

# Obstetrical Trauma & Hemorrhage

## Emergency Readiness and Strategies for Mitigation

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# Objectives & Conflict Statement

- Understand the common etiologies of **obstetrical trauma and hemorrhage.**
- Review evidence-based **management strategies**
- Explore the unique challenges and solutions in **rural Georgia.**
- **Neither Dr. Braun nor Dr. Ray have any relevant financial conflicts.**

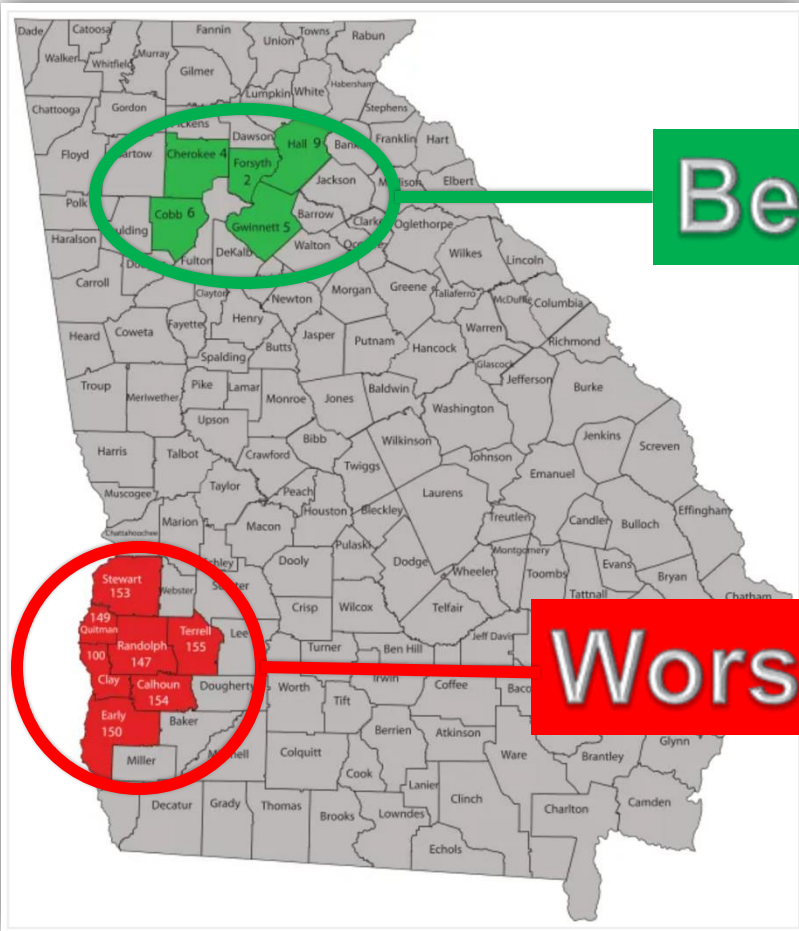
# The Two Georgias of Health: From Minnesota to Mississippi

by Jessica Moseley on February 12, 2013



For at least 30 years now, editorial writers, politicians and civic leaders have been wringing their hands about the “two Georgias” problem. The term was reportedly coined by the late Albany, Ga., media magnate James Gray in 1983 to frame a discussion about economic disparities between north and south Georgia. Generations of leaders have since regularly invoked it as a lament about the state’s seeming inability to bridge myriad gaps among various parts of the state.

The discussions almost always center on economic development and prosperity in different parts of the state and then bridge to other issues, including education and transportation. Health status and healthcare sometimes make it onto the agenda, but usually as a footnote or an afterthought.



Better than Minnesota (best)

Worse than Mississippi (worst)

Health outcome metrics compiled by the University of Wisconsin, 2012

# Rural Considerations for Maternal Risk

- Long distances to trauma centers delay care.
- High prevalence of IPV and lack of local resources.
- Poor road conditions increase MVC risks.
- Higher rates of maternal comorbidities (e.g., obesity, hypertension, tobacco).
- Limited access to prenatal care, increasing undiagnosed risk factors.
- Delay in recognizing hemorrhage due to fewer resources.

# Obstetric Hemorrhage



*“Obstetric hemorrhage is one of the leading cause of maternal mortality in Georgia and is highly preventable.”*

# Obstetric Hemorrhage

## OBJECTIVE

- Scope and impact of obstetric hemorrhage
  - Worldwide
  - U.S.
  - Georgia



# Obstetrical Hemorrhage

## Global



- **Leading cause** of maternal morbidity/mortality worldwide
- **Disproportionately affects low- and middle-income countries**
- Accounts for **approximately 27% of maternal deaths** worldwide
- Global MMR is **~223 deaths per 100,000 live births** (compared to ~30:100,000 in GA based on 2018-2020 data)
- In LMICs, the MMR can exceed 400 deaths per 100,000 live births, (compared to 16:100,000 in high-income countries)



# Scope of Obstetrical Hemorrhage United States

## Maternal Mortality:

- Approximately **10-15% of maternal deaths**
- Preventable in over **70%** of cases with timely intervention.

## Severe Maternal Morbidity (SMM):

- A leading cause of SMM, contributing to complications such as hysterectomy, organ failure, and prolonged hospitalization.
- Accounts for **12-20% of all SMM cases.**

## Incidence:

- Postpartum hemorrhage (PPH) affects about **3-5% of all deliveries** in the U.S.
- Rates have been increasing due to higher cesarean delivery rates and other factors like advanced maternal age and obesity.

# Scope of Obstetrical Hemorrhage Georgia

## Maternal Mortality:

- Responsible for **14-16% of pregnancy-related deaths.**
- **Rural hospitals** often lack access to resources, leading to delays in care and higher mortality.

## Severe Maternal Morbidity (SMM):

- Hemorrhage contributes to approximately **15-18% of SMM cases** in Georgia, particularly in rural regions with limited access to blood products or surgical expertise.

## Incidence:

- The proportion of maternal deaths due to hemorrhage emphasizes the need for continued efforts in prevention, timely recognition, and effective management of obstetric hemorrhage.

