Introducing the National Partnership for Maternity Safety: Bundle 1--Obstetric Hemorrhage

Elliott K. Main, MD
Director, California Maternal Quality Care Collaborative
Chair, CA Pregnancy-Associated Mortality Review Committee
Chair, ACOG-CDC National Maternal Mortality “Action” Committee

Main@CMQCC.org
Objectives:

- You will be able to describe the national efforts to reduce maternal mortality and morbidity
- You will be able to describe the key components of the hemorrhage safety bundles
- You be able to take the first steps to implement the bundle in your birthing facility

Disclosures:

- Dr. Main has no conflicts and no disclosures
National Maternal Health Initiative: Strategies to Improve Maternal Health And Safety

May 5th 2013
New Orleans, LA
“What every birthing facility in the US should have…”
Maternal Mortality Rate, California and United States; 1999-2010

SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2010. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95, O98-O99) for 1999-2010. United States data and HP2020 Objective were calculated using the same methods. U.S. maternal mortality rates are published by the National Center for Health Statistics (NCHS) through 2007 only. Rates for 2008-2010 were calculated using NCHS Final Birth Data (denominator) and CDC Wonder Online Database for maternal deaths (numerator). Accessed at http://wonder.cdc.gov/ucd-icd10.html on Apr 17, 2013 8:00:39 PM. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, April, 2013.
Pregnancy-Related Mortality in the United States

Mortality (%)

- Hemorrhage
- Thrombotic pulmonary embolism
- Amniotic fluid embolism
- Hypertensive disorders of pregnancy
- Cardiomyopathy
- Anesthesia
- Cerebrovascular accident
- Cardiovascular conditions
- Noncardiovascular medical conditions

Cause of death

# Maternal Mortality and Severe Morbidity

Approximate distributions, compiled from multiple studies

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mortality (1-2 per 10,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE and AFE</td>
<td>15%</td>
</tr>
<tr>
<td>Infection</td>
<td>10%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>15%</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>15%</td>
</tr>
<tr>
<td>Cardiac Disease</td>
<td>25%</td>
</tr>
</tbody>
</table>
Maternal Mortality and Severe Morbidity
Approximate distributions, compiled from multiple studies

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mortality (1-2 per 10,000)</th>
<th>ICU Admit (1-2 per 1,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE and AFE</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>Infection</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Cardiac Disease</td>
<td>25%</td>
<td>20%</td>
</tr>
</tbody>
</table>
# Maternal Mortality and Severe Morbidity

Approximate distributions, compiled from multiple studies

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mortality (1-2 per 10,000)</th>
<th>ICU Admit (1-2 per 1,000)</th>
<th>Severe Morbid (1-2 per 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE and AFE</td>
<td>15%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Infection</td>
<td>10%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>15%</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>15%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Cardiac Disease</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Cause</td>
<td>Mortality (1-2 per 10,000)</td>
<td>ICU Admit (1-2 per 1,000)</td>
<td>Severe Morbid (1-2 per 100)</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------</td>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>VTE and AFE</td>
<td>15%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Infection</td>
<td>10%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>15%</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>15%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Cardiac Disease</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Many Streams of Activity Came Together in New Orleans: ACOG ACM May 2013
Many Streams of Activity Came Together in New Orleans: ACOG ACM May 2013

Examples of Current Large-scale Projects Addressing Maternal Mortality & SMM

ACOG/CDC
Maternal Mortality Action Committee

SMFM:
“M back in MFM group”

State Quality Improvement Collaboratives

AWHONN

HRSA: MCH-B

CDC

AMCHP
Maternal Safety Bundles
SMFM/ACOG/AWHONN workgroups

- Obstetric Hemorrhage
- Hypertension in Pregnancy
- Prevention of VTE in Pregnancy

---

Strong support that every hospital needs to have “a” protocol and bundle, not “the” protocol

Each safety bundle is designed with key components / tools with example materials
ACOG/CDC workgroups on Maternal Safety Bundles

• Maternity Care QI: Importance of Process – David Lagrew
  Common issues in introducing change (safety bundles)

• Maternal Early Warning Criteria - Jill Mhyre
  Criteria to identify women who require immediate bedside assessment by an MD

