Implementing Maternal Safety Bundles from the Bedside and Beyond

Hemorrhage
Hypertension
Venous Thromboembolism
Cardiovascular Morbidity

Valerie Huwe, RNC-OB, MS, CNS
UCSF Benioff Children’s Hospital Outreach Services, Mission Bay
Objectives

- Review normal physiologic changes of pregnancy that impact maternal decompensation
- Highlight abnormal conditions that contribute to the severity of obstetric emergencies.
- Cite four Maternal Safety Bundles aimed to reduce maternal morbidity and death
- Describe how direct care nurses can improve patient safety with their organization
Perinatal Safety Bundles

Hemorrhage
Hypertension
Venous Thromboembolism
Cardiovascular Morbidity
Risk-benefit analysis

Balancing 2 Principles

1. Maternal
   - Benefit should outweigh risk
2. Fetal
   - Optimal outcome
Maternal Mortality Ratios in Selected Countries over the Past 30 Years

Hogan et al, Lancet 2010; 375: 1609–23
Maternal Mortality Is Rising in the U.S. As It Declines Elsewhere

Deaths per 100,000 live births

<table>
<thead>
<tr>
<th>Country</th>
<th>Deaths per 100,000 Live Births</th>
</tr>
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<tbody>
<tr>
<td>U.S.A.</td>
<td>26.4</td>
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<tr>
<td>U.K.</td>
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<td>Portugal</td>
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<td>Germany</td>
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<td>France</td>
<td>7.8</td>
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<tr>
<td>Canada</td>
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<td>Netherlands</td>
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<tr>
<td>Spain</td>
<td>5.6</td>
</tr>
<tr>
<td>Australia</td>
<td>5.5</td>
</tr>
<tr>
<td>Ireland</td>
<td>4.7</td>
</tr>
<tr>
<td>Sweden</td>
<td>4.4</td>
</tr>
<tr>
<td>Italy</td>
<td>4.2</td>
</tr>
<tr>
<td>Denmark</td>
<td>4.2</td>
</tr>
<tr>
<td>Finland</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Notes
Only data for 1990, 2000 and 2015 was made available in the journal.

Source: The Lancet
Credit: Rob Weychert/ProPublica

- Severe morbidity during delivery hospitalizations more than doubled
- Blood transfusion, hysterectomy & eclampsia accounted for ~75% of severe morbidity
U.S. MATERNAL MORTALITY & MORBIDITY ON THE RISE

Many theories based on data we have access to (State MMRs, Vital Statistics, Hospital Discharge Data)

- **Women’s characteristics**
- **Increasing CS rates**

What about

- **Quality of care & information?**
- **Hospital readiness?**
- **Women’s accounts?**

http://www.facethefactsusa.org/facts/more-us-mothers-dying-despite-expensive-care
Current Commentary

The National Partnership for Maternal Safety

Mary E. D’Alton, MD, Elliott K. Main, MD, M. Kathryn Menard, MD, and Barbara S. Levy, MD

Current Commentary

The Maternal Early Warning Criteria

A Proposal From the National Partnership for Maternal Safety

Mhyre, J., D’ Oria, R., Hameed, A., et al
Maternal Warning Systems

- The Joint Commission (2010) requires hospitals to have written criteria to observe change or deterioration in a patient’s condition and how to recruit staff to manage patient care.

- Signs and symptoms of impending severe maternal illness or collapse went unrecognized in many cases (CEMACH, 2011) due to the relative rarity of such events and normal changes in physiology associated with pregnancy and childbirth compounds the problem.

  - **Recommendation:** Develop and adopting systems to alert the team of maternal deterioration to assist in early recognition, intervention and timely referral of treatment of women (CEMACH, 2011)

- The **National Partnership for Maternal Safety** is a multi-stakeholder consensus effort and is comprised of representatives from organizations in women’s health care and other provider, state, federal, and regulatory bodies which supports early warning criteria to promote patient safety.

http://www.safehealthcareforeverywoman.org/maternal-safety.html
Vital Sign Assessment

- Vital sign assessment is critical during active bleeding. Blood pressure, pulse and respirations have been the standard in assessing vital signs.

- Often variations in vital signs are ignored or dismissed as “normal” due to the physiological changes in pregnancy (CEMACH, 2011)

- Lack of standardized documentation can result in delays in recording of abnormal results which can effect timeliness of clinical decision making (Yeung, Lapinsky, Granton, Doran, & Cafazzo, 2012)
Maternal Early Warning Systems

- Abnormal physiologic signs and symptoms precede critical illness
- Early intervention will avoid severe M&M occurrence
- Effective policy of escalation of care
Maternal Early Warning Criteria

| Measure                                                        | Value                      |
|                                                               |                           |
| Systolic Blood Pressure (mm Hg)                                | <90 or >160               |
| Diastolic Blood Pressure (mm Hg)                              | >100                      |
| Heart rate (beats per minute)                                 | <50 or >120               |
| Respiratory rate (breaths per min)                            | <10 or >30                |
| Oxygen saturation on room air, at sea level %                 | <95                       |
| Oliguria, mL/hr for ≥2 hrs                                    | <35                       |
| Maternal agitation, confusion, or unresponsiveness            |                           |
| Woman with preeclampsia reporting a non-remitting headache or shortness of breath |               |
National Partnership Strategy to Enhance Maternal Safety

BUNDLE SCIENCE

A "bundle" is a group of interventions related to a disease process that, when executed together, result in better outcomes than when implemented individually.
Organizations United to Provide Safe Health Care for Every Woman

Missed something?
All of our informative Safety Action Series sessions are available for audio playback.
Click here for a comprehensive listing of these sessions. All sessions and recordings are provided free of charge.

Want to make a change but don’t know where to start?
Contact Us to learn more about the AIM Program and how to become a partner.

National Improvement Challenge
Learn more about this innovative new program designed specifically to drive quality improvement at the educational and residency program level. Awards are available for winning programs!
Learn more here.
## CA-PAMR: Chance to Alter Outcome
**Grouped Cause of Death; 2002-2004 (N=145)**

<table>
<thead>
<tr>
<th>Grouped Cause of Death</th>
<th>Strong / Good (%)</th>
<th>Some (%)</th>
<th>None (%)</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric hemorrhage</td>
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<tr>
<td><strong>Preeclampsia/eclampsia</strong></td>
<td><strong>50</strong></td>
<td><strong>50</strong></td>
<td>0</td>
<td><strong>25 (17)</strong></td>
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<tr>
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<td>61</td>
<td>14</td>
<td>28 (19)</td>
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<tr>
<td>Cerebral vascular accident</td>
<td>22</td>
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<tr>
<td><strong>Total (%)</strong></td>
<td><strong>40</strong></td>
<td><strong>48</strong></td>
<td><strong>12</strong></td>
<td><strong>145</strong></td>
</tr>
</tbody>
</table>
Normal physiologic changes

- Cardiovascular
- Hematologic
- Pulmonary
Cardiovascular

Normal Cardiac Adaptation during Pregnancy

Cardiac Changes

**Stroke Volume**

\[ \uparrow 30-50\% \]

**Heart Rate**

\[ \uparrow 20\% \text{ (~10-20 beats)} \]

**Anatomic Changes**

\[ \uparrow \text{ Uterus} \]

**Vascular Resistance**

\[ \downarrow \text{ SVR} \quad \downarrow \text{ PVR} \]

