The Diane McCabe Quality Lecture

The Safe Motherhood Initiative: Making Childbirth Safer

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11/21/2013
• **NO CONFLICTS OF INTEREST**

• **NO FINANCIAL DISCLOSURES**
LEARNING OBJECTIVES

AT THE CONCLUSION OF THIS LECTURE, THE PARTICIPANT WILL BE ABLE TO IDENTIFY, PREVENT, DIAGNOSE AND MANAGE:

a) Postpartum hemorrhage
b) Hypertension in pregnancy
c) Venous thromboembolism (causing pulmonary embolism)
MATERNAL MORTALITY PER 100,000 LIVEBORN INFANTS

Source: NLWC from Center for Disease Control and Prevention, National Center for Health Statistics 1999-2006
The Problem(s)

- Approximately 50% of all maternal deaths are considered to be preventable!

- Over the last 20 years, the US maternal mortality ratio has doubled to 14.5 per 100,000.

- Cause(s): changes in National Vital Statistics System may have improved the ascertainment of maternal deaths (& “sicker” pts??).
US Pregnancy-Related Mortality

Maternal Risk Factors

- Maternal age
- Obesity
- Cesarean delivery
- More pregnancies in women with significant chronic medical conditions
  - Hypertension
  - Pregestational diabetes
  - Congenital heart disease
  - Organ transplant
Where Is the “M” in Maternal–Fetal Medicine?

Mary E. D’Alton, MD

In contrast to the generally encouraging trend regarding global maternal mortality, there has been an apparent increase in the maternal mortality ratio in the United States. Although maternal death remains a relatively rare adverse event in this country, programs to reduce maternal mortality also will result in a reduction in maternal morbidity, which is a far more prevalent problem. Progress in the field of maternal–fetal medicine over the past several decades has been largely attributable to improvements in fetal and neonatal medicine. We need to develop an organized, national approach focused on reducing maternal mortality and morbidity. The goal will be to outline a specific plan for clinical, educational, and research initiatives to put the “M” back in maternal–fetal medicine.

(Obstet Gynecol 2010;116:1401–4)

decreasing maternal mortality. More recently, reduction in maternal mortality became one of the eight Millennium Development Goals of the United Nations.²

There has been good news this year in the progress toward the Millennium Development Goals of the United Nations, which targets a reduction in the maternal mortality ratio by 75% from 1990 to 2015. In a comprehensive analysis funded by the Bill and Melinda Gates Foundation, estimates of global maternal deaths have declined from 526,300 in 1980 to 342,900 in 2008.³

Maternal mortality is difficult to measure, particularly in developing countries; thus, there are wide uncertainty intervals around these numbers. Nevertheless, these new estimates provide hope that interventions to reduce fertility rates, increase income and education, and expand access to skilled birthing attendants,
Consensus in New York State
Reasons for standardization of 3 bundles:

1) most common reasons leading to maternal death
2) most of these deaths have preventable causes

| Obstetric Hemorrhage | Severe Hypertension in Pregnancy | Venous Thromboembolism (VTE) |
Focus Population

• 131 New York State Obstetric Hospitals
  • 52 Level 1s
  • 28 Level 2s
  • 34 Level 3s
  • 17 RPCs
• Ob-Gyn; Nursing, Anesthesia, Pediatrics, Critical Care, Cardiology, Family Practice, Midwifery, Hospital Administration
• Liaison members: all major hospital associations

THE SAFE MOTHERHOOD INITIATIVE: MAKING CHILDBIRTH SAFER
How can maternal mortality be reduced in New York State?

• Implement Obstetric Bundles in every NY birthing facility to standardize the management of:
  1. Obstetric Hemorrhage
  2. Severe Hypertension in Pregnancy
  3. Venous Thromboembolism Prevention
Bundle #1: Obstetric Hemorrhage

- Severe hemorrhage is the **leading** cause of maternal deaths (worldwide).

- Hemorrhage is a **clinical sign** NOT a diagnosis.

**Comprehensive maternal hemorrhage protocols have been shown to improve patient safety and reduce utilization of blood products.**

Obstetric Hemorrhage

The strategy for appropriate hemorrhage care is focused on:

- Identify maternal risks for this condition
- Refer pt. to a specialized center for delivery, when appropriate
OB Hemorrhage QI Toolkits

Optimizing Protocols in Obstetrics

Management of Obstetric Hemorrhage

SERIES 2

ACOG
THE AMERICAN CONGRESS OF OBSTETRICIANS AND GYNECOLOGISTS
DISTRICT II

A California Toolkit to Transform Maternity Care

Improving Health Care Response to Obstetric Hemorrhage

THIS COLLABORATIVE PROJECT WAS DEVELOPED BY:

THE OBSTETRIC HEMORRHAGE TASK FORCE
THE MATERNAL QUALITY IMPROVEMENT PANEL
CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE
MATERNAL, CHILD AND ADOLESCENT HEALTH DIVISION, CENTER FOR FAMILY HEALTH
CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

