

# Obstetrical Harm

2016 UPDATE

## Change Package

*RECOGNITION AND PREVENTION OF OBSTETRICAL RELATED EVENTS AND HARM*



## ACKNOWLEDGEMENTS

We would like to recognize the contributions of the American Hospital Association (AHA)/Health Research & Educational Trust (HRET) Hospital Engagement Network (HEN) team and Cynosure Health for their work in developing the content of this change package.

**Suggested Citation:** Health Research & Educational Trust (March 2016). Obstetrical Harm Change Package: 2016 Update. Chicago, IL: Health Research & Educational Trust. Accessed at [www.hret-hen.org](http://www.hret-hen.org).

**Accessible at:** [www.hret-hen.org](http://www.hret-hen.org)

**Contact:** [hen@aha.org](mailto:hen@aha.org)

© 2016 Health Research & Educational Trust. All rights reserved. All materials contained in this publication are available to anyone for download on [www.aha.org](http://www.aha.org), [www.hret.org](http://www.hret.org) or [www.hpoe.org](http://www.hpoe.org) for personal, non-commercial use only. No part of this publication may be reproduced and distributed in any form without permission of the publisher or in the case of third party materials, the owner of that content, except in the case of brief quotations followed by the above suggested citation. To request permission to reproduce any of these materials, please email [hen@aha.org](mailto:hen@aha.org).

## TABLE OF CONTENTS

<b>Part 1:</b> Adverse Event Area (AEA) Definition and Scope	02
<b>Part 2:</b> Measurement	03
<b>Part 3:</b> Approaching your AEA	04
<b>Part 4:</b> Conclusion and Action Planning	13
<b>Part 5:</b> Appendices	14
<b>Part 6:</b> References	21

---

### How to Use this Change Package

This change package is intended for hospitals participating in the Hospital Engagement Network (HEN) 2.0 project led by the Centers for Medicare & Medicaid Services (CMS) Partnership for Patients (PFP); it is meant to be a tool to help you make patient care safer and improve care transitions. This change package is a summary of themes from the successful practices of high-performing health organizations across the country. It was developed through clinical practice sharing, organization site visits and subject matter expert contributions. This change package includes a menu of strategies, change concepts and specific actionable items that any hospital can choose to implement based on need and to begin testing for purposes of improving patient quality of life and care. This change package is intended to be complementary to literature reviews and other evidence-based tools and resources.

## PART 1: ADVERSE EVENT AREA (AEA) DEFINITION AND SCOPE

An obstetrical (OB) adverse event is a pregnancy-related complication that results in harm to the mother or baby. For the purposes of the Hospital Engagement Network (HEN) project, the focus areas are severe preeclampsia, post-partum hemorrhage and significant perineal lacerations caused by childbirth. Third and fourth degree perineal lacerations are an uncommon complication of childbirth that involves vaginal tears extending to the anal sphincter or further into the lining of the rectum during the birth process.<sup>1,2</sup> Severe preeclampsia is a pregnancy complication characterized by high blood pressure and signs of damage to multiple organ systems. Post-partum hemorrhage refers to massive blood loss during or shortly after delivery of an infant, normally requiring the use of blood products and/or surgical intervention.

### Magnitude of the Problem

In the United States, women's risk of dying as a result of pregnancy and childbirth is one in 1,800. The U.S. is 61st in the world rankings for maternal health, placing last compared to all other developed countries. Possible causes for this ranking include early elective deliveries (EEDs), a higher incidence of Cesarean sections, more cases of severe pre-eclampsia and complications from other co-morbidities.<sup>3</sup> According to a 2012 federal study, the rate of severe complications during and after delivery has doubled in the last decade. According to the study 52,000 women experience emergencies such as acute renal failure, shock, respiratory distress, aneurysms and heart disease requiring surgery each year.<sup>4</sup> The rate of "near-misses", where a woman nearly dies, has increased by 27 percent.<sup>5</sup> Most of these events are preventable. A failure to recognize and rapidly treat obstetric emergencies is the prominent factor in the majority of maternal deaths.<sup>6</sup> Deaths from post-partum hemorrhage and severe preeclampsia constitute a large percentage of maternal deaths that can be prevented.

Recognition, response, readiness to treat, reporting and learning from these conditions are the keys to decreasing obstetric mortality and morbidity.<sup>7</sup> The biggest challenges for hospitals are to identify those patients at highest risk for maternal morbidity and imminent risk for harm and to then implement strategies in a timely manner to mitigate those risks.

### HEN 1.0 Progress

From 2011 through 2014, over 1,400 hospitals worked to prevent OB adverse events and reduced total OB harm by over 26 percent.



of Eligible  
Acute/CAH/  
Children's Hospital  
Reporting Data



"Chance The Information  
Will Improve My  
Effectiveness/Results"

of Positive  
Responses to CLABSI  
Education Events

#### What does that Mean?

766

OB HARMS  
PREVENTED



\$704,720+

TOTAL PROJECTS  
ESTIMATED COST SAVING



40%

17 states  
MEETING THE  
REDUCTION GOAL

### HEN 2.0 Reduction Goals

Reduce the incidence of harm due to obstetrical events by 40 percent by September 23, 2016.

## PART 2: MEASUREMENT

A key component to making patient care safer in your hospital is to track your progress toward improvement. This section outlines the nationally recognized process and outcome measures that you will be collecting and submitting data as part of the AHA/HRET HEN 2.0. Collecting these monthly data points at your hospital will guide your quality improvement efforts as part of the Plan-Do-Study-Act (PDSA) process. Tracking your data in this manner will provide valuable information needed to study your data across time and help determine the effect your improvement strategies are having in your hospital at reducing patient harm. Furthermore, collecting these standardized metrics will allow the AHA/HRET HEN to aggregate, analyze and report its progress toward reaching the project's 40/20 goals across all AEAs by September 2016.