Cardiac Output

Weeks of gestation

pregnant

postpartum
Blood Volume Changes

**Total Volume**
- ↑ 35% (~ 2,000ml)

**Plasma Volume**
- ↑ 50% (~ 1,600ml)

**RBC Mass**
- ↑ 17% (~ 350mL)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrin</td>
<td>Increases 40% at term</td>
</tr>
<tr>
<td>Plasma fibrinogen</td>
<td>Increases 50% (300 – 600) mg/dl</td>
</tr>
<tr>
<td>Coagulation factors I, VII, VIII, X, XII</td>
<td>Increases markedly</td>
</tr>
<tr>
<td>Von Willebrand factor antigen</td>
<td>Increases markedly</td>
</tr>
<tr>
<td><strong>Coagulation factor XI</strong></td>
<td>Decreases 60% - 70%</td>
</tr>
<tr>
<td><strong>Coagulation factor XIII</strong></td>
<td>Decreases slightly</td>
</tr>
<tr>
<td>Coagulation factors II, V</td>
<td>Increases slightly or unchanged</td>
</tr>
<tr>
<td><strong>Protein S (anticoagulant) activity</strong></td>
<td>Decreased</td>
</tr>
<tr>
<td>Clotting and bleeding time</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Prothrombin time</td>
<td>Increases slightly or unchanged</td>
</tr>
<tr>
<td>Partial plasma thromboplastin time</td>
<td>Increases slightly or unchanged</td>
</tr>
<tr>
<td>Fibrin degradation products</td>
<td>Increased (D–Dimer increased)</td>
</tr>
<tr>
<td>Platelets</td>
<td>Unchanged (150 K – 500K)</td>
</tr>
</tbody>
</table>
Hematologic

Factors V, VII, VIII, IX, X, XII

Fibrinolysis

Fibrinogen

Prothrombin
Pulmonary

- Diaphragm 4-7 cm – ribs flare
- Functional Residual Capacity 25%
- Respiratory Rate 16-20
- Tidal volume from 500 – 700 ml
- Compensatory Alkalemia
Deep Vein Thrombosis Formation

Venous stasis

+ 

↓ Clotting clearance

+ 

Platelets deposits in valve cusp pockets

+ 

↑ Hypercoagulation

↓ Anticoagulation

A. Normal Blood Flow

B. Deep Vein Thrombosis

C. Embolus
Pathophysiology of Hypovolemic Shock

- Tissue hypoperfusion → metabolic acidosis → inflammatory mediators → tissue and vascular injury → multiple organ failure
Adult Respiratory Distress Syndrome

Hemorrhagic Shock →

Damage to endothelial cells in pulmonary vasculature → Fluid leaks from vascular space into alveoli → Respiratory failure
Case Presentation: Hemorrhage

- 38 y.o. @40+2 admitted for elective IOL:
- Dinoprostone placed, misoprostol X2, AROM, oxytocin started
- Epidural is placed
- Rapidly progress to 10 cm, MD Notified
- 15 minute 2nd stage → male infant
- 1 minute later: Placenta delivered spontaneously
- Manual exploration of uterus “cleared of clots “
- Fundal checks (6) RN charted “moderate”
The Maternal Safety Bundle for Obstetric Hemorrhage

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

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

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

Etiologies of Obstetric Hemorrhage

**Postpartum**

- Uterine atony
- Retained Placenta
- Lower genital tract lacerations (cervix, vagina, perineum)
- Upper genital tract lacerations (uterine rupture)
- Placenta accreta, increta, percreta

**Intrapartum**

- Uterine rupture
- Placental abruption

**Antepartum**

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

**Inherited coagulopathy** (Von Willebrand Disease)
- **Acquired coagulopathy** (abruption, AFE, retained dead fetus syndrome)
Improve Recognition...

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

- Training and quantification of how blood loss is estimated – put up posters

- Measurement of actual blood
  - Fluid in canisters, under buttocks drapes
  - Weigh saturated items
  - and subtract dry weight
AWHONN
Postpartum Hemorrhage Project Video

Quantification of Blood Loss
Every Birth

https://www.youtube.com/watch?v=F_ac-aCbEn0
Quick access to emergency supplies

Refrigerator for meds

Establish necessary items and par levels

Label drawers/compartment

Include checklists

Develop process for checking and restocking

Educate nursing and physician staff

Photo courtesy of J. McNulty MD, 2014.
Tranexamic acid (TXA)

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

Intrauterine Balloons

- Used for intrauterine tamponade during hemorrhage
- Need ultrasound guidance to determine placement
- Always use normal saline (NS)
- Average filling volume = 250 ml – 300 ml (500 ml max)
- Document amount of NS used
- Insert vaginal packing and secure tubing
- Connect to a closed system/urinary catheter bag
**Additional Hemorrhage Management**

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

☆ Patient must be in stable condition

Henry Vandyke Carter [Public domain], via Wikimedia Commons
Blood Products and Equipment

- Rapid Infuser
- Platelet infusion set
- Mechanical warming device

Massive Transfusion Guideline

Photos courtesy of Holli M. Mason MD, 2017
CPMS Blood Bank Webinar Slide Set
# Blood Component Therapy

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VOLUME (ML)</th>
<th>CONTENTS</th>
<th>EFFECT (PER UNIT)</th>
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</thead>
<tbody>
<tr>
<td>Packed Red Blood Cells</td>
<td>240</td>
<td>RBC, WBC, plasma</td>
<td>↑ hematocrit 3% &amp; Hgb 1 g/dl</td>
</tr>
<tr>
<td>Platelets</td>
<td>50</td>
<td>Platelets, RBC, WBC, plasma</td>
<td>↑ platelet count 5,000-10,000 mm$^3$ per unit</td>
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<tr>
<td>Fresh Frozen Plasma</td>
<td>250</td>
<td>Fibrinogen, antithrombin III, factors V* &amp; VIII*</td>
<td>↑ fibrinogen by 10mg/dl</td>
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<tr>
<td>Cryoprecipitate</td>
<td>40</td>
<td>Fibrinogen, factors VIII &amp; XIII and Von Willebrand</td>
<td>↑ fibrinogen by 10mg/dl</td>
</tr>
</tbody>
</table>
Laboratory Diagnosis of DIC

All routine screening tests of coagulation yield grossly abnormal results

<table>
<thead>
<tr>
<th>Laboratory Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platelets</td>
<td>Decreased</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>Less than 200</td>
</tr>
<tr>
<td>Fibrin Split Products</td>
<td>Increased</td>
</tr>
<tr>
<td>PT &amp; aPTT</td>
<td>Initially increased</td>
</tr>
<tr>
<td>D Dimer</td>
<td>Increased</td>
</tr>
</tbody>
</table>
The Lethal Triad of Coagulopathy: Why?

- **Dilutional**
  - Transfusion of crystalloid and packed cells devoid of clotting factors
  - A problem once 1 ½ total blood volume replaced

- **Hypothermia**
  - Significantly decreases platelet function: even if counts are adequate

- **Acidemia**
  - Occurs with massive hemorrhage due to hypovolemia, peripheral tissue hypoxia: as hydrogen ion concentration increases, enzyme functions involved in coagulation pathway stop functioning
  - VERY DIFFICULT TO REVERSE!
Unplanned Hysterectomy: Postoperative Course

- Transfer from ICU
- Weak but stable
- Loss of choice
- Hbg Hct
  - Iron—IV (sucrose)
  - Rh-Erythropoeitin
  - Heparin

➢ Discharge home with support
Where do we go from here?

