

Obstetrical Hemorrhage

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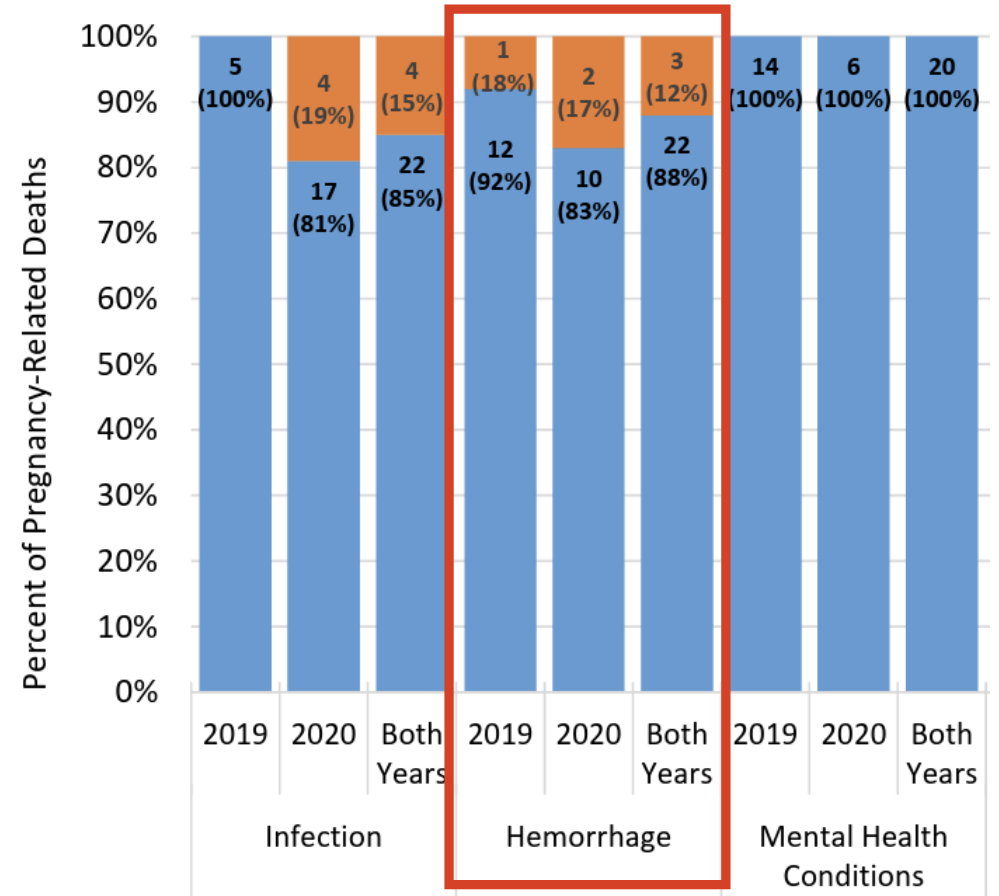
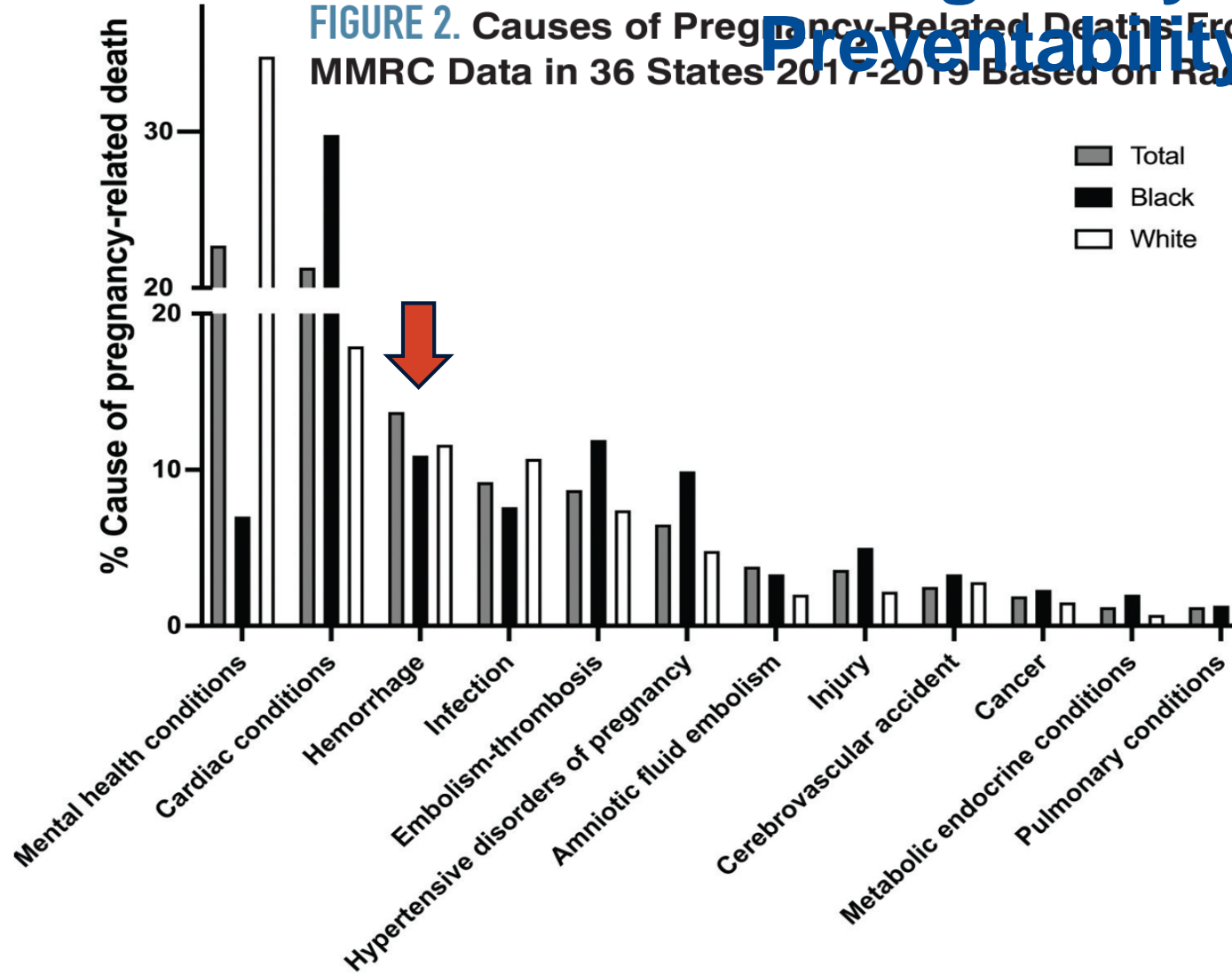
Postpartum Hemorrhage: Evidence-Based Management and Clinical Updates

Learning Objectives

- Define postpartum hemorrhage, identify major etiologies, and describe the most common contributions to obstetric hemorrhage-associated morbidity and mortality.
- Summarize physiologic changes in pregnancy that affect hemorrhage risk and complicate assessment and management.
- Describe evidence-based PPH evaluation and management, including components of a standardized obstetric hemorrhage protocol.

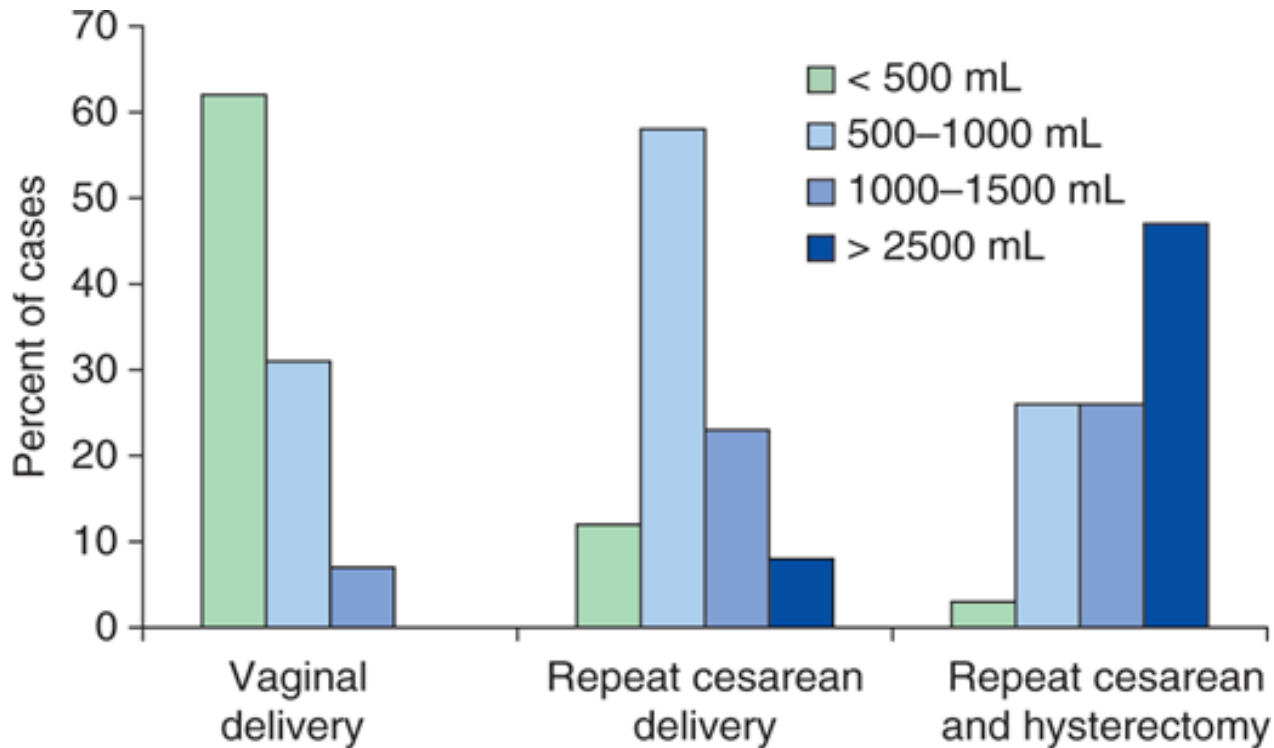
Causes of Pregnancy-Related Deaths & Preventability Trends