• Severe Maternal Morbidity Facility Review – Sarah Kilpatrick,
  Every case should be reviewed by a multidisciplinary team with a goal of systems improvement

• Staff, Family and Patient Support – Cynthia Chazotte
  Support resources for all those involved in a severe maternal morbidity or mortality
Now 3 years old…
• Washington DC, July 29, 2013
• Formal Support and Endorsement of National Partnership for Maternal Safety
• Will coordinate dissemination and Implementation among the following agencies:
Creating the Collaborative for Change

Maternal Safety

Obstetricians (ACOG/SMFM/ACOOG)
Nurses (AWHONN)
Midwives (ACNM)
Nurse Practitioners (NPWH)
Direct Providers

Family Practice (AAFP)
OB Anesthesia (SOAP)
Blood Banks (AABC)
Hospitals (AHA, VHA)
Birthing Centers (AABC)

Perinatal Quality Collaboratives (many)

Federal (MCH-B, CDC, CMS/CMMI)

State (AMCHP, ASTHO, MCH)

Safe, Credentials (TJC)
For many American obstetricians, maternal mortality has been considered a problem of the past, successfully put to bed, with asepsis and antibiotics conquering childbirth fever and blood transfusions saving mothers from hemorrhage. The impressive decline of U.S. maternal deaths from 850 per 100,000 live births in 1900 to 7.4 per 100,000 in 1986 would have supported that interpretation. However, during the past 20 years, the United States has seen a reversal in this trend. The U.S. maternal morality ratio has doubled to 14.5, with rates among African American women reaching 37.7, which is threefold to fourfold higher than rates among white women. We do not fare well when compared with other high-resource countries, and some see this as evidence of serious problems in the American system of maternity care.

The study in this issue by Saucedo and colleagues (see page 752) examining French maternal deaths from 1998 to 2007 provides an opportunity for comparison. In their population, maternal deaths did not increase from the first 5-year period (8.8 per 100,000) to the last 5 years (8.4 per 100,000) despite an increase in prevalence of advanced maternal age, obesity, and cesarean delivery (though the rates of the last 2 years are still considerably lower than in the United States). This is important as Americans analyze their national statistics because the increase in maternal comorbidities often is blamed for the increase in mortality.

Counting maternal deaths on a population basis is, surprisingly, very difficult. The rarity and multiple potential locations of death beyond the obstetric service require the use of death certificates. However, careful studies have estimated that up to 38% of maternal deaths have been unidentified on death certificates. This under-reporting has led all jurisd-
Maternity Safety Bundles: “Three R’s”

- Readiness
- Recognition
- Response
Maternity Safety Bundles: “Three R’s”

- Readiness
- Recognition
- Response
- Reporting / Measuring
- pRevention / Learning
Everyone’s nightmare...
Obstetric Hemorrhage Safety Bundle

Readiness:
- Hemorrhage Cart / with Procedural Instructions (balloons, stitches)
- Partnership with Blood Bank
- Regular unit-based drills (with debriefs)
- Ensure rapid availability of medications
- Establish easily availability for special case resources
- Unit Education to protocols

Recognition:
- Assessment of hemorrhage risk on admission and late in labor
- Early Warning Tool for vital signs and symptoms
- Assessment of semi-quantitative CUMMULATIVE blood loss

Response:
- Unit-standard OB Hemorrhage Protocol with checklists

Prevention / Learning:
- Universal use of Active Management of 3rd Stage
- Establish a culture of Post-event Debrief / Huddle
- Review all serious cases for systems issues (mini RCA format)
Key OB Hemorrhage QI Toolkits

A California Toolkit to Transform Maternity Care

Improving Health Care Response to Obstetric Hemorrhage

THIS COLLABORATIVE PROJECT WAS DEVELOPED BY:
THE OBSTETRIC HEMORRHAGE TASK FORCE
THE MATERNAL QUALITY IMPROVEMENT PANEL
CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE
MATERNAL, CHILD AND ADOLESCENT HEALTH DIVISION, CENTER FOR FAMILY HEALTH
CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

Optimizing Protocols in Obstetrics

MANAGEMENT of OBSTETRIC HEMORRHAGE

SERIES 2

ACOG
THE AMERICAN CONGRESS OF OBSTetricIANS AND GYNECOLOGISTS
DISTRICT II
Obstetric Hemorrhage is Increasing

- The United States, Australia and Scotland have all reported increases in rates of severe complications of childbirth that have been almost entirely due to increases in the use of blood transfusions and/or severe obstetric hemorrhage [30-55%] (1).
- In these countries it appears that not only are PPH rates increasing but so is the hemorrhage severity (1).
- The rates of transfusion in the United States has increased by 92% during delivery hospitalization between 1997 and 2005 (2).