- Immediate post-op plan
  - Ongoing maternal assessment
  - Treat anemia
    - IV Iron Sucrose
  - Care of newborn

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

Photo courtesy of UCSF, Circa:1906.
Postpartum Care and Patient Satisfaction after Hemorrhage

- Australian study: 206 women primary PPH > 1500 ml
  - Written questionnaire 1st week and 2 and 4 months
  - Four Themes:
    1. Adequacy of care
    2. Emotional response
    3. Future Implications
    4. Concern for the baby

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

- 36 yo G3 P2, 37 + 2
- Spanish speaking woman admitted to L&D with her English speaking cousin as her support person. FOB not involved.
- Hx GDM diet controlled
- Precipitous birth 37+2 – Apgar 8, 9
  - Blood glucose at delivery 130
- IV Fentanyl x 1: (Repair of 2nd) Pain= 4/10
- Patient complaining of headache
  - T: 98.8, Pulse: 96, BP: 156/92, R: 20
How Errors Occur

Failures

Defenses

Culture

Policies

Resources

Training

Communication

Safeguards

Stop the line

Standard work

Flexible staffing

Self-checks

Harm
Hypertensive Disorders

- Most common medical complication of pregnancy
- **Chronic hypertension** is increasing in the general population
- Native American, African American, and Hispanic women affected disproportionately

**Preeclampsia**
- Complicates 3% to 6% of all pregnancies
- Reason for up to 25% of VBLW births
- Highest Morbidity occurs when GA <35 weeks (early onset)
Pathophysiology of Preeclampsia

- Failure of maternal spiral artery remodeling in early second trimester sets the stage
- Leads to release of vascular damaging agents
Cycle of Reactivity

Vasospasm
Systemic resistance

Decreased plasma volume and perfusion

Endothelial cell activation

Intravascular fluid redistribution

Activation of coagulation cascade

Vasoconstriction

Decreased organ perfusion
Overlapping role of hypertension, capillary leak, maternal symptoms, and fibrinolysis/hemolysis in the spectrum of atypical preeclampsia.

FIGURE 1

Pathophysiology

- **Normal**
- **Mild**
- **Severe**

**Blood Pressure**

**Capillary Leak**

**Symptoms**

- Epigastric pain
- CNS
- Bleeding
- Nausea/vomiting

**Fibrinolysis Hemolysis**

- Low platelets
- ↑ Liver enzymes

**Proteinuria**

- Facial Edema
- Pulmonary Edema
- Ascites
- Pleural effusions

**HELLLP**

- Renal Failure
- DIC

Pathophysiology of Preeclampsia

Maternal artery endothelial cell dysfunction causes:

- Vasoconstriction
- Hypertension
- Edema
  - Pulmonary edema
  - Headache
  - Epigastric pain
  - Oliguria
<table>
<thead>
<tr>
<th>Grouped Cause of Death</th>
<th>Chance to Alter Outcome</th>
<th>Strong / Good (%)</th>
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COUNCIL ON PATIENT SAFETY IN WOMEN’S HEALTH CARE

READINESS

Every Unit

- Standards for early warning signs, diagnostic criteria, monitoring and treatment of severe preeclampsia/eclampsia (include order sets and algorithms)
- Unit education on protocols, unit-based drills (with post-drill debriefs)
- Process for timely triage and evaluation of pregnant and postpartum women with hypertension including ED and outpatient areas
- Rapid access to medications used for severe hypertension/eclampsia: Medications should be stocked and immediately available on L&D and in other areas where patients may be treated. Include brief guide for administration and dosage.
- System plan for escalation, obtaining appropriate consultation, and maternal transport, as needed

RECOGNITION & PREVENTION

Every Patient

- Standard protocol for measurement and assessment of BP and urine protein for all pregnant and postpartum women
- Standard response to maternal early warning signs including listening to and investigating patient symptoms and assessment of labs (e.g. CBC with platelets, AST and ALT)
- Facility-wide standards for educating prenatal and postpartum women on signs and symptoms of hypertension and preeclampsia
RESPONSE

Every case of severe hypertension/preeclampsia

- Facility-wide standard protocols with checklists and escalation policies for management and treatment of:
  - Severe hypertension
  - Eclampsia, seizure prophylaxis, and magnesium over-dosage
  - Postpartum presentation of severe hypertension/preeclampsia
- Minimum requirements for protocol:
  - Notification of physician or primary care provider if systolic BP =/> 160 or diastolic BP =/> 110 for two measurements within 15 minutes
  - After the second elevated reading, treatment should be initiated ASAP (preferably within 60 minutes of verification)
  - Includes onset and duration of magnesium sulfate therapy
  - Includes escalation measures for those unresponsive to standard treatment
  - Describes manner and verification of follow-up within 7 to 14 days postpartum
  - Describe postpartum patient education for women with preeclampsia
  - Support plan for patients, families, and staff for ICU admissions and serious complications of severe hypertension

REPORTING/SYSTEMS LEARNING

Every unit

- Establish a culture of huddles for high risk patients and post-event debriefs to identify successes and opportunities
- Multidisciplinary review of all severe hypertension/eclampsia cases admitted to ICU for systems issues
- Monitor outcomes and process metrics

Note: “Facility-wide” indicates all areas where pregnant or postpartum women receive care. (E.g. L&D, postpartum critical care, emergency department, and others depending on the facility).
ACOG Executive Summary on Hypertension In Pregnancy, Nov 2013

1. The term “mild” preeclampsia is discouraged for clinical classification. The recommended terminology is:
   a. “preeclampsia without severe features” (mild)
   b. “preeclampsia with severe features” (severe)

2. Proteinuria is not a requirement to diagnose preeclampsia with new onset hypertension.

3. The total amount of proteinuria > 5g in 24 hours has been eliminated from the diagnosis of severe preeclampsia.

4. Early treatment of severe hypertension is mandatory at the threshold levels of 160 mm Hg systolic or 110 mm Hg diastolic.

5. Magnesium sulfate for seizure prophylaxis is indicated for severe preeclampsia and should not be administered universally for preeclampsia without severe features (mild).
6. Preeclampsia with onset prior to 34 weeks is most often severe and should be managed at a facility with appropriate resources for management of serious maternal and neonatal complications.

7. Induction of labor at 37 weeks is indicated for preeclampsia and gestational hypertension.

8. The postpartum period is potentially dangerous. Patient education for early detection during and after pregnancy is important.

9. Long-term health effects should be discussed.
Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period
Question

- Multiple choice

- Your patient is sitting up in bed on PP day #1.

- You introduce yourself and take her vitals.

- You note the BP is 156/114.

- What should you do?