CMQCC
CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE

California Department of Public Health
Risk Assessment

Antepartum

- Suspected placenta accreta/increta/percreta
  - BMI >50
  - Clinically significant bleeding disorders
  - Other significant medical/surgical risks (e.g., patients who decline transfusion)

Transfer to appropriate level of care for delivery*

* Review availability of medical/surgical, blood bank, ICU, and interventional radiology support
Placenta Accreta Management

• Patients at high risk for placenta accreta should:
  – Obtain proper imaging to evaluate risk prior to delivery, and
  – If accreta is suspected, be delivered by obstetricians and specialists experienced in accreta management at a hospital with ICU facilities available for post-operative management.
Risk Assessment: Admission

**Medium Risk**
- Prior cesarean, uterine surgery, or multiple laparotomies
- Multiple gestation
- > 4 prior births
- Prior PPH
- Large myomas
- EFW > 4000gm
- Obesity (BMI > 40)

**High Risk**
- Placenta previa/low lying
- Suspected accreta/percreta
- Hematocrit < 30% & other risk
- Platelet count < 70,000
- Active bleeding
- Known coagulopathy
- 2 or more medium risk factors

Type & CROSS, review protocol

**Developing Risk During Labor**
- Chorioamnionitis
- Prolonged oxytocin
- Prolonged 2nd stage

Type & SCREEN, review protocol

- New active bleeding
- 2 or more medium risk factors

Type & CROSS, review protocol
Can obstetric hemorrhage be prevented?

• Active management of the 3rd stage of labor
  – Oxytocin 10-20 units/1000 milliliters vs. 10 units IM
  – Titrate to uterine tone
  – Vigorous fundal massage (for at least 15 seconds)
Hemorrhage Checklist

Stage 1
- Blood loss > 500 milliliters vaginal OR
- Blood loss > 1000 milliliters cesarean

- Record VS, O2 sat at every 5 minutes
- Record cumulative blood loss
- Increase intravenous fluid (crystallloid 3:1 ratio without oxytocin)
- IV access: at least 18 gauge
- Fundal massage
- Empty bladder
- Determine and treat etiology (4 T’s: Tone, Trauma, Tissue, Thrombin)

Blood Bank
- Type & Cross 2 units PRBCs

Medications
- Oxytocin 40-80 international units/liter IV
- Methergine 0.2 milligrams IM (may be repeated every 2-4 hours)
- Hemabate 250 micrograms IM (may be repeated every 15 min, max 8 doses)
- Misoprostol 800-1000 micrograms PR

Stage 2
- Continued bleeding EBL up to 1500 milliliters OR any patient requiring ≥ 2 uterotonics
- 2nd IV access (at least 18 gauge)
- STAT labs, with coagulopathy and fibrinogen
- Consider warming blanket
- Consider D&C OR intrauterine balloon

Blood Bank: DO NOT wait for labs (Transfuse per clinical signs/symptoms)
- Notify OB hemorrhage
- Bring 2 units PRBCs to bedside
- Thaw 2 units FFP

Medications
- Continue medications from Stage 1
- Alert team members
- Consider moving patient to OR

Stage 3
- Continued bleeding with EBL > 1500 mL OR
- > 2 units PRBCs given OR
- Suspicion of coagulopathy

- Mobilize additional team members
- FILL IN TEAM FOR YOUR INSTITUTION (Consider surgical support, 2nd Anesthesia provider, OR staff, Critical Care)
- Consider Surgical intervention
- B-lynch suture
- Uterine artery ligation
- Hysterectomy
- Fluid warmer
- Body warmer
- Sequential compression devices
- Blood Bank
- Obtain Massive Hemorrhage Pack (6 PRBC: 4 FFP: 1 PLT)
- Continue to prepare packs
- Cryoprecipitate
- Consider transfer to another facility/ICU

Stage 4
- Hypotension, acidosis, coagulopathy in the setting of ongoing bleeding require urgent/expeditious surgical intervention to achieve hemostasis
- Coagulopathic (Abnormal PTT, PT, INR, fibrinogen)
- Acidotic (metabolic acidosis)

Intervention
- The most expedient surgical intervention likely to ensure hemostasis (most often hysterectomy)

Clinical considerations
- Debrief
- Document after team debrief
- Discuss with patient

NYU Langone Medical Center
Standardized Approach: Introduction

• Call for assistance: Response team for OB hemorrhage to the bedside
  – The appropriate team for YOUR institution (e.g. in-house Obstetrician, charge RN, Anesthesiologist, Surgeon, etc)
• Appoint leader, recorder, nursing roles
• Team should:
  – Identify hemorrhage STAGE
  – Activate OB hemorrhage protocol
The Safe Motherhood Initiative: Making Childbirth Safer