FIGURE 2. Causes of Pregnancy-Related Deaths From MMRC Data in 36 States 2017-2019 Based on Race¹⁶



Nelson DB, Fomina YY. *Contemporary OB/GYN*. 2023. Texas MMRC & DSHS. Joint Biennial Report. 2024.

Physiologic Hemorrhage Protections & “Normal” Blood Loss at Delivery



PPH DEFINITION: Cumulative blood loss $\geq 1,000$ mL or blood loss accompanied by signs or symptoms of hypovolemia

Adapted Hemostatic Mechanisms

- Increased clotting factor production (especially factors II, VII, VIII, IX, X, XII + vWF and fibrinogen)
- Myometrial contractions after placental separation
- Contractions are followed by clotting and vessel lumen obliteration
- An intact coagulation system is NOT necessary unless obstetric lacerations or incisions are present!

Pregnancy-Induced Hypervolemia

- Increases by 50%, range 30-60% = 1500-2000 mL
- Increases across GA and plateaus at approximately 34 weeks
- Typically, little change in the hematocrit postpartum

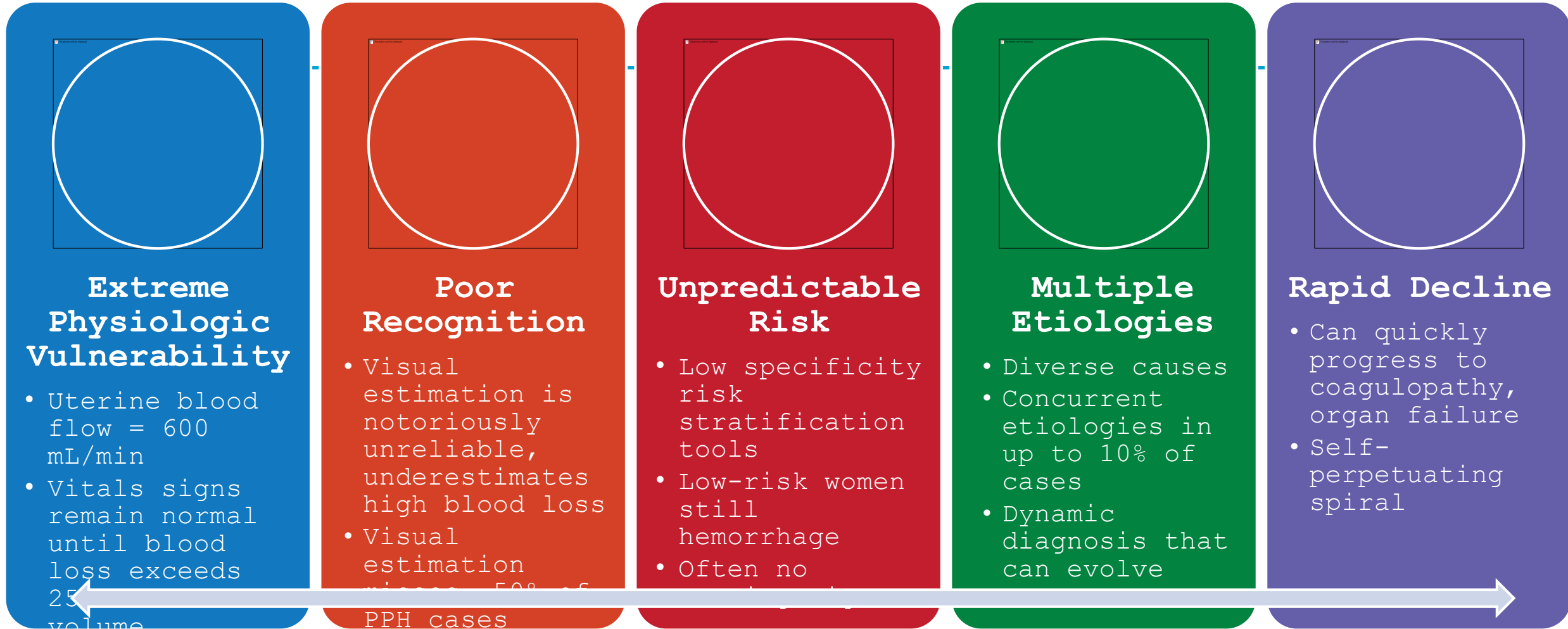
Cunningham FG et al. *Williams Obstetrics*. 26e. 2022.

ACOG PB 183. *Obstet Gynecol*. 2017.

Etiologies of Postpartum Hemorrhage: "4 Ts" Framework

Etiology	Frequency	Description	Key Risk Factors
STONE (Uterine Atony)	~70%	Failure of the uterus to contract adequately after delivery	Chorioamnionitis, magnesium sulfate use, prolonged or precipitous labor, labor induction, overdistention
TRAUMA (Genital Tract Injury)	~17%	Lacerations, hematomas, or uterine rupture	Operative vaginal delivery precipitous delivery, episiotomy
TISSUE (Retained Products)	~16%	Retained placenta, placental fragments, or clots	Placenta accreta spectrum, prior uterine surgery
THROMBIN (Coagulopathy)	~3%	Clotting factor deficiencies or platelet disorders	Severe preeclampsia, placental abruption, demise, AFE, inherited disorders <small>Yunas et al., Lancet, 2025</small>
Multiple Concurrent Causes	~8%	Two or more etiologies present simultaneously	Variable depending on contributing etiologies

If the causes are well-understood, why does obstetric hemorrhage remain so dangerous?



Bienstock et al., *NEJM*, 2021

Stages of Hemorrhagic Shock

Table 2. Classification of Hemorrhagic Shock.*

Shock Class	Blood Loss† <i>ml (%)</i>	Heart Rate <i>beats/min</i>	Blood Pressure	Pulse Pressure	Respiratory Rate <i>breaths/min</i>	Mental Status
I	<750 (15)	<100	Normal	Normal	14–20	Slightly anxious
II	750–1500 (15–30)	100–120	Normal	Narrowed	20–30	Mildly anxious
III	1500–2000 (30–40)	120–140	Decreased	Narrowed	30–40	Anxious, confused
IV	>2000 (>40)	>140	Decreased	Narrowed	>35	Confused, lethargic



* Data are from the American College of Surgeons Committee on Trauma.⁴²

† Blood-loss volume and percentage of total blood volume are for a male patient with a body weight of 70 kg.

