Maternal Safety Bundles: MEWS

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Objectives

- Brief Review of Maternal Early Warning Systems (MEWS)

- Discuss why MEWS are important

- How can MEWs help with other safety bundles

Maternal Early Warning Systems

- System of escalation based on maternal vital signs

- Developed to facilitate timely recognition, diagnosis, and treatment for women developing critical illness

Table 1. The Maternal Early Warning Criteria

Systolic BP (mm Hg)	<90 or >160
Diastolic BP (mm Hg)	>100
Heart rate (beats per min)	<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 hours	<35
Maternal agitation, confusion, or unresponsiveness; Patient with preeclampsia reporting a non-remitting headache or shortness of breath	

BP, blood pressure.

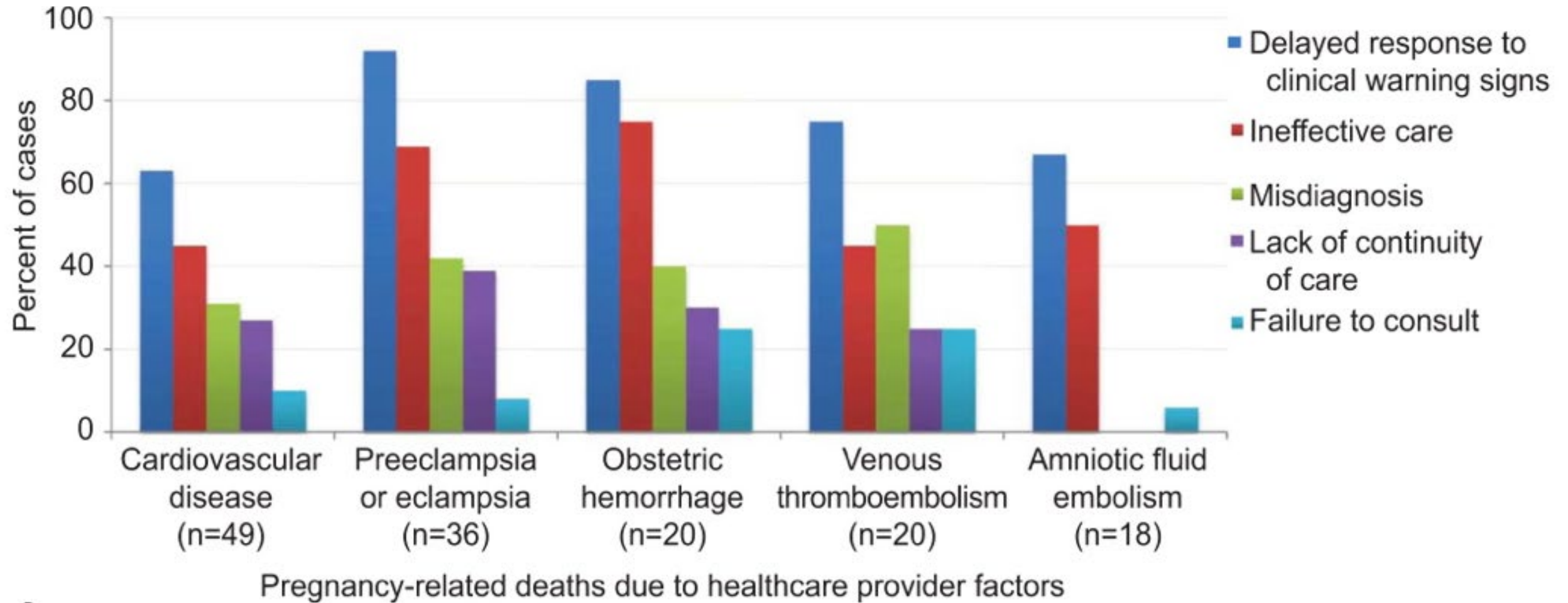These triggers cannot address every possible clinical scenario that could be faced by an obstetric clinician and must not replace clinical judgment. As a core safety principle, bedside nurses should always feel comfortable to escalate their concerns at any point.