FIGURE 1
Annual postpartum hemorrhage rates (United States, 1994–2006)

Not only is Atony increasing, it is more severe.

Safety Bundle for OB Hemorrhage Checklist for Every Hospital

- Risk Assessment tool
- Quantification of blood loss
- Trigger tool/ Early identification
- OB Hemorrhage Protocol with stages
  - Nursing checklists,
- Hemorrhage Cart (equipment) / Kit (meds)
- Instruction cards for new procedures
  - Balloons, compression sutures
- Massive Transfusion Protocol (that includes OB)
- Debrief tool
- Drills (with scenarios)
Hemorrhage Risk Assessment

- Evaluation at Admission
  - Multiple gestation, macrosomia, polyhydramnios
  - History of PPH, coagulation problems, anemia
  - Prior CS, previa or abruption
- Evaluation at Late labor/2nd Stage
  - Long labor, prolonged oxytocin (>12hrs)
  - Chorioamnionitis
  - Prolonged Magnesium SO4 use
- Anticipation
  - Blood bank, back-ups
Formal Quantification of Blood Loss at Birth (QBL)

- How can we improve the clinical measurement of blood loss during vaginal and cesarean birth?
- How can communication of blood loss be improved among caregivers?
Methods to Estimate Blood Loss

1. Weigh sponges and pads with known dry weight
2. Visual estimate of clots / pads
3. Use graduated drapes/containers

- 18 x 18 inch dry lap sponge
  - 25 ml
  - 50 ml
  - 75 ml
  - 100 ml

- Blood loss at obstetric haemorrhage:
  - PPH on bed only
    - 1000 ml
  - PPH spilling to floor
    - 2000 ml
  - Full kidney dish
    - 500 ml
Best Method to Quantitate Blood Loss

- Use graduated collection containers (C/S and vaginal deliveries)
  - Account for other fluids (amniotic fluid, urine, irrigation)
  - In most births, the large majority of bleeding occurs after the delivery of the placenta, providing a moment to stop and establish a baseline of other fluids
- Weigh lap sponges in their “counting” plastic bag and compare to dry weight
Vital Signs are Often Ignored
Concept of “Triggers”

- Triggers identify patients that need more attention (from on-call physician, in-house physician, or rapid response team (RRT))
- Prevent such patients from being ignored
- Independent of diagnosis, useful for all OB emergencies
- Used in many areas of hospital medicine
<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Every woman in labor/giving birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments</td>
<td>Meds/Procedures</td>
</tr>
<tr>
<td>Every woman in labor/giving birth</td>
<td>Active Management 3rd Stage:</td>
</tr>
<tr>
<td>Assess every woman for risk factors for hemorrhage</td>
<td>• Oxytocin IV infusion or 10u IM</td>
</tr>
<tr>
<td>Ongoing quantitative evaluation of blood loss on every birth</td>
<td>• Fundal Massage-vigorous, 15 seconds min.</td>
</tr>
</tbody>
</table>

Stage 0 focuses on risk assessment and active management of the third stage.