---

### Nationally Recognized Measures: Process and Outcome

Please download and reference the encyclopedia of measures (EOM) on the HRET HEN website for additional measure specifications and for any updates after publication at: <http://www.hret-hen.org/audience/data-informatics-teams/EOM.pdf>

#### HEN 2.0 EVALUATION MEASURES

- Obstetrical (OB) Trauma – Vaginal Delivery with Instrument (AHRQ PSI 18)
- OB Trauma – Vaginal Delivery without Instrument (AHRQ PSI 19)
- OB Hemorrhage – Massive Blood Transfusions
- Preeclampsia – ICU Admissions

#### PROCESS MEASURES

- Percentage of women who are assessed for preeclampsia on admission
- Percentage of women who are assessed for risk of OB hemorrhage on admission

## PART 3: APPROACHING YOUR AEA

### Suggested Bundles and Toolkits

- The California Maternal Quality Care Collaborative (CMQCC) Maternal Hemorrhage Toolkit 2.0. Retrieved at: [www.CMQCC.org](http://www.CMQCC.org)
- The CMQCC Severe Preeclampsia Toolkit. Retrieved at: [www.CMQCC.org](http://www.CMQCC.org)
- The Council on Patient Safety in Women’s Health Care Obstetric Hemorrhage Bundle. Retrieved at: [www.safehealthcareforeverywoman.org](http://www.safehealthcareforeverywoman.org)
- The Council on Patient Safety in Women’s Health Care Severe Hypertension Bundle. Retrieved at: [www.safehealthcareforeverywoman.org](http://www.safehealthcareforeverywoman.org)
- The Council on Patient Safety in Women’s Health Care Patient/Family/Staff Support Bundle. Retrieved at: [www.safehealthcareforeverywoman.org](http://www.safehealthcareforeverywoman.org)
- The Institute for Healthcare Improvement (IHI) How-to Guide: Prevent Obstetrical Adverse Events. Retrieved at: <http://www.ihl.org/resources/Pages/Tools/HowtoGuidePreventObstetricalAdverseEvents.aspx>
- For additional tools and resources related to recognizing and preventing obstetrical-related events and harm, visit [www.hret-hen.org](http://www.hret-hen.org).

### Investigate Your Problem and Implement Best Practices

Driver diagrams: A driver diagram visually demonstrates the causal relationship between your change ideas, secondary drivers, primary drivers and your overall aim. A description of each of these components is outlined in the table below. This change package reviews the components of the driver diagram to first, help you and your care team identify potential change ideas to implement at your facility and second, to show how this quality- improvement tool can be used by your team to tackle new process problems.

Aim	Primary Driver	Secondary Driver	Change Idea
		Secondary Driver	Change Idea
	Primary Driver	Secondary Driver	Change Idea

**AIM:** A clearly articulated goal or objective describing the desired outcome. It should be specific, measurable and time-bound.

**PRIMARY DRIVER:** System components or factors that contribute *directly* to achieving the aim.

**SECONDARY DRIVER:** Action, interventions or lower-level components necessary to achieve the primary driver.

**CHANGE IDEAS:** Specific change ideas that will support and achieve the secondary driver.

## Drivers in This Change Package

Reduce Harm From Maternal Hemorrhage	Standardize Readiness	Make emergency supplies available	Change Idea
	Standardize Recognition	Recognize of risk factors	Change Idea
	Standardize Response	Increase staff competency and comfort level	Change Idea
Reduce Harm From Severe Preeclampsia	Standardize Readiness	Make emergency supplies and medication available in all hospital areas	Change Idea
	Standardize Recognition	Implement early warning systems to identify high-risk patients	Change Idea
	Standardize Response	Implement standardized protocols	Change Idea
Reduce Harm from Perineal Trauma in Vaginal Deliveries	Standardize Practices to Reduce the Risk of Third or Fourth Degree Lacerations	Implement standardized protocols	Change Idea

## OVERALL AIMS: REDUCE HARM FROM MATERNAL HEMORRHAGE

### Primary Driver > Standardize Readiness

Postpartum hemorrhage is a low-volume, high risk event for hospitals. Birthing hospitals that have a response plan for hemorrhage have reported improved outcomes.<sup>8</sup> Early identification of postpartum hemorrhage may prevent death or severe maternal morbidity. Obstetric staff must be able to respond quickly with available supplies and equipment in preventing harm from postpartum hemorrhage.

### Secondary Driver > Make emergency supplies available

Emergency uterotonic medications and supplies, such as Bakri balloons and compression sutures, need to be readily available during an emergency. Keeping these supplies, along with a copy of the hospital's protocol in one standardized location can decrease confusion and the time required to gather supplies.

### Change Ideas

- + Have emergency supplies and medications readily available through the use of standardized hemorrhage carts or kits kept in strategic locations in the obstetrical unit.
- + With the assistance of physicians, clinicians, nurses and blood bank staff develop a hospital protocol for the response to hemorrhage. The protocol should detail the supplies, medications and personnel needed in an emergency. An example is the California Maternal Quality Care Collaborative (CMQCC) Maternal Hemorrhage Toolkit.

### Suggested Process Measures for Your Test of Change

- Assess the level of implementation for creating an emergency postpartum hemorrhage cart or kit in obstetric care areas
- Assess the level of implementation of a standardized policy for response to hemorrhage

### Primary Driver > Standardize Recognition

A majority of preventable obstetrical deaths are attributed to a delayed recognition of an emergency condition.<sup>9</sup> Hospitals must be prepared to quickly recognize an impending emergency in order to prevent harm.

### Secondary Driver > Recognize risk factors

Tools to assist hospitals in identifying an impending emergency, such as an early warning system or a system to document accurate, cumulative blood loss can help clinicians focus efforts on treatment early in an emergency as well as the early identification of patients at risk for harm. Alerts within the electronic medical record connected to risk assessments and cumulative blood loss may be helpful in early recognition of an impending emergency.

### Change Ideas

- + Use a trigger tool like the Modified Early Obstetric Warning System (MEOWS) to identify symptoms and physiologic changes indicative of an impending emergency.<sup>10</sup>
- + Use a risk assessment tool like the one developed by the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) to identify obstetric patients at risk for postpartum hemorrhage prior to delivery.<sup>11</sup>
- + Use a standardized hemorrhage clinical decision making tool based on amount of blood loss, like the one developed by the CMQCCC.<sup>12</sup>
- + Use standardized language to describe fetal heart monitor tracings, such as the one recommended by the Eunice Kennedy Shriver National Institute for Child Health and Human Development (NICHD).<sup>13</sup>
- + Use a standardized approach to document accurate, quantitative blood loss (instead of estimated blood loss) through the use of weighing pads and calibrated drapes.
- + Utilize alerts within the electronic medical record to notify clinicians of risk assessments and cumulative blood loss in deliveries.

### Suggested Process Measures for Your Test of Change

- Rate of adherence to hospital's postpartum hemorrhage protocol
- Rate of risk assessments completed for obstetric patients

## Primary Driver > Standardize Response

A swift, coordinated response is essential to ensuring that all emergency personnel, equipment, medications and blood products are available to the patient in a timely manner. Practicing the coordination of emergency responses through the use of simulation exercises assists the hospital in ensuring the process is viable.

## Secondary Driver > Increase staff competency and comfort level

Simulation exercises with all disciplines responsible for responding to obstetric emergencies are an opportunity to practice skills and identify areas of improvement. Participation in simulation exercises directly related to hemorrhage protocols has a positive effect on maintaining and improving competency levels of staff members.

