TCHMB Handout on Maternal Early Warning System (MEWS)

- Maternal mortality surveillance in the United States, France and United Kingdom suggests that 40-50% of maternal deaths are potentially preventable\(^1\).

- Delays in recognition, diagnosis, and treatment precede the majority of deaths from hemorrhage, hypertension, infection, and venous thrombosis.

- Early signs of life-threatening illness can be difficult to recognize in obstetric patients because: 1) critical illness is rare; 2) there are significant changes in maternal vital signs with normal pregnancy and childbirth; and 3) healthy women have substantial physiologic reserve to compensate for pathologic derangements.

- It is known that abnormal physiologic signs and symptoms often precede critical illness. Early warning systems have been proposed to facilitate timely recognition, diagnosis, and treatment for women developing critical illness, thus avoiding major morbidity and mortality.

- Essential components of an early warning system include: 1) maternal early warning criteria that prompts reporting to a clinician; and 2) an effective escalation process that prompts bedside evaluation by a clinician.

**MEWS in United States**

1. **Single trigger\(^2\):** National Partnership for Maternal Safety defined the Maternal Early Warning Criteria, which is a list of abnormal parameters that indicate the need for urgent bedside evaluation by a clinician with the capacity to escalate care as necessary in order to pursue diagnostic and therapeutic interventions. Evaluation and management are at the discretion of bedside provider.

2. **Pathway-specific trigger(s)\(^3\):** One or two abnormal values with recommended clinical evaluation and treatment guidelines. Allows for initiation of diagnostic and therapeutic options by bedside nurse.
Flow diagram for maternal early warning trigger (MEWT) tool

**MATERNAL TRIGGERS**
- Temperature: $38^oC (100.4^oF) \leq 36^oC (96.8^oF)$
- Pulse Ox: $\geq 95$
- Heart Rate: $\geq 110$ or $< 50$
- Resp Rate: $> 24$ or $< 12$
- Systolic BP: $> 155$ or $< 80$ or Diastolic BP: $> 105$ or $< 45$
- Altered Mental Status anytime
- Fetal HR $> 160$ (infection path only)

**MATERNAL ASSESSMENT**
- Temp, Pulse Ox, HR, RR, B/P

**Abnormal Maternal Assessment**
- 2 or More Triggers

**Abnormal Maternal Temp**

**Infection - Sepsis**
- Two or more Triggers
- Notify Physician, CBC, antibiotics, consider blood cultures
- HR $> 110$ and/or MAP $< 65$
- Consider Overlap
- Test organ dysfunction: (lactic acid, LFTs total bil, Creatinine, Urine Output)
- Severe Sepsis / Septic Shock
  - Notify RRT, ICU transfer, and/or consult as appropriate
  - Fluid Resuscitation (within 1 hour) MAP $< 65$ or lactic acid $> 4$mmol/L Crystalloid bolus 30mL/kg over 1 hr
  - Goal for MAP $> 65$ and HR $< 110$ [www.tchmb.org]

**Cardiopulmonary**
- HR $> 110$, MAP $< 65$, O2 Sat $\leq 93$%, RR $> 24$ or Altered Mental Status
- Consider
- Cardiomyopathy / CHF
- Myocardial Infarction
- Pulmonary Edema
- Pulmonary HTN
- Pulmonary Embolus / DVT
- Blood Drug Use
- BNP, cardiac enzymes, EKG, echo, spiral CT
- Consults (Anesthesia, Medicine, Critical Care, Perinatology)

**Hypertension in Pregnancy**
- SBP $> 155$ and/or DBP $> 105$, MD notified
- Sustained $> 160/110$ - Treatment Indicated
- Hypertensive Disorders of Pregnancy Protocol
  - Treatment of BP within 1 hour
  - Magnesium Sulfate – 4Gm Bolus and 2Gm per hour, PIH labs, PIH powerplan

**Obstetrical Hemorrhage**
- HR $> 110$, MAP $> 65$ and Bleeding or recent surgery
- Management of Obstetrical Hemorrhage Protocol
  - Move to Stage 3
  - Activate MTP, CBC and DIC panel, OB and Anesthesia to bedside

**Confirmed (sustained): REQUEST PROVIDER EVALUATION**
- Continue toward Critical Care Assessment Pathway

**Normal Assessment**
- (No abnormal triggers)
- Stood here and continue to monitor

**1 Abnormal Trigger**
- HR $> 130$, RR $> 30$, MAP $< 55$, O2 sat $< 90$%, nursing clinically uncomfortable with patient status*

*Maternal Early Warning Trigger (MEWT) tool.

*bili, bilirubin; BNP, brain natriuretic peptide; BP, blood pressure; CBC, complete blood count; CT, computerized tomography; DBP, diastolic blood pressure; DIC, disseminated intravascular coagulation laboratory results; EKG, electrocardiogram; gm, grams; Hr, hour; HR, heart rate; ICU, intensive care unit; LFTs, liver function testing; MAP, mean arterial pressure; MTP, maternal transfusion protocol; OB, obstetrician; O2 Sat, oxygen saturation; PIH, preeclampsia laboratory assessment; Powerplan, electronic medical record preeclampsia order set; Pulse Ox, pulse oximetry; RR, respiratory rate; RRT, rapid response team; SBP, systolic blood pressure; Temp, temperature.

Example of MEWS Process

**MEWS Trigger Criteria**
- Systolic BP < 90 or > 160
- Diastolic BP > 100
- Heart Rate < 50 or > 120
- Respiratory Rate < 10 or > 30
- O2 Sat % on RA < 95
- Oliguria < 35 mL/hr for ≥ 2 hrs
- Maternal agitation, confusion or unresponsiveness
- Patient with preeclampsia reporting a non-rupturing headache or shortness of breath

1. Abnormal MEWS criteria vital sign (in red box) obtained by PCA or RN
2. PCA immediately notifies RN
3. Vital sign repeated and verified by RN

Within 5 minutes of identifying MEWS trigger, using SBAR communication, RN notifies designated provider:
- L&D PGY 3 for all units excluding OB triage
- OB triage hospitalist for triage
- If no answer from designated provider within 5 minutes, call another resident or OB attending

**Designated provider will:**
- Assume patient care responsibility until issue is resolved or patient is handed off to another provider
- Report findings to patient’s OB attending
- Discuss plan of care and additional orders with RN
  - Differential diagnosis
  - Planned frequency of monitoring & re-evaluation
  - Diagnostic or therapeutic interventions (e.g., labs, imaging)

Designated provider will evaluate patient at the bedside within 15 minutes of notification

PCA = patient care assistant

Chain of Command and Documentation

- **PCA** ➔ **RN** ➔ **MEWS MD/Charge Nurse** ➔ **House Supervisor**

**RN documents in Epic:**
- Name of provider notified
- Time MEWS was activated
- Specific MEWS trigger

**MEWS MD documents in EMR using MEWS Smart Phrase**
- Include in end-of-shift quality & safety report
- Discuss at Daily Safety Brief/Huddle
How TCHMB Can Provide MEWS Support to TexasAIM Plus Hospitals

- Telephonic assistance/consultation on MEWS implementation, data collection and QI methods and implementation
- On-site assistance on MEWS implementation, data collection and QI methods and implementation
- Access to tools and materials developed through TCHMB
- Webinars on MEWS implementation and QI methods
- Listserv with MEWS related studies and publications

References