FIGURE
Flow diagram for maternal early warning trigger (MEWT) tool
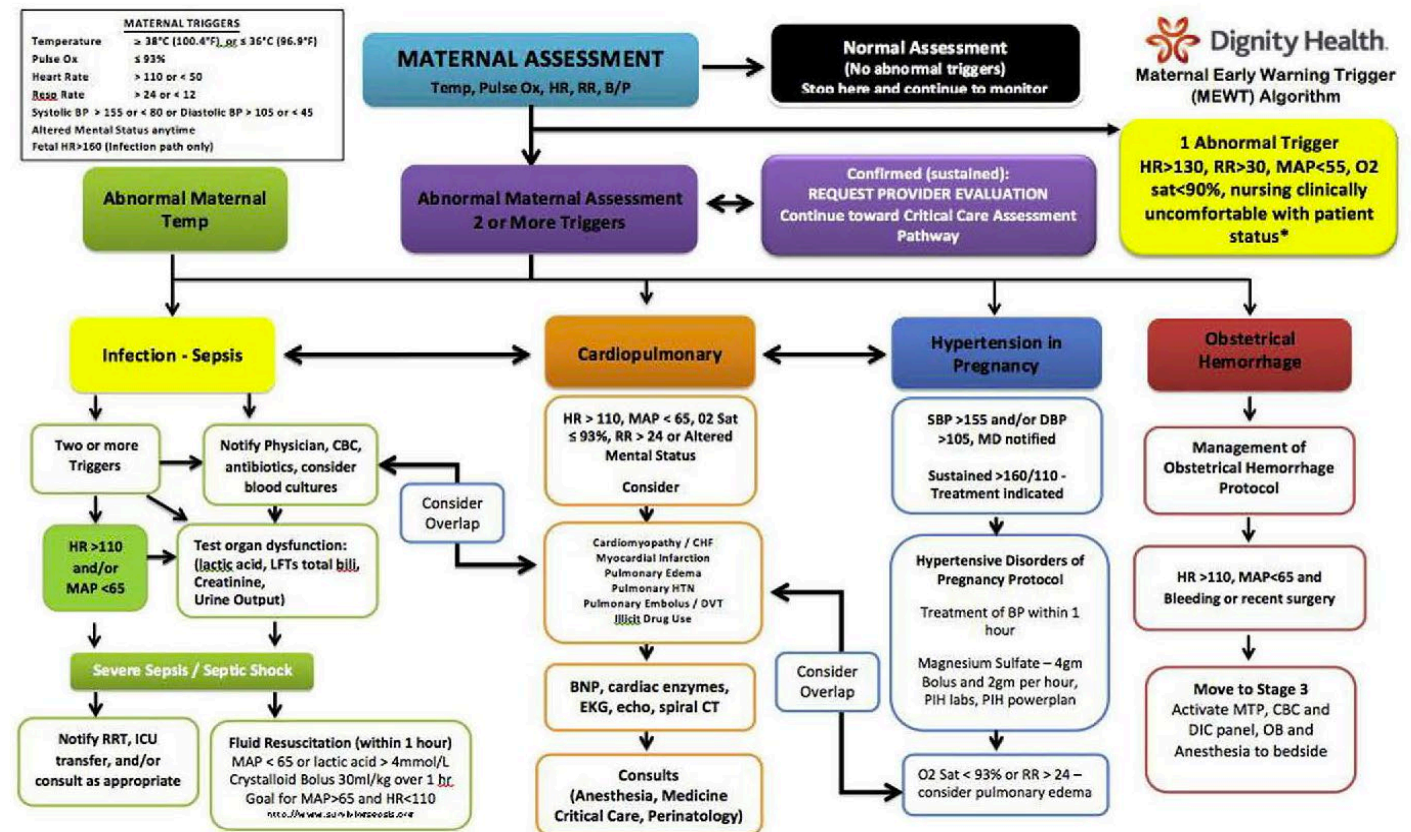
Main et al. Pregnancy-related mortality in California. Obstet Gynecol 2015