### Change Ideas

- + Use simulation drills with all disciplines to determine opportunities to improve availability of emergency supplies and response to emergencies associated with postpartum hemorrhage.
- + Keep copies of the hospital protocol for responding to hemorrhage emergencies in all obstetrical patient care areas to ensure personnel are aware of the process for responding to postpartum hemorrhage emergencies.
- + Provide regular education to staff on the postpartum hemorrhage response plan.
- + Have a standardized debrief after every postpartum hemorrhage occurrence to discuss opportunities for improvement

### Suggested Process Measures for Your Test of Change

- Rate of staff participation in simulation drills for postpartum hemorrhage
- Ratio of debrief episodes following postpartum hemorrhage events

## Hardwire the Process

Postpartum hemorrhage is an emergency in obstetrics. Responding quickly to the emergency is dependent on the availability of emergency supplies and staff members' knowledge of roles and responsibilities. Keep a laminated copy of the hemorrhage protocol in every obstetric patient room so even registry and new staff have easy access to the plan. Retrieve and open the hemorrhage emergency cart during simulation drills to familiarize all staff with the contents and make improvements based on debriefs from simulation events.

# OVERALL AIMS: REDUCE HARM FROM SEVERE PREECLAMPSIA

## Primary Driver > Standardize Readiness

The biggest opportunity to prevent maternal mortality from severe preeclampsia is through the prevention of stroke. Controlling blood pressure is the best way to prevent stroke in obstetric patients. Hospitals must be ready to quickly identify and treat obstetric patients who present with blood pressure of greater than or equal to 160/110. Even those hospitals that do not provide obstetric services must be prepared for the possible postpartum patient in the emergency department. Severe preeclampsia can occur up to six weeks postpartum, and treatment of hypertension must occur within one hour to help prevent the possibility of stroke.

## Secondary Driver > Make emergency supplies and medication available in all hospital areas

Upon recognition of severe preeclampsia, treatment within a short period of time can decrease the risk of harm from elevated blood pressure. Keeping emergency antihypertensive medications in a centrally located and easily accessible location can cut down on the time to administer life saving treatment.

### Change Ideas

- + Have emergency antihypertensive medications readily available to be administered within 15-30 minutes of documented elevated blood pressure through the use of standardized preeclampsia kits kept in strategic locations in the hospital, wherever obstetric patients might present for care.
- + With the assistance of obstetric and emergency department staff, develop a hospital protocol for the response to severe preeclampsia. The protocol should detail the supplies, medications and personnel needed in an emergency, as well as a communication guideline for hospitals to communicate with regional perinatal centers prior to transferring obstetric emergency patients.

### Suggested Process Measures for Your Test of Change

- Assess implementation level of a standardized emergency medication kit in all areas of the hospital where obstetric patients might present for care
- Assess the level of implementation of a standardized treatment protocol for severe preeclampsia

### Primary Driver > Standardize Recognition

Early recognition and treatment of severe hypertension are critical to preventing maternal mortality. In order to prevent stroke, it is imperative to recognize and quickly treat worsening signs and symptoms of preeclampsia. A standardized tool to identify clinical signs or triggers of an impending emergency can help clinicians recognize and respond to severe preeclampsia.

### Secondary Driver > Implement early warning systems to identify high risk patients

The use of a clinical decision-making tool can help clinicians recognize an impending emergency and guide safe treatment. Clinicians can easily visualize trends that indicate the need for a bedside evaluation with a trigger tool or decision aid, which is based on vital sign findings, pulse oximetry and pain scale ratings, among other clinical conditions.

### Change Ideas

- + Standardize the definition of severe preeclampsia with systolic and diastolic parameters for blood pressure readings.
- + Use blood pressure cuffs appropriate to the size of the patient's arm when measuring blood pressure.
- + Use a standardized trigger tool to assist in clinical decision making based on blood pressure parameters and other symptoms, such as the one developed by the CMQCC.<sup>7</sup>

### Suggested Process Measures for Your Test of Change

- Assess the level of implementation of a standardized trigger tool for decision making
- Review the timeliness of medication administration following elevated blood pressure readings

### Primary Driver > Standardize Response

The critical intervention to decrease maternal mortality and morbidity, secondary to severe preeclampsia is to administer antihypertensive medications within 15-30 minutes of documentation of persistent blood pressure readings of greater than or equal to 160/110. Blood pressure should be reevaluated 15 minutes after the first elevated reading. Treatment should start within 15-30 minutes of the second elevated reading. Severe preeclampsia can develop up to six weeks postpartum, so it is essential that all areas of the hospital in which obstetric and postpartum patients may present are prepared to respond.

### Secondary Driver > Implement standardized protocols

Clinical personnel should be educated about the risk of stroke in severe preeclampsia and the need for immediate treatment. Severe preeclampsia can occur at up to six weeks postpartum. Areas of the hospital that may encounter a postpartum patient, even if the hospital does not provide obstetric services must be able to recognize the emergency and quickly treat the patient.

### Change Ideas

- + Conduct simulation drills in all areas of the hospital that OB and postpartum patients may present for care to determine opportunities for improvement.
- + Conduct a debrief with all disciplines after a patient with severe preeclampsia is treated to determine opportunities to improve care delivery.
- + Treat patients with appropriate antihypertensive medication within 15-30 minutes of a documented, sustained blood pressure of greater than or equal to 160/110.
- + Develop a standardized protocol for treatment and continuation of care for all patients with severe preeclampsia, such as the one developed by the CMQCC.<sup>7</sup>

### Suggested Process Measure for Your Test of Change

- Timelines of antihypertensive-medication administration for patients with severe preeclampsia

### Hardwire the Process

Severe preeclampsia can occur up to six weeks postpartum. All areas of the hospital where pregnant and postpartum patients might present need to be ready to treat a hypertensive emergency within 15–30 minutes. Place a severe-preeclampsia medication kit in all of those areas, including the ED. Collect data on timeliness of administration of antihypertensive medication to patients with a diagnosis of severe preeclampsia. Drill down in the data to ensure that compliance with the protocol is maintained in all areas. Train nurses to “believe the BP”. Time spent having the patient reposition, getting a different sized BP cuff or trying relaxation exercises could mean loss of perfusion. If the blood pressure is 160/110 or higher, repeat the blood-pressure reading in 15 minutes and treat if still high.