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Blood loss: &gt;500 ml vaginal or &gt;1000 ml Cesarean, or VS changes (by &gt;15% or HR ≥110, BP ≤85/45, O2 sat &lt;95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments</td>
<td>Meds/Procedures</td>
</tr>
<tr>
<td>Stage 1 is short: activate hemorrhage protocol, initiate preparations and give Methergine IM.</td>
<td>• IV Access: at least 18gauge</td>
</tr>
<tr>
<td>• Activate OB Hemorrhage Protocol and Checklist</td>
<td>• Increase Oxytocin rate, and repeat fundal massage</td>
</tr>
<tr>
<td>• Notify Charge nurse, Anesthesia Provider</td>
<td>• Methergine 0.2mg IM (if not hypertensive)</td>
</tr>
<tr>
<td>• VS, O2 Sat q5'</td>
<td>May repeat if good response to first dose, BUT otherwise move on to 2nd level uterotonic drug (see below)</td>
</tr>
<tr>
<td>• Calculate cumulative blood loss q5-15'</td>
<td>• Empty bladder: straight cath or place foley with urimeter</td>
</tr>
<tr>
<td>• Weigh bloody materials</td>
<td></td>
</tr>
<tr>
<td>• Careful inspection with good exposure of vaginal walls, cervix, uterine cavity, placenta</td>
<td></td>
</tr>
</tbody>
</table>

Stage 2 | Continued bleeding with total blood loss under 1500ml |
### Stage 2 - Continued bleeding with total blood loss under 1500ml

<table>
<thead>
<tr>
<th>OB back to bedside (if not already there)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra help: 2nd OB, Rapid Response Team (per hospital), assign roles</td>
</tr>
<tr>
<td>VS &amp; cumulative blood loss q 5-10 min</td>
</tr>
<tr>
<td>Weigh bloody materials</td>
</tr>
<tr>
<td>Complete evaluation of vaginal wall, cervix, placenta, uterine cavity</td>
</tr>
<tr>
<td>Send additional labs, including DIC labs</td>
</tr>
<tr>
<td>If in Postpartum: Move to L&amp;D/OR</td>
</tr>
<tr>
<td>Evaluate for special cases:</td>
</tr>
<tr>
<td>- Uterine Inversion</td>
</tr>
<tr>
<td>- Amn. Fluid Embolism</td>
</tr>
</tbody>
</table>

#### 2nd Level Uterotonic Drugs:

- Hemabate 250 mcg IM or
- Misoprostol 800-100 mcg PR

#### 2nd IV Access (at least 18gauge)

- Bimanual massage

#### Vaginal Birth: (typical order)

- Move to OR
- Repair any tears
- D&C: t/o retained placenta
- Place intrauterine balloon
- Selective Embolization (Interventional Radiology)

#### Cesarean Birth: (still intra-op) (typical order)

- Inspect broad lig, posterior uterus and retained placenta
- B-Lynch Suture
- Place intrauterine balloon

- Notify Blood Bank of OB Hemorrhage
- Bring 2 Units PRBCs to bedside, transfuse per clinical signs – do not wait for lab values
- Use blood warmer for transfusion
- Consider thawing 2 FFP (takes 35+min), use if transfusing >2u PRBCs
- Determine availability of additional RBCs and other Coag products

### Stage 3 - Total blood loss over 1500ml, or >2 units PRBCs given or VS unstable or suspicion of DIC

<table>
<thead>
<tr>
<th>Mobilize team -Advanced GYN surgeon</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 2nd Anesthesia Provider</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activate Massive Hemorrhage Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Laparotomy:</td>
</tr>
<tr>
<td>- B-Lynch Suture</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transfuse Aggressively</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massive Hemorrhage Pack</td>
</tr>
<tr>
<td>- Near 1:1 PRBC:FFP</td>
</tr>
<tr>
<td>- 1 PLT dose immediate</td>
</tr>
</tbody>
</table>

Stage 3 is focused on the Mission...
Every hospital will need to customize the protocol—but the point is every hospital needs one.
# STAGE 1: OB Hemorrhage