Top Causes of Maternal Death in Texas: During Pregnancy & Within 7 Days Postpartum

Top Causes of Maternal Death, Occurring During Pregnancy or up to 7 Days Postpartum. Confirmed Maternal Deaths, 2012-2015
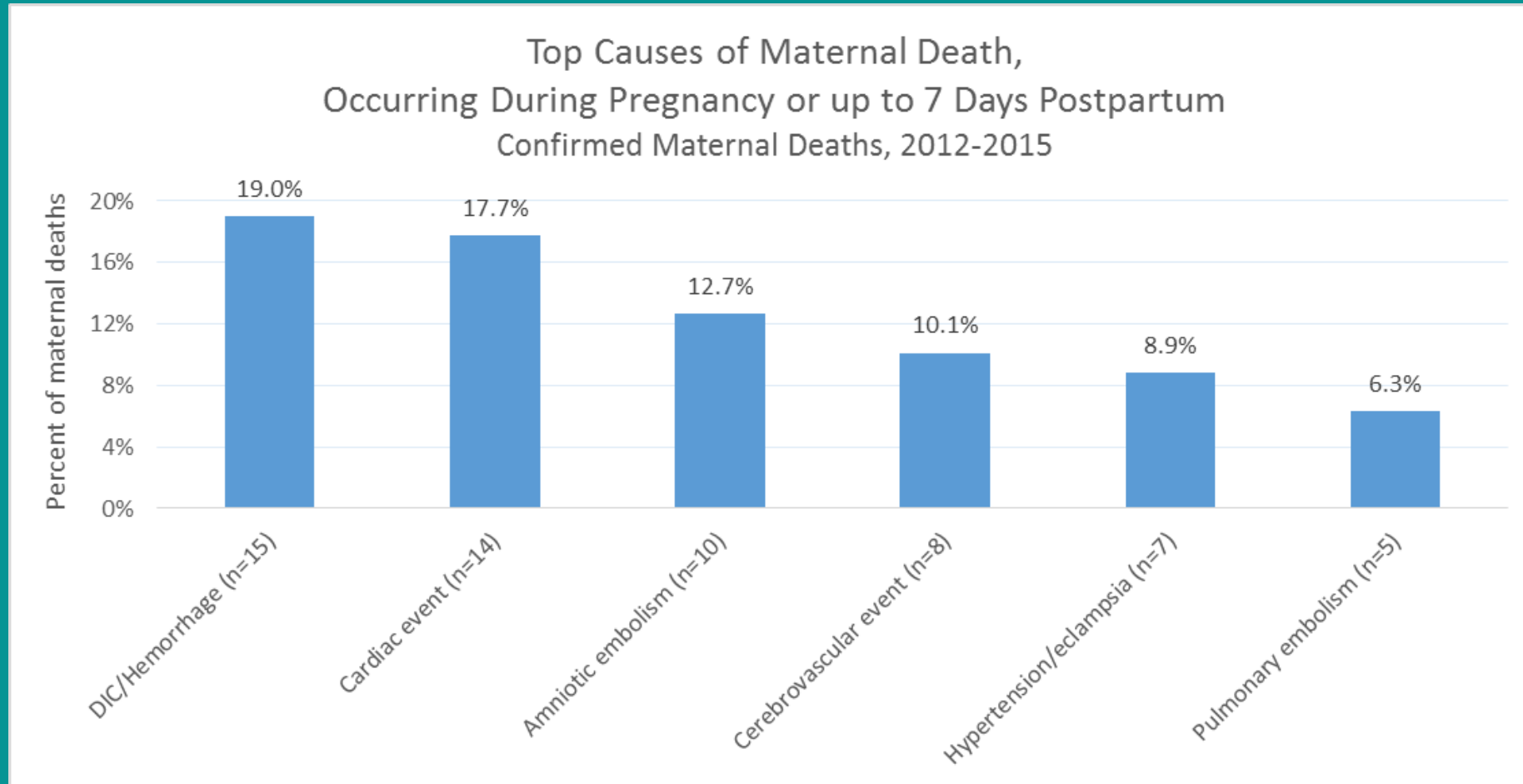
Slide from Dr. Lisa Hollier