# Obstetric Hemorrhage

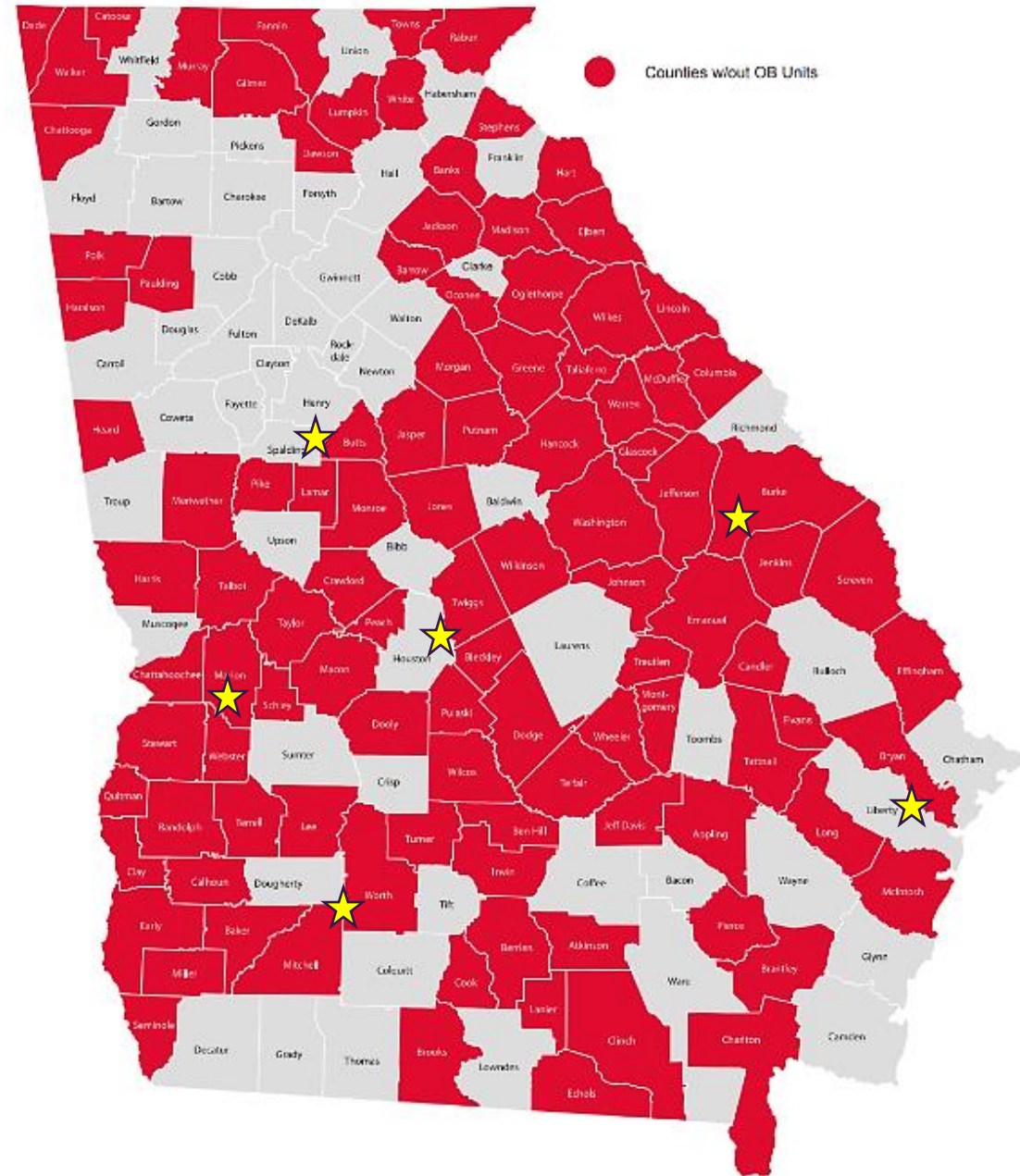
## OBJECTIVE

- Review Georgia's Data
  - Geographic complexity
  - Hemorrhage as a major contributor to poor outcomes



# Geographic Disparities Georgia

- **Rural counties in Georgia lack essential maternity care services**
  - Out of 159 counties
    - 93 are "maternity care deserts"
    - 75 No OB/GYN or midwife
- **Rural women in Georgia experience significantly higher maternal mortality rates** compared to their urban counterparts.
  - Rural Black women have a 30% higher
  - Rural White women have a 50% higher



★ Denotes Regional Perinatal Center as designated by GA DPH

## Pregnancy-Related Deaths, Number + Ratio by Public Health District of Residence Georgia, 2018-2020

PUBLIC HEALTH DISTRICT	FREQUENCY	BIRTHS	RATIO
Clayton ( <i>Jonesboro</i> )	*	12719	*
Coastal ( <i>Savannah</i> )	6	24857	24.1
Cobb & Douglas	8	30927	25.9
DeKalb	10	31382	31.9
East Central ( <i>Augusta</i> )	7	18570	37.7
East Metro ( <i>Lawrenceville</i> )	8	40536	19.7
Fulton	10	34536	29.0
LaGrange	8	28657	27.9
North Central ( <i>Macon</i> )	11	18494	59.5
North Georgia ( <i>Dalton</i> )	7	15857	44.1
North ( <i>Gainesville</i> )	*	23053	*
Northeast ( <i>Athens</i> )	5	17066	29.3
Northwest ( <i>Rome</i> )	5	23297	21.5
South ( <i>Valdosta</i> )	*	10112	*
Southeast ( <i>Waycross</i> )	*	13575	*
Southwest ( <i>Albany</i> )	5	12609	39.7
West Central ( <i>Columbus</i> )	9	13697	65.7
South Central ( <i>Dublin</i> )	0	4736	0

\* Data for districts with fewer than 5 pregnancy-related deaths were suppressed to maintain confidentiality per standard epidemiologic data protocol.