## OVERALL AIMS: REDUCE HARM FROM PERINEAL TRAUMA IN VAGINAL DELIVERIES

### Primary Driver > Standardize Practices to Reduce the Risk of Third or Fourth Degree Lacerations

Perineal injury through lacerations or tears during delivery can cause significant ongoing health issues for women. Third or fourth degree lacerations or tears that extend to the rectal tissue are associated with fecal incontinence and bleeding issues for mothers. While an abundance of peer reviewed evidence for successful efforts at reducing harm from lacerations is not available, the Association of Women’s Health, Obstetric and Neonatal Nurses (AWHONN) does have a program called Save the Perineum that was presented nationally and was aimed at prevention of harm. This program addresses methods hospitals can implement that are thought to decrease harm to mothers from significant perineal lacerations.<sup>14</sup>

While not a direct driver for the reduction of third and fourth degree lacerations in vaginal deliveries, the American College of Obstetricians and Gynecologists (ACOG) recommends against the routine use of episiotomy. ACOG notes that episiotomy procedures are associated with the extension of smaller lacerations into more significant degrees of laceration. Therefore, a standardized policy for episiotomy use that is linked to medical indications rather than the routine practice of episiotomies for most women in labor may assist hospitals to lower rates of extension of perineal trauma to third or fourth degree lacerations.

### Secondary Driver > Implement standardized protocols

Allow for perineal rest prior to pushing that includes the practice of “laboring down” after the mother reaches 10 centimeter cervical dilation. Wait for the mother to feel the urge to push naturally during the second stage of labor to allow for natural stretching of the perineum prior to delivery of the baby. Work with clinicians to develop a protocol that uses medical indications for the use of episiotomy, rather than allowing the routine use on most patients.<sup>15,16</sup>

### Change Ideas

- + Reduce the routine use of episiotomies during delivery.
- + Once the mother has reached 10 cm dilation, allow the baby to descend the birth canal naturally without pushing until the urge to push is felt naturally. This is known as “laboring down”. Encourage the mother to wait to push until the urge to push is felt.
- + Allow mothers to let their legs rest on the bed instead of being held by nurses or labor partners to allow for natural stretching of the perineum.

### Suggested Process Measure for Your Test of Change

- Rate of episiotomy use for all vaginal deliveries

### Hardwire the Process

Update training for labor and delivery nurses to include that patience and time are the best change ideas. Have a discussion with patients when they are admitted to labor and delivery and again when they are fully dilated, that the act of pushing will not start until the woman feels the urge to push. In addition, have the medical staff review the necessity of episiotomies performed in the organization as part of ongoing performance improvement reviews in quality committees.

## PDSA IN ACTION | TIPS ON HOW TO USE THE MODEL FOR IMPROVEMENT

Analyze data at the hospital level to determine which areas of harm are at highest risk. Utilize benchmark data to determine the highest risk areas that need attention first. Start with one area of potential harm in obstetrics and improve the process before moving on to another area of potential harm. Let data help guide decision making.

---

### Implement Small Tests of Change

Implementing an Emergency Hemorrhage Kit

#### PLAN

---

The objective is to make sure that all emergency supplies that might be needed for a postpartum hemorrhage are easily accessible and available in strategic places in the organization.

#### DO

---

Using input from frontline staff members in OB (obstetrician, sterile processing, pharmacy and blood bank), gather all necessary supplies in a cart or box than can be easily accessible in an emergency. Include instructions on how to access refrigerated medications and the blood bank in the emergency kit. Have staff members utilize the kit during a simulation session.

#### STUDY

---

During the debrief of the simulation session, determine if all necessary supplies were easily accessible in the emergency kit. Make changes based on the feedback from the staff utilizing the kit.

#### ACT

---

Once the kit is determined to contain all necessary supplies and the location is determined to be optimal, place the kit for use on the obstetric unit.

---

### Implement Small Tests of Change

Implementing an Emergency Severe Preeclampsia Medication Kit

#### PLAN

---

The objective is to make sure that all emergency antihypertensive medications that may be needed for a patient who presents with a diagnosis of severe preeclampsia will be easily accessible and available in strategic places in the organization.

#### DO

---

Using input from frontline staff members, physicians and pharmacists assemble a medication kit that can be kept in or near the medication delivery system in the obstetric, postpartum and emergency department patient care areas. Include printed and laminated clinical decision support tools for severe preeclampsia that includes drug dosages, as well as information for contacting the hospital's regional perinatal center if the hospital does not treat high risk obstetric patients. Have frontline staff members and physicians utilize the kit during a simulation session in both obstetric and emergency departments.

---

## STUDY

---

Following the simulation exercises, have all participants available for a debrief to discuss any difficulties in obtaining medications, communicating with the perinatal team or treating the patient. Make changes based on the feedback from the staff participating in the simulation exercise.

## ACT

---

Continue to test in simulation exercises until the kit is determined to contain all necessary supplies and the location of the kits in the obstetric, postpartum and emergency departments is determined to be optimal for on-going use.

---

## Implement Small Tests of Change

Implement a Process for the Review of Episiotomies

## PLAN

---

Gather retrospective data on overall episiotomy use for all patients in the last year or last quarter of deliveries, dependent upon volume.

## DO

---

Assemble a team of physician leaders in obstetrics to review the data and identify trends, and make recommendations for a policy that details medical indications for episiotomy use.

## STUDY

---

Review concurrent episiotomy cases and rates by physician, as well as third and fourth degree laceration rates before and after implementation of episiotomy policy.

## ACT

---

Send trends identified by concurrent review of episiotomy rates after policy implementation to the medical staff performance improvement committee for recommendations.

---

## Potential Barriers

Physicians and other clinicians may be reluctant to change practices or be resistant to care bundles that direct care. Lead with data from the local and national level to share the scope of the problem with maternal mortality and morbidity.

Following a severe maternal adverse event, clinicians often feel that they are solely to blame. Fear of the loss of reputation and fear of legal action can prevent clinicians from participating openly in an intensive review of the event. Provide support to clinicians as the second victims in the form of peer support and counseling if needed. Utilize a system of intensive review that focuses on identifying system redesigns to prevent the adverse event from occurring again.

Multiple emergency kits for multiple types of emergency situations may be difficult to maintain for some hospitals. Include only those medications or supplies that are most likely to be needed in an obstetric emergency.

## Enlist Administrative Leadership as Sponsors to Help Remove or Mitigate Barriers

- Implement frequent walking rounds with frontline staff and clinicians in the maternal-health care areas. Ask staff members what they believe the biggest risks to patient safety are in their place of work. Encourage open reporting and discussion. Talk openly about past adverse events and what the organization has done to improve care based on what was learned after the event. Make changes based on staff recommendations and provide feedback.
- Development of successful, refined practices requires resources such as staff time. Leadership support to gain these resources is necessary.