Severe Maternal Morbidity: Top Causes
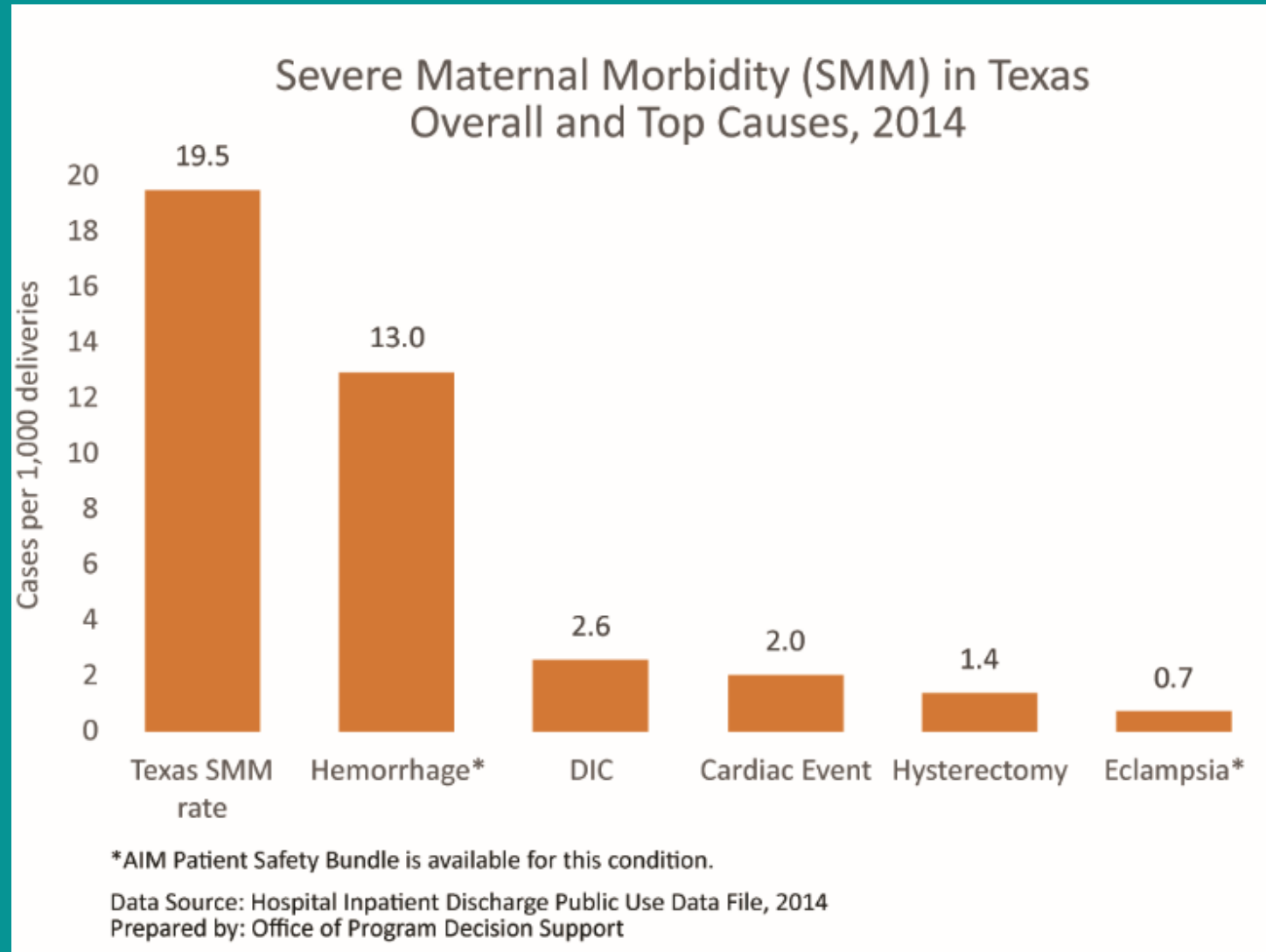
Severe Maternal Morbidity (SMM) in Texas Overall and Top Causes, 2014