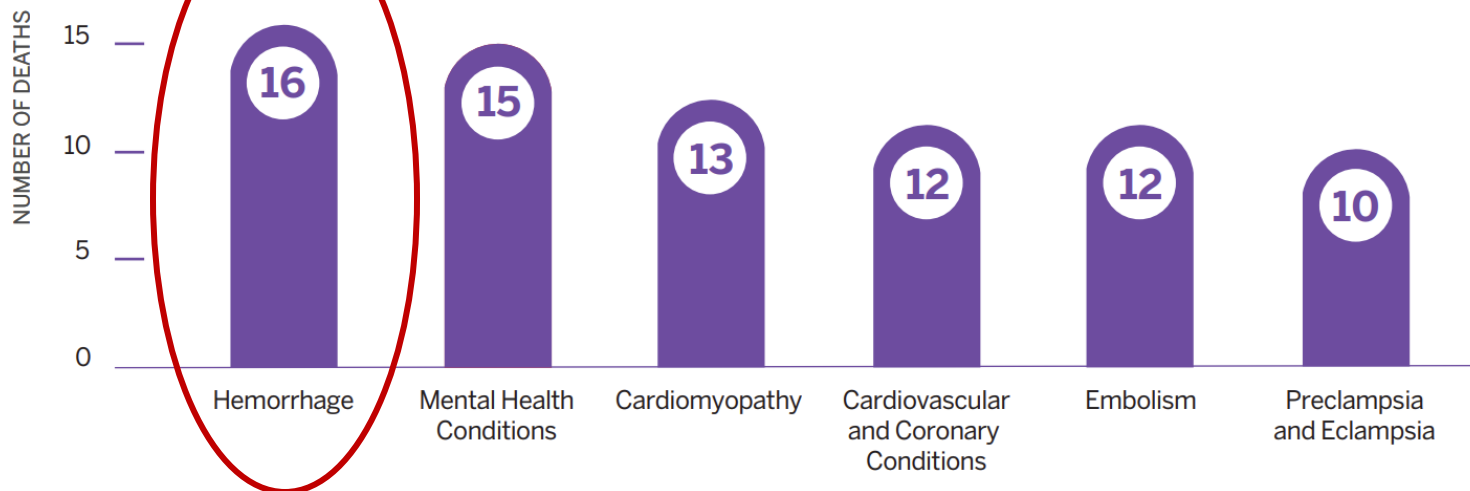
# Causes of Pregnancy-Related Death

GEORGIA 2018-2020

## MATERNAL MORTALITY

### LEADING CAUSES OF DEATH

FOR PREGNANCY-RELATED MATERNAL DEATHS



Leading Causes of Pregnancy-Related Deaths Among Non-Hispanic, White Women Georgia, 2018-2020

CAUSE OF DEATH	NUMBER	PERCENTAGE
Mental Health Conditions	10	27%
Hemorrhage	8	22%
Cardiovascular + Coronary Conditions	4	11%
Cardiomyopathy	3	8%
Embolism	3	8%

Leading Causes of Pregnancy-Related Deaths Among Non-Hispanic, Black Women Georgia, 2018-2020

CAUSE OF DEATH	NUMBER	PERCENTAGE
Cardiomyopathy	10	16%
Embolism	9	14%
Cardiovascular + Coronary Conditions	8	13%
Preclampsia + Eclampsia	8	13%
Hemorrhage	7	11%

For more information: [www.dph.ga.gov/maternal-mortality](http://www.dph.ga.gov/maternal-mortality)

# Obstetrical Hemorrhage

## Georgia MMRC Data

- Majority (69%) of pregnancy-related deaths due to hemorrhage occur within the **first 7 days** of the postpartum period.
- Nearly half of hemorrhage deaths occurred within **24 hours**.
- **All hemorrhage deaths were determined to be preventable.**

# Obstetrical Hemorrhage

## Georgia MMRC Contributing Factors

- Providers did not adequately assess risk factors for hemorrhage.
- Providers did not respond to hemorrhage in a timely manner, including delay in initiating a massive transfusion protocol and delay in escalating to surgical management.
- Hospitals did not follow the **Alliance for Innovation on Maternal Health (AIM) Obstetric Hemorrhage Patient Safety Bundle**



# Obstetrical Hemorrhage

## Georgia MMRC Contributing Factors

- Patients had a lack of knowledge about the importance of adhering to medical care and when to seek medical care.
- Providers and hospitals did not transfer patients to the appropriate level of care for delivery.
- ED's did not adequately assess for pregnancy and providers were delayed in recognizing a ruptured ectopic pregnancy.

# Obstetric Hemorrhage

## OBJECTIVE

- Clinical Care of Obstetric Hemorrhage
  - Common etiologies
  - Management
  - Resources for best practice



# Obstetrical Hemorrhage

## Common Etiologies

### Antepartum:

- Placenta previa: Placenta covers cervical os
- Placental abruption: Premature detachment of placenta
- Vasa previa: Fetal vessels overlying cervix

# Obstetrical Hemorrhage

## Common Etiologies

### Postpartum:

- Uterine Atony: Most common cause of postpartum hemorrhage
- Lacerations: Cervical, vaginal, or perineal tears
- Retained placenta: Failure of complete placental delivery

## Early postpartum hemorrhage (up to 24 hours)

- Uterine atony (most common)
- Retained placental fragments
- Lower genital tract lacerations
- Uterine rupture
- Uterine inversion
- Placenta accreta spectrum disorder
- Hereditary coagulopathy

**“Four T’s”**  
**Tone**  
**Tissue**  
**Trauma**  
**Thrombin**

## Late postpartum hemorrhage (24 hours to 12 weeks)

- Infection
- Placental site subinvolution
- Retained placental fragments
- Hereditary coagulopathy

# Obstetrical Hemorrhage Management

## Immediate Response

- **Recognition and Stabilization:**
  - Assess and address bleeding source: “Four T’s”
- **IV access:** 2 Large-bore IVs (18g AC)
- **Vital signs monitoring:** Continuous
- **Early labs:** CBC, PT, aPTT, fibrinogen, type & crossmatch

“Four T’s”  
Tone  
Tissue  
Trauma  
Thrombin

# Obstetrical Hemorrhage Management

## First-Line Interventions

- **Uterine Atony Management - Uterotonics**
  - Oxytocin (IV/IM): First-line therapy.
  - Misoprostol (oral, sublingual, or rectal)
  - Methylergonovine or carboprost (if available)
    - Contraindications (e.g., hypertension or asthma).
- **Uterine Massage: Manual stimulation** to promote contraction.
- **Adjunctive agents: TXA** and/or Recombinant factor VIIa

# Obstetrical Hemorrhage Management

## Other interventions

- **Non-pharmacological compression:** Bimanual uterine compression for temporary control of bleeding.
- **Mechanical compression:** Uterine Balloon Tamponade:
  - Devices like the Bakri balloon, Jada System, or **improvised solutions** (e.g., condom catheter)
  - Can be inserted bedside without surgical expertise.