Cannon JW. N Engl J Med. 2018



RECOGNIZE: Use QBL; don't wait for hypotension



STANDARDIZE: Use protocols; escalate and call for help early



TREAT: Give uterotonics early, add TXA



RESUSCITATE: Early MTP; balanced blood products



ESCALATE: Tamponade device > OR > Hyst if needed



COORDINATE: Assign team roles, use effective communication



PRACTICE: Use simulation and drills to educate, reinforce and improve

Evidence-Based Interventions to Improve Hemorrhage Management & Outcomes

Improve Early Recognition = Integrate Quantitative Blood Loss (QBL)

Metric	Visual Estimation	Calibrated Drape + Observations
Sensitivity for PPH (≥ 500 mL)	48%	93%
Specificity for PPH (≥ 500 mL)	97%	95%
Sensitivity for Severe PPH (≥ 1000 mL)	9%	—
Accuracy Error	~30%	Reference standard

✓ Quantitative measurement is more accurate than visual estimation

✓ Calibrated drape + observations achieves 93% sensitivity vs 48% for visual estimation

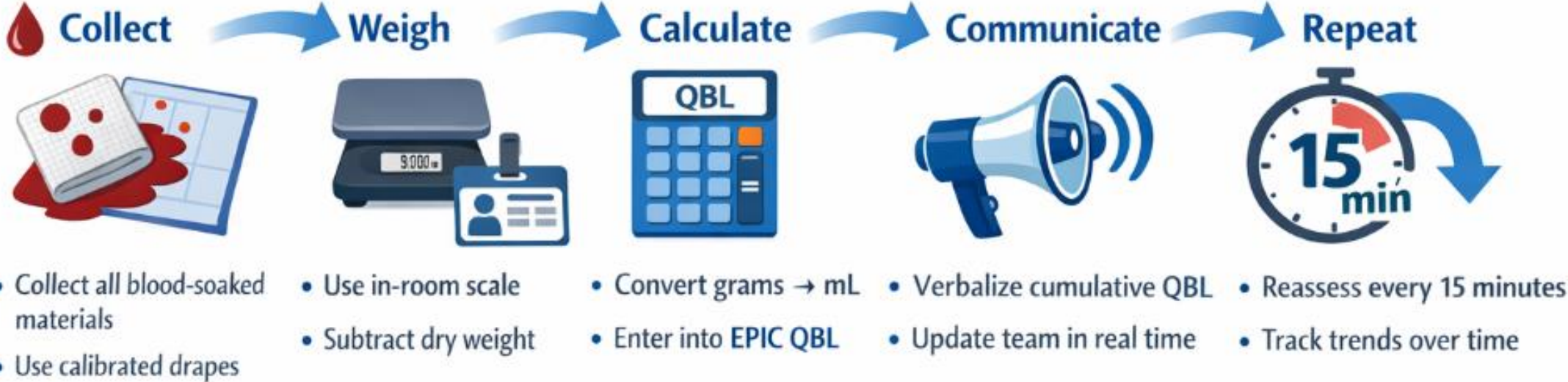
✓ Earlier thresholds (≥ 300 mL + abnormal vitals) may improve outcomes

⚠ Direct evidence of improved clinical outcomes still needed

Gallos I et al. *N Engl J Med.* 2023
Yunas I et al. *Cochrane Database Syst Rev.* 2025.

Quantitative Blood Loss

Real-Time Quantitative Blood Loss (QBL): Standardized Workflow



Collect → Weigh → Calculate → Communicate → Repeat

QBL – Real Time Criteria for Success

Operational Reliability Elements

- Timers readily accessible
- Scales in every room
- Badge Buddies
- EHR Integration
- CST/Tech Support



STAGE 2: Continued Bleeding (EBL up to 1500mL OR > 2 uterotonics) with normal vital signs and lab values

INITIAL STEPS:

- Mobilize additional help
- Place 2nd IV (16-18G)
- Draw STAT labs (CBC, Coags, Fibrinogen)
- Prepare OR

MEDICATIONS:

- Continue Stage 1 medications; consider TXA

BLOOD BANK:

- Obtain 2 units PRBCs (DO NOT wait for labs. Transfuse per clinical signs/symptoms)
- Thaw 2 units FFP

ACTION:

- For uterine atony --> consider uterine balloon or packing, possible surgical interventions
- Consider moving patient to OR
- Escalate therapy with goal of hemostasis

Huddle and move to Stage 3 if continued blood loss and/or abnormal VS

Safe Motherhood Initiative

Tranexamic Acid (TXA)
1 gram IV over 10 min (add 1 gram vial to 100mL NS & give over 10 min; may be repeated once after 30 min)

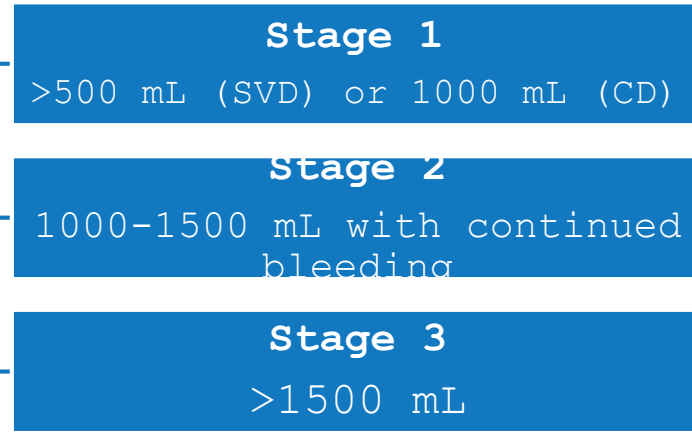
Possible interventions:

- Bakri balloon
- Compression suture/B-Lynch suture
- Uterine artery ligation
- Hysterectomy



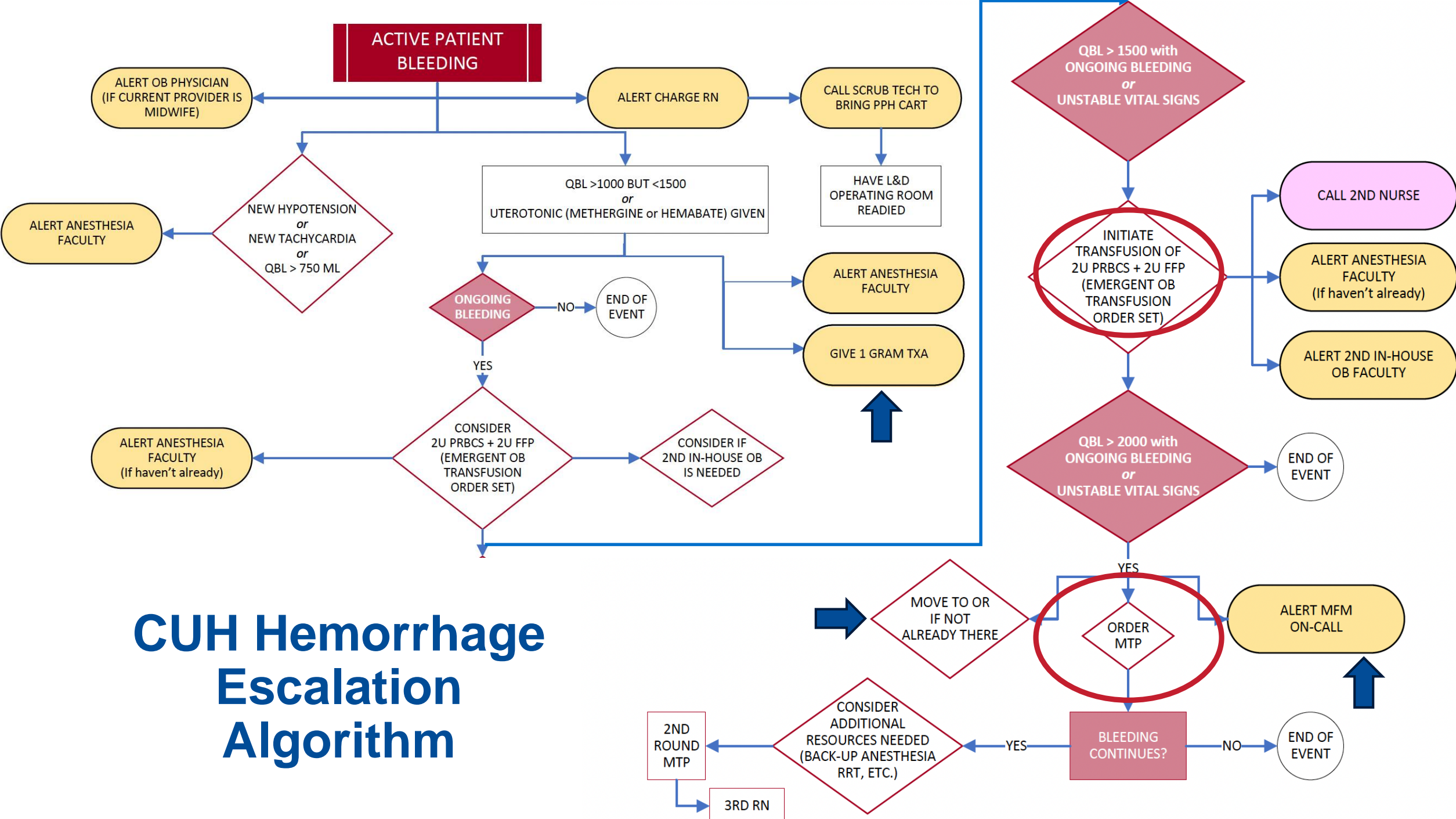
Cumulative Blood Loss

Ensure Consistent Treatment & Resuscitation = Use a Stage-Based PPH Checklist and/or Management Algorithm



District II Safe Motherhood Initiative. Obstetric hemorrhage checklist.