Cases per 1,000 deliveries

- Texas SMM rate: 19.5
- Hemorrhage*: 13.0
- DIC: 2.6
- Cardiac Event: 2.0
- Hysterectomy: 1.4
- Eclampsia*: 0.7

*AIM Patient Safety Bundle is available for this condition.

Data Source: Hospital Inpatient Discharge Public Use Data File, 2014
Prepared by: Office of Program Decision Support

Slide from Dr. Lisa Hollier

ucating prenatal and postpartum women on signs and symptoms of hypertension and preeclampsia

les for high risk patients and post-event debriefs to identify successes and opportunities

- Multidisciplinary review of serious hemorrhages for systems issues
- Monitor outcomes and process metrics in perinatal quality improvement (QI) committee

FIGURE
Flow diagram for maternal early warning trigger (MEWT) tool

MATERNAL TRIGGERS

Temperature	≥ 38°C (100.4°F) or ≤ 36°C (96.9°F)
Pulse Ox	≤ 93%
Heart Rate	> 110 or < 50
Resp Rate	> 24 or < 12

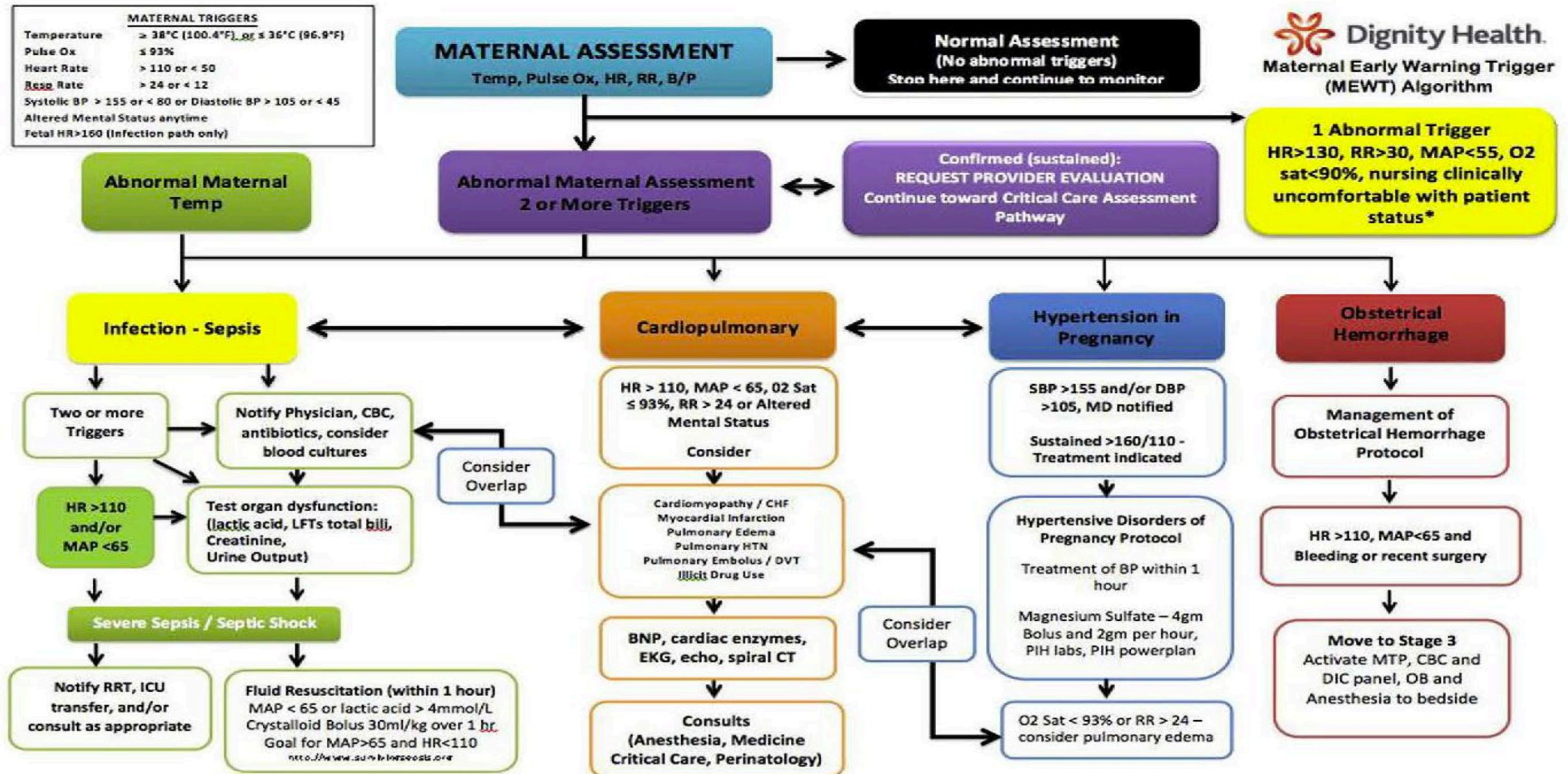Systolic BP > 155 or < 80 or Diastolic BP > 105 or < 45
Altered Mental Status anytime
Fetal HR >160 (Infection path only)