# Obstetrical Hemorrhage Management

## Improvised Balloon Tamponade Methods

- Improvised balloon tamponade devices can be life-saving in managing postpartum hemorrhage (PPH) caused by uterine atony.
  - Readily available materials, ideal for rural emergency.
  - Goal - **direct pressure** against the uterine walls to compress blood vessels.
  - Inserted aseptically and monitored closely after placement.

# Obstetrical Hemorrhage Management

## Improvised Balloon Tamponade

- Condom Catheter Tamponade
- Surgical Glove Balloon Tamponade



## Uterine Packing

- Gauze Roll Tamponade

### Materials Needed:

- A sterile condom or surgical glove.
- A Foley catheter (16 or 18 French).
- 500 mL saline bag or sterile syringe.
- Suture or rubber band to secure the condom.

### Steps:

1. Attach a sterile condom/surgical glove to the Foley catheter using sutures or a rubber band.
2. Insert the condom/surgical glove into the uterine cavity.
3. Gradually fill the condom with sterile saline (typically 250–500 mL) via the catheter.
4. Monitor uterine tone and adjust the volume as needed.
5. Leave the catheter in place to allow for drainage and prevent overdistension.

# Obstetrical Hemorrhage Management

## Activation of a Massive Transfusion Protocol (MTP)

- “Massive Transfusion” - **any large volume** blood transfusions
- “Massive Transfusion Protocol” refers to **rapid** administration of **large** amounts of blood products for hemorrhagic shock
- Protocol should have specific guidelines
  - Defined roles and responsibilities

# Obstetrical Hemorrhage Management

## Activation of a Massive Transfusion Protocol (MTP)

- MTP is critical when hemorrhage exceeds 1,500 mL or ongoing hemorrhage is refractory to initial measures
- Transfusion goals:
- Balanced transfusion ratios:

### Maintain

Hemoglobin >7 g/dL.  
Fibrinogen >200 mg/dL.  
Platelets >50,000/ $\mu$ L.

### Deliver in 1:1:1 ratio

PRBCs, FFP & Platelets

# Obstetrical Hemorrhage Management

## Hemorrhage Cart (or equivalent)

- Contains: all the instruments necessary to treat obstetric hemorrhage before hysterectomy is considered.
  - Tools and instruments (ie, suture, packing supplies, etc.)
  - Medications (for treatment of atony, TXA, etc.)
  - Checklists & Supporting documents/protocols/algorithm

## OB Hemorrhage Cart: Recommended Supplies

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>▶ IV start supplies</li><li>▶ Angiocaths</li><li>▶ IV tubing</li><li>▶ IV extension set</li><li>▶ Blood product transfusion tubing</li><li>▶ Blood warmer tubing</li><li>▶ Urinary catheter kit with urometer</li><li>▶ Flashlight</li><li>▶ Lubricating jelly</li><li>▶ Assorted sizes sterile gloves</li><li>▶ Lab tubes: CBC, coagulation studies, etc.</li><li>▶ Venipuncture supplies</li><li>▶ Pressure infuser bags</li><li>▶ Chux</li><li>▶ Peri-pads</li><li>▶ Vaginal packing (consider arm banding to indicate packing used)</li><li>▶ Hemorrhage balloon and supplies</li><li>▶ Skin marker</li></ul> | <ul style="list-style-type: none"><li>▶ Syringes</li><li>▶ Needles</li><li>▶ Tegaderm</li><li>▶ 2x2 gauze</li><li>▶ Adhesive bandages</li><li>▶ Alcohol swabs</li><li>▶ Paper tape</li><li>▶ Cloth tape</li><li>▶ Manual BP cuff</li><li>▶ Stethoscope</li><li>▶ Povidone iodine</li><li>▶ Personal Protection</li><li>▶ Operating room towel</li><li>▶ Sterile speculum</li><li>▶ Diagrams depicting (e.g., B-Lynch, uterine balloon placement)</li><li>▶ IV fluids for administration of balloons as your institution requires</li></ul> |
|---|--|

## Recommended Instruments

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>▶ Set of vaginal retractors (long right angle); long weighted speculum</li><li>▶ Sponge forceps (minimum: 2)</li><li>▶ Sutures (for cervical laceration repair and B-Lynch)</li></ul> | <ul style="list-style-type: none"><li>▶ Banjo curettes, several</li><li>▶ Long needle holder</li><li>▶ Uterine forceps</li></ul> |
|---|--|

# CMQCC

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## OB Hemorrhage Medication Kit:

Available in the L&D and Postpartum automated dispensing cabinet/refrigerator

### Consider kit labeling to include:

**Carboprost (Hemabate) - "Avoid with Asthma"**

**Methylergonovine (Methergine) - "Avoid with Hypertension"**

- ▶ Oxytocin (Pitocin) 10-40 units per 500-1000 mL NS, 2 pre-mixed bags
- ▶ Oxytocin (Pitocin) 10-unit vial, 2 vials
- ▶ Methylergonovine (Methergine) 0.2 mg/mL, 1 ampule\*
- ▶ 15-methyl PGF<sub>2</sub>α (Hemabate, carboprost) 250 mcg/mL, 1 ampule\*
- ▶ Tranexamic Acid (TXA) 1000 mg/10 mL vial, 1-2 vials\*\* (also available as 1000 mg/100 mL IVPB)
- ▶ Misoprostol (Cytotec) 200 mcg tablets, 5 tabs

\*Carboprost requires refrigeration. Methylergonovine injection is stable for only 14 days outside of refrigeration conditions.