A. Lower her head, turn her on her side and retake her blood pressure with the cuff on the up arm

B. The BP cuff looks a little small so go get a larger one and see if it’s lower with the larger cuff

C. Retake the BP in her lower leg, it’s the same as the arm

D. Let her eat breakfast and recheck it after she’s eaten

E. Ask her if she is in pain and offer her pain medication

F. None of the above
What about this position?

“Her blood pressure was elevated when she first presented to triage but I had her rest on her side to cycle her blood pressures and all other measurements have been within normal limits”
Diagnostic Criteria
## Diagnostic Criteria

### TABLE E-1. Diagnostic Criteria for Preeclampsia

| Blood pressure | Greater than or equal to 140 mm Hg systolic or greater than or equal to 90 mm Hg diastolic on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure
|                | Greater than or equal to 160 mm Hg systolic or greater than or equal to 110 mm Hg diastolic, hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy

and

| Proteinuria | Greater than or equal to 300 mg per 24-hour urine collection (or this amount extrapolated from a timed collection)
|            | Protein/creatinine ratio greater than or equal to 0.3*
|            | Dipstick reading of 1+ (used only if other quantitative methods not available)

Or in the absence of proteinuria, new-onset hypertension with the new onset of any of the following:

- **Thrombocytopenia**: Platelet count less than 100,000/microliter
- **Renal insufficiency**: Serum creatinine concentrations greater than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease
- **Impaired liver function**: Elevated blood concentrations of liver transaminases to twice normal concentration
- **Pulmonary edema**
- **Cerebral or visual symptoms**

* Each measured as mg/dL.
**Severe Features of Preeclampsia**

**BOX E-1. Severe Features of Preeclampsia** (Any of these findings)

- Systolic blood pressure of 160 mm Hg or higher, or diastolic blood pressure of 110 mm Hg or higher on two occasions at least 4 hours apart while the patient is on bed rest (unless antihypertensive therapy is initiated before this time)
- Thrombocytopenia (platelet count less than 100,000/microliter)
- Impaired liver function as indicated by abnormally elevated blood concentrations of liver enzymes (to twice normal concentration), severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by alternative diagnoses, or both
- Progressive renal insufficiency (serum creatinine concentration greater than 1.1 mg/dl or a doubling of the serum creatinine concentration in the absence of other renal disease)
- Pulmonary edema
- New-onset cerebral or visual disturbances
If you combine the two...

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
<th>Severe Feature</th>
</tr>
</thead>
</table>
| **Blood pressure**| • ≥140* systolic or ≥90* diastolic (2 occasions ≥4 hr apart, after 20 weeks, previously normal BPs) OR  
• ≥160* systolic or ≥110* diastolic (can be confirmed in a short time [min] to encourage antihypertensive therapy) | • No           |
|                   | And                                                                         |                |
| **Proteinuria**   | • ≥300 mg/24 hr urine collection OR  
• Protein/creatinine ratio ≥0.3** | • No           |
|                   | or if no proteinuria, new-onset HTN*** w/ new onset of ANY of the following: |                |
| **Thrombocytopenia** | • Platelet count < 100,000/μL                                                | • Yes          |
| **Renal insufficiency** | • Serum creatinine > 1.1** or doubled from previous values (in absence of other renal disease) | • Yes          |
| **Impaired liver function** | • Elevated serum liver transaminases to double normal values | • Yes—with or without persistent right upper quadrant/epigastric pain not responsive to pain medication |
| **Pulmonary edema** | • Fluid collection in the lungs                                              | • Yes          |
| **New-onset visual or cerebral changes** | • Blurred vision or scotoma  
• Headache  
• Stroke  
• Seizure                                                                 | • Yes  
• Yes  
• Yes  
• Eclampsia |

Note: Adapted from ACOG (2013). Executive Summary: Hypertension in Pregnancy. Box E-1 & Table E-1. *mm Hg; **mg/dL; ***hypertension
What Changed?

- No more mild preeclampsia
- No more proteinuria requirements
- Edema not a diagnostic factor
- IUGR interventions separate from preeclampsia management
Antihypertensive Medications

**SBP ≥ 160 OR DBP ≥ 105-110?**

- Medications should be given NO MORE than 1 hour after presenting in hypertensive emergency*
  - Aim for no more than 30 minutes

- This is the biggest step in decreasing morbidity and mortality

- Aim to return BP to a range where intracranial hemorrhage not a risk, but **not** to normal range
  - Goal: 140-160/90-100

*Hypertensive emergency: acute-onset, severe hypertension that persists for ≥ 15 minutes
# Anithypertensive Medications

## First Line Agents

<table>
<thead>
<tr>
<th></th>
<th>IV Labetalol</th>
<th>IV Hydralizine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose (IVP over 2 min)</td>
<td>20 mg</td>
<td>5-10 mg</td>
</tr>
<tr>
<td>Onset</td>
<td>2-5 minutes</td>
<td>5-20 minutes</td>
</tr>
<tr>
<td>Peak</td>
<td>5 minutes</td>
<td>15-30 minutes</td>
</tr>
<tr>
<td>24 hour max</td>
<td>220 mg</td>
<td>25 mg</td>
</tr>
</tbody>
</table>

** If no IV access, PO nifedipine should be used
- Nifedipine PO 10 mg may repeat in 30 min
- Onset: 5-20 min
- Peak 30-60 min
## Maternal Early Warning Criteria

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Blood Pressure (mm Hg)</td>
<td>&lt;90 or &gt;160</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mm Hg)</td>
<td>&gt;100</td>
</tr>
<tr>
<td>Heart rate (beats per minute)</td>
<td>&lt;50 or &gt;120</td>
</tr>
<tr>
<td>Respiratory rate (breaths per min)</td>
<td>&lt;10 or &gt;30</td>
</tr>
<tr>
<td>Oxygen saturation on room air, at sea level %</td>
<td>&lt;95</td>
</tr>
<tr>
<td>Oliguria, mL/hr for ≥2 hrs</td>
<td>&lt;35</td>
</tr>
<tr>
<td>Maternal agitation, confusion, or unresponsiveness</td>
<td></td>
</tr>
<tr>
<td>Woman with preeclampsia reporting a non-remitting headache or shortness of breath</td>
<td></td>
</tr>
</tbody>
</table>
Repeat and Treat

Algorithms - Checklists - Escalation policies

**Early** treatment of **severe** hypertension is mandatory at the threshold levels of **160 mm Hg** systolic or **110 mm Hg** diastolic.

Magnesium sulfate for seizure prophylaxis is **indicated** for **severe** preeclampsia and **should not** be administered universally for preeclampsia without severe features (mild).

The **postpartum period** is potentially dangerous.

Patient education for early detection **during** and **after** pregnancy is important.

Long-term health effects should be discussed.
ACOG Executive Summary: Hypertension in Pregnancy

“For women in the postpartum period who present with new onset hypertension associated with headaches or blurred vision or preeclampsia with severe hypertension, the parenteral administration of magnesium sulfate is suggested.”

For women with persistent hypertension, systolic $BP \geq 150$ or diastolic $BP \geq 100$ on at least 2 occasions 4-6 hours apart, antihypertensive therapy is suggested. Persistent $BP \geq 160$ or diastolic $BP \geq 110$ should be treated within 1 hour.
15% of Eclampsia occurs Postpartum
63% had NO Hypertension Diagnosis

Eclamptic seizures can occur > 48 hours PP
- even until 4 weeks PP
- BP elevation is not predictive of eclampsia
70% of patients report headache
Other prodromal symptoms:
- shortness of breath, blurry vision, nausea or vomiting, edema, neurological deficit, and epigastric pain
Magnesium Sulfate – High Alert Medication

- Safety Considerations
  - Precautions
    - Renal function
  - Standard Protocols
    - Rapid access (Eclampsia Supply Box)
    - Premix solutions
    - Independent double checks
    - Monitoring parameters
  - Guidelines
    - Staffing
Question:
True or False

- The risk of eclampsia or severe morbidity associated with preeclampsia ends once the patient has given birth
# Monitoring