Standardized Approach: STAGE 1

Blood loss >500 milliliters vaginal or >1000 milliliters Cesarean

- Record VS, O2 sat. every 5 minutes & cumulative blood loss
- IV access: at least 18 gauge & increase intravenous fluid
- Fluid resuscitation with crystalloid (3:1 ratio), should not contain Oxytocin
- Fundal massage & empty the bladder
- Determine and treat etiology (4 T’s - Tone, Trauma, Tissue, Thrombin)
- Blood bank:
  - Type & CROSS 2 units PRBCs (if not already done)
- Medications:
  - **Oxytocin**: 40-80 international units/litre intravenous
  - **Methergine**: 0.2 milligrams intramuscular (may be repeated every 2-4 hours)
  - **Hemabate**: 250 micrograms intramuscular (may repeat every 15 minutes, maximum 8 doses)
  - **Misoprostol**: 800-1000 micrograms per rectum
Standardized Approach: STAGE 2

Continued bleeding: EBL up to 1500 milliliters OR any patient requiring ≥ 2 uterotonics

• 2nd IV access (at least 18 gauge) & STAT labs, including coags & fibrinogen
• Consider warming blanket
• Consider D&C, intrauterine balloon (Bakri)
• Blood bank: Transfuse per clinical signs/symptoms. **DO NOT** await labs.
  – Notify appropriate persons about the OB hemorrhage
  – Have 2 units PRBCs at bedside
  – Thaw 2 units FFP
• Medications: Continue dosing medications as in Stage 1
• Alert team members and consider moving patient to OR
Standardized Approach: STAGE 3
Continued bleeding: EBL >1500 milliliters or >2 units PRBCs transfused or coagulopathy suspected

• Mobilize additional team members, as needed
  • Appropriate persons for YOUR institution.
    (e.g. senior Surgeons, additional Anesthesia providers, O.R. staff, Critical Care, etc)
• Consider surgical intervention: B-Lynch suture, uterine artery ligation, hysterectomy
• Fluid warmer, body warmer, sequential compression devices
• Blood bank:
  • Obtain massive hemorrhage pack
  • 6 PRBC: 4 FFP: 1 PLT (continue to prepare packs)/ cryoprecipitate
• Consider transfer to another facility or to an ICU
Standardized Approach: Stage 4

• **Definition:** Hypotension, acidosis, coagulopathy in the setting of ongoing bleeding requires expeditious surgical intervention to achieve hemostasis
  – Coagulopathic (Abn. PTT, PT, INR, fibrinogen)
  – Acidotic (metabolic acidosis)

• **Intervention:** The most expedient surgical intervention likely to ensure hemostasis (most often hysterectomy)
Blood Bank

In order to provide safe obstetric care the institution must:

1. Have a functioning Massive Transfusion Protocol (MTP)
2. Have a minimum of 4 units of O-negative PRBCs
3. Have the availability to obtain 6 units PRBCs and 4 units FFP (type specific) for a bleeding patient
4. Have a mechanism in place to obtain platelets and additional products in a timely fashion
Blood Bank: Massive Transfusion Protocol

I. PATIENT AT RISK FOR UNCONTROLLABLE BLEEDING

1. Activate MTP – call and say:
   “activate massive transfusion protocol”
2. Nursing / Anesthesia draw stat labs
   a. Type & CROSS
   b. CBC, PT/PTT, Fibrinogen, and ABGs (as needed)

II. IMMEDIATE NEED FOR TRANSFUSION (*crossmatch not yet available*)

1. YES – give 2-4 units O-negative blood
2. NO – conventional resuscitation with intravenous fluids;
   ongoing evaluation
Massive Transfusion Protocol (contd.)

III. ANTICIPATE ONGOING MASSIVE TRANSFUSION NEEDS
   1. YES – OBTAIN MASSIVE TRANSFUSION PACK; give immediately:
      ✓ 6 units PRBCS
      ✓ 4 units FFP
      ✓ 1 apheresis pack of platelets
   2. NO – conventional resuscitation with intravenous fluids; ongoing evaluation

IV. INITIAL LAB RESULTS
   1. Normal → anticipate ongoing bleeding → repeat massive transfusion pack → bleeding controlled → deactivate MTP
   2. Abnormal → repeat massive transfusion pack; repeat labs
Blood Bank: Massive Transfusion Protocol

*Important protocol items to be determined at YOUR institution:*

1. How to activate your institution’s MTP
2. Blood bank number & location
3. Emergency release protocol that the blood bank and ordering parties (*MD/RN/CNM, etc.*) understand
4. How will blood be brought to L&D?
5. How will additional blood products/platelets be obtained?
6. How will ongoing labs and clinical evaluations be done?
Hemorrhage Cart

- Vaginal retractors; long weighted speculum
- Sponge forceps (minimum 2)
- Long needle holder and scissors
- Sutures (laceration repair and B-Lynch) – #1 chromic or plain catgut suture and reloadable straight needle for B-Lynch suture
- Uterine balloon
- Banjo curette
- Bright (portable) light
- Procedure diagrams (B-Lynch, Balloon, arterial ligation)
- Hemorrhage protocol & debrief tool
## Supplies: Medication Kit

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<th>Quantity</th>
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<tr>
<td>Oxytocin 20 units/liter</td>
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<tr>
<td>Hemabate 250 micrograms/milliliters</td>
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<td>Cytotec 200 microgram tablets</td>
<td>5 tabs</td>
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<tr>
<td>Methergine 0.2 milligrams/milliliters</td>
<td>1 ampule*</td>
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* Another source for additional medications should be immediately available 24/7.
Debriefing

Obstetric Team Debriefing Form

Remember: Debriefing is meant to be a learning experience and a way to address both human factors and systems issues to improve the response for next time. There is to be no blaming/finger-pointing.