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

Normal Assessment
(No abnormal triggers)
Stop here and continue to monitor

Dignity Health
Maternal Early Warning Trigger (MEWT) Algorithm

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

Abnormal Maternal Temp

Abnormal Maternal Assessment 2 or More Triggers

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

Infection - Sepsis

Cardiopulmonary

Hypertension in Pregnancy

Obstetrical Hemorrhage

Two or more Triggers

Notify Physician, CBC, antibiotics, consider blood cultures

Consider Overlap

HR > 110, MAP < 65, 02 Sat ≤ 93%, RR > 24 or Altered Mental Status
Consider

SBP >155 and/or DBP >105, MD notified

Sustained >160/110 - Treatment indicated

Management of Obstetrical Hemorrhage Protocol

HR >110 and/or MAP <65

Test organ dysfunction: (lactic acid, LFTs total bili, Creatinine, Urine Output)

Cardiomyopathy / CHF
Myocardial Infarction
Pulmonary Edema
Pulmonary HTN
Pulmonary Embolus / DVT
Illicit Drug Use

Hypertensive Disorders of Pregnancy Protocol

Treatment of BP within 1 hour

Magnesium Sulfate – 4gm Bolus and 2gm per hour, PIH labs, PIH powerplan

HR >110, MAP<65 and Bleeding or recent surgery

Severe Sepsis / Septic Shock

Consider Overlap

BNP, cardiac enzymes, EKG, echo, spiral CT

Move to Stage 3
Activate MTP, CBC and DIC panel, OB and Anesthesia to bedside

Notify RRT, ICU transfer, and/or consult as appropriate

Fluid Resuscitation (within 1 hour)
MAP < 65 or lactic acid > 4mmol/L
Crystalloid Bolus 30ml/kg over 1 hr.
Goal for MAP>65 and HR<110
http://www.survivingsepsis.org

Consults
(Anesthesia, Medicine Critical Care, Perinatology)