\*\*While manufacturer endorses room temperature storage, military data is supportive of refrigeration, which is helpful in the creation of kits.

*Oxytocin and methylergonovine are considered 'Special Handling' for the health care worker (Hazardous Drug—Potential Reproductive Risk). Provide institution-specific PPE and disposal guidelines and appropriate ancillary labeling.*

# Obstetrical Hemorrhage Management

## Simulation and Drills

- Team-based drills are a critical component of readiness
- Simulations and timely debriefs
  - All elements of the facilities care for patients with obstetric hemorrhage based on an evidenced-based, protocol driven plan
  - Transfusion protocols and access/limitations of blood bank
  - Patient-centered, empathetic, trauma-informed care

# Obstetrical Hemorrhage Management

## Quantitative and Cumulative Blood Loss

- Quantitative Assessment of blood loss includes:
  - Use of direct measurement of obstetric blood loss
  - Protocols for collecting and reporting a cumulative blood loss
- Ensure equipment needed for quantification of blood loss is easily available



# Obstetrical Hemorrhage Solutions

- Referral networks/transfer agreements (Georgia RPCs)
- Establish referral pathways to facilitate timely transfers
- Shared blood resources
- Telemedicine and regional teleconsultation
- Participation in: State level - GAPQC, MMRC, Project ECHO, etc.  
National initiatives - AIM bundles, etc

## The **AIM Obstetric Hemorrhage Patient Safety Bundle**

was revised in 2022 to incorporate respectful care considerations, revise existing elements, include new elements related to evidence-informed practices, and update data collection plans.

- Develop processes for the management of patients with obstetric hemorrhage, including:
  - A designated rapid response team co-led by nursing, obstetrics, and anesthesia with membership appropriate to the facility's Level of Maternal Care;\*
  - A standardized, facility-wide, stage-based obstetric hemorrhage emergency management plan with checklists and escalation policy;\*
  - Emergency release and massive transfusion protocols to ensure immediate access to blood products;\*
  - A protocol, including education and consent practices, to collaborate with patients who decline blood products, but may accept alternative approaches;\* and
  - Review of policies to identify and address organizational root causes of racial and ethnic disparities in outcomes related to the diagnosis, management, and surveillance of obstetric hemorrhage.
- Maintain a hemorrhage cart or equivalent with supplies, checklists, and instruction cards for devices or procedures where antepartum, laboring, and postpartum patients are located.\*
- Ensure immediate access to first- and second-line hemorrhage medications in a kit or equivalent per the unit's obstetric hemorrhage emergency management plan.\*
- Conduct interprofessional and interdepartmental team-based drills with timely debriefs that include the use of simulated patients.\*



<https://saferbirth.org/psbs/obstetric-hemorrhage/>

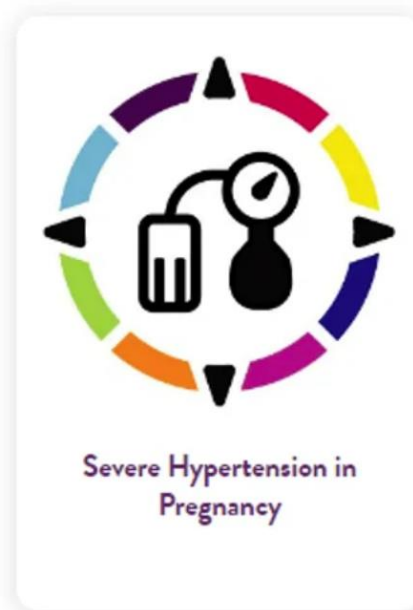
## OB Hemorrhage Toolkit V3.0

**CMQCC**

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Appendix A: Classification of Evidence Grading  
Appendix B: Obstetric Hemorrhage Care Guidelines: Checklist Format  
Appendix C: Obstetric Hemorrhage Care Guidelines: Table Format  
Appendix D: Obstetric Hemorrhage Care Guidelines: Flowchart Format  
Appendix E: Checklist: Carts, Kits and Trays  
Appendix F: Simulations and Drills: Guidelines for Simulation Scenario Development  
Appendix G: Simulations and Drills Sample Scenarios  
Appendix H: Checklist for Patients Who May Decline the Use of Blood Products  
Appendix I: Discharge Planning for Women with Hemorrhage During the Birth Hospital Stay  
Appendix J: Sample Obstetric Outpatient Intravenous Iron Infusion  
Appendix K: Obstetric Hemorrhage Risk Factor Assessment Screen  
Appendix L: Hemorrhage ED Visit Stop Sign  
Appendix L: Hemorrhage ED Visit Stop Sign, Spanish Language  
Appendix M: Sample QBL Worksheet  
Appendix N: Techniques for Quantitative Assessment of Blood Loss (QBL)  
Appendix O: Terms and Techniques for Describing Blood Loss  
Appendix P: Sample Paper Calculators for Quantifying Blood Loss  
Appendix Q: Sample Schematic: Preadmission Planning for Women Undergoing Scheduled Cesarean Section  
Appendix R: Medications for Postpartum Hemorrhage  
Appendix S: Sample Massive Transfusion Policy – Torrance  
Appendix T: Sample Massive Transfusion Procedure Miller Children's and Women's Hospital  
Appendix U: Sample Code Crimson Postpartum Hemorrhage Management  
Appendix V: A Guide to Recognizing Acute Stress Disorder in Postpartum Women in the Hospital Setting  
Appendix W: Patient and Family Support Checklist for Postpartum Hemorrhage  
Appendix X: Life After Postpartum Hemorrhage  
Appendix Y: Resources for Postpartum Hemorrhage Survivors  
Appendix Z: Sample Patient Summary Form: Obstetric Hemorrhage Event  
Appendix AA: Sample Script: Provider - Patient Postpartum Hemorrhage Post-Event Discussion  
Appendix BB: FAQ What do patients need to know?  
Appendix CC: Sample Hemorrhage Rapid Debrief Form  
Appendix DD: Sample Labor and Delivery Event Debrief Form  
Appendix EE: Alert on Blood Transfusion Procedure Coding  
Appendix FF: Obstetric Hemorrhage Sample Order Set Staged