CUH Hemorrhage Escalation Algorithm



E TST - Hyperspace - UH 05B LDRP - OBRN UH

Vocera Web Console COVID-19 In Basket Chart Schedule Patient Lists Patient Station Clinical Calculator GB My Reports CPM Index Hosp Policies

Zzztest, Pphtest

Summary Chart Results Problems Flowsheets Care Education MAP Labels Delivery Navigation Orders Notes

BestPractice Advisory - Zzztest, Pphtest

Important (1)

POSTPARTUM HEMORRHAGE STAGE 1 (1000-1249 mL)

Process Instructions:

- Administer first line IM uterotonics
- Notify charge RN
- Alert OB faculty
- Alert Anesthesia faculty
- Call scrub tech to bring PPH cart
- Fundal massage

Order Not Order PPH Stage 1 Process Instructions

Order Do Not Order CYTOTEK 1000 MCG rectally

Acknowledge Reason

Patient not actively bleeding Orders placed Inappropriate

Accept Dismiss

Flowsheets

File Add Rows

Vital Signs Nursing I

Accordion Exp

Search (Alt+Con)

QBL Indications

Indications for perfo

Vaginal Delivery

4x4 Number of Item	
- 4x4s Total Dry We	
4x4 Total Wet Weig	
4x4 Blood Loss	
Sterile Towels Num	
- Sterile Towels Total Dry vweight	110
Sterile Towels Wet Weight	300
Sterile Towels Blood Loss	190
Chucks Number of Items	2
- Chucks Total Dry Weight	776
Chucks Wet Weight	1400
Chuck Blood Loss	624
Drape Volume	100
- Amniotic Fluid Volume	
- Graduated Cylinder Volume	
Total Vaginal Delivery QBL	1034

Search

Class: Inpatient

PPH Stage 1

Flu vaccine due

Morgan, Jamie Larsen, MD
Attending

Allergies: Not on File

Team: None

1st Call Provider: None

Nurse: None

Bed Phone: 214-633-0509

PCP, PCP Aff: None, None

LABOR

Cervical Exam: None

ROM: No data

SINGLETON PREGNANCY

Orders

IP OB POSTPARTUM HEMORRHAGE ^

OB HEMORRHAGE STAGES

Stage 1: 1000-1249 mL Blood Loss

Stage 1 PPH Orders

- PPH Stage 1 Process Instructions
STAT, UNTIL DISCONTINUED, Starting today
POSTPARTUM HEMORRHAGE STAGE 1 (1000-1249 mL) Process Instructions: • Notify charge RN • Alert OB faculty • Alert Anesthesia faculty • Call scrub tech to bring PPH cart • Fundal massage
- miSOPROStoL (CYTOTEK) tablet DOSE: 1,000 mcg (\$)
1,000 mcg, Rectal, ONCE, For 1 dose, today
Take with food.

STAGE 1
=
1000-1250 mL

Stage-Based BPA Example: Operationalizing Consistent PPH Treatment

**STAGE 2 =
1250-1500 mL**

- Stage 2: 1250-1499 mL Blood Loss
 - Stage 2 PPH Orders
 - PPH Stage 2 Process Instructions
STAT, UNTIL DISCONTINUED, Starting today
POSTPARTUM HEMORRHAGE STAGE 2 (1250-1499 mL) Process Instructions: • Ensure charge RN, OB/anesthesia notified • Place Foley catheter • Consider OB hemorrhage labs • agents • Consider 1st dose of TXA • Fundal massage (15 sec minimum)
 - START 2ND PERIPHERAL IV
Routine, ONE TIME, For 1 occurrence, today
 - Insert and/or maintain Foley catheter
Routine, UNTIL DISCONTINUED, Starting today
Indication for Medical Necessity: Need for accurate measurement of urinary output due to hemodynamic instability
 - Strict intake and output
Routine, UNTIL DISCONTINUED, Starting today
 - UTSW OB HEMORRHAGE LABS
 - CBC without Differential (\$\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
 - Prothrombin Time + INR (\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
 - PTT (APTT) (\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
 - Fibrinogen (\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
 - INTEM (\$\$\$\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
 - OB ROTEM (for OB use only)
 - For OB use ONLY**
 - EXTEM - OB (\$\$\$\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
 - FIBTEM - OB (\$\$\$\$)
STAT, For 1 occurrence, today
Release to patient: Auto-release
- methylergonovine (METHERGINE) injection DOSE: 200 mcg (\$\$)
200 mcg (0.2 mg), intraMUSCULAR, ONCE, For 1 dose, today
Avoid with hypertension
- carboprost (HEMABATE) injection DOSE: 250 mcg (\$\$\$)
250 mcg, intraMUSCULAR, EVERY 15 MINUTES, For 8 doses, Starting today
- misOPROStoL (CYTOTEC) tablet DOSE: 1,000 mcg (\$)
1,000 mcg, Rectal, ONCE, For 1 dose, today
Take with food.
- misOPROStoL (CYTOTEC) tablet DOSE: 400 mcg (\$) ⓘ
~~400 mcg~~ Sublingual, ONCE, For 1 dose, today
Take with food.
- tranexamic acid (CYKLOKAPRON) 1 g infusion (minibag plus)
1 g, intraVENOUS, at 650 mL/hr, Administer over 10 Minutes, ONCE, For 1 dose, today, 110 mL

BestPractice Advisory - Zzztest, Pptest

Important (1)

POSTPARTUM HEMORRHAGE STAGE 2 (1250-1499 mL)

Process Instructions:

- ! • Ensure charge RN, OB/anesthesia notified
- Place Foley catheter
- Consider OB hemorrhage labs
- Consider need for additional uterotonic agents
- Consider 1st dose of TXA

Open Order Set

Do Not Open

IP OB POSTPARTUM HEMORRHAGE [Preview](#)

Acknowledge Reason

Patient not actively bleeding

Orders placed

Inappropriate

✓ Accept

Dismiss

High Priority (1)

POSTPARTUM HEMORRHAGE STAGE 3 (1500-1999 mL)

Process Instructions:

- Alert 2nd In-house OB faculty
- Request 2nd RN for labs/blood
- Ensure charge RN, OB/anesthesia notified
- Consider need for additional uterotonic agents
- Administer TXA
- Order OB hemorrhage labs
- Order emergency blood (2U RBCs, 2U FFP)

IP OB POSTPARTUM HEMORRHAGE [Preview](#)

Emergent OB Transfusion Orders (RBC, FFP, MTP) [Preview](#)

Acknowledge Reason

**STAGE 3 =
1500-2000 mL**

**STAGE 4 =
>2000 mL**

Critical (1)

POSTPARTUM HEMORRHAGE STAGE 4 (>2000 mL)

Process Instructions:

- Transfer to OR
- Notify MFM on-call notified
- Ensure Emergency Blood ordered
- Consider need for gyn-onc assistance
- Order MTP
- Consider need for RRT assistance
- Consider need for additional uterotonic agents
- Consider 2nd dose of TXA

IP OB POSTPARTUM HEMORRHAGE [Preview](#)

Emergent OB Transfusion Orders (RBC, FFP, MTP) [Preview](#)

Acknowledge Reason

A quick aside regarding hemorrhage interventions...

Tranexamic Acid (TXA)

- Antifibrinolytic agent that prevents fibrinolysis
- Dosing = 1 g IV TXA over 10 minutes within 3 hours of delivery
- Second dose if bleeding continues after 30 minutes