## Change not only “The Practice” but also “The Culture”

Early recognition and response to small changes in an obstetrical patient’s status can mean the difference between life and death. The majority of maternal deaths are from conditions that are absolutely preventable but not recognized in time.

A culture of safety that encourages staff, patients and patients’ family members to speak up when something seems wrong and that ensures concerns are taken seriously can help. Educate patients and their family members to verbalize concerns as they arise with staff members. Leadership rounds in the obstetric units should focus on frontline staff members and their concerns about safety hazards. A feedback loop should be established from the leadership team that details changes that have been made in the organization as a result of input from frontline staff members should be implemented to encourage open dialogues about patient safety.

## PART 4: CONCLUSION & ACTION PLANNING

Preventable harm during labor and delivery of an infant has especially poignant and far-reaching repercussions. Hospitals that work to prevent harm to mothers are working to improve the health of the next generation. The four “R’s” – Readiness, Recognition, Response and Reporting/Learning are the keys to making sustainable, reliable improvements. Below are next steps to implement the four “R’s”:

### **Physician Leaders:**

- Support efforts to establish an interdisciplinary standard of practice for the second stage of labor.
- Work with a unit-based team to examine the current state of obstetrical-harm prevention efforts.
- Share obstetrical-harm data (outcome and process measures) with clinicians and hospital leadership.
- Work with a unit based team to hardwire processes related to readiness, recognition, response, reporting and learning from obstetrical emergencies.

### **Unit Based Team:**

- Choose a process to audit (i.e., length of time of second stage of labor, ICU days or massive-transfusion protocol alerts).
- Enlist frontline nurses to help audit.
- Use audit data to guide PDSA efforts.
- Determine your hospital’s baseline rates for the obstetric-harm measures.
- Engage a physician leader and executive sponsor.
- Assemble a team of experts led by the disciplines taking care of maternal patients – clinicians, nurses, pharmacists, blood bank, etc.

### **Hospital Leadership:**

- Round on frontline staff to engage in a conversation about obstetrical-harm prevention successes and challenges.
- Ensure obstetrical-harm data are regularly reported to providers and hospital leadership.
- Support unit based teams in removing barriers to obstetrical-harm prevention.
- Provide leadership support to the team through resources and administrative time to develop protocols, emergency-management strategies and analysis of data.

### **Patient and Family Engagement:**

- Develop a plan to involve patients and their families in obstetrical-harm prevention efforts.
- Recruit a patient and family advisor who has experience with obstetrical harm or severe maternal morbidity to act as an advisor in obstetrical-harm prevention programming.

## PART 5: APPENDICES

### APPENDIX 1A: OB HARM TOP TEN CHECKLIST

**Associated Hospital/Organization:** AHA/HRET HEN 2.0

**Purpose of Tool:** A checklist to review current or initiate new interventions for OB-harm prevention in your facility

**Reference:** [www.hret-hen.org](http://www.hret-hen.org)

OB Harm Top Ten Checklist				
Process Change	In Place	Not Done	Will Adopt	Notes (Responsible and By When?)
Implement policies and protocols that align with nationally recognized evidence based practices, such as the ones developed by the Council on Patient Safety in Women's Healthcare. ( <a href="http://www.SafeHealthcareforEveryWoman.org">www.SafeHealthcareforEveryWoman.org</a> )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Complete an intensive, multidisciplinary review of all cases that meet the criteria of Severe Maternal Morbidity or Mortality in an effort to address systems issues and improve outcomes for patients.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Develop protocols and policies to address specific support for patients, families and staff following a significant adverse event in maternal health.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Implement standardized language such as National Institute of Child Health and Human Development (NICHD) to describe changes in fetal heart rates and ensure a shared mental model about the condition of baby during labor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize an obstetric early warning system such as the Modified Early Obstetric Warning System (MEOWS) as a trigger tool for an impending obstetric emergency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Develop an organization specific responses and clinical decision guide for triggers in the early warning system that includes expectations for response times for all team members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize simulation drills to practice the response to obstetric emergencies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Use data from past adverse events, simulation drills and early warning trigger tools to identify opportunities for and drive improvement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Include frontline maternal health staff members in quality improvement education.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Consider the use of alternative staffing of clinicians through the use of nurse midwives, laborists, obstetric hospitalists, doulas or a dedicated obstetric emergency department as methods to increase patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## APPENDIX 1B: OB HEMORRHAGE TOP TEN CHECKLIST

**Associated Hospital/Organization:** AHA/HRET HEN 2.0

**Purpose of Tool:** A checklist to review current or initiate new interventions for OB hemorrhage prevention in your facility

**Reference:** [www.hret-hen.org](http://www.hret-hen.org)

OB Hemorrhage Top Ten Checklist				
Process Change	In Place	Not Done	Will Adopt	Notes (Responsible and By When?)
Develop a hemorrhage cart with sutures, balloons, medications and a copy of the hospital's hemorrhage protocol to be kept in a secure, easily accessible area for nursing staff.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Develop a hospital decision making guide for the response to hemorrhage using an evidence based example, such as the Maternal Hemorrhage Toolkit found on <a href="http://www.CMQCC.org">www.CMQCC.org</a> , with the involvement of the blood bank, nurses and physicians.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Schedule simulation drills to practice the response to obstetrical emergencies, such as hemorrhage, on a regular basis.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Place copies of the hospital's hemorrhage protocol in prominent places in each patient room.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Document cumulative blood loss during delivery (instead of estimated blood loss) by using graduated drapes, weighing sponges and drapes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize a risk-assessment tool at prenatal visits, on admission, during labor and after delivery to document and alert staff of a patient's risk of hemorrhage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Establish a culture of huddles for high risk patients and post event debriefings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Review all hemorrhages that require four or more units of packed red blood cell transfusion with a perinatal improvement team to identify systems issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Include members from the blood bank, laboratory, pharmacy and unit secretary staff in the multidisciplinary perinatal quality improvement team tasked with customizing a massive transfusion plan for the organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize alerts within the electronic medical record to set up parameters for cumulative blood loss to alert clinicians of an impending hemorrhage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

# APPENDIX 1C: SEVERE PREECLAMPSIA TOP TEN CHECKLIST

**Associated Hospital/Organization:** AHA/HRET HEN 2.0

**Purpose of Tool:** A checklist to review current or initiate new interventions for severe preeclampsia prevention in your facility