O2 Sat < 93% or RR > 24 – consider pulmonary edema

Ben Taub PPH Outcomes following MEWS

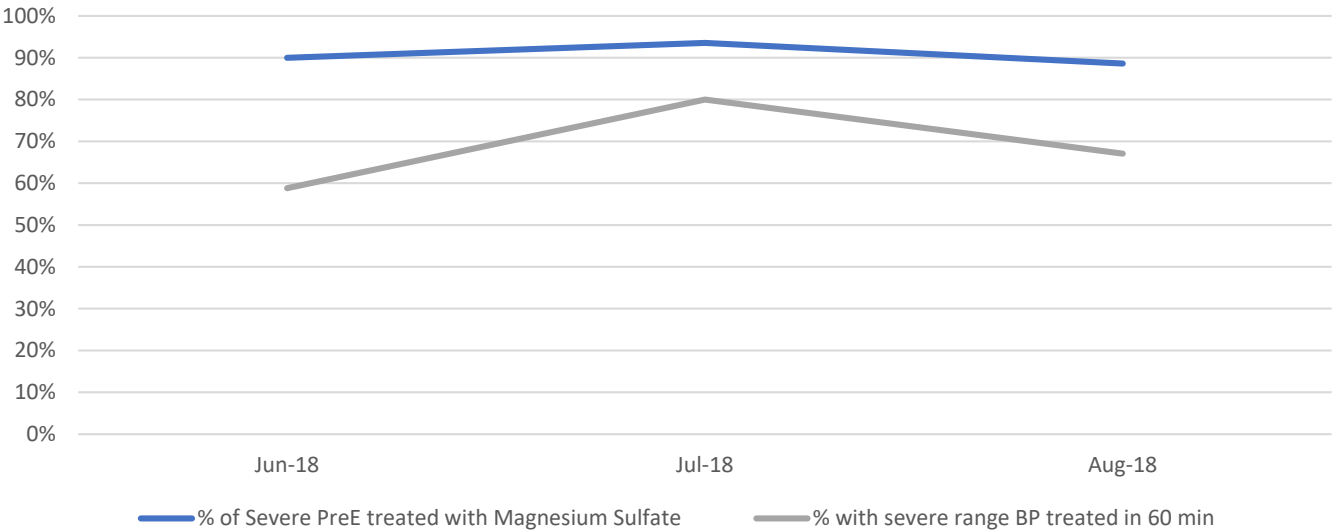| Outcome Measure	Pre-MEWS (n= 2291)	Post-MEWS (n=3946)	p value
Composite Adverse Event Rate (%)	4.5	2.2	0.006
Time to resolution of abnormal vital sign (minutes)	474	98	<0.001
PPH (%)	2.4	6	0.08
Transfusions ≥4 units (%)	1.5	0.3	0.002

Hypertension

COUNCIL ON PATIENT SAFETY
IN WOMEN'S HEALTH CARE
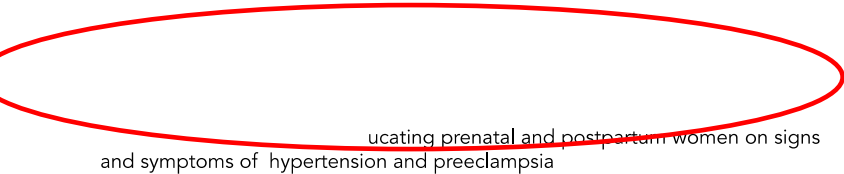
ucating prenatal and postpartum women on signs
and symptoms of hypertension and preeclampsia

Hypertension

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

Jun-18   Jul-18   Aug-18

— % of Severe PreE treated with Magnesium Sulfate   — % with severe range BP treated in 60 min

Hypertension

120%
100%
80%
60%
40%
20%
0%

% of Severe PreE treated with Magnesium Sulfate   % with severe range BP treated in 60 min   Follow up scheduled   HTN Education provided

