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
Saving Mothers’ Lives:
Reviewing maternal deaths to make motherhood safer - 2003-2005

December 2007
The Seventh Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom

March 2011
The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom
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>
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</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>
</tr>
<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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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”

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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<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 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 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, SpO₂

• 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
- Rapid Response Team
- Patient
- Bedside Nurse
- Nurse Midwife
- MFM Laborist
- Family MD
- Hospitalist Intensivist
- Primary Obstetric Provider
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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