**Reference:** [www.hret-hen.org](http://www.hret-hen.org)

Severe Preeclampsia Top Ten Checklist				
Process Change	In Place	Not Done	Will Adopt	Notes (Responsible and By When?)
Develop a hospital decision-making guide for the response to severe preeclampsia using an evidence-based example, such as the Preeclampsia Toolkit found on <a href="http://www.CMQCC.org">www.CMQCC.org</a> .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Schedule simulation drills to practice the response to obstetrical emergencies, such as severe preeclampsia in the emergency department, on a regular basis, and use the feedback after the event to improve future responses.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Place copies of the hospital's severe preeclampsia protocol in prominent places in each patient room for staff members to access in an emergency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Believe the blood pressure and treat it. Time wasted trying different patient positions and blood pressure cuff sizes to get a lower BP result can result in stroke.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Use policies, protocol examples and educational materials that are already created and available publicly from California Maternal Quality Care Collaborative (CMQCC) and the Council on Patient Safety for Women's Healthcare for the prevention of harm from severe preeclampsia.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Implement an emergency-medication kit for severe preeclampsia and keep it in all areas of the hospital that may treat obstetric patients, including the emergency department.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Review all obstetric adverse events, such as admission to the ICU, utilizing an intensive review format such as a root cause analysis (RCA) format.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Utilize alerts within the electronic medical record to set up parameters for blood pressure to alert clinicians of an impending emergency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Establish a culture of huddles for high risk patients and post-event debriefings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hospitals that do not provide obstetric services should still be prepared to treat and transfer postpartum patients with severe preeclampsia, as the condition can occur up to six weeks post-partum. A medication kit with antihypertensive medication, a copy of the hospital's protocol for treatment of severe preeclampsia as well as instructions for transfer to the nearest regional perinatal center is of great assistance in these situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

# APPENDIX II: CMQCC OBSTETRIC HEMORRHAGE CARE GUIDELINES: TABLE CHART FORMAT

**Associated Hospital/Organization:** California Maternal Quality Care Collaborative

**Purpose of Tool:** Decision aid for treatment decisions in post-partum hemorrhage

**Reference:** California Maternal Quality Care Collaborative Obstetric Hemorrhage Toolkit 2.0, copyright California Department of Public Health 2009 Retrieved from: <https://www.cmqcc.org/resource/ob-hem-emergency-management-plan-table-chart>

 <b>Obstetric Hemorrhage Emergency Management Plan: Table Chart Format</b> <small>version 2.0</small>			
	Assessments	Meds/Procedures	Blood Bank
<b>Stage 0</b>			
<b>Every woman in labor/giving birth</b>			
<i>Stage 0 focuses on risk assessment and active management of the third stage.</i>	<ul style="list-style-type: none"> <li>Assess every woman for risk factors for hemorrhage</li> <li>Measure cumulative quantitative blood loss on every birth</li> </ul>	<b>Active Management 3<sup>rd</sup> Stage:</b> <ul style="list-style-type: none"> <li>Oxytocin IV infusion or 10u IM</li> <li>Fundal Massage- vigorous, 15 seconds min.</li> </ul>	<ul style="list-style-type: none"> <li>If Medium Risk: T &amp; Scr</li> <li>If High Risk: T&amp;C 2 U</li> <li>If Positive Antibody Screen (prenatal or current, exclude low level anti-D from RhoGam):T&amp;C 2 U</li> </ul>
<b>Stage 1</b>			
<b>Blood loss: &gt; 500ml vaginal or &gt;1000 ml Cesarean, or VS changes (by &gt;15% or HR ≥110, BP ≤85/45, O2 sat &lt;95%)</b>			
<i>Stage 1 is short: activate hemorrhage protocol, initiate preparations and give Methergine IM.</i>	<ul style="list-style-type: none"> <li>Activate OB Hemorrhage Protocol and Checklist</li> <li>Notify Charge nurse, OB/CNM, Anesthesia</li> <li>VS, O2 Sat q5'</li> <li>Record cumulative blood loss q5-15'</li> <li>Weigh bloody materials</li> <li>Careful inspection with good exposure of vaginal walls, cervix, uterine cavity, placenta</li> </ul>	<ul style="list-style-type: none"> <li>IV Access: at least 18gauge</li> <li>Increase IV fluid (LR) and Oxytocin rate, and repeat fundal massage</li> <li>Methergine 0.2mg IM (if not hypertensive) May repeat if good response to first dose, BUT otherwise <u>move on</u> to 2<sup>nd</sup> level uterotonic drug (see below)</li> <li>Empty bladder: straight cath or place foley with urimeter</li> </ul>	<ul style="list-style-type: none"> <li>T&amp;C 2 Units PRBCs (if not already done)</li> </ul>
<b>Stage 2</b>			
<b>Continued bleeding with total blood loss under 1500ml</b>			
<i>Stage 2 is focused on sequentially advancing through medications and procedures, mobilizing help and Blood Bank support, and keeping ahead with volume and blood products.</i>	<ul style="list-style-type: none"> <li>OB back to bedside (if not already there)</li> <li>Extra help: 2<sup>nd</sup> OB, Rapid Response Team (per hospital), assign roles</li> <li>VS &amp; cumulative blood loss q 5-10 min</li> <li>Weigh bloody materials</li> <li>Complete evaluation of vaginal wall, cervix, placenta, uterine cavity</li> <li>Send additional labs, including DIC panel</li> <li>If in Postpartum: Move to L&amp;D/OR</li> <li>Evaluate for special cases:                             <ul style="list-style-type: none"> <li>Uterine Inversion</li> <li>Amn. Fluid Embolism</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>2<sup>nd</sup> Level Uterotonic Drugs:                             <ul style="list-style-type: none"> <li>Hemabate 250 mcg IM or</li> <li>Misoprostol 800 mcg SL</li> </ul> </li> <li>2<sup>nd</sup> IV Access (at least 18gauge)</li> <li>Bimanual massage</li> <li>Vaginal Birth: (typical order)                             <ul style="list-style-type: none"> <li>Move to OR</li> <li>Repair any tears</li> <li>D&amp;C: r/o retained placenta</li> <li>Place intrauterine balloon</li> <li>Selective Embolization (Interventional Radiology)</li> </ul> </li> <li>Cesarean Birth: (still intra-op) (typical order)                             <ul style="list-style-type: none"> <li>Inspect broad lig, posterior uterus and retained placenta</li> <li>B-Lynch Suture</li> <li>Place intrauterine balloon</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Notify Blood Bank of OB Hemorrhage</li> <li>Bring 2 Units PRBCs to bedside, transfuse per clinical signs – do not wait for lab values</li> <li>Use blood warmer for transfusion</li> <li>Consider thawing 2 FFP (takes 35+min), use if transfusing &gt; 2u PRBCs</li> <li>Determine availability of additional RBCs and other Coag products</li> </ul>
<b>Stage 3</b>			
<b>Total blood loss over 1500ml, or &gt;2 units PRBCs given or VS unstable or suspicion of DIC</b>			
<i>Stage 3 is focused on the Massive Transfusion protocol and invasive surgical approaches for control of bleeding.</i>	<ul style="list-style-type: none"> <li>Mobilize team                             <ul style="list-style-type: none"> <li>Advanced GYN surgeon</li> <li>2<sup>nd</sup> Anesthesia Provider</li> <li>OR staff</li> <li>Adult Intensivist</li> </ul> </li> <li>Repeat labs including coags and ABG's</li> <li>Central line</li> <li>Social Worker/ family support</li> </ul>	<ul style="list-style-type: none"> <li>Activate Massive Hemorrhage Protocol</li> <li>Laparotomy:                             <ul style="list-style-type: none"> <li>B-Lynch Suture</li> <li>Uterine Artery Ligation</li> <li>Hysterectomy</li> </ul> </li> <li>Patient support                             <ul style="list-style-type: none"> <li>Fluid warmer</li> <li>Upper body warming device</li> <li>Sequential compression stockings</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Transfuse Aggressively Massive Hemorrhage Pack                             <ul style="list-style-type: none"> <li>Near 1:1 PRBC:FFP</li> <li>1 PLT apheresis pack per 4-6 units PRBCs</li> </ul> </li> <li>Unresponsive Coagulopathy:                             <ul style="list-style-type: none"> <li>After 8-10 units PRBCs and full coagulation factor replacement: may consult re rFactor VIIa risk/benefit</li> </ul> </li> </ul>