Jun-18   Jul-18   Aug-18
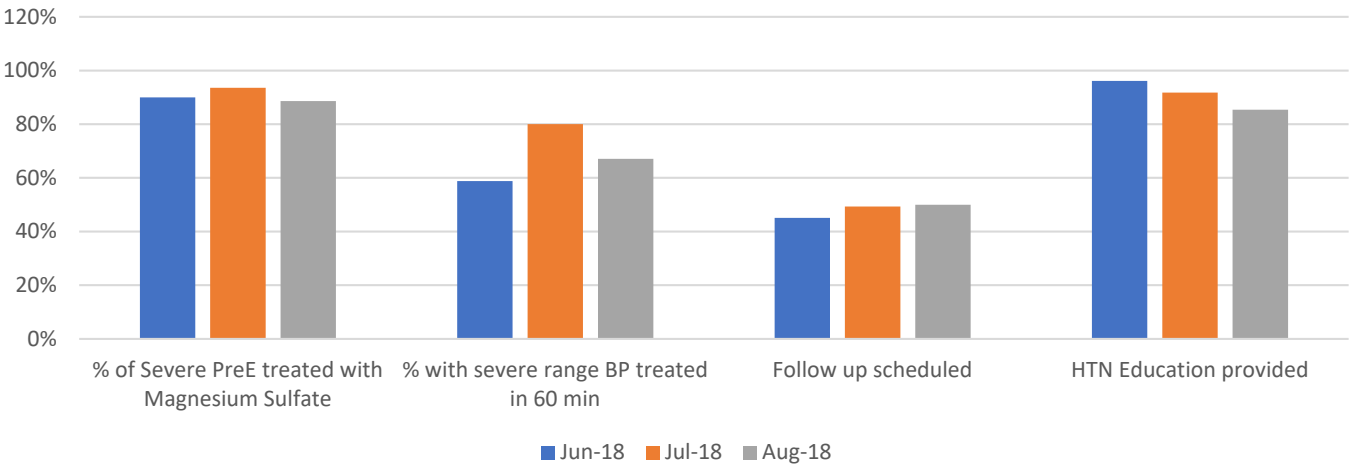
Ben Taub Obstetrics Sepsis Algorithm

Did the patient trigger the maternal early warning system AND have either a temperature >100.4F or <96.8F

YES → Is this likely due to an infection?

NO (from first box) → Reassess vitals per obstetric protocol

NO (from infection box) → Reassess vitals per obstetric protocol

YES → What is the Sepsis in Obstetrics Score?

<6 → Sepsis
- Cultures, labs and diagnostic tests as appropriate
- Reassess SOS q2-4 hours
- Give antimicrobials as appropriate
- Intravenous fluid resuscitation
- Reassess lactate

>= 6 → Lactate >= 4

NO → Severe Sepsis

YES → Septic Shock

Table 1. The Sepsis in Obstetrics Score

Variable	High Abnormal Range				Normal	Low Abnormal Range			
	+4	+3	+2	+1	0	+1	+2	+3	+4
Temperature (°C)	Higher than 40.9	39–40.9		38.5–38.9	36–38.4	34–35.9	32–33.9	30–31.9	Less than 30
SBP					Higher than 90		70–90		Less than 70
HR	Higher than 179	150–179	130–149	120–129	119 or less				
RR	Higher than 49	35–49		25–34	12–24	10–11	6–9		5 or less
SpO$_2$					92% or higher	90–91%		85–89%	Less than 85%
WBC	Higher than 39.9		25–39.9	17–24.9	5.7–16.9	3–5.6	1–2.9		Less than 1
% immature neutrophils			10 or higher		Less than 10				
Lactic acid			4 or higher		Less than 4				

SBP, systolic blood pressure; HR, heart rate; RR, respiratory rate; SpO$_2$, peripheral oxygen saturation; WBC, white blood cell count.

Albright, Has, Rouse, Hughes. Internal validation of the Sepsis in Obstetrics Score to Identify Risk of Morbidity from Sepsis in Obstetrics. Obstet and Gynecol. October 2017

Thank You!