Type of event: ______________________________ Date of event: ______________________________
Location of event: ______________________________

Members of team present: (circle all that apply)
- Primary RN
- Anesthesia personnel
- Nurse Manager
- Primary MD
- Neonatology personnel
- OB/Surgical tech
- Charge RN
- MFM leader
- Resident(s)
- Patient Safety Officer
- Other RNs
- Unit Clerk

Thinking about how the obstetric emergency was managed...

Identify what went well (Check if yes)
- Communication
- Role clarity (leader/supporting roles identified and assigned)
- Teamwork
- Situational awareness
- Decision-making
- Other: ______________________________

Identify opportunities for improvement: “human factors” (Check if yes)
- Communication
- Role clarity (leader/supporting roles identified and assigned)
- Teamwork
- Situational awareness
- Decision-making
- Other: ______________________________

Identify opportunities for improvement: “systems issue” (Check if yes)
- Equipment
- Medication
- Blood product availability
- Inadequate support (in unit or other areas of the hospital)
- Delays in transporting the patient (within hospital or to another facility)
- Other: ______________________________

For identified issues, fill in table below...

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<tr>
<th>Issue</th>
<th>Actions to be Taken</th>
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“Clinical Diamonds” for Hemorrhage

• Angiographic embolization is not indicated for use in acute, massive postpartum hemorrhage.
• If > a single dose of medication is necessary to treat uterine atony, an Attending should be at bedside until atony resolved.
• Never treat postpartum hemorrhage without simultaneously pursuing a clinical cause/diagnosis.
• In an actively bleeding postpartum patient or one who has recently stopped bleeding and is OLIGURIC, furosemide is not the answer.
• Any woman with placenta previa and 1 or more prior Cesarean deliveries should be evaluated and considered for delivery in a tertiary care center.
• Have an updated massive transfusion protocol which is based on established trauma protocols.
ACOG District II
Safe Motherhood Initiative Initiative (SMI)

Severe Hypertension in Pregnancy
Maternal Safety Bundle
US Pregnancy-Related Mortality

- Hemorrhage
- Thrombotic pulmonary embolism
- Amniotic fluid embolism
- Infection
- Hypertensive disorders of pregnancy
- Cardiomyopathy
- Anesthesia
- Cardiovascular accident
- Cardiovascular conditions
- Noncardiovascular medical conditions

Bundle #2: Severe Hypertension

- Occurs in 10-20% of pregnancies
- Severe hypertension can cause central nervous system injury
  - Cerebral hemorrhage
  - Cerebral infarction
- Directly responsible for nearly 20% of maternal deaths in the United States
- Emergency therapy for severe hypertension is the first priority

ACOG Bulletin # 33
ACOG Committee Opinion # 514
DIAGNOSTIC CRITERIA
(Severe Hypertension)

- Severe hypertension accurately measured using standard techniques and persistent for > 15 minutes is a hypertensive emergency.

- Severe hypertension is defined as:
  
  \[
  \text{systolic blood pressure} \geq 160 \text{ mm Hg} \quad \text{or} \quad \text{diastolic blood pressure} \geq 110 \text{ mm Hg}
  \]

- Can occur during antepartum, intrapartum, or postpartum period
  
  - in patients not known to have chronic hypertension who develop sudden, severe hypertension due to preeclampsia/eclampsia or gestational hypertension
  - in patients with chronic hypertension who develop superimposed preeclampsia with acutely worsening, difficult to control, severe hypertension

ACOG Committee Opinion # 514
First line medications for the management of acute-onset, severe hypertension in pregnant and postpartum women are:

- intravenous labetalol
- intravenous hydralazine

**Note:** magnesium sulfate
- is *not* recommended as an antihypertensive agent
- remains the drug of choice for seizure prophylaxis and for controlling seizures in eclampsia
- unless contraindicated, should be given when managing a hypertensive crisis
  - IV bolus of 4-6 grams in 100 ml over 15 minutes followed by IV infusion of 1-2 grams per hour