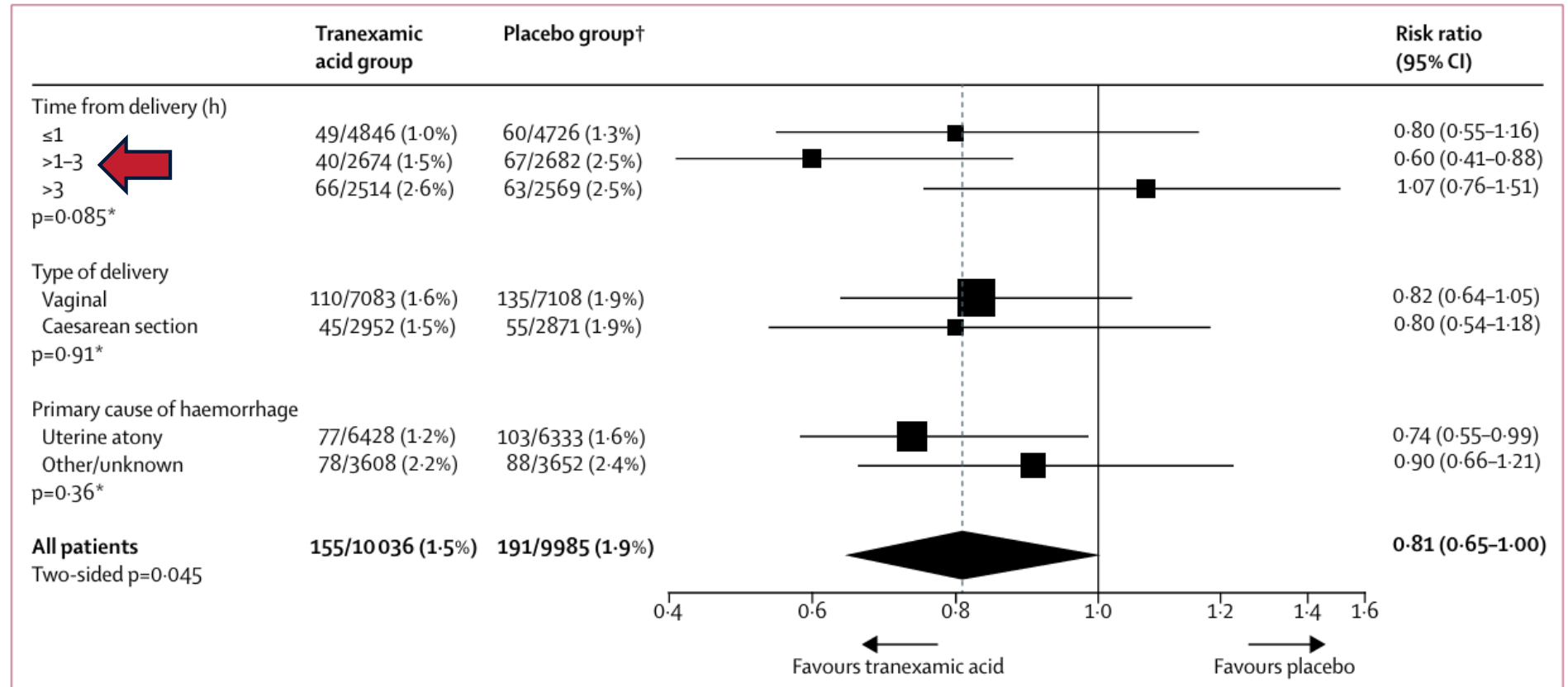


Figure 3: Death from bleeding by subgroup

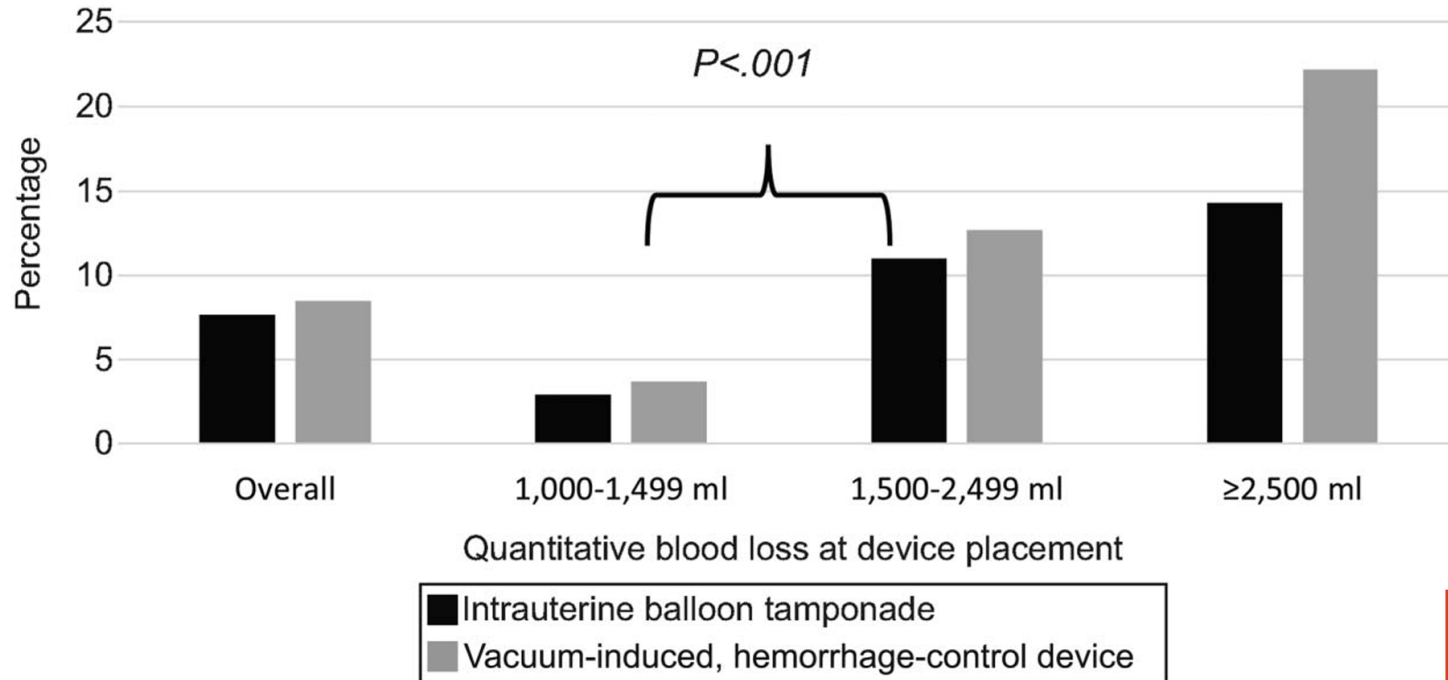
WOMAN Trial, *Lancet*, 2017

Device	Mechanism	Cost	Dwell Time	Success Rate	Key Advantages	Key Limitations
Bakri Balloon	Fluid-filled silicone balloon	\$150-300	Up to 24 hours	85-91%	FDA-cleared; drainage port for blood monitoring; most extensively studied	Higher expulsion rate (14%); longer dwell time
Jada System (VHD)	Low-level vacuum induces uterine contraction	~\$1000	2-8 hours	94-96%	Shorter dwell time (4 vs 14 hrs); no expulsion; may reduce downstream costs	Higher upfront cost; requires vacuum source; less long-term data
Condom Catheter	Fluid-filled condom tied to Foley catheter	\$0.64-\$6	12-24 hours	85-89%	Extremely low cost; widely available	May be less effective than other options
Gauze Packing	Mechanical compression via layered	~\$5	12-24 hours	Variable	No special equipment needed	Higher infection rates;

Mechanical Tamponade Devices

Shields LE et al. *Obstet Gynecol.* 2025.
 Overton E et al. *Am J Obstet Gynecol.* 2024.

Does one tamponade device really work better than another?



Device failure rate based on quantitative blood loss (QBL) at time of hemorrhage-control device placement

Device placement at QBL 1,000–1,499 mL vs $\geq 1,500$ mL resulted in:

- Lower transfusion rates (39% vs 70%)
- Fewer massive transfusions (14% vs 38%)

BOTTOM LINE

Regardless of device choice, **earlier placement significantly improves outcomes**

Shields LE et al. *Obstet Gynecol.* 2025.

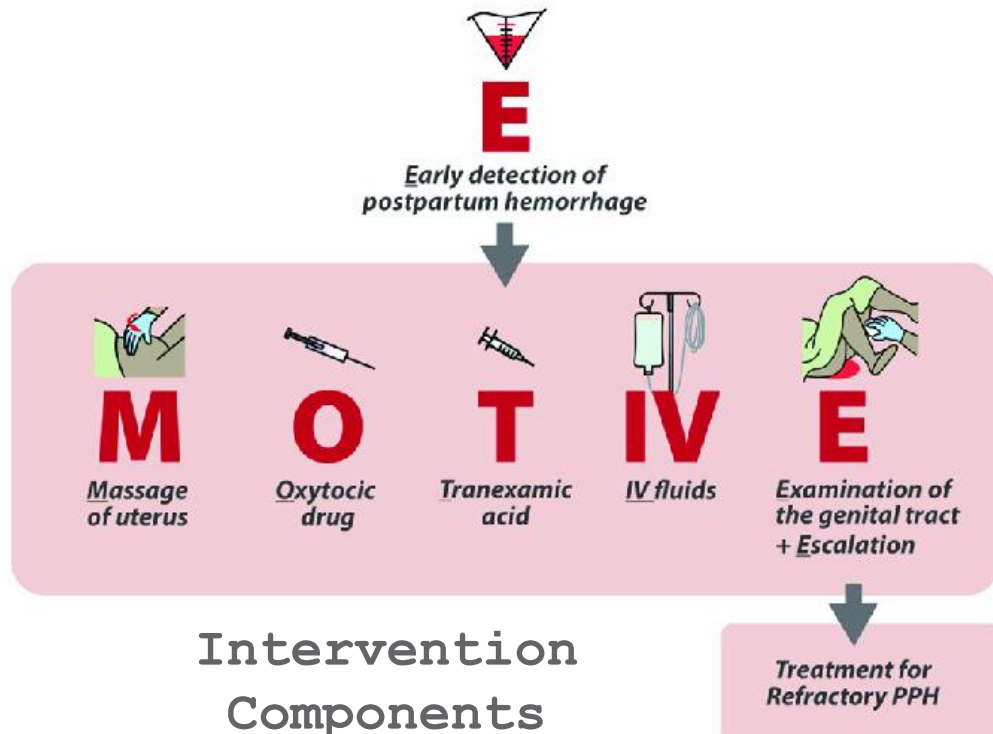


Standardize Hemorrhage Processes = Safety-Bundle Implementation

Alliance for Innovation on Maternal Health (AIM) Obstetric Hemorrhage Bundle

Readiness	<ul style="list-style-type: none"> • Hemorrhage cart with supplies/meds • Rapid access to blood products • Standardized protocols/checklists
Recognition	<ul style="list-style-type: none"> • Quantify blood loss (QBL) • Stage hemorrhage • Use early warning criteria (vitals, symptoms)
Response	<ul style="list-style-type: none"> • Stage-based management • Uterotonics + early TXA • Activate MTP as needed • Clear team communication
Reporting	<ul style="list-style-type: none"> • Post-event debriefs • Track outcomes/metrics • Review severe cases (SMM)
Respectful Care	<ul style="list-style-type: none"> • Provide equitable care • Address bias • Include patient/family in communication

