tamponade

Jada Suction Device



Uterine Packing



Surgical Intervention

- When conservative management fails, take the patient to the OR for further examination
 - Dilation and Curettage
 - ► Tamponade devices
 - In the delivery room or in the OR
 - B-Lynch sutures, square sutures, O'Leary stitches
 - ► Uterine preservation
 - ► Hysterectomy







Patient: "I read online that Oxytocin isn't necessary postpartum, so I don't want it."



Standard: Oxytocin after delivery of the placenta



Postpartum Hemorrhage Happens Fast



2023 Koenigsegg Jesko Absolut – 1600 hp, 330mph \$3 million

- ► Increased blood volume → increased cardiac output → large volumes of blood can be lost rapidly → exsanguination in 8 -10 minutes
- The most preventable cause of maternal morbidity and mortality
 - Delays in treatment or diagnosis, ineffective management, lack of proper preventative measures
 - ▶ <u>Highest Risk</u>: 1st hour after birth



How and When to Transfuse



		25 mL peripad	50 mL peripad	100 mL p	eripad	
			Percentage of	Saturation		
		25%	50%	50%	100%	
Gauze Size	10×10 cm	3 mL	6 mL	6 mL	12 mL	
	30×30 cm	25 mL	50 mL	75 mL	100 mL	
	45×45 cm					

↑Estimated Blood Deficit and Ongoing Blood Loss (or EBL ≥1500 mL)					
Hg <7 g/dL	•Some patients are an exception and should be transfused at Hg 10 or less				
Abnormal Vital Signs	 Do not wait for EBL 1500 mL H&H not accurate during ongoing hemorrhage Patient had a drop in Hg postpartum <u>and</u> is symptomatic (ie: Hg 14→8 g/dL) 				
Ratio 1:1:1	 PRBC : Platelet : FFP (DIC → Add Cryoprecipitate) 				
Massive Transfusion	10 units or more in 24 hours4 units in 1 hour with anticipation of needing more blood				
Rapid Transfusion Device					
Patient Refusal of Blood Products: Hetastarch, Cell-Saver, autologous blood, IV fluids, Albumin	 Significantly higher risk of maternal mortality (44 to 130-fold) • 1U PRBC's = ↑Hg 1g/dL, 3% Hct 				



<u>Thrombocytopenia</u>

- Platelets prevent and stop bleeding
- Transfuse Platelets:
 - ▶ SVD: <100,000
 - ▶ CD: <30,000-50,000
 - ▶ Epidural: <80,000
- Risk of spontaneous bleeding: <10,000</p>



6 pack of platelets = \uparrow 30,000-60,000/µl

DLAMOND OF DEATH

- Citrate preservative is added to blood products
 - ► Binds endogenous calcium rendering it inactive → hypocalcemia
 - Hyperkalemia
- Treatment
 - ► For every 4 units of blood products →give 1g calcium gluconate IV



<u>Labs</u>

- ► CBC
- CMP (ionized calcium)
- Coag Panel: pT, pTT, fibrinogen
- ▶ Type and Cross
- ▶ <u>ROTEM Panel</u>:
 - Invented during WWII
 - Targeted treatment of bleeding events
 - Provides information on whole kinetics of hemostasis: clotting time, clot formation, clot stability and lysis
 - <u>Positives</u>: Not affected by platelet inhibitors such as Aspirin or vWF
 - <u>Negatives</u>: Not useful with LMWH, not as useful during active hemorrhage
 - Products given based on EXTEM and FIBTEM (algorithm)



IN MEMORIAM HELLMUT HARTERT 1918-1993

Systems Level Interventions

Hospitals should adopt a system to implement key elements in 4 categories



Practice Bulletin No.183: Postpartum Hemorrhage (2006, Reaffirmed 2021), Council on Patient Safety in Women's Healthcare

Protocols for emergency release of blood products and for massive transfusion

• Develop plans for immediate blood shipment for facilities with limited blood supply -Know how long it will take to receive blood products

Unit education on protocols with regular unit-based drills and debriefs

Perform hemorrhage risk factor assessment upon admission, antepartum, intrapartum, and postpartum

Perform QBL (quantification of blood loss)

A standardized hemorrhage safety bundle should be in place to guide you through the management of PPH



Risky Business: Hemorrhage Risk Assessment Tools

- Have been shown to identify 60-85% of patients who will have a significant obstetrical hemorrhage
- On admission, transition phase of labor, or any major changes throughout the labor process (ie: starting Magnesium, labor > 18 hours, chorioamnionitis, etc). Assess again in the recovery stage.
 - ▶ 0 Risk Factors = low risk (NOT "Zero Risk")
 - 1 Risk Factor = moderate risk
 - 2+ Risk Factors = high risk
 - High Risk: 2 large bore IV's, type and cross, uterotonics at the bedside for delivery

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► Two Hemorrhage Carts Per Floor

- ▶ L&D, postpartum, and in the ED
- Safety checklists, instruction cards for intrauterine balloons and compression stitches
- Supplies: IV start kits, blood draw supplies, arterial line supplies, intrauterine balloon, foley catheter, pressure bag, uterotonics, etc.

Establish a Rapid Response Team

OB Hemorrhage Cart



2 hemorrhage carts on the floor

Readiness is KEY

Every patient is at risk



<u>Think Ahead</u>: After Oxytocin, what will your first-line uterotonic be? Second-line?

What uterotonics are contraindicated in this patient?

Type and cross blood ahead of time?

IV lines – Do you need 2?

Have uterotonics already in the room

During a Hemorrhage: Utilize the 4 T's, uterotonics

Communicate about ongoing blood loss (real time EBL)

Is the patient symptomatic/abnormal vital signs?

Do you need another IV line?

KEEP CALM AND BE PREPARED

#1: Physical Exam#2: Is Oxytocin Running Effectively



The mind is like water. When it's turbulent, it's difficult to see. When it's calm, everything becomes clear.

-Prasad Mahes

QUESTIONS?

RD

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