Copyright California Department of Public Health, 2014, supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Hemorrhage Taskforce. Visit [www.CMQCC.org](http://www.CMQCC.org) for details.

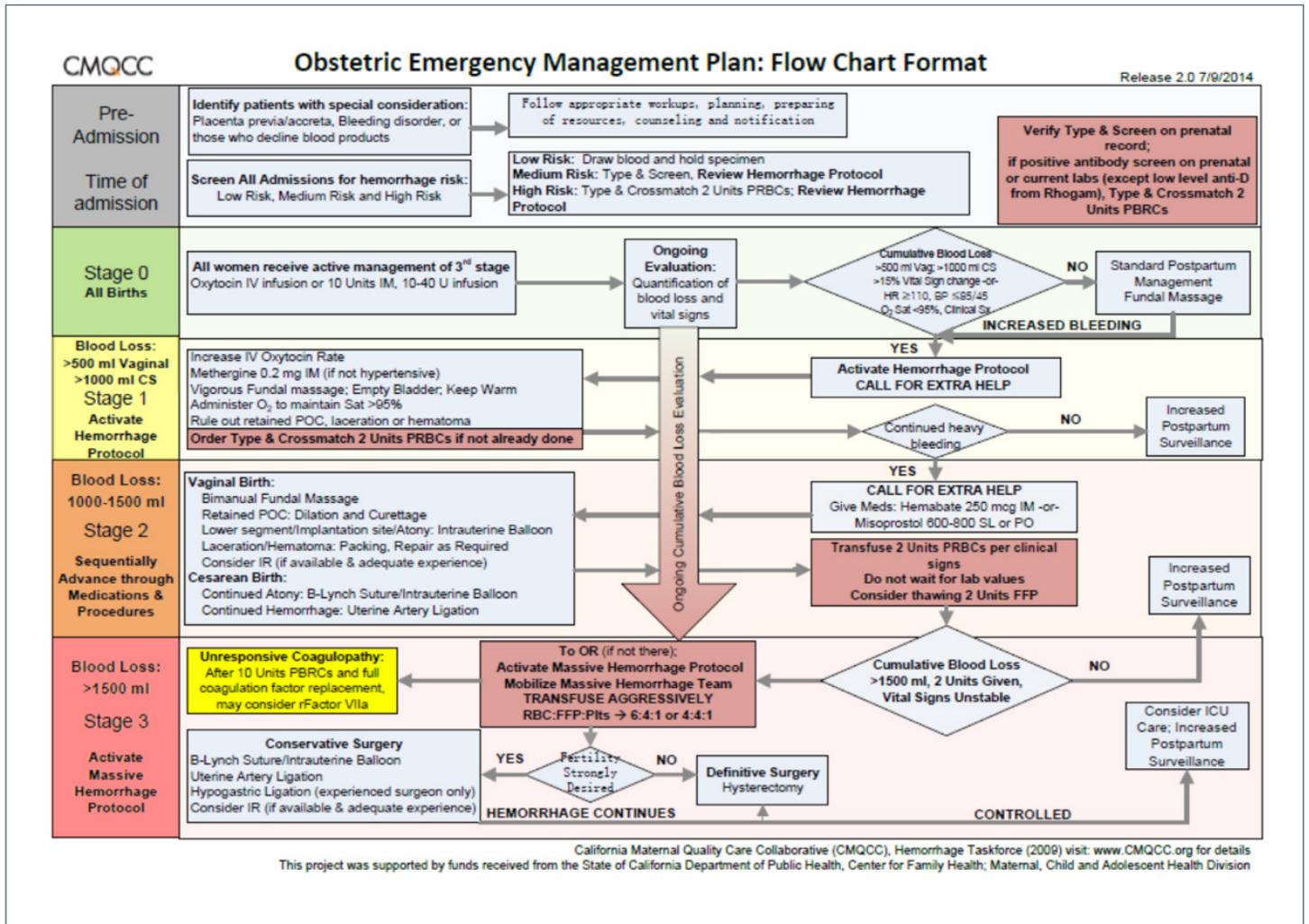
# APPENDIX III: CMQCC OBSTETRIC HEMORRHAGE CARE GUIDELINES: FLOW CHART FORMAT

**Associated Hospital/Organization:** California Maternal Quality Care Collaborative

**Purpose of Tool:** Decision aid for treatment decisions in post-partum hemorrhage

**Reference:** California Maternal Quality Care Collaborative Obstetric Hemorrhage Toolkit 2.0, copyright California Department of Public Health 2009.