## Nursing Assessment Frequency

### A. Preeclampsia Without Severe Features (Mild)

<table>
<thead>
<tr>
<th></th>
<th>Antepartum*</th>
<th>Intrapartum*</th>
<th>Postpartum*</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP, Pulse, Respiration, SaO2</td>
<td>Every 4 hours</td>
<td>Every 60 min</td>
<td>Every 4 hours</td>
</tr>
<tr>
<td>Lung sounds</td>
<td>Every 4 hours</td>
<td>Every 4 hours</td>
<td>Every 4 hours</td>
</tr>
<tr>
<td>Deep consciousness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edema</td>
<td>Every 8 hours</td>
<td>Every 8 hours</td>
<td>Every 8 hours</td>
</tr>
<tr>
<td>Assessment for headache, visual disturbances, epigastric pain</td>
<td>Every 8 hours</td>
<td>Every 8 hours</td>
<td>Every 8 hours</td>
</tr>
<tr>
<td>Fetal status and uterine activity</td>
<td>Every shift</td>
<td>Continuous</td>
<td>N/A</td>
</tr>
<tr>
<td>Temperature</td>
<td>Per facility protocol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake and output</td>
<td>Every 1 hour with totals every 8 and 24 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This is the minimum frequency recommended for the patient NOT on magnesium sulfate.*
## Monitoring

### Nursing Assessment Frequency

#### B. Severe Preeclampsia Nursing Assessment Frequency

<table>
<thead>
<tr>
<th>Severe Preeclampsia Intrapartum and Postpartum for women on Magnesium Sulfate</th>
</tr>
</thead>
</table>
| BP, Pulse, Respiration, SaO2 | • Every 5 mins during loading dose and q30 mins during maintenance of magnesium sulfate infusion  
• Can change to every 60 mins if any one or more of the following criteria are met:  
  o Preeclampsia without severe features (mild)  
  o BP stable without increases for a minimum of 2 hours  
  o No antihypertensives within last 6 hours  
  o Antepartum patient  
  o Latent phase of labor  
• Continuous SaO2 during magnesium infusion for intrapartum. For postpartum patient, check with vital signs |
| Lung sounds | Every 2 hours |
| Deep tendon reflexes & clonus, Level of consciousness, Edema, Assessment for headache, visual disturbances, epigastric pain | Every 4 hours |
| Temperature | Per facility protocol |
| Intake and output | Intake:  
  • IV solutions and medication drips should all be on a pump  
  • Total hourly intake should be < 125 ml/hr  
  • NPO with ice chips or as permitted by practitioner  
Output:  
  • Insert Foley with urometer  
  • Calculate hourly, end of shift, and 24-hour totals |
| Fetal status and uterine activity | Continuous fetal monitoring |

CMQCC Preeclampsia Toolkit (2013): Section: AP, IP, PP Nsg Mgmt & Assessment of PreE: Maternal/Fetal Assessment & Monitoring Recs, Table 1, p. 38-39
Response

- Facility-wide standard protocols with checklists and escalation policies for management and treatment of:
  - Severe hypertension
  - Eclampsia, seizure prophylaxis, and magnesium over-dosage
  - Postpartum presentation of severe hypertension/preeclampsia

- Minimum requirements for protocol:
  - Notification of physician or primary care provider if systolic BP ≥160 or diastolic BP ≥110 for two measurements within 15 minutes
ACOG Executive Summary: Hypertension in Pregnancy Patient Education Materials

For all women in the postpartum period (not just women with preeclampsia), it is suggested that discharge instructions include information about the signs and symptoms of preeclampsia as well as the importance of prompt reporting of this information to their health care providers.
Ask Your Doctor or Midwife

Preeclampsia

What Is It?
Preeclampsia is a serious disease related to high blood pressure. It can happen to any pregnant woman.

Risks to You
- Seizures
- Stroke
- Organ damage
- Death

Risks to Your Baby
- Premature birth
- Death

Signs of Preeclampsia
- Stomach pain
- Headaches
- Feeling nauseous; throwing up
- Seeing spots
- Swelling in your hands and face
- Gaining more than 5 pounds in a week

What Should You Do?
Call your doctor right away. Finding preeclampsia early is important for you and your baby.

For more information go to www.preeclampsia.org

www.preeclampsia.org/market-place
California Partnership for Maternal Safety

**REACHINESS**

**Every unit**
- Adopt standards for early warning signs, diagnostic criteria, monitoring and treatment for severe preeclampsia/eclampsia to include order sets and algorithms
- Unit team education, reinforced by regular unit-based drills
- Process for timely triage and evaluation of pregnant and postpartum women with hypertension including ED and outpatient areas
- Rapid access to medications used for severe hypertension/eclampsia: Medications should be stocked and readily available on L&D and in other areas where patients may be treated. Include brief guide for administration and dosage
- System plan for escalation, obtaining appropriate consultation and maternal transport, as needed

**RECOGNITION & PREVENTION**

**Every patient**
- Adoption of a standard process for the measurement and assessment of BP and urine protein for all pregnant and postpartum women
- Implementation of standard response to maternal early warning criteria
- Implementation of facility-wide standards for educating prenatal and postpartum women on signs and symptoms of preeclampsia and hypertension

**RESPONSE**

**All severe hypertension/preeclampsia**
- Facility-wide standard processes with checklists for management and treatment of:
  - Severe hypertension
  - Eclampsia, seizure prophylaxis, and magnesium over-dosage
  - Postpartum, emergency department and outpatient presentation of severe hypertension/preeclampsia
- Support plan for patients, families and staff for ICU admissions and serious complications of severe hypertension

**REPORTING/SYSTEMS LEARNING**

**Every unit**
- Implementation of a huddle for high risk cases and post-event team debrief
- Review all severe hypertension/eclampsia/ICU cases for systems issues
- Monitor outcomes and process metrics
- Documentation of education of pregnant and postpartum women about symptoms of preeclampsia

This bundle was developed by the Council On Patient Safety In Women’s Health Care, National Partnership for Maternal Safety 2015
Case Presentation: Venous Thromboembolism

42 y.o. G3 P1, two days after emergency cesarean for fetal intolerance to labor

- On your initial assessment in the morning:
  - Afebrile, vital signs stable, lungs are clear
  - Dressing dry and intact, bowel sounds in four quadrants
  - Fundus firm midline and below umbilicus
  - Lochia normal
Case Presentation: Venous Thromboembolism

You take out her IV and help her get up to take a shower. As she returns from the bathroom she says her leg hurts. On exam you note redness in one leg.

- What do you think?
- What do you do next?
The Nurse Detective
READINESS

Every Unit
- Use a standardized thromboembolism risk assessment tool for VTE during:
  - Outpatient prenatal care
  - Antepartum hospitalization
  - Hospitalization after cesarean or vaginal deliveries
  - Postpartum period (up to 6 weeks after delivery)

RECOGNITION & PREVENTION

Every Patient
- Apply standardized tool to all patients to assess VTE risk at time points designated under "Readiness"
- Apply standardized tool to identify appropriate patients for thromboprophylaxis
- Provide patient education
- Provide all healthcare providers education regarding risk assessment tools and recommended thromboprophylaxis

RESPONSE

Every Unit
- Use standardized recommendations for mechanical thromboprophylaxis
- Use standardized recommendations for dosing of prophylactic and therapeutic pharmacologic anticoagulation
- Use standardized recommendations for appropriate timing of pharmacologic prophylaxis with neuraxial anesthesia

REPORTING/SYSTEMS LEARNING

Every Unit
- Review all thromboembolism events for systems issues and compliance with protocols
- Monitor process metrics and outcomes in a standardized fashion
- Assess for complications of pharmacologic thromboprophylaxis

Standardization of health care processes and reduced variation has been shown to improve outcomes and quality of care. The Council on Patient Safety in Women’s Health Care disseminates patient safety bundles to help facilitate the standardization process. This bundle reflects emerging clinical, scientific, and patient safety advances as of the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Although the components of a particular bundle may be adapted to local resources, standardization within an institution is strongly encouraged.

