Safety Action Series

Maternal Early Warning Criteria
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Disclosures

- Robyn D’Oria, MA, RNC, APC has no actual or perceived conflict of interest in relation to this presentation.

- Jill Mhyre, MD has no actual or perceived conflict of interest in relation to this presentation.
Objectives

This session will provide:

- Systems solutions to identify and treat women who may be developing critical illness, including The Modified Early Obstetric Warning System (MEOWS) and The Maternal Early Warning System (MEWS)
- Tips on when to communicate assessment parameters that fall outside of norms
- Escalation policies to ensure timely bedside evaluation and treatment for those women who need it
- Implementation considerations to maximize efficacy of The Maternal Early Warning System
Rationale

• “In many cases in this report, the early warning signs of impending maternal collapse went unrecognized.”

• Why?
  – These events are relatively rare
  – The childbearing population is mostly healthy
  – The normal physiologic changes of pregnancy
## California Pregnancy Associated Mortality Review
### 2002-2005

<table>
<thead>
<tr>
<th>Delayed response to triggers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preeclampsia</td>
<td>92%</td>
</tr>
<tr>
<td>Postpartum hemorrhage</td>
<td>85%</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>63%</td>
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<tr>
<td>Venous thromboembolism</td>
<td>75%</td>
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<tr>
<td>Amniotic fluid embolism</td>
<td>67%</td>
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</table>
The United States Joint Commission 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.

National Partnership for Maternal Safety Goals

1. To reduce maternal morbidity and mortality in the US by 50%
2. To reduce racial and ethnic maternal health disparities

Box 1. Key Priorities in Maternal Safety

Core Patient Safety Bundles
- Obstetric hemorrhage
- Severe hypertension in pregnancy
- Venous thromboembolism prevention in pregnancy

Supplemental Patient Safety Bundles
- Maternal Early Warning Criteria: criteria to identify maternal patients who require urgent bedside evaluation
- Facility Review: case review packages for facility-based, miniroot cause analysis for use in all cases of severe maternal morbidity and mortality
- Family and Staff Support: recommendations for support of patients, families, and staff who experience a severe maternal event

What are Early Warning Signs?

*Early warning signs are*

“... a set of predetermined ‘calling criteria’ (based on periodic charting of vital signs) as indicators of the need to escalate monitoring or call for assistance”


**Slide 11**
Two Essential Components

Maternal Early Warning Criteria

Effective Escalation Policy
Modified Early Obstetric Warning System (MEOWS)

“Contact doctor if one red or two yellow scores at any one time.”

A validation study of the CEMACH recommended modified early obstetric warning system (MEOWS)*

<table>
<thead>
<tr>
<th></th>
<th>Red trigger</th>
<th>Yellow trigger</th>
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</thead>
<tbody>
<tr>
<td>Temperature; °C</td>
<td>&lt; 35 or &gt; 38</td>
<td>35–36</td>
</tr>
<tr>
<td>Systolic BP; mmHg</td>
<td>&lt; 90 or &gt; 160</td>
<td>150–160</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or 90–100</td>
</tr>
<tr>
<td>Diastolic BP; mmHg</td>
<td>&gt; 100</td>
<td>90–100</td>
</tr>
<tr>
<td>Heart rate; beats.min⁻¹</td>
<td>&lt; 40 or &gt; 120</td>
<td>100–120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or 40–50</td>
</tr>
<tr>
<td>Respiratory rate; breaths.min⁻¹</td>
<td>&lt; 10 or &gt; 30</td>
<td>21–30</td>
</tr>
<tr>
<td>Oxygen saturation; %</td>
<td>&lt; 95</td>
<td>–</td>
</tr>
<tr>
<td>Pain score</td>
<td>–</td>
<td>2–3</td>
</tr>
<tr>
<td>Neurological response</td>
<td>Unresponsive, pain</td>
<td>Voice</td>
</tr>
</tbody>
</table>

Outcomes

- Pulmonary embolism
- Cerebral venous sinus thrombosis
- Intracranial bleed
- Status epilepticus
- DKA
- Myocardial infarction
- Pulmonary edema
- Anesthetic complications

Results

- 673 patients scored
- 200 (30%) triggered an evaluation
- 86 (13%) met criteria for morbidity

- Sensitivity 89%
- Specificity 79%
- Positive Predictive Value 39%
- Negative Predictive Value 98%

Maternal Early Warning Criteria

- Systolic BP; mmHg <90 or >160
- Diastolic BP; mmHg >100
- Heart rate; beats per min <50 or >120
- Respiratory rate; breaths per min <10 or >30
- Oxygen saturation; % <95
  room air, sea level
- Oliguria; <35
  ml/hr for 2 hours