<table>
<thead>
<tr>
<th>MOBILIZE</th>
<th>ACT</th>
<th>THINK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary nurse, Physician or Midwife to:</strong></td>
<td><strong>Primary nurse:</strong></td>
<td><strong>Consider potential etiology:</strong></td>
</tr>
<tr>
<td>□ Activate OB Hemorrhage Protocol and Checklist</td>
<td>□ Establish IV access if not present, at least 18 gauge</td>
<td>Uterine atony</td>
</tr>
<tr>
<td>□ Notify obstetrician (in-house and attending)</td>
<td>□ Increase IV fluids rates (Lactated Ringers preferred) and increase Oxytocin rate (500 mL/hour of 10-40 units/1000 mL solution); Titrate Oxytocin infusion rate to uterine tone</td>
<td>Trauma/Laceration</td>
</tr>
<tr>
<td>□ Notify charge nurse</td>
<td>□ Continue vigorous fundal massage</td>
<td>Retained placenta</td>
</tr>
<tr>
<td>□ Notify anesthesiologist</td>
<td>□ Administer Methergine 0.2 mg IM per protocol (if not hypertensive); give once, if no response, move to alternate agent; if good response, may give additional doses q 2 hr</td>
<td>Amniotic Fluid Embolism</td>
</tr>
<tr>
<td></td>
<td>□ Vital Signs, including O2 sat &amp; level of consciousness (LOC) q 5 minutes</td>
<td>Uterine Inversion</td>
</tr>
<tr>
<td></td>
<td>□ Weigh materials, calculate and record cumulative blood loss q 5-15 minutes</td>
<td>Coagulopathy</td>
</tr>
<tr>
<td></td>
<td>□ Administer oxygen to maintain O2 sats at &gt;95%</td>
<td>Placenta Accreta</td>
</tr>
<tr>
<td></td>
<td>□ Empty bladder: straight cath or place Foley with urimeter</td>
<td>Uterine Rupture</td>
</tr>
<tr>
<td></td>
<td>□ Type and Crossmatch for 2 units Red Blood Cells STAT (if not already done)</td>
<td>Once stabilized: Modified Postpartum management with increased surveillance</td>
</tr>
<tr>
<td></td>
<td>□ Keep patient warm</td>
<td></td>
</tr>
<tr>
<td><strong>Physician or midwife:</strong></td>
<td>□ Rule out retained Products of Conception, laceration, hematoma</td>
<td></td>
</tr>
<tr>
<td>□ Inspect for uncontrolled bleeding at all levels, esp. broad ligament, posterior uterus, and retained placenta</td>
<td><strong>Surgeon (if cesarean birth and still open)</strong></td>
<td></td>
</tr>
</tbody>
</table>

## If: Continued bleeding or Continued Vital Sign instability, and <1500 mL cumulative blood loss

**proceed to STAGE 2**

---

## UTEROTONIC AGENTS for POSTPARTUM HEMORRAGE

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Route (not given IV)</th>
<th>Frequency</th>
<th>Side Effects</th>
<th>Contraindications</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitocin® (Oxytocin)</td>
<td>10-40 units per 1000 mL</td>
<td>IV infusion</td>
<td>Continuous</td>
<td>Usually none</td>
<td>Hypersensitivity to drug</td>
<td>Room temp</td>
</tr>
<tr>
<td></td>
<td>10 units/mL</td>
<td></td>
<td></td>
<td>Nausea, vomiting, hypotension (“water intoxication”) with prolonged IV admin, ↓ BP and ↑ HR with high doses, esp IV push</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methergine® (Methylergonovine)</td>
<td>0.2 mg</td>
<td>IM</td>
<td>- Q 4-5 hours</td>
<td>Nausea, vomiting, Severe hypertension, esp. with rapid administration in or patients with HTN or PIH</td>
<td>Hypertension, PIH, Heart disease, Hypersensitivity to drug</td>
<td>Refrigerate, Protect from light</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(not given IV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemabate® (15-methyl PG F2a)</td>
<td>250 mcg</td>
<td>IM or intra-myometrial</td>
<td>- Q 15-90 min</td>
<td>Nausea, vomiting, Diarrhea, Fever (transient), Headache, Chills, shivering, Hypertension, Bronchospasm</td>
<td>Caution in women with hepatic disease, asthma, hypertension, active cardiac or pulmonary disease, Hypersensitivity to drug</td>
<td>Refrigerate</td>
</tr>
<tr>
<td></td>
<td>250 mcg/ml</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytotec® (Misoprostol)</td>
<td>800-1000 mcg</td>
<td>Per rectum (PR)</td>
<td>One time</td>
<td>Nausea, vomiting, diarrhoea, Shivering, Fever (transient), Headache</td>
<td>Rare Known allergy to prostaglandin</td>
<td>Room temp</td>
</tr>
<tr>
<td></td>
<td>100 or 200 mcg tablets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Obstetric Hemorrhage Care Guidelines: Table Chart Format