The Council on Patient Safety in Women’s Health Care is a broad consortium of organizations across the spectrum of women’s health for the promotion of safe health care for every woman.

For more information visit the Council’s website at www.safehealthcareforeverywoman.org

October 2015
Deep Vein Thrombosis (DVT)

- Pregnancy predisposes to DVT due to:
  - Venous stasis from enlarge uterus compression, and decreased vascular tone
  - Hypercoagulability
  - Remember Virchow’s triad?
    - Hypercoagulability
    - Stasis of blood flow
    - Endothelial injury
## Risk Factors for DVT

<table>
<thead>
<tr>
<th>Maternal</th>
<th>Pregnancy</th>
<th>Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>Multiparity</td>
<td>Cesarean Birth</td>
</tr>
<tr>
<td>Smoking</td>
<td>Preeclampsia</td>
<td>PPH Blood</td>
</tr>
<tr>
<td>Hx of VTE</td>
<td>Physiologic changes of Pregnancy</td>
<td>Infection</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td>Immobilization</td>
</tr>
<tr>
<td>Age &gt; 35 years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AWHONN Post Birth Warning Signs
VTE Parent Education

- What is VTE?
  - VTE is when you develop a blood clot usually in your leg (calf area)

- Signs of VTE
  - Leg pain, tender to touch, burning or redness, particularly in calf area

- Getting Help
  - Call healthcare provider immediately for signs of VTE if no response call 911 or go to nearest hospital emergency department

http://www.awhonn.org/?page=POSTBIRTH
VTE: Key Summary Points

- All patients require VTE risk assessment at multiple time points in pregnancy and postpartum

- All patients undergoing cesarean delivery require mechanical prophylaxis, early ambulation, and adequate hydration

- Women with additional risk factors for VTE after delivery may benefit from pharmacologic prophylaxis

- Empiric pharmacologic prophylaxis is a reasonable option for:
  - All women undergoing cesarean delivery
  - All antepartum patients hospitalized >72 hours

CVD Case Presentation

- 25 year old obese (BMI 38) African-American G2P2 presents 10 days after an uncomplicated vaginal delivery with fatigue and persistent cough since delivery.

- BP 110/80, HR 110, RR 28, afebrile, with O2 sat 94% on room air.

- She gets diagnosed with respiratory infection and is prescribed an antibiotic. Fatigue is attributed to lack of sleep.
CVD Case Presentation (CONTINUED)

- One week later, she presents again with continued symptoms. Antibiotics are switched and beta-agonists are added for presumptive “new-onset asthma.”

- Two days later, the patient experiences cardiac arrest at home and resuscitation attempts are unsuccessful.

- Autopsy findings were indicative of cardiomyopathy.
A California Toolkit to Transform Maternity Care

Improving Health Care Response to Cardiovascular Disease in Pregnancy: A California Quality Improvement Toolkit

For More Information and to Download the Toolkit

- Visit www.cmqcc.org
- Visit https://www.cdph.ca.gov
- Contact: info@cmqcc.org

THIS COLLABORATIVE PROJECT WAS DEVELOPED BY:
THE CARDIOVASCULAR DISEASE IN PREGNANCY TASK FORCE
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
Rationale for Toolkit

Cardiovascular Disease is

- the leading cause of maternal mortality in CA and U.S.
- under-recognized in pregnant or postpartum women
- higher among African-American women

- 25% of deaths attributed to cardiovascular disease may have been prevented if the woman’s heart disease had been diagnosed earlier.

- Pregnancy is a period of frequent interaction with health care providers and offers an opportunity to detect and treat heart disease, improve pregnancy outcomes, and affect future cardiovascular health.


©California Department of Public Health, 2017; supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Cardiovascular Disease in Pregnancy and Postpartum Taskforce. Visit: www.CMQCC.org for details
CVD Toolkit Goals

Given that CVD is the leading cause of maternal mortality & morbidity in California, the Toolkit aims to:

- Encourage obstetric and other healthcare providers to retain a high index of suspicion for CVD, particularly among women with risk factors who present with symptoms in late pregnancy or early postpartum period

- To serve as resource for generalists who provide maternity care to women, with special emphasis on
  - Prenatal visits
  - Postpartum encounters
  - Emergency room visits

Hameed, AB, Morton, CH and A Moore. Improving Health Care Response to Cardiovascular Disease in Pregnancy and Postpartum Developed under contract #11-10006 with the California Department of Public Health, Maternal, Child and Adolescent Health Division. Published by the California Department of Public Health, 2017.
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CVD Assessment Algorithm
For Pregnant and Postpartum Women

Red Flags
- Shortness of breath at rest
- Severe orthopnea ≥ 4 pillows
- Resting HR ≥120 bpm
- Resting systolic BP ≥160 mm Hg
- Resting RR ≥30
- Oxygen saturations ≤94% with or without personal history of CVD

PROMPT EVALUATION and/or hospitalization for acute symptoms

PLUS

CONSULTATIONS with MFM and Primary Care/Cardiology

Personal History of CVD
Without Red Flags

CONSULTATIONS with MFM and Primary Care/Cardiology

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CARDIOVASCULAR DISEASE ASSESSMENT IN PREGNANT and POSTPARTUM WOMEN

SYMPTOMS
*NYHA class > II

Suggestive of Heart Failure:
- Dyspnea
- Mild orthopnea
- Tachypnea
- Asthma unresponsive to therapy

Suggestive of Arrhythmia:
- Palpitations
- Dizziness/syncope

Suggestive of Coronary Artery Disease:
- Chest pain
- Dyspnea

VITAL SIGNS
- Resting HR ≥110 bpm
- Systolic BP ≥140 mm Hg
- RR ≥24
- Oxygen sat ≤96%

RISK FACTORS
- Age ≥40 years
- African American
- Pre-pregnancy obesity (BMI ≥35)
- Pre-existing diabetes
- Hypertension
- Substance use (nicotine, cocaine, alcohol, methadone, methamphetamines)
- History of chemotherapy

**PHYSICAL EXAM

ABNORMAL FINDINGS
Heart: Loud murmur or
Lung: Basilar crackles

NO → YES

Consultation indicated:
MFM and Primary Care/Cardiology

≥ 1 Symptom + ≥ 1 Vital Signs Abnormal + ≥ 1 Risk Factor or ANY COMBINATION ADDING TO ≥ 4

Obtain: EKG and BNP
- Echocardiogram +/- CXR if HF or valve disease is suspected, or if the BNP levels are elevated
- 24 hour Holter monitor, if arrhythmia suspected
- Referral to cardiologist for possible treadmill echo vs. CTA vs. alternative testing if postpartum

Consider: CXR, CBC, Comprehensive metabolic profile, Arterial blood gas, Drug screen, TSH, etc.