ACOG Committee Opinion # 514
Algorithm: First Line Management with Labetalol

- SBP ≥ 160 or DBP ≥ 110
  - Notify MD and institute fetal surveillance if viable
  - Labetalol 20 mg IV over 2 minutes
    - *Repeat BP in 10 minutes
    - If SBP ≥ 160 or DBP ≥ 110, administer labetalol 40 mg IV over 2 minutes; if BP is below threshold, continue to monitor BP closely
    - *Repeat BP in 10 minutes
    - If SBP ≥ 160 or DBP ≥ 110, administer labetalol 80 mg IV over 2 minutes; if BP is below threshold, continue to monitor BP closely
    - *Repeat BP in 10 minutes
    - If SBP ≥ 160 or DBP ≥ 110, administer hydralazine 10 mg IV over 2 minutes; if below threshold, continue to monitor BP closely
      - *Repeat BP in 10 minutes and again in 20 minutes
      - If SBP ≥ 160 or DBP ≥ 110 at 20 minutes, obtain emergency consultation from specialist in MFM, internal medicine, anesthesiology, or critical care
      - Give additional antihypertensive medication per specific order as recommended by specialist

- Once BP thresholds are achieved, repeat BP
  - every 10 minutes for 1 hour
  - then every 15 minutes for 1 hour
  - then every 30 minutes for 1 hour
  - then every hour for 4 hours

- Institute additional BP monitoring per specific order

*Record Results

Total maximum IV labetalol dose is 220 mg
Algorithm: First Line Management with Hydralazine

1. **SBP ≥ 160 or DBP ≥ 110**
   - Notify MD and institute fetal surveillance if viable
   - Administer hydralazine 5 mg or 10 mg IV over 2 minutes
   - *Repeat BP in 10 minutes and again in 20 minutes
   - If SBP ≥ 160 or DBP ≥ 110 at 20 minutes, administer hydralazine 10 mg IV over 2 minutes; if below threshold, continue to monitor BP closely
   - *Repeat BP in 10 minutes
   - If SBP ≥ 160 or DBP ≥ 110 at 20 minutes, administer labetalol 20 mg IV over 2 minutes; if below threshold, continue to monitor BP closely
   - *Repeat BP in 10 minutes
   - If SBP ≥ 160 or DBP ≥ 110, administer labetalol 40 mg IV over 2 minutes and obtain emergency consultation from specialist in MFM, internal medicine, anesthesiology, or critical care
2. Once BP thresholds are achieved, repeat BP:
   - every 10 minutes for 1 hour
   - then every 15 minutes for 1 hour
   - then every 30 minutes for 1 hour
   - then every hour for 4 hours
3. Institute additional BP monitoring per specific order

ACOG Committee Opinion # 514

*Record Results*
AGENTs TO USE: If no IV access

If intravenous access is not yet obtained in a pregnant or postpartum woman with severe hypertension, administer:

- 200 mg of labetalol orally
- Repeat in 30 minutes if systolic BP remains ≥ 160 or diastolic BP ≥ 110 and intravenous access still unavailable

ACOG Committee Opinion # 514
AGENTS TO USE: Second Line

If pt. fails to respond to first line agents, obtain emergency consultation with a specialist for management decisions. e.g.

- Maternal Fetal Medicine
- Internal Medicine
- Anesthesiology
- Critical Care
MONITORING
(Blood Pressure Management)

1. Maternal
   o Measure BP every 10 minutes during administration of antihypertensive medications
   o Once blood pressure is controlled (<160/110), measure blood pressure:
     • Every 10 minutes for 1 hour
     • Every 15 minutes for next hour
     • Every 30 minutes for next hour
     • Every hour for four hours
   o Obtain baseline labs
     • CBC, platelets, LDH, liver function tests, electrolytes, BUN creatinine, urine protein

2. Fetal
   Fetal monitoring surveillance as appropriate for gestational age

ACOG Committee Opinion # 514
Hypertensive Disorders During Pregnancy or Postpartum Checklist

(Trigger for initiating this checklist is a SBP ≥160 or DBP ≥110)

- Obtain intravenous access

- Obstetrical staff should be at the bedside within 1 hour to evaluate the patient (immediately, if the blood pressure remains elevated above the trigger level after it is repeated)

- Notify Anesthesiology staff

- Notify Pediatric staff if the patient is pregnant

- Initial labs to send: CBC/platelets, PT/aPTT, fibrinogen, chem 7, uric acid, LFTs, LDH, type and screen, urinalysis for protein/creatinine

- Consider initiating 24-hour urine collection for protein and creatinine

- Foley catheter (as appropriate; e.g. for patients on magnesium sulfate, severe preeclampsia) with hourly I&O (report if output <30 ml/hr)

The Safe Motherhood Initiative: Making Childbirth Safer
Magnesium sulfate, if ordered
- If given intravenously, must use IV infusion pump
- Magnesium sulfate dosing intravenously: 4-6 g IV loading dose over 20 minutes, followed by 2 g per hour via pump. For recurrent seizures, consider another IV bolus of 2 g magnesium sulfate. Continue for 24 hours after delivery or last seizure episode.
- Be certain that the pump and the magnesium sulfate infusion are marked to distinguish them from other fluids running intravenously
- Relative contraindications:
  - Evidence of pulmonary edema or congestive heart failure
  - Evidence of renal failure or poor urinary output
  - Myasthenia gravis
- If magnesium sulfate is contraindicated, consider another anticonvulsant
- Magnesium sulfate should be continued during an operative delivery