**Release 1.2 6/16/09**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Assessments</th>
<th>Meds/Procedures</th>
<th>Blood Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 0</strong></td>
<td><strong>Every woman in labor/giving birth</strong></td>
<td><strong>Active Management</strong></td>
<td><strong>If Medium Risk:</strong> T&amp;Scr</td>
</tr>
<tr>
<td></td>
<td>Stage 0 focuses on risk assessment and active management of the third stage.</td>
<td>3rd Stage:</td>
<td><strong>If High Risk:</strong> T&amp;C 2 U</td>
</tr>
<tr>
<td></td>
<td>• Assess every woman for risk factors for hemorrhage</td>
<td>• Oxytocin IV infusion or</td>
<td><strong>If Positive Antibody Screen</strong> (prenatal or</td>
</tr>
<tr>
<td></td>
<td>• Ongoing quantitative evaluation of blood loss on every birth</td>
<td>10u IM</td>
<td>current, exclude low level anti-D from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fundal Massage-</td>
<td>Rh oGam): T&amp;C 2 U</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vigorous, 15 seconds</td>
<td></td>
</tr>
<tr>
<td><strong>Stage 1</strong></td>
<td><strong>Blood loss: &gt;500 ml vaginal, or VS changes (by &gt;95%)</strong></td>
<td><strong>Active Management</strong></td>
<td><strong>If Medium Risk:</strong> T&amp;Scr</td>
</tr>
<tr>
<td></td>
<td>Stage 1 is short: activate hemorrhage protocol, initiate preparations and</td>
<td>3rd Stage:</td>
<td><strong>If High Risk:</strong> T&amp;C 2 U</td>
</tr>
<tr>
<td></td>
<td>give Methergine IM.</td>
<td>• Oxytocin IV infusion or</td>
<td><strong>If Positive Antibody Screen</strong> (prenatal or</td>
</tr>
<tr>
<td></td>
<td>• Assess every woman for risk factors for hemorrhage</td>
<td>10U IM</td>
<td>current, exclude low level anti-D from</td>
</tr>
<tr>
<td></td>
<td>• Evaluate cumulative blood loss q5-15’</td>
<td>• Fundal Massage-</td>
<td>Rh oGam): T&amp;C 2 U</td>
</tr>
<tr>
<td></td>
<td>• Weigh bloody materials</td>
<td>vigorous, 15 seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Careful inspection with good exposure of vaginal walls, cervix, uterus</td>
<td><strong>If Medium Risk:</strong> T&amp;Scr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Empty bladder: straight cath or place foley with urimeter</td>
<td><strong>If High Risk:</strong> T&amp;C 2 U</td>
<td></td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td><strong>Continued bleeding with total blood loss under 1500ml</strong></td>
<td><strong>If Positive Antibody Screen</strong> (prenatal or current, exclude low level anti-D from Rh oGam): T&amp;C 2 U</td>
<td></td>
</tr>
</tbody>
</table>

**Version 2.0 Coming later this year!**
Cook Bakri™ Intrauterine Balloon

- There are now several balloons, but the most widely used in the US is the “Bakri” Balloon
  - First one designed for this purpose
  - Double lumen (for drainage from above)
  - Silicone (non-latex)
  - Uterine contour shape
  - Good filling capacity (saline)
  - Inexpensive
  - Easy to use
Tips for Cook Balloon

- Place a balloon early
- Involve at least 3 clinicians (MD/RN):
  - Uterine evaluation, holding the balloon, instilling fluid
- More fluid, not less
  - How much to fill? (150-500ml is a big range). We recommend estimating the uterine volume bimanually -- usually 250-300ml is sufficient unless the uterus is very “floppy”.
- Vaginal packing is often useful
  - There can be “hour-glassing” of the balloon thru the cervix into the vagina (esp if more than 1-2cm dilated)
  - Remember to tie the kerlex to the tubing....
Norgenix Ebb™ Intrauterine Balloon

- A new design now available in the US
  - Additional vaginal balloon for place holding
  - 4-lumens (one per balloon and one each for cavity infusion and cavity drainage)
  - Polyurethane bags (better for irregular contours)
  - 750ml filling capacity
  - Rapid filling
“Intrauterine Balloon Should be First Step after Failure of Medical Therapy”