Follow-up within one week

Results negative
Signs and symptoms resolved
Reassurance and routine follow-up

Results abnormal
CVD highly suspected

©California Department of Public Health, 2016; supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Cardiovascular Disease in Pregnancy and Postpartum Taskforce. Visit: www.CMQCC.org for details
B Type Natriuretic Peptide (BNP)

Neurohormone secreted by the cardiac ventricles in response to ventricular volume expansion and pressure overload.

- **End-diastolic volume & pressure in ventricles**
- **Pro-BNP**
- **BNP**

- Inhibits renin-angiotensin-aldosterone system
- Increases natriuresis and diuresis

Relaxes vascular smooth muscle

Image Credit: Afshan Hameed, MD. Used with permission

©California Department of Public Health, 2017; supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Cardiovascular Disease in Pregnancy and Postpartum Taskforce. Visit: [www.CMQCC.org](http://www.CMQCC.org) for details.
Clinical Uses of BNP in Pregnancy

- Diagnosis of heart failure
  - In pregnant women with dilated CMP, higher BNP predicts adverse cardiovascular outcomes

- Asymptomatic left ventricular function
  - Useful to evaluate shortness of breath

- Predictor of cardiovascular outcome
  - In pregnant women with congenital heart disease, higher BNP levels are associated with poor outcomes

Key Clinical Pearls

- First presentation of cardiovascular disease may be during pregnancy or early postpartum.
- The highest risk period for CVD worsening is between 24-28 weeks or postpartum.
- CVD symptoms or vital sign abnormalities should not be ignored in pregnant/postpartum women.
- New onset or persistent asthma may be a sign of heart failure.
- Bilateral infiltrates on chest x-ray may be due to heart failure rather than pneumonia.
Key Clinical Pearls (continued)

- Pregnancy or postpartum women with significant risk factors should be counseled regarding future CVD risk.

- Women with known CVD should receive pre- & inter-conception counseling by an experienced perinatologist and cardiologist.

- Contraception choices should be tailored to the individual.

- Provider and patient education is essential.

- High index of suspicion, early diagnosis, appropriate referrals and follow up are the key elements to a successful outcome.
Postpartum Presentations to the ED, PCP or OB Provider

When a woman presents in the postpartum period with complaints of shortness of breath, ask if she has experienced:

- Worsened level of exercise tolerance
- Difficulty performing activities of daily living; Unexpected fatigue
- Symptoms that are deteriorating, especially chest pain, palpitations, or dizziness
- New onset of cough or wheezing
- Leg edema and if it is improving or deteriorating
- Inability to lay flat; if this is a change; how many pillows she uses to sleep
- Failure to lose weight or unusual weight gain, and how much
- A history of cardiac or pulmonary conditions
- A history of substance abuse and/or cigarette use
- Or has been seen by other providers or in other Emergency Departments since giving birth.
Postpartum Presentations to the ED, PCP or OB Provider

Key Points (1)

- Symptoms related to physiologic changes of pregnancy should be improving in the postpartum period.
- Any visits to Emergency Department for dyspnea should raise suspicion for cardiovascular disease.
- Women of childbearing age should be questioned about recent pregnancies, in addition to their last menstrual period (LMP).
- Postpartum dyspnea or new onset cough is concerning for cardiovascular disease.
Postpartum Presentations to the ED, PCP or OB Provider

Key Points (2)

- New onset asthma is rare in adults.
- Bilateral crackles on lung examination are most likely associated with Congestive Heart Failure (CHF).
- Improvement of dyspnea with bronchodilators does not confirm the diagnosis of asthma, as CHF may also improve with bronchodilators. Likewise, a lack of response to bronchodilators should prompt the entertainment of a diagnosis other than asthma.
Racial Disparities in CVD
Clinical Implications

- **Listen to women.** Take patient complaints seriously, and maintain a high index of suspicion for CVD especially in ALL African-American women.

- Any co-morbidity should further heighten the clinical index of suspicion.

- African-American women with chronic or gestational hypertension, high BMI (>35) who present with symptoms suggestive of CVD or vital signs indicated in the CVD Assessment Algorithm should be evaluated carefully and thoroughly for potential CVD.
Guide to Contraception Information for Women with Cardiovascular Disease

Patients with cardiovascular disease including hypertension, congenital heart defects, arrhythmia and heart failure should be educated about contraceptive choices to improve overall health and prevent unwanted pregnancy.

- **Non-hormonal methods** are the preferred contraception in patients with cardiovascular disease, given the minimal risk of thromboembolism with their use.
- **Hormonal methods** containing estrogen products and depot medroxy-progesterone acetate injection should be used with caution in patients who have multiple risk factors or a history of cardiovascular disease.
Lifetime Risks of Heart Disease After Pregnancy Complications

- Pregnancy complications increase heart disease (CVD) risk:
  - Gestational hypertension, preeclampsia and HELLP syndrome
  - Gestational diabetes
  - Preterm birth.
- Women are often unaware of their CVD risk but are enthusiastic to learn more.
- Hypertension and diabetes in pregnancy = wake-up call for women and families.
- Future CVD risk can be reduced by 4-13% with healthy lifestyle changes.
FROM BIRTH TO THE COMPREHENSIVE POSTPARTUM VISIT

READYNESS

Every woman
- Engages with her provider during prenatal care to develop a comprehensive personalized postpartum care plan that includes designation of a postpartum medical home, where the woman can access care and support during the period between birth and the comprehensive postpartum visit.
- Receives woman-centered counseling and anticipatory guidance regarding medical recommendations for breastfeeding in order to make an informed feeding decision.
- Receives woman-centered counseling regarding medical recommendations for birth spacing and the range of available contraceptive options.
- Identifies a postpartum care team, inclusive of friends and family, to provide medical, material, and social support in the weeks following birth.

Every provider
- Ensures that each woman has a documented postpartum care plan and care team identified in the prenatal period.
- Develops and maintains a working knowledge of evidence-based evaluation and management strategies of common issues facing the mother-infant dyad.

Every clinical setting
- Develops and optimizes models of woman-centered postpartum care and education, utilizing adult-learning principles when possible and embracing the diversity of family structures, cultural traditions, and parenting practices.
- Develops systems to connect families with community resources for medical follow up and social and material support.
- Optimizes counseling models, clinical protocols, and reimbursement options to enable timely access to desired contraception.
- Develops systems to ensure timely, relevant communication between inpatient and outpatient providers.
- Develops protocols for screening and treatment for postpartum concerns, including depression and substance abuse disorders, and establishes relationships with local specialists for co-management or referral.
MATERNAL MENTAL HEALTH: PERINATAL DEPRESSION AND ANXIETY

**READINESS**

*Every Clinical Care Setting*

- Identify mental health screening tools to be made available in every clinical setting (outpatient OB clinics and inpatient facilities).
- Establish a response protocol and identify screening tools for use based on local resources.
- Educate clinicians and office staff on use of the identified screening tools and response protocol.
- Identify an individual who is responsible for driving adoption of the identified screening tools and response protocol.

**RECOGNITION & PREVENTION**

*Every Woman*

- Obtain individual and family mental health history (including past and current medications) at intake, with review and update as needed.
- Conduct validated mental health screening during appropriately timed patient encounters, to include both during pregnancy and in the postpartum period.
- Provide appropriately timed perinatal depression and anxiety awareness education to women and family members or other support persons.
RESPONSE

Every Case

- Initiate a stage-based response protocol for a positive mental health screen.
- Activate an emergency referral protocol for women with suicidal/homicidal ideation or psychosis.
- Provide appropriate and timely support for women, as well as family members and staff, as needed.
- Obtain follow-up from mental health providers on women referred for treatment. This should include the necessary release of information forms.