Evidence of Bundle-Related Improvement: E-MOTIVE Trial




1. Calibrated blood collection drape for early PPH detection
2. MOTIVE treatment bundle
3. Implementation support

Outcome	Intervention	Usual Care	Risk Ratio (95% CI)
Primary composite (severe PPH ≥1000 mL, laparotomy, or death)	1.6%	4.3%	0.40 (0.32–0.50)
PPH ≥500 mL	8.5%	16.7%	0.51 (0.44–0.60)
Severe PPH ≥1000 mL	1.6%	4.3%	0.39 (0.31–0.49)
PPH detection rate	93.1%	51.1%	1.58 (1.41–1.76)
Treatment bundle adherence	91.2%	19.4%	4.94 (3.88–6.28)
Blood transfusion for bleeding	1.2%	1.9%	0.71 (0.55–0.90)
Maternal death from	12	18	0.80 (0.38–


Nursing Pearls: Obstetric Hemorrhage

- Quantify blood loss early and trend in real time

- ⚠ Escalate concern before
 - hypotension develops

-  Prioritize uterine tone, bleeding source, and team notification

- Keep hemorrhage supplies and medications readily available

-  Anticipate next interventions (TXA, tamponade, transfusion)

-  Use clear, closed-loop communication

Obstetric Hemorrhage Take-Homes

Cornerstone of hemorrhage management = early recognition and proactive treatment

- In many settings, **real-time** QBL is a helpful tool to ensure early recognition and guide stage-based treatment
- All hemorrhage resources and medications **MUST** be readily available
- Incorporate early transfusion into OB management protocols (emergency release blood followed by MTP)

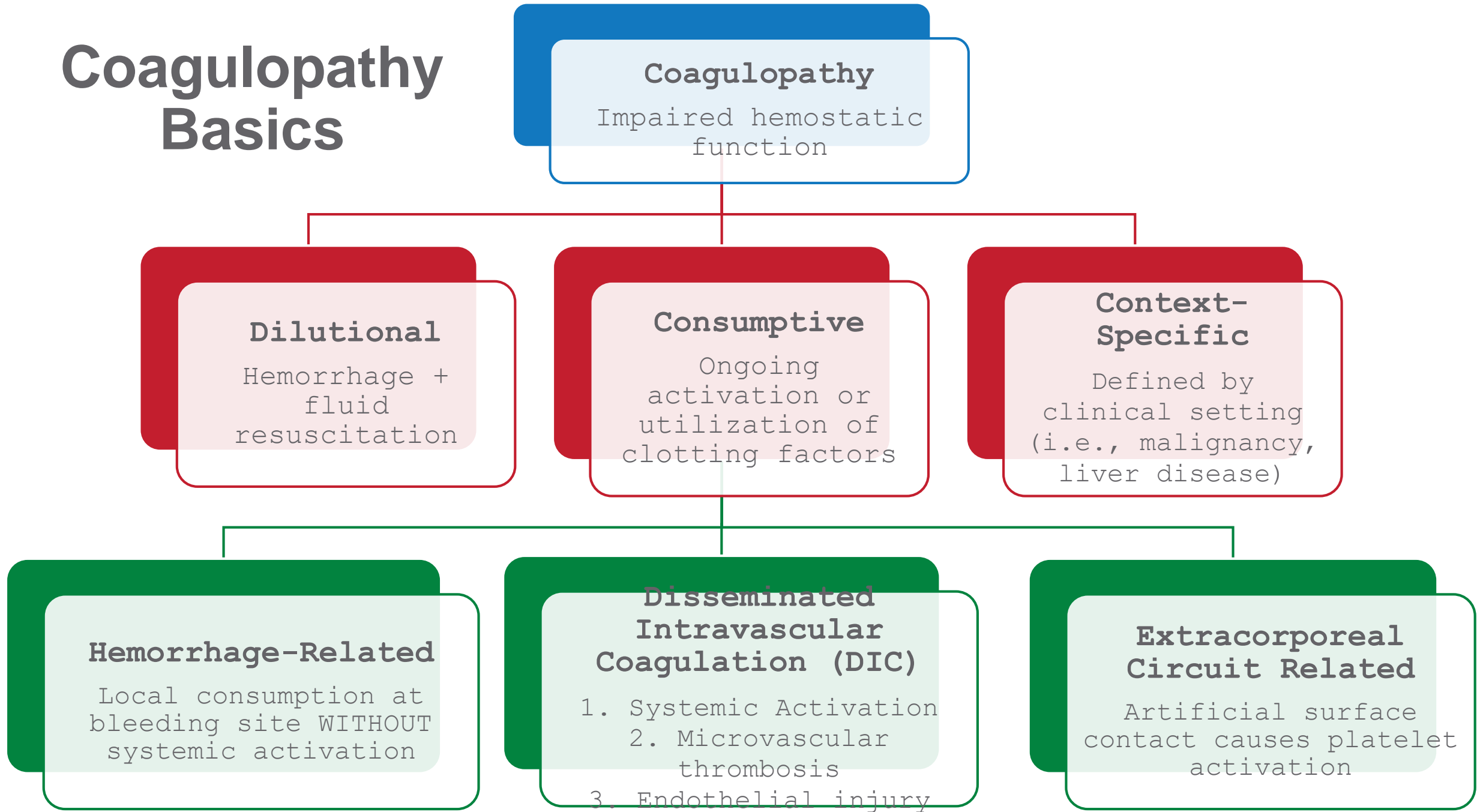
More than any particular PPH treatment algorithm, the key to improving outcomes is consistent process application, early activation, and standardized escalation

Massive Transfusion in Obstetrics: Triggers, Timing, and Teamwork

Learning Objectives

- Recognize and manage common causes of obstetric coagulopathy.
- Identify clinical triggers for activation of the obstetric massive transfusion protocol (MTP).
- Describe recommended transfusion/product ratios in the obstetric patient and how these compare to MTP protocols for the non-pregnant adult.
- Outline team roles and communication strategies during MTP activation, including how simulation can be used