<https://www.cmqcc.org/resources-tool-kits/toolkits/ob-hemorrhage-toolkit>



<https://georgiapqc.org/maternal-initiatives>

## Our Partners



# Obstetric Trauma

# Obstetric Trauma Objectives

- Identify the unique physiological changes in pregnancy that impact trauma evaluation and management.
- Differentiate between minor and major trauma
- Screen OB trauma patients using appropriate diagnostic tools.
- Collaborate among the interprofessional team to enhance care
- Consider unique challenges of cardiac arrest in advanced pregnancy

# Obstetric Trauma

Complicates 1 in 12 pregnancies

Leading cause of non-obstetric mortality

Can range from:

- Mild: single fall - Increased risk of prematurity or LBW if in ½ trimester
- Major: high force penetrating or blunt injury (MVA)
  - 40-50% increased risk of fetal death

Domestic violence is common , 4-8% of pregnancies

- Homicide also increased

MVAs: 50% of traumatic injuries in pregnancy

- 82% trauma related fetal death
- Pelvic fracture is most common injury leading to fetal death

# Obstetric Trauma

## Complications include:

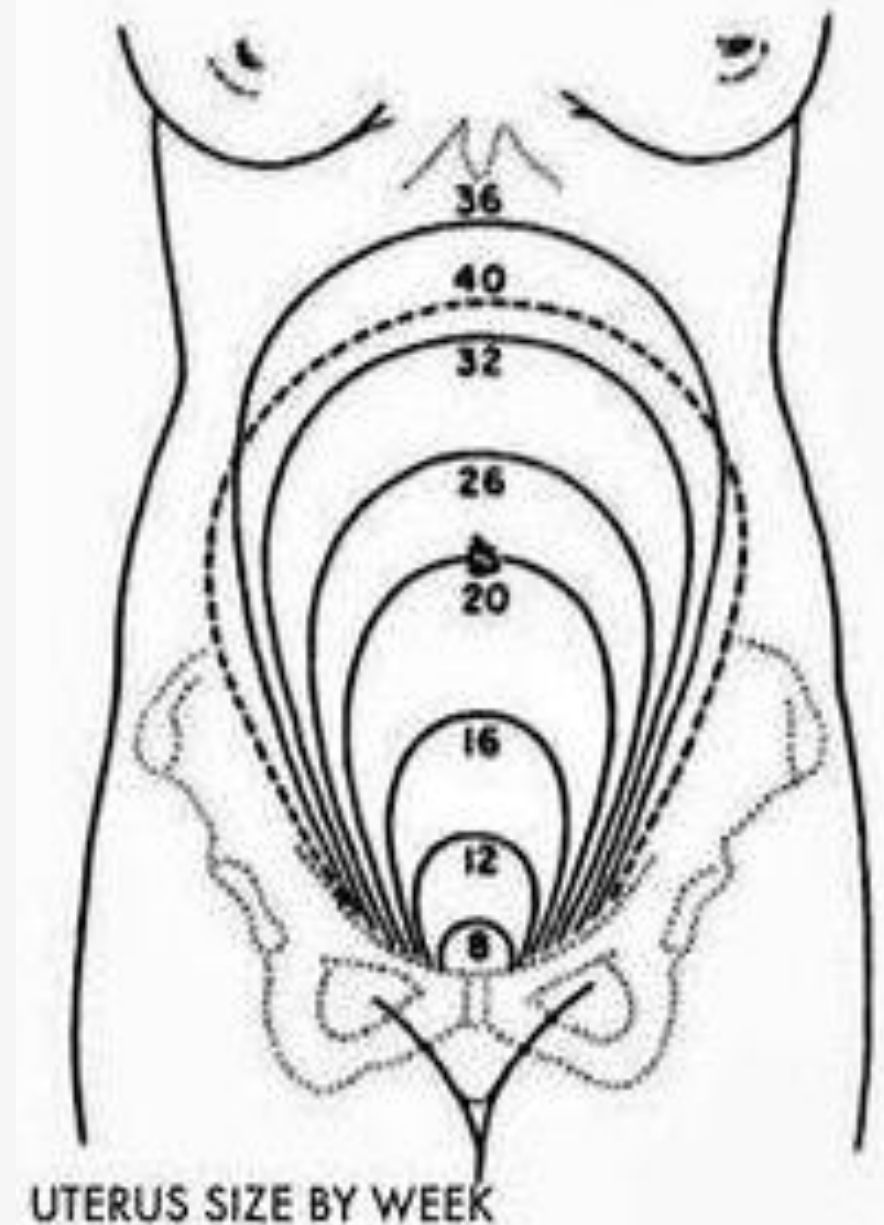
- spontaneous abortion
- contractions
- preterm labor
- fetal maternal hemorrhage
- premature rupture of membranes
- preterm birth
- uterine rupture
- **placental abruption**
  - 1-6% of minor injury
  - 50% major injury
- intrauterine fetal demise

Best predictor for fetal demise and uterine irritability is maternal injury severity, measured by ISS and GCS

- Most women without severe injuries can be managed locally
- Consider opportunity for tele-consultation

# Management of OB Trauma

- OB evaluate pregnant trauma patients if feasible
- Initial evaluation includes (standard ATLS):
  1. Primary, Secondary and Tertiary survey
  2. History (including obstetric), ABCs, & VS
  3. Fundal height and \*uterine displacement
  4. FHT
    - Audible by stethoscope at 20 weeks
    - Continuous monitoring if 23 weeks or more
- Monitoring x 4-6 hours minimum
  - 24 hours if contractions
  - Transfer if contractions or FHT changes