REPORTING/SYSTEMS LEARNING

Every Clinical Care Setting

- Establish a non-judgmental culture of safety through multidisciplinary mental health rounds.
- Perform a multidisciplinary review of adverse mental health outcomes.
- Establish local standards for recognition and response in order to measure compliance, understand individual performance, and track outcomes.

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Standardization of care processes and reduced variation has been shown to improve outcomes and quality of care. The Council on Patient Safety in Women’s Health Care disseminates patient safety bundles to help facilitate the standardization process. This bundle reflects emerging clinical, scientific, and patient safety advances as of the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Although the components of a particular bundle may be adapted to local resources, standardization within an institution is strongly encouraged.

The Council on Patient Safety in Women’s Health Care is a broad consortium of organizations across the spectrum of women’s health for the promotion of safe health care for every woman.

For more information visit the Council’s website at www.safehealthcareforeverywoman.org

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READINESS

Every patient/family

- Provide education to promote understanding of opioid use disorder (OUD) as a chronic disease.
- Emphasize that substance use disorders (SUDs) are chronic medical conditions, treatment is available, family and peer support is necessary and recovery is possible.
- Emphasize that opioid pharmacotherapy (i.e. methadone, buprenorphine) and behavioral therapy are effective treatments for OUD.
- Provide education regarding neonatal abstinence syndrome (NAS) and newborn care.
- Awareness of the signs and symptoms of NAS
- Interventions to decrease NAS severity (e.g. breastfeeding, smoking cessation)
- Engage appropriate partners (i.e. social workers, case managers) to assist patients and families in the development of a “plan of safe care” for mom and baby.

Every clinical setting/health system

- Provide staff-wide (clinical and non-clinical staff) education on SUDs.
- Emphasize that SUDs are chronic medical conditions that can be treated.
- Emphasize that stigma, bias and discrimination negatively impact pregnant women with OUD and their ability to receive high quality care.
- Provide training regarding trauma-informed care.
- Establish specific prenatal, intrapartum and postpartum clinical pathways for women with OUD that incorporate care coordination among multiple providers.
- Develop pain control protocols that account for increased pain sensitivity and avoidance of mixed agonist-antagonist opioid analgesics.
- Know state reporting guidelines regarding the use of opioid pharmacotherapy and identification of illicit substance use during pregnancy.
Know federal (Child Abuse Prevention Treatment Act - CAPTA), state and county reporting guidelines for substance-exposed infants.

- Understand “Plan of Safe Care” requirements.
- Know state, legal and regulatory requirements for SUD care.
- Identify local SUD treatment facilities that provide women-centered care.
- Ensure that OUD treatment programs meet patient and family resource needs (i.e. wrap-around services such as housing, child care, transportation and home visitation).
- Ensure that drug and alcohol counseling and/or behavioral health services are provided.
- Investigate partnerships with other providers (i.e. social work, addiction treatment, behavioral health) and state public health agencies to assist in bundle implementation.

**RECOGNITION & PREVENTION**

Every provider/clinical setting

- Assess all pregnant women for SUDs.
  - Utilize validated screening tools to identify drug and alcohol use.
  - Incorporate a screening, brief intervention and referral to treatment (SBIRT) approach in the maternity care setting.
  - Ensure screening for polysubstance use among women with OUD.
- Screen and evaluate all pregnant women with OUD for commonly occurring co-morbidities.
  - Ensure the ability to screen for infectious disease (e.g. HIV, Hepatitis and sexually transmitted infections (STIs)).
  - Ensure the ability to screen for psychiatric disorders, physical and sexual violence.
  - Provide resources and interventions for smoking cessation.
- Match treatment response to each woman’s stage of recovery and/or readiness to change.
RESPONSE

Every provider/clinical setting/health system

- Ensure that all patients with OUD are enrolled in a woman-centered OUD treatment program.
- Establish communication with OUD treatment providers and obtain consents for sharing patient information.
- Assist in linking to local resources (e.g. peer navigator programs, narcotics anonymous (NA), support groups) that support recovery.
- Incorporate family planning, breastfeeding, pain management and infant care counseling, education and resources into prenatal, intrapartum and postpartum clinical pathways.
- Provide breastfeeding and lactation support for all postpartum women on pharmacotherapy.
- Provide immediate postpartum contraceptive options (e.g. long acting reversible contraception (LARC)) prior to hospital discharge.
- Ensure coordination among providers during pregnancy, postpartum and the inter-conception period.
- Provide referrals to providers (e.g. social workers, psychiatry, and infectious disease) for identified co-morbid conditions.
- Identify a lead provider responsible for care coordination, specify the duration of coordination and assure a “warm handoff” with any change in the lead provider.
- Develop a communication strategy to facilitate coordination among the obstetric provider, OUD treatment provider, health system clinical staff (i.e. inpatient maternity staff, social services) and child welfare services.
- Engage child welfare services in developing safe care protocols tailored to the patient and family’s OUD treatment and resource needs.
- Ensure priority access to quality home visiting services for families affected by SUDs.
Every clinical setting/health system
- Develop mechanisms to collect data and monitor process and outcome metrics to ensure high quality healthcare delivery for women with SUDs.
- Develop a data dashboard to monitor process and outcome measures (i.e. number of pregnant women in OUD treatment at specified intervals).
- Create multidisciplinary case review teams to evaluate patient, provider and system-level issues.
- Develop continuing education and learning opportunities for providers and staff regarding SUDs.
- Identify ways to connect non-medical local and community stakeholders with clinical providers and health systems to share outcomes and identify ways to improve systems of care.
- Engage child welfare services, public health agencies, court systems and law enforcement to assist with data collection, identify existing problems and help drive initiatives.
# SIRS Criteria Comparison

<table>
<thead>
<tr>
<th>Adult Screening Criteria</th>
<th>Perinatal Screening Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temp &gt; 38°C (100.4°F) or &lt; 36°C (96.8°F)</td>
<td>• Temp &gt; 38°C (100.4°F) or &lt; 36°C (96.8°F)</td>
</tr>
<tr>
<td>• HR &gt; 90 bpm</td>
<td>• HR &gt; 110 bpm</td>
</tr>
<tr>
<td>• Resp Rate &gt; 20 breaths/minute</td>
<td>• Resp Rate &gt; 24 breaths/minute</td>
</tr>
<tr>
<td>• WBC &gt; 12,000, &lt; 4,000 or &gt; 10% immature neutrophils</td>
<td>• WBC &gt; 15,000 or &lt; 4,000 or &gt; 10% immature neutrophils</td>
</tr>
<tr>
<td>• Blood glucose &gt; 140 mg/dl in the absence of diabetes</td>
<td>• Blood glucose &gt; 140 mg/dl in absence of diabetes</td>
</tr>
<tr>
<td>• New mental status change</td>
<td>• Mental status change</td>
</tr>
</tbody>
</table>
Summary

- There are various ways direct care nurses can get involved and improve care for pregnant women and newborns.

- Nurses are the front line providers of patient care and have an essential role in quality improvement.

- Utilizing a patient safety bundle can be an effective way to improve care and patient outcomes.

- Standardization is encouraged however it’s up to YOU and your colleagues to meet the needs and goals of your organization.
Nurses are a valuable source of information and support for women and their families.

UCSF Benioff Children’s Hospitals

Thank You!

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