Seizure precautions
- Oxygen (100% non-rebreather at the bedside)
- Bag-mask ventilation on the unit
- Appropriate benzodiazepine readily available on the unit
Hypertensive Disorders During Pregnancy or Postpartum Checklist (Continued)

- Monitoring
  - Vital signs, oxygen saturation, level of consciousness and DTRs during loading of magnesium
  - If undelivered, continuous fetal heart rate monitoring while on magnesium. If magnesium is not being administered, monitor vital signs at least every 30 minutes and urine output at least hourly.
  - Consider continued checks every 10-30 minutes depending on patient’s status and response to treatment
  - Neuro checks every hour
  - Assess for pulmonary edema (SOB, decreased oxygen saturation, etc.) and toxicity (DTRs, neuro checks, respiratory rate, etc.)
  - If clinically indicated, check magnesium level at regular intervals as ordered

- Calcium gluconate for magnesium toxicity readily available on the unit (10 ml of 10% solution). If indicated can be given IV push slowly over 1-2 minutes.
Hypertensive Disorders During Pregnancy or Postpartum Checklist (Continued)

- Consider antihypertensive medications (see antihypertensive medication guidelines)
  - Antihypertensive medications (repeat BP every 10 minutes during administration):
    - Labetalol - (20, 40, 80 mg IV over 2 minutes, escalating doses, repeat every 10 minutes to maximum dose 220 mg, or 200 mg orally if no IV access); avoid in asthma or heart failure, can cause neonatal bradycardia
    - Hydralazine - (5-10 mg IV over 2 minutes, repeat in 20 minutes until target blood pressure is reached)

- If first line agents are unsuccessful, recommend emergent consultation with specialist (e.g., MFM, internal medicine, OB anesthesiology, critical care) for second line management decisions

- Consider anticonvulsant medications (for recurrent seizures or when magnesium is contraindicated):
  - Lorazepam (2-4 mg IV x 1, may repeat x 1 after 10-15 min)
  - Diazepam (5-10 mg IV every 5-10 min to max dose 30 mg)
  - Phenytoin (15-20 mg/kg IV x 1, may repeat 10 mg/kg IV after 20 minutes if no response); avoid with hypotension, may cause cardiac arrhythmias
  - Keppra (500 mg IV or po, may repeat in 12 hours); dose adjustment needed if renal impairment

- Re-address VTE prophylaxis requirement

- Postpartum:
  - Continue antihypertensive medications postpartum to maintain BP <140/90
  - Consider early follow-up of BP after discharge (either early office visit or home nurse visit)
THE SAFE MOTHERHOOD INITIATIVE: MAKING CHILDBIRTH SAFER

OB Provider Documentation Guidelines

- On admission, document complete history and complete physical examination including any symptoms associated with preeclampsia
  - Key elements include any symptoms of headaches, vision changes, abdominal pain, fetal activity, contractions, loss of fluid, vaginal bleeding
  - Baseline BPs over the course of the pregnancy
  - Any medications/drugs taken during the pregnancy (including illicit and OTC)
  - Current vital signs, including oxygen saturation
  - Current physical examination
  - Current fetal assessment (including FHR monitoring results, estimated fetal weight, and BPP, as appropriate)

- In documentation of assessment and plan, be sure to include:
  - Whether a diagnosis of preeclampsia has been made and if not what steps are being taken to exclude the diagnosis
  - Whether antihypertensive medications are required to control BP and if so, medication, dose, route, and frequency
  - Current fetal status
  - Whether magnesium sulfate is being initiated for seizure prophylaxis and if so, dosing, route, and duration of therapy
  - Whether delivery is indicated and if so, timing, method, and route. If delivery is not indicated, document under what circumstances it would be indicated
  - Consideration of antenatal corticosteroids if < 34 weeks of gestation

- Ongoing assessment and documentation should be every 30 minutes until the patient is stabilized with BPs below the trigger SBP of 160 or DBP of 110
# COMPLICATIONS & ESCALATION PROCESS

**Maternal** (pregnant or postpartum)
- CNS (seizure, headache, visual disturbance)
- Pulmonary edema or cyanosis
- Epigastric or right upper quadrant pain
- Impaired liver function
- Thrombocytopenia
- Hemolysis
- Coagulopathy
- Oliguria*

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<th>Fetal</th>
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**Prompt Evaluation and Communication**
*(if undelivered, plan for delivery)*

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<td>Neonatology (if undelivered)</td>
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*Oliguria: <30 ml/hr for 2 consecutive hours*
FURTHER EVALUATION: type of hypertension?