# Management of OB Trauma

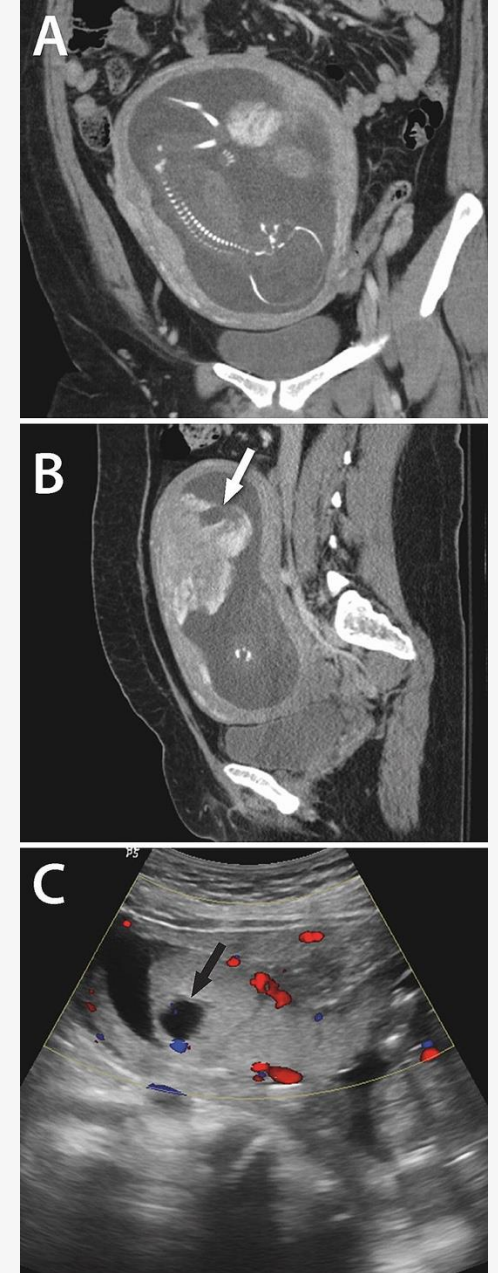
- Additional labs may include:
  - blood type and Rh status
  - coagulation studies with fibrinogen
  - Kleihauer–Betke (KB) test (FCP)
- Concerning Exams Findings
  - Penetrating injury to the abdomen
  - Vaginal bleeding
  - Ruptured membranes
  - Bulging perineum
  - Presence of contractions
  - Abnormal fetal heart rate or rhythm



300  $\mu\text{g}$  dose of Rhogam will protect up to 30 ml of fetal blood

# Management of OB Trauma

- *Imaging- Mother first*
  - X-Ray and CT is OK if needed
- Warning Signs
  - cardiac arrest (well that is kinda late!!)
  - Altered Mentation
  - BP < 80/40
  - HR < 50 or > 140
- FAST evaluation – Tele-US



# Physiologic Changes of Pregnancy



## Abdominal

Increased risk of  
Aspiration

Decreased sensation  
of peritoneum

Enlarged, thin uterus-  
susceptible to injury



## Hematologic

Dilutional anemia

Hypercoagulable



## Cardiovascular

HR increases 15-20 bpm

Decreased BP 15-20 mm Hg

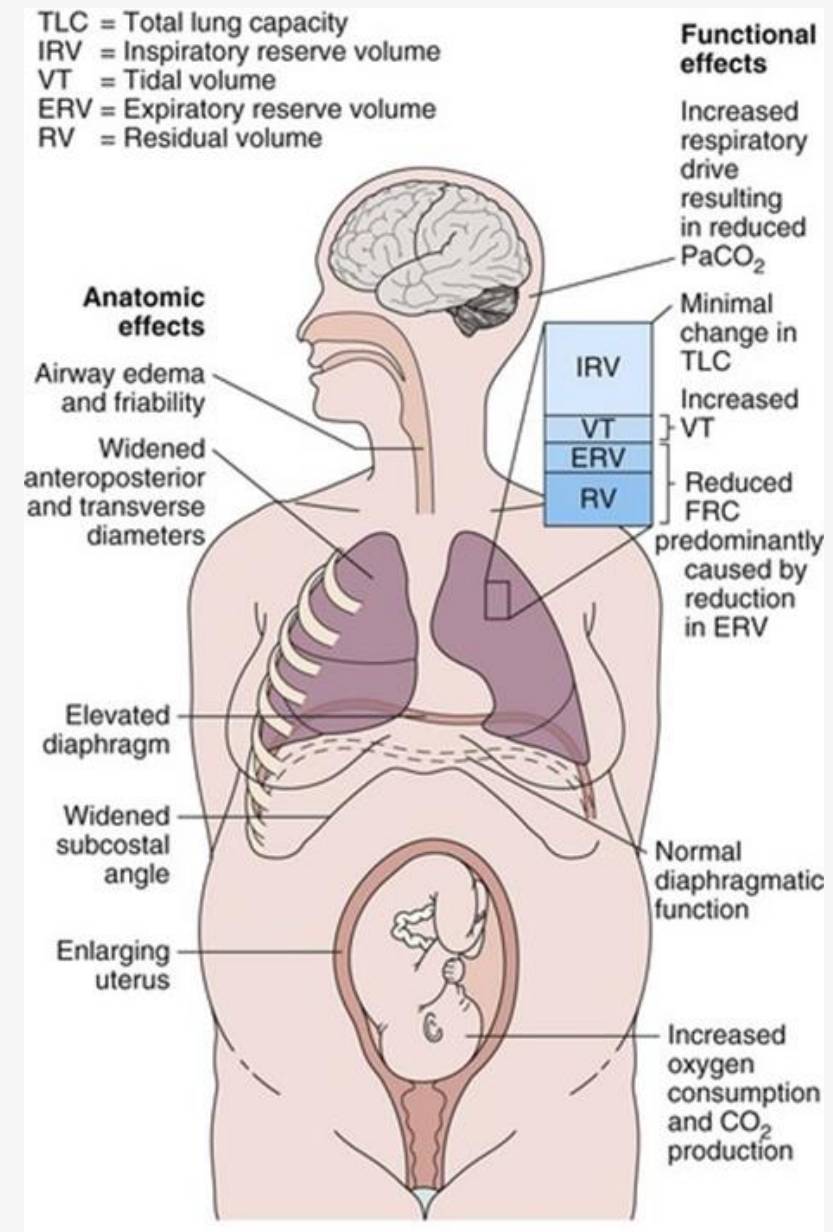
Increased plasma volume,  
delayed recognition of shock