Retrieved from <https://www.cmqcc.org/resource/ob-hem-emergency-management-plan-flow-chart>



## APPENDIX IV: CMQCC PREECLAMPSIA EARLY RECOGNITION TOOL

**Associated Hospital/Organization:** California Maternal Quality Care Collaborative

**Purpose of Tool:** Early warning tool in the recognition of severe preeclampsia and decision aid for treatment

**Reference:** California Maternal Quality Care Collaborative Severe Preeclampsia Toolkit, California Department of Public Health 2013. Retrieved from: <https://www.cmqcc.org/resource/preeclampsia-early-recognition-tool-pert>

ASSESS	NORMAL (Green)	WORRISOME (Yellow)	SEVERE (Red)
<b>Awareness</b>	Alert/oriented	+ Agitated/confused + Drowsy + Difficulty speaking	Unresponsive
<b>Headache</b>	None	+ Mild headache + Nausea, vomiting	Unrelieved headache
<b>Vision</b>	None	Blurred or impaired	Temporary blindness
<b>Systolic BP (mm HG)</b>	100-139	140-159	≥160
<b>Diastolic BP (mm HG)</b>	50-89	90-105	≥105
<b>HR</b>	61-110	111-129	≥130
<b>Respiration</b>	11-24	25-30	<10 or >30
<b>SOB</b>	Absent	Present	Present
<b>O2 Sat (%)</b>	≥95	91-94	≤90
<b>Pain: Abdomen or Chest</b>	None	+ Nausea, vomiting + Chest pain + Abdominal pain	+ Nausea, vomiting + Chest pain + Abdominal pain
<b>Fetal Signs</b>	+ Category I + Reactive NST	+ Category II + IUGR + Non-reactive NST	Category III
<b>Urine Output (ml/hr)</b>	≥50	30-49	≤30 (in 2 hrs)
<b>Proteinuria</b> (Level of proteinuria is not an accurate predictor of pregnancy outcome)	Trace	+ > +1** + ≥300mg/24 hours	
<b>Platelets</b>	>100	50-100	≤30 (in 2 hrs)
<b>AST/ALT</b>	<70	>70	>70
<b>Creatinine</b>	<0.8	0.9-1.1	>1.2
<b>Magnesium Sulfate Toxicity</b>	+ DTR +1 + Respiration 16-20	Depression of patellar reflexes	Respiration <12

APPENDIX IV: CMQCC PREECLAMPSIA EARLY RECOGNITION TOOL  
(CONTINUED)

GREEN = NORMAL Proceed with protocol		
<b>YELLOW = WORRISOME</b> Increase assessment frequency	# Triggers 1	<b>To do</b> + Notify provider
	≥2 # Triggers	+ Notify charge RN + In-person evaluation + Order labs/tests + Anesthesia consult + Consider magnesium sulfate + Supplemental oxygen  **Physician should be made aware of worsening or new-onset proteinuria
<b>RED = SEVERE</b>	<b>Trigger: 1 of any type listed below</b>  1 of any type	<b>To do</b> + Immediate evaluation + Transfer to higher acuity level + 1:1 staff ratio
	Awareness	+ Consider Neurology consult
	Headache	+ CT Scan
	Visual	+ R/O SAH/intracranial hemorrhage
	BP	+ Labetalol/hydralazine in 30 min + In-person evaluation + Magnesium sulfate loading or maintenance infusion
	Chest Pain	+ Consider CT angiogram
	Respiration	+ O2 at 10 L per rebreather mask
	SOB	+ R/O pulmonary edema
	O2 SAT	+ Chest x-ray

## PART 6: REFERENCES

1. Angioli R, Gómez-Marín O, Cantuaria G, O'sullivan MJ. Severe perineal lacerations during vaginal delivery: the University of Miami experience. *American Journal of Obstetrics & Gynecology*. 2000 May;182(5):1083-5. PubMed PMID: 10819834.
2. Sheiner E, Levy A, Walfisch A, Hallak M, Mazor M. Third degree perineal tears in a university medical center where midline episiotomies are not performed. *Archives of Gynecology & Obstetrics*. 2005 Apr;271(4):307-10. Epub 2004 Mar 16. PubMed PMID: 15024575.
3. Creanga, A. A., Berg, C. J., Ko, J. Y., Farr, S. L., Tong, V. T., Bruce, F., & Callaghan, W. M. (2014). Maternal Mortality and Morbidity in the United States: Where Are We Now? *Journal of Womens Health*, 3-9.
4. Callaghan, W., Creanga, A., & Kuklina, E. (2012). Severe maternal morbidity among delivery and postpartum hospitalizations in the United States. *Obstetric & Gynecology Journal*, 1029-36.
5. Coeytaux, F., Bingham, D., & Strauss, N. (2011). Maternal Mortality in the United States: A Human Rights Failure. Editorial. *Contraception*, 189-93.
6. California Department of Public Health. *The California Pregnancy-Associated Mortality Review*. Report from 2002 and 2003 Maternal Death Reviews. California Department of Public Health, Maternal Child and Adolescent Health Division. Sacramento. 2011.
7. Main, E., Morton, C., Hopkins, D., Giuliani, G., Melsop, K., & Gould, J. (2011). *Cesarean Deliveries, Outcomes, and Opportunities for Change in California: Toward a Public Agenda for Maternity Care Safety and Quality*. Retrieved from California Maternal Quality Collaborative: <http://www.cmqcc.org>
8. Shields LE, Smalarz K, Reffigee L, Mugg S, Burdumy TJ, Propst M. Comprehensive maternal hemorrhage protocols improve patient safety and reduce utilization of blood products. *American Journal of Obstetrics & Gynecology*. Oct 2011;205(4):368 e361-368.
9. California Department of Public Health. *The California Pregnancy-Associated Mortality Review*. Report from 2002 and 2003 Maternal Death Reviews. California Department of Public Health, Maternal Child and Adolescent Health Division. Sacramento. 2011.
10. Lewis G, *Saving Mothers' Lives*, 2007. Retrieved from <http://www.publichealth.hscni.net/sites/default/files/Saving%20Mothers'%20Lives%202003-05%20.pdf>
11. Association of Women's Health, *Obstetric and Neonatal Nurses*. Retrieved from <http://www.awhonn.org/>
12. *Improving Health Care Response to Obstetric Hemorrhage*, Version 2.0: A California Toolkit to Transform Maternity Care. (2015, March 1). Retrieved from <https://www.cmqcc.org/resources-tool-kits/toolkits/ob-hemorrhage-toolkit>
13. Macones GA, Hankins GDV, Spong CY, Hauth J, Moore T. The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring: update on definitions, interpretation, and research guidelines. *Obstetrics & Gynecology Journal* 2008;112:661– 6.
14. Burke C, Centanni E, Save the Perineum! A Protocol to Reduce Perineal Trauma. *Journal of Obstetric, Gynecologic, & Neonatal Nursing Special Issue: 2013 Convention Proceedings Volume 42, Issue s1, page S3, June 2013 DOI: 10.1111/1552-6909.12048*
15. Nager, et al. Episiotomy increases perineal laceration length in primiparous women. *American Journal of Obstetric & Gynecology* 2001;185: 444-450.
16. ACOG Practice Bulletin. *Episiotomy*. Number 71. April 2006. Pages 829-834.