- **Chronic** hypertension
  - SBP ≥ 140 or DBP ≥ 90
  - prepregnancy or < 20 weeks

- **Gestational** hypertension
  - SBP ≥ 140 or DBP ≥ 90
  - > 20 weeks
  - no proteinuria

- **Preeclampsia**
  - SBP ≥ 140 or DBP ≥ 90
  - proteinuria
  - may be superimposed on chronic hypertension

- **Severe** preeclampsia
  - SBP ≥ 160 or DBP ≥ 110
  - 3+ random urine or 5 g/24 hr
  - persistent oliguria < 500 ml/24 hr
  - severe headache/visual disturbances
  - pulmonary edema
  - epigastric/RUQ pain
  - LFTs > 2x normal
  - platelets < 100K
  - fetal growth restriction
  - HELLP syndrome

- **Eclampsia**
  - seizure in setting of preeclampsia
Once the pregnant patient with severe hypertension is stabilized, consider:

- Magnesium sulfate for seizure prophylaxis if not already initiated
- Timing and route for delivery
  - In cases of eclampsia, recommend delivery after stabilization
  - Vaginal delivery is preferred if thought to be attainable in reasonable amount of time in most cases of HELLP syndrome, severe preeclampsia, and chronic hypertension with superimposed preeclampsia
  - If ≥ 34 weeks, deliver
- Use of antenatal corticosteroids and subsequent pharmacotherapy if preterm (<34 weeks) and expectant management planned
  - Delivery should not be delayed for antenatal steroids in cases complicated by eclampsia, HELLP syndrome, or severe hypertension refractory to treatment, or with maternal symptoms, biochemical/hematological impairment, or fetal compromise

NYS DOH, Hypertensive Disorders in Pregnancy, 2013
ON-GOING SURVEILLANCE: Inpatient

Once the hypertensive emergency is treated and the patient is delivered, additional monitoring, follow-up, and education are necessary to prevent additional morbidity

- Preeclampsia and eclampsia can develop postpartum
- Blood pressure should be measured every 4 hours after delivery
- Patient should not be discharged until BP is well controlled for at least 24 hours
- Blood pressure peaks 2-4 days after birth so early discharge planning should include repeat blood pressure measurements as outpatient and a review of the signs and symptoms that should prompt the patient to seek medical care
POST-DISCHARGE EVALUATION OF POSTPARTUM PATIENT: *Elevated BP at home, in office, in triage*

**Postpartum triggers:**
- SBP ≥ 160 or DBP ≥ 110 or
- SBP ≥ 140-159 or DBP ≥ 90-109 with any of the following:
  - headaches
  - visual disturbances
  - epigastric/RUQ pain

- To Emergency Department; physicians to begin treatment (antihypertensives for SBP ≥ 160 or DBP ≥ 110, magnesium for seizure prophylaxis), and evaluation (e.g. lab work, head imaging studies)

- To Labor & Delivery or ICU setting
  - To Medical Unit
    - Special concerns (e.g. telemetry)
  - High Risk OB Unit

- Good response to antihypertensive treatment and asymptomatic
  - MICU consult
    - Signs and symptoms of eclampsia, abnormal neurological evaluation, congestive heart failure, renal failure, coagulopathy, poor response to antihypertensive treatment
    - To Medical Unit

- Patient stable

**ACOG, Optimizing Protocols in Obstetrics, 2013**
CONCLUSIONS

• Risk reduction and successful, safe clinical outcomes for women with preeclampsia, eclampsia, or chronic hypertension with superimposed preeclampsia require avoidance and management of severe systolic and severe diastolic hypertension.

• Increasing evidence indicates that standardization of care improves patient outcomes.

• Systolic BP ≥ 160 mm Hg or diastolic BP ≥ 110 mm Hg warrant prompt evaluation at the bedside and treatment to decrease maternal morbidity and mortality.
US Pregnancy-Related Mortality

Bundle #3: Venous Thromboembolic Disease

• VTE is #1 cause of preventable death among hospitalized patients
• 200,000 patients die every year from VTE—more then from breast cancer, AIDS and traffic accidents combined!
• Heparin prophylaxis reduces the incidence of VTE by 50 to 65%
Bundle #3: Venous Thromboembolic Disease

- VTE accounts for 9% of maternal deaths in the US
- Pregnant women have a 5 fold increased risk vs. non-pregnant women
- Prevalence of VTE among pregnant women is 0.5-2 per 1000 deliveries
- 50% of VTEs occurs during pregnancy and 50% in postpartum period

ACOG Bulletin # 123
Venous Thromboembolism in Pregnancy

- Pulmonary embolism as a cause of mortality is the most amenable to reduction, by systematic changes in practice *

- The Joint Commission has recommended:
  - pneumatic compression devices for patients undergoing C-section who are at high risk for PE.
  - In post-partum patients who are at high risk for VTE, consider low molecular weight heparin.
  - Use of compression devices should precede the beginning of surgery and continue until the patient is fully ambulatory.