Uterus receives 20% of CO in  
3<sup>rd</sup> trimester

AOC compression

# Physiologic Changes Continued

- The diaphragm elevates by up to 4 cm in 3<sup>rd</sup> trimester causing decreased chest compliance
- FRC decreases by up to 25% in the supine position at term
- Mild respiratory alkalosis from increased minute ventilation due to progesterone
  - Decreased respiratory reserve
- Hyperemia of upper airway from estrogen can result in increased bleeding
- Higher risk of aspiration
  - Cricoid pressure avoided due to may impede ventilation



# Cardiac Arrest in Pregnancy

Rare:  
1 in 12,000 hospital  
admissions for  
delivery

Up to 58% of  
patients survive

Increasing maternal  
mortality - higher  
number of cardiac risk  
factors

Management of 2  
patients

Early recognition and  
intervention with  
effective chest  
compressions and  
airway management are  
crucial

Consideration for C -  
section depending on  
gestational age

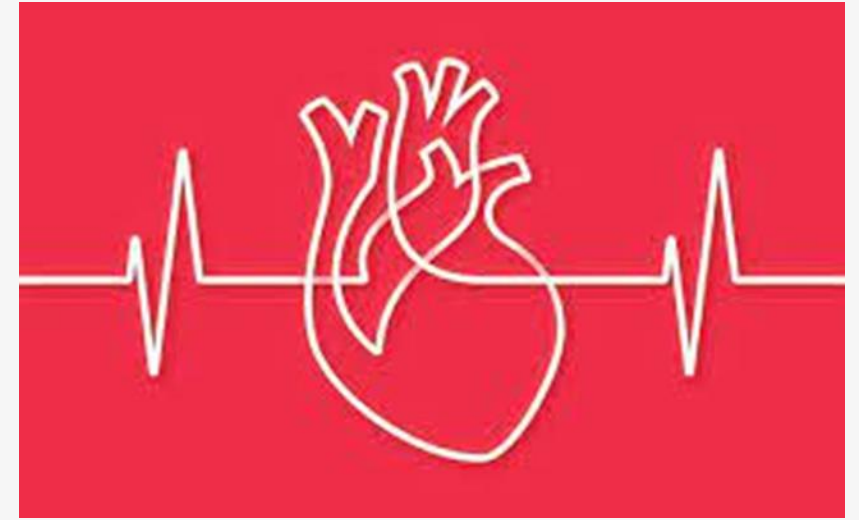
# Obstetric Considerations

- Manual left uterine displacement - LUD
- Keep Mom flat for more effective compressions
- Continue LUD throughout resuscitation and delivery
  - From the right: uterus is pushed upward and leftward
  - From the left side, uterus is cupped and lifted up and leftward



# Cardiac Arrest Etiology

- ABCDEFGH for identifying potential underlying causes:
  - Anesthesia / Accidents
  - Bleeding
  - Cardiovascular
  - Drugs
  - Embolism
  - Fever
  - General
  - Hypertension



Most common causes of arrest

- Hemorrhage
- Heart failure
- Amniotic fluid embolism
- Sepsis

# Management of Cardiac Arrest

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- Team Members:
  - Providers for adult resuscitation
  - Obstetrics
  - Anesthesia
  - Neonatology (if fetal viability)
- Added equipment
  - Emergency cesarean delivery kit
  - Neonatal resuscitation equipment





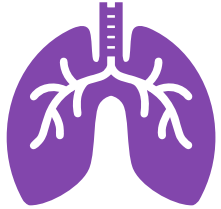
## Emergency Cesarean Equipment

### Table 2 – Recommended equipment for an emergency cesarean section.

#### Equipment for emergency cesarean delivery

Scalpel with number 10 blade  
2 Kelly clamps  
Needle driver  
Russian forceps  
Sutures  
Suture scissors  
Lower end of a Balfour retractor

# Obstetric ACLS Considerations



**Chest compressions performed are same**

rate of 100–120 compressions per minute  
depth of at least 2 in with minimal interruptions



**Bag-mask ventilation with 100% oxygen**

compression–ventilation ratio of 30:2



**Early defibrillation should be provided when appropriate**

NO modifications in shock energy

Fetal monitoring **NOT** essential, and may impede CPR



# Obstetric ACLS Highlights

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- **Airway management imperative**
  - Performed by most experienced provider
- Medications **DO NOT** need to be adjusted
- If ROSC achieved:
  - Place in **full Left - lateral decubitus** position



# Perimortem Cesarean Delivery (PMCD)

- Should be initiated after 4 min of failed resuscitative efforts
  - goal of delivery within 5 min of initiation of resuscitative efforts\*
- If the mother has clearly non-survivable injuries, it is not necessary to wait to begin the PMCD
- Only recommended if the uterus extends to at least the level of the umbilicus



# References

1. [https://cpr.heart.org/-/media/cpr-files/cpr-guidelines-files/algorithms/algorithmacls\\_ca\\_in\\_pregnancy\\_inhospital\\_200612.pdf?la=en](https://cpr.heart.org/-/media/cpr-files/cpr-guidelines-files/algorithms/algorithmacls_ca_in_pregnancy_inhospital_200612.pdf?la=en)
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3. Kirk CH, Ciraulo GE, Ciraulo RS, Falank CR, Ciraulo DL. Obstetrical Trauma: Reducing the Burden of Trauma Transfer to Tertiary Care Centers. *Am Surg*. 2023 Jul;89(7):3084-3088. doi: 10.1177/00031348231157847. Epub 2023 Feb 16. PMID: 36797010.
4. Kikuchi J, Deering S. Cardiac arrest in pregnancy. *Semin Perinatol*. 2018 Feb;42(1):33-38. doi: 10.1053/j.semperi.2017.11.007. Epub 2017 Dec 13. PMID: 29246735.
5. <https://cpr.heart.org/en/resuscitation-science/cpr-and-ecc-guidelines/algorithms>
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# QUESTIONS



# DISCUSSION