- High success rate not different than other approaches
- Low-tech, fast, inexpensive, easy to utilize on any L&D Unit
- Least morbidity of any “next step”
- Can be used as “Tamponade Test” to temporize, determine needs and mobilize other resources

Dabelea V, Schultze PM, McDuffie RS  Am J Perinatol 2007; 24: 359-64
B-Lynch Suture

- Every Obstetrician should know how to do this (diagrams are in each OR)
- Quick (<2 minutes) and easy!
- Ideal at time of Cesarean birth for atony
- Can be combined with an intrauterine balloon for “Sandwich technique”
B-Lynch Compression Suture
“Belt and Suspenders”
B-Lynch Suture completed
Among 211 women treated with B-Lynch sutures:
- Hysterectomy rate was 16% if done within an hour of delivery.
- Hysterectomy rate was 42% with a delay of 2-6 hours.

Move along a plan!

Hemorrhage Cart / Procedure Instructions

- Hemorrhage Cart (a collected spot for supplies and equipment) including instructions for new procedures such as intrauterine balloons and compression sutures
  - for both L&D and Postpartum
  - B-Lynch Compression Suture Poster, Bakri use instructions
  - Example: CMQCC Hemorrhage Cart List
Lessons from Combat in Iraq

- Lowest losses ever from hemorrhage
- Key: increased FFP:RBC ratio
Iraq Theatre Experience

- Retrospective review of all soldiers with massive transfusion (>10u RBC in 24 hr) Nov 2003-Sept 2005. N=246
- Composition closer to whole blood more effective than 1980’s ratios:
  - Not a RCT!
  - Biased against greatest EBL
  - But results are striking…

Borgman MA. J Trauma. 2007 (Oct);63:805–813.
New Transfusion Principles

“Whole blood” is good for OB hemorrhage

- After 2u PRBCs, start FFP
- Massive transfusion protocol: close to 1:1 ratio FFP/RBC
  - 6 RBC + 4 FFP + 1Plt pack (Stanford+)
  - 4 RBC + 4 FFP, plts and cryo on request (CPMC)--think ahead!
- Keep up!

Recent data may suggest that rapid use of FFP may be as important as a fixed ratio
New Transfusion Principles

Two Stages: Resuscitation and Treatment

- Resuscitation, transfuse per clinical signs
- DIC treatment, transfuse per lab parameters

Supportive measures are critical

- Warm patient (Bair Hugger®, fluid warmer)
- Correct metabolic acidosis
Recommendations: Massive Transfusion Protocol

- Every OB unit needs one
- Coordinated with Blood Bank, Anesthesia, and ER/ICU
- Ability to deliver large volumes of RBCs and coagulation products
- Guidelines for coagulation product usage
Emerging Lessons

- Zen moment (in “reverse”)
- Building a business case
- Creating a team for ALL Obstetric emergencies
Typical Zen Parable: Doing less is more...
Typical Zen Parable: Doing less is more...

Reverse Zen Parable: Doing more [early] is less [blood loss]...
Baseline mean: 158 units/1000 births

Follow-up mean: 50 units/1000 births
Baseline mean: 82 units/1000 births

Follow-up mean: 65 units/1000 births
Baseline
Mean: 1.2 women w/ massive transfusion per month (0.27%)

Follow-up
Mean: 0.4 women w/ massive transfusion per month (0.09%)
Baseline
Mean: 1.6 women w/ massive transfusion per month (0.27%)

Follow-up
Mean: 1.5 women w/ massive transfusion per month (0.26%)

Mx B: Total Number of Women w/ Massive Transfusion
(>5 units PRBCs) per Month at Large Hospital B
# Measure C: Rate of Hysterectomy during Birth Admission

<table>
<thead>
<tr>
<th></th>
<th>Mean Number of Hysterectomies per 1000 births during Baseline</th>
<th>Mean Number of Hysterectomies per 1000 births During Follow-up</th>
<th>Difference</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women WITH Placenta Previa/Accreta/Percreta</td>
<td>0.60</td>
<td>0.45</td>
<td>-0.15 (-25%)</td>
<td>0.481</td>
</tr>
<tr>
<td>Women WITHOUT Placenta Previa/Accreta/Percreta</td>
<td>0.45</td>
<td>0.39</td>
<td>-0.06 (-13.3%)</td>
<td>0.692</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.06</strong></td>
<td><strong>0.84</strong></td>
<td><strong>-0.21 (-19.6%)</strong></td>
<td><strong>0.132</strong></td>
</tr>
</tbody>
</table>