## VTE Risk Assessment – Pregnant Initial Assessment

<table>
<thead>
<tr>
<th>History of VTE</th>
<th>VTE Prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple VTE episodes</td>
<td>Yes -&gt; T*</td>
</tr>
<tr>
<td>1st VTE idiopathic</td>
<td>Yes -&gt; P*</td>
</tr>
<tr>
<td>1st VTE pregnancy/OC Related</td>
<td>Yes -&gt; P*</td>
</tr>
<tr>
<td>1st VTE provoked</td>
<td>No</td>
</tr>
<tr>
<td>Inherited Thrombophilia carrier</td>
<td></td>
</tr>
<tr>
<td>High Risk</td>
<td>Yes -&gt; T*</td>
</tr>
<tr>
<td>Low Risk</td>
<td>Yes -&gt; P*</td>
</tr>
<tr>
<td>Acquired Thrombophilia carrier</td>
<td>Yes -&gt; T*</td>
</tr>
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<tr>
<td>Low Risk</td>
<td>No</td>
</tr>
<tr>
<td>Acquired Thrombophilia</td>
<td>No</td>
</tr>
<tr>
<td>Family History of VTE + High Risk (I+A)</td>
<td>Yes -&gt; P*/I</td>
</tr>
<tr>
<td>Fam Hx + low risk</td>
<td>No</td>
</tr>
</tbody>
</table>
VTE Risk Assessment

- **High risk thrombophilia**: FVL or PT gene homozygous, antithrombin deficiency or combined disorders
- **Low risk thrombophilia**: FVL or PT heterozygous, Protein C or S deficiency
- **Acquired Thrombophilia**: LA, ACA, APLS
- **MTHFR or PAI-1 do not require prophylaxis**
VTE Risk Assessment – Pregnancy Re-Assessment

• B-1. Hospital admission for Antepartum complications (conservative management not in labor, not scheduled for delivery).
• B-2. Postpartum
• B-3. Upon Discharge
VTE Risk Assessment – Antepartum Hospitalized B1

- All receive SCD (sequential compression devices) during hospitalization
- Add heparin (LMWH/UFH)
  - Already receiving prophylaxis/full anticoagulation
  - Morbid obesity (BMI>40)
  - History of VTE – not already on prophylaxis
  - All pts. with score 3 or more risks

<table>
<thead>
<tr>
<th>B1 Antepartum Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombophilia-not already on prophylaxis</td>
</tr>
<tr>
<td>Age &gt; 40 years or &lt; 15 years</td>
</tr>
<tr>
<td>Obesity (BMI&gt;30)</td>
</tr>
<tr>
<td>Medical complications</td>
</tr>
<tr>
<td>Pregnancy complications (Multiple, Pre-eclampsia, IUGR)</td>
</tr>
<tr>
<td>Bed rest</td>
</tr>
</tbody>
</table>
VTE Risk Assessment–Postpartum

• Cesarean Delivery:
  • SCDs prior to surgery

• Vaginal and Cesarean deliveries:
  • Early mobilization, avoid dehydration
  • Add heparin prophylaxis if:
    • Already receiving prophylaxis/full anticoagulation
    • History of VTE not already on heparin prophylaxis
    • Family history of VTE and any thrombophilia
    • Morbid obesity (BMI>40)
    • With score 2 or more (see B-1 & B-2 Risks)
Contraindications to LMWH therapy

• Hemophilia or other known bleeding disorder (e.g. von Willebrand’s ds. or acquired coagulopathy)
• Active or threatened antepartum bleeding (e.g. placenta previa/placental abruption)
• Thrombocytopenia (platelet count < 75 x10^9)
• Hx of Stroke (hemorrhagic/ischemic)
• Severe renal disease (GFR < 30ml/min)
• Severe liver disease (prolonged PT)
• Uncontrolled hypertension (SBP > 200mm Hg or DBP > 120mm Hg)
### VTE Risk Assessment – Risk Factors

<table>
<thead>
<tr>
<th>B1 Antepartum Risk Factors</th>
<th>B2 Postpartum Risk Factors</th>
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</thead>
<tbody>
<tr>
<td>Thrombophilia-not already on prophylaxis</td>
<td>Any factors from B-1</td>
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<tr>
<td>Age &gt; 40 years or &lt; 15 years</td>
<td>Cesarean section</td>
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<tr>
<td>Obesity (BMI &gt; 30)</td>
<td>Peripartum Hemorrhage</td>
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<tr>
<td>Medical complications</td>
<td>Hysterectomy</td>
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<tr>
<td>Pregnancy complications (Multiple, Pre-eclampsia, IUGR)</td>
<td>General Anesthesia</td>
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<tr>
<td>Bed rest</td>
<td>Postpartum infection</td>
</tr>
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# VTE Risk Assessment – Postpartum on Discharge

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An Event As Tragic As Maternal Death or Disability ... **Must Result in Greater Professional Awareness and Improved Patient Care !!**
US Pregnancy-Related Mortality

Strategies for Success

- **ACOG to provide financial resources**: supported by *Merck for Mothers* foundation grant
- **ACOG to offer professional education**: regional teaching days, webinars, data access, grand rounds
- **ACOG on-site assistance / implementation** (Physician alignment, engagement and work with errant physicians)
- **Involve hospital leadership and build consensus, PR campaign**
- **Offer access to academic, & obstetric leaders** anywhere in the state for sustained effort
Safe Motherhood Initiative

Thank you!

Questions?