Maternal Early Warning Criteria

✓ Maternal agitation, confusion, or unresponsiveness

✓ Patient with hypertension reporting a non-remitting headache or shortness of breath

Measurement Artifact

- A single abnormal vital sign can reflect measurement artifact

- Verify isolated abnormal measurements
  - HR, BP, RR, SpO$_2$

- Urgent bedside evaluation is usually indicated if:
  - Any value persists for more than one measurement
  - Values present in combination with additional abnormal parameters
  - Value recurs more than once
Immediate Action Required

- Systolic BP; mmHg  <90 or >160
- Diastolic BP; mmHg  >100
- Heart rate; bpm  <50 or >120
- Respiratory rate; bpm  <10 or >30
- Oxygen saturation; %  <95
- Oliguria; ml/hr x 2h  <35

- Maternal agitation, confusion, or unresponsiveness
- Patient with hypertension reporting a non-remitting headache or shortness of breath
Case Illustration

• 34 year old recovering from cesarean delivery in the PACU

• Nausea, vomiting, diaphoresis
Effective Escalation Policy

An abnormal parameter would require:

1) Prompt **reporting** to a physician or other qualified clinician

2) Prompt bedside **evaluation** by a physician or other qualified clinician with the ability to activate resources in order to initiate emergency diagnostic and therapeutic interventions as needed
4 Implementation Principles

1) Every hospital should have “A” warning system, we are not developing “THE” standard US early warning system

2) “Plans are nothing; planning is everything.”
   - Dwight D Eisenhower

3) Multi-disciplinary team work is key for the development, maintenance and daily use of the warning systems

4) Simplicity is critical for success
Local Implementation

Need to define:

1) Who to notify
2) How to notify them
3) How rapidly to expect a response
4) When and how to activate the clinical chain of command in order to ensure an appropriate response
Streamline Communication

• Task shifting
• Mobile communication devices
• Automated paging systems
• Abbreviated communication (e.g., SBAR)
• A well-established normative expectation for bedside evaluation
• Team training (e.g., TeamSTEPPS)
Why Bedside Evaluation

• Maternal mortality reviews repeatedly identify the **lethal consequences** of phone-based management in women developing critical illness
Evaluating Clinician

- Anesthesiologist
- Nurse Anesthetist
- Emergency Physician
- Patient
- Rapid Response Team
- Bedside Nurse
- MFM Laborist Family MD
- Nurse Midwife
- Hospitalist Intensivist
- Primary Obstetric Provider
- Family MD
Differential Diagnoses

Common vs. rare life-threatening diagnoses

• Hypertension (SBP>160 or DBP>100)
• Hypotension (SBP<90)
• Tachycardia (HR>120)
• Bradycardia (HR<50)
• Tachypnea (RR>30)
• Bradypnea (RR<10)
• Hypoxemia (SpO₂ <95% on room air)
• Oliguria (<35 ml/hr for >2 hrs)
• Confusion, agitation, or unresponsiveness
What are appropriate outcomes for a bedside evaluation?

When the bedside evaluation is non-diagnostic, or when clinicians suspect that a particular MEW criterion reflects normal physiology for that patient.

The team should establish a tailored plan for subsequent monitoring, notification and clinical review.
What are appropriate outcomes for a bedside evaluation?

**Recurrent MEW criteria**

- Increase the intensity and frequency of monitoring
- Increase the frequency of evaluation
- Initiate resuscitative and diagnostic interventions
- Carefully consider the appropriate differential until a diagnosis is confirmed, or until the criteria resolve
What are appropriate outcomes for a bedside evaluation?

Diagnosed as critically ill or a high likelihood of developing critical illness

- Initiate appropriate resuscitative, diagnostic and therapeutic interventions
- Escalate level of care
  - Obstetric emergency response teams
  - Rapid response teams
  - Transfer to a higher acuity setting
Summary

• Delays in diagnosis contribute to a large portion of preventable maternal deaths
• Maternal Warning Criteria and Escalation Policy
• Prompt reporting and bedside evaluation
• Local implementation details
  – Cut-points
  – Who to notify, how to notify them
  – How quickly to expect a response
  – Back-up systems to ensure timely evaluation
Q&A Session

Press *1 to ask a question

You will enter the question queue
Your line will be unmuted by the operator for your turn

A recording of this presentation will be made available on our website:
www.safehealthcareforeverywoman.org
Next Safety Action Series

Quantifying Blood Loss

Date and Time To Be Determined

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