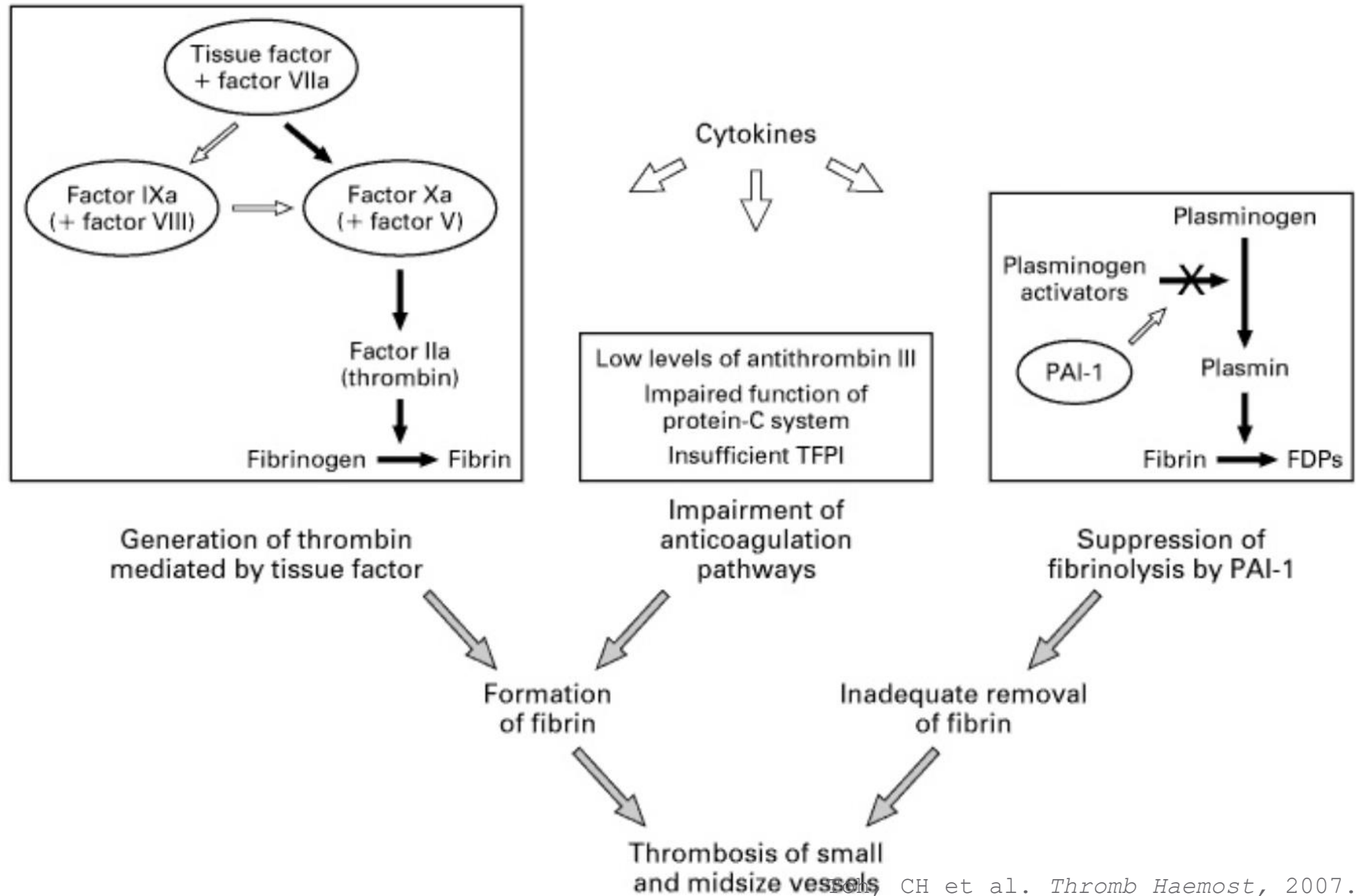
Coagulopathy Basics



Disseminated Intravascular Coagulation (DIC):

“an acquired syndrome characterized by the intravascular activation of coagulation with loss of localization arising from different causes”

-International Society on Thrombosis and Haemostasis

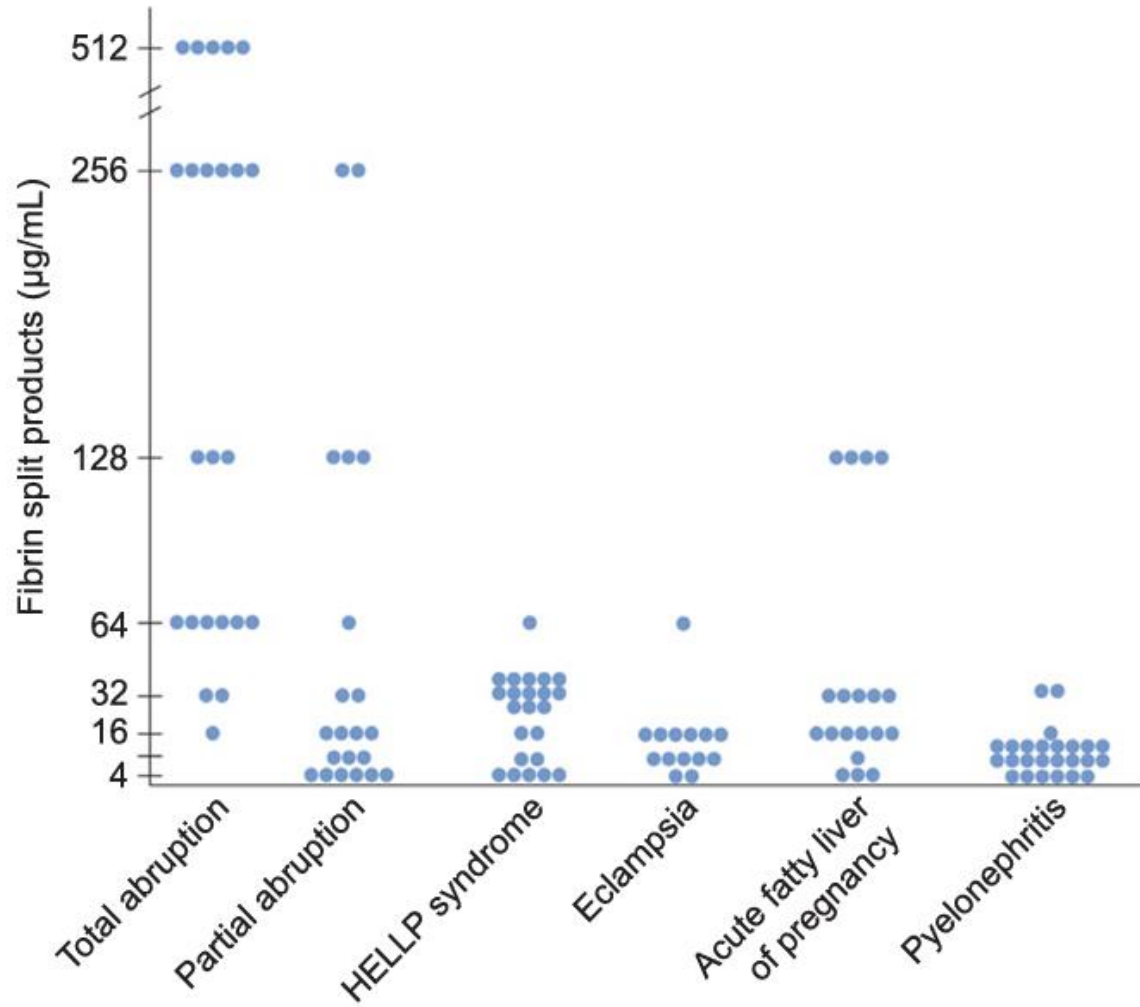


CH et al. *Thromb Haemost*, 2007.
Levi M. *N Engl J Med*. 1999.

Category	Condition	Frequency of DIC	Key Features
More Common	Massive obstetric hemorrhage	Variable	Dilutional + consumptive; most avoidable cause of maternal death; causes 25-35% of all obstetric DIC cases
	Severe preeclampsia	Mild	More common with HELLP syndrome; thrombocytopenia most common finding
	HELLP syndrome	Mild	Consumptive thrombocytopenia, hemolysis, hepatic dysfunction
Less Common but Important	Placental abruption	>50% of cases Typically severe	Severity correlates with degree of separation; 17% of massive transfusions
	Amniotic fluid embolism	>50% of cases Typically severe	Triad: CV collapse + acute hypoxia + DIC; PPH almost always present
	Sepsis syndrome	Variable	Systemic inflammatory response activates coagulation
	Acute fatty liver of pregnancy	Common	Hepatic failure impairs clotting factor synthesis

Causes of Coagulopathy in Obstetrics

Hematologic Indices Suggestive of Obstetric-Associated DIC



Condition	n	Platelets/Microliter	Fibrinogen (mg/dL)
Normal pregnancy ³⁷	20	278,000±68,000	415±130
Placental abruption ³⁷			
Total abruption	23	138,000±72,000	116±87
Partial abruption	21	194,100±85,000	289±123
Eclampsia ³⁷	65	202,000±92,000	412±75
HELLP syndrome	27	48,600±39,000	607±238
Sepsis syndrome			
Pyelonephritis	30	235,000±43,000	456±120
Clostridium	12	139,000±74,000	243±108
Acute fatty liver ²¹	51	154,000±95,000	188±24

HELLP, hemolysis, elevated liver enzymes, and low platelet count syndrome.
Data are mean±1 standard deviation or standard error of mean.

Cunningham and Nelson. *Obstet Gynecol*, 2015

Fibrin split products in obstetric conditions associated with disseminated intravascular coagulation

Massive Transfusion Terminology & Triggers

Massive Transfusion Definition

- ≥ 10 units of packed red blood cells (pRBCs) within 24 hours
- ≥ 4 units of pRBCs within 1 hour when ongoing need is anticipated
- Replacement of a complete blood volume

Massive Transfusion Protocol (MTP)

- Rapid administration of large amounts of blood products (at least 6 units of pRBC) in fixed ratios (usually 1:1:1) for the management of hemorrhagic shock

Triggers for MTP activation

- Ongoing bleeding with blood loss $\geq 1,500$ mL
- Abnormal vital signs (tachycardia and hypotension) in the setting of active/suspected bleeding

ACOG PB 183. *Obstet Gynecol.* 2017.

Obstetric Massive Transfusion Protocols

Cornerstone = Fixed Ratios of RBCs: FFP: Platelets

- **Reduced mortality is achieved via balanced transfusion with PRBCs to fresh frozen plasma (FFP), with current evidence supporting a 1:1 or 1:1.5 ratio of RBCs to plasma**
- **Cryoprecipitate is needed to augment survival, as FFP alone is a suboptimal source of fibrinogen**
- **Platelet transfusion should be given if the platelet count is less than 75,000/ μ L or after every 1, 4, or 6 units of packed red blood cells**
- **Hospitals should have a protocol in place rapid delivery of fixed ratios**

Recommend avoiding crystalloid resuscitation during hemorrhagic shock

- **For shock with ongoing bleeding, crystalloid administration dilutes coagulation factors**
- **Front-loading resuscitation with crystalloid may eventually serve to promote *volume overload***
- **Whenever feasible, hemorrhagic shock resuscitation should be performed with blood products**

Kogutt BK, Vaught AJ. Semin Perinatol. 2019.