**Take Home Number:** 1 Hysterectomy for every 1,000 births
Business Case

- Blood products are VERY expensive
- Hemabate is ALSO VERY expensive
- R-Factor VIIa and Uterine Artery Embolization are VERY VERY expensive

Math: more early interventions
  = fewer hemorrhages that reach “massive”
  = fewer high level (expensive) interventions
Importance of Drills / Simulations
Safety and QI Leader: Paul Preston, MD

“Medicine is the last high-risk industry that expects people to perform perfectly in complex, rare emergencies but does not support them with high-quality training and practice throughout their careers.”

“Certain individual and team skills require regular practice that cannot ethically occur in routine care.”
Creating a “Team For All Seasons”

- OB Hemorrhage is the prototypic OB emergency
- Many of the system changes are directly applicable to other obstetric emergencies
- Creating the team and systems to implement hemorrhage project makes other OB QI projects easier and more successful
Kaiser—Roseville (Northern California)
“We have learned that through debriefing, we talk about problems, and by talking about problems not only can we find solutions, but we can change outcomes.”
- John Vallee, MD, Chairman, Department of Ob/Gyn

Salinas Valley Memorial Healthcare System—Salinas
"It's not just hemorrhage that we address here; we are trying to make L&D safer for moms and babies. As a result of processes we put into place, ALL births are safer."
- Amen Ness, MD, Director of Perinatal Diagnostic Center
Safety Bundle for OB Hemorrhage Checklist for Every Hospital

- Risk Assessment tool
- Quantification of blood loss
- Trigger tool/ Early identification
- OB Hemorrhage Protocol with stages
  - Nursing checklists,
- Hemorrhage Cart (equipment) / Kit (meds)
- Instruction cards for new procedures
  - Balloons, compression sutures
- Massive Transfusion Protocol (that includes OB)
- Debrief tool
- Drills (with scenarios)
National Partnership for Maternal Safety

“3 Bundles, 3 Years”

Stay tuned:
1) Final definition of the bundles
2) Collection of shared best practices
3) Final metrics
Maternal Mortality Rate, California and United States; 1999-2010

SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2010. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95, O98-O99) for 1999-2010. United States data and HP2020 Objective were calculated using the same methods. U.S. maternal mortality rates are published by the National Center for Health Statistics (NCHS) through 2007 only. Rates for 2008-2010 were calculated using NCHS Final Birth Data (denominator) and CDC Wonder Online Database for maternal deaths (numerator). Accessed at http://wonder.cdc.gov/ucd-icd10.html on Apr 17, 2013 8:00:39 PM. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, April, 2013.
Thank You!
More resources at www.CMQCC.org
CMQCC Hemorrhage Task Force
Best Practice Documents:

Hemorrhage Background and Preparation

- Definitions, Early Recognition and Response Triggers
- Congenital Coagulation Disorders
- OB Care for Pregnant Women who Decline Transfusion
  - Checklist for OB Care for Jehovah’s Witness
  - Informed Consent for Blood Products Jehovah’s Witness
  - Protocol for IV Iron Sucrose
- Placenta Accreta and Percreta: Risks, Dx and Tx
- Hemorrhage Kits, Carts and Trays
- Simulations and Drills-Scenarios and Worksheets
- Lessons Learned from New York and Washington State Taskforces

www.cmqcc.org/ob_hemorrhage
Hemorrhage Management

- Active Management of 3rd Stage Labor
- Blood Loss: Clinical Techniques for Ongoing Quantitative Measurement
- Blood Product Replacement
  - Massive Transfusion Protocol
  - Intrauterine Balloons (coming Soon)
- Surgery: B-Lynch Sutures, Uterine Artery Occlusion
- Uterotonic Agent Summary Sheet
- Anti-Shock Garments
- Family Support

www.cmqcc.org/ob_hemorrhage