Blood shipment schedule

Massive Transfusion Protocol

Example

Shipment	Red Blood Cells (RBC)	Thawed Plasma (THPL)	Apheresis Platelets (PLT)	Cryoprecipitate
No History or current ABO/Rh	5 (O-neg or pos) see above	3 (A) - Non OB/L&D 5 (A) - OB/L&D	1 - OB/L&D	1 - OB/L&D
Current ABO/Rh	5	3 - Non OB/L&D 5 - OB/L&D	1 - OB/L&D	1 - OB/LD
2	5	3 - Non OB/L&D 5 - OB/L&D	1 - Non OB/L&D	
3	5	3 - Non OB/L&D 5 - OB/L&D	1 - OB/L&D	1 - Non OB/L&D 1 - OB/L&D
4	5	3 - Non OB/L&D 5 - OB/L&D	1 - Non OB/L&D	

The Critical Role of Fibrinogen

Fibrinogen falls earlier than other coagulation factors during PPH, thus is a sensitive indicator of ongoing blood loss

Likely related to loss of fibrinogen through bleeding, increased fibrinolytic activity, and hemodilution from fluids resuscitation

Fibrinogen depletion is an early predictor of hemorrhage severity and can be used to guide the approach to clinical resuscitation

Normal fibrinogen in a term pregnancy is 350 to 650 mg/dL, which is nearly double that of nonpregnant adults (200 to 400 mg/dL)

Low fibrinogen (less than 200 mg/dL) is predictive of severe PPH, defined as need for transfusion of multiple units of blood and blood products, need for angiographic embolization or surgical management of hemorrhage, or maternal death.

Abdul-Kadir R et al. *Transfusion*. 2014.

Sahin AS et al. *Med Sci Monit*. 2019.

Graphic from ACOG District II Obstetric Hemorrhage slide deck

Laboratory Parameter

Goal Value

Hemoglobin

>8 g/dL

Fibrinogen

>2 g/L (200 mg/dL)

Platelets

>50,000/ μ L

PT/aPTT

1.5 times normal

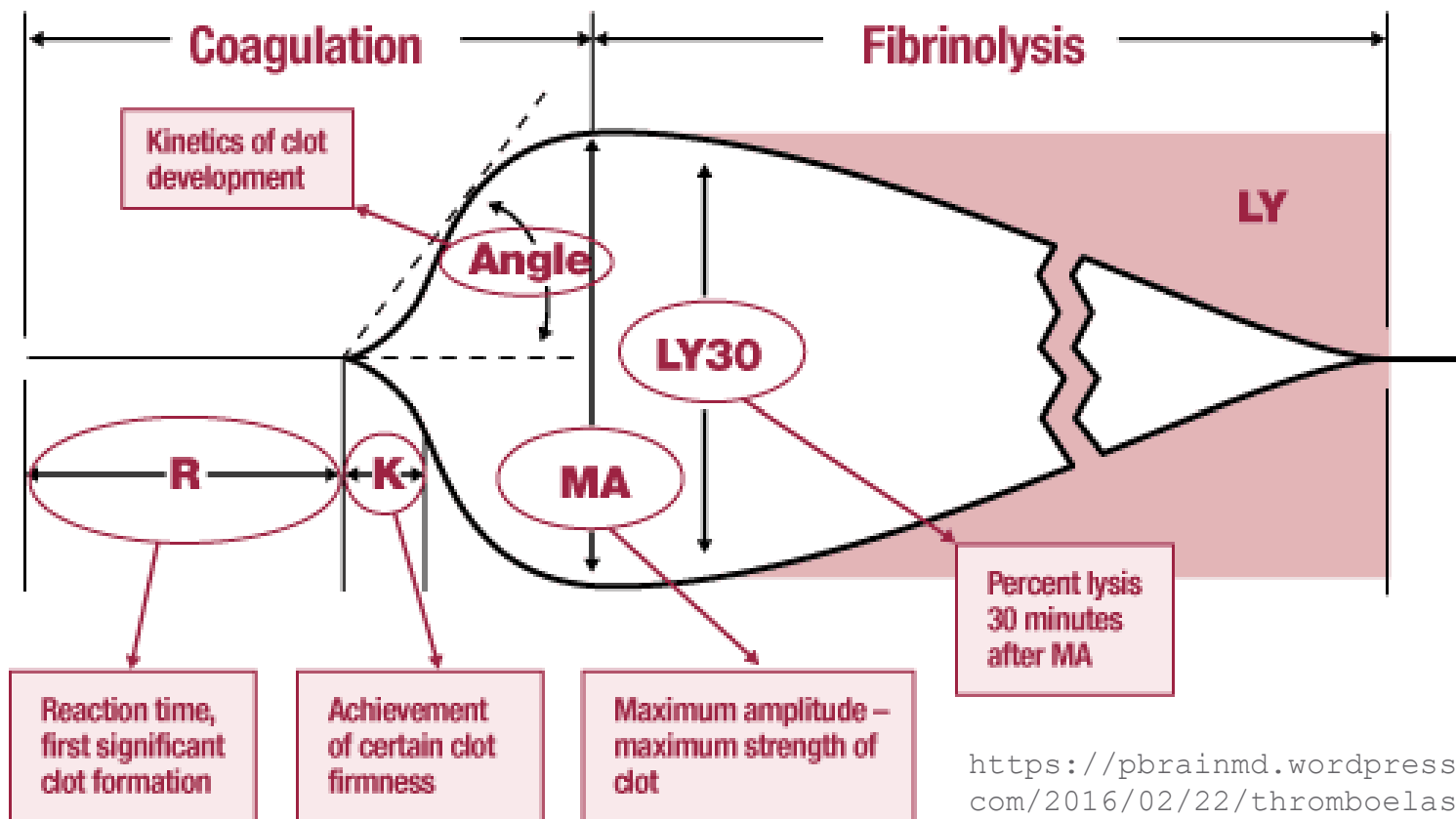
Goal Laboratory Values during MTP

Use of Viscoelastic Hemostatic Assays (VHAs)

VHAs are a point-of-care, viscoelastic test that assesses hemostatic function and coagulation parameters, guiding the targeted correction of coagulopathy

- Particularly useful for detecting hypofibrinogenemia and guiding fibrinogen replacement
- VHA-guided transfusion in obstetric hemorrhage may reduce blood product use and hemorrhage-related morbidity

Katz D, et al. Am J Obstet Gynecol 2014



<https://pbrainmd.wordpress.com/2016/02/22/thromboelastography/>



brandy snifter
normal



red wine glass
factor deficiency
↑ R, ↑ K,
give FFP



champagne flute
fibrinogen deficiency
↑ R, ↑ K, ↓ MA, ↓ α angle
give cryoprecipitate



test tube
thrombocytopenia/thrombocytopathy
↓ mA, normal R, ↑ K
give platelets








inverted martini glass
fibrinolysis
↑ Ly30, continuous ↓ MA
give TXA

Condition	Appearance	Main treatment
Normal		
Hemodilution or clotting factor deficiency		Fresh frozen plasma
Fibrinogen deficiency		Cryoprecipitate
Low or dysfunctional platelets		Platelets
Thrombosis		Anticoagulant
Primary fibrinolysis		Antifibrinolytics or tranexamic acid
Secondary fibrinolysis		Treating disseminated intravascular coagulation

Left graphic: <https://foamcast.org/2019/07/31/thromboelastography-teg-guided-graphs-citations/>
tips: <https://www.youtube.com/watch?v=JMmk8eSSp40>

Simulation – What Drives Success

- ✓  **Make it real** — use your unit, equipment, and workflows
- ✓  **Train the real team** — multidisciplinary participation matters
- ✓  **Practice roles and communication**, not just clinical skills
- ✓  **Debrief every time** — focus on system improvement
- ✓  **Keep it frequent** and aligned to your protocols

Simulation reveals how your system performs—not just your people

At the Bedside: Nursing Role in MTP



Recognize

- Trend QBL and clinical status in real time
- Advocate early for escalation and MTP activation



Prepare

- Be familiar with MTP process
- Ensure rapid access and readiness for transfusion



Communicate

- Verbalize QBL, vitals, and blood products in real time
- Use closed-loop communication with the full team

Massive Transfusion Take-Homes

Component	Recommendation	Evidence Level
MTP Activation Trigger	QBL $\geq 1,500$ mL or hemodynamic instability	Consensus
Initial Blood Product Ratio	1:1 (pRBCs: FFP)	Adapted from trauma
Fibrinogen Target	>200 mg/dL (>2 g/L)	Consensus/observational
Cryoprecipitate	Early administration, especially with abruptio/AFE	Consensus
Tranexamic Acid	1 g IV within 3 hours of PPH onset	Level B (WOMAN trial)
Viscoelastic Testing	Consider for goal-directed transfusion	Emerging evidence

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