Checklists and Protocols to Prevent and Treat Peripartum Hemorrhage

Alliance for Innovation in Maternal Health (AIM)

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Marshall University School of Medicine
How Daylight Saving Time Feels

It's pitch-black out!

What TIME is it?

IS IT MIDNIGHT?

It feels like MIDNIGHT!

It's 5:27 p.m.

www.hedgerhumor.com
90% deliveries in hospital and increasing cesarean sections

Initiation of prenatal care

Antibiotics

Blood transfusion
Table 2

<table>
<thead>
<tr>
<th>Year</th>
<th>Maternal Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>18.8</td>
</tr>
<tr>
<td>2001</td>
<td>19.2</td>
</tr>
<tr>
<td>2002</td>
<td>19.5</td>
</tr>
<tr>
<td>2003</td>
<td>19.9</td>
</tr>
<tr>
<td>2004</td>
<td>20.3</td>
</tr>
<tr>
<td>2005</td>
<td>20.6</td>
</tr>
<tr>
<td>2006</td>
<td>21.0</td>
</tr>
<tr>
<td>2007</td>
<td>21.3</td>
</tr>
<tr>
<td>2008</td>
<td>21.7</td>
</tr>
<tr>
<td>2009</td>
<td>22.0</td>
</tr>
<tr>
<td>2010</td>
<td>22.4</td>
</tr>
<tr>
<td>2011</td>
<td>22.8</td>
</tr>
<tr>
<td>2012</td>
<td>23.1</td>
</tr>
<tr>
<td>2013</td>
<td>23.5</td>
</tr>
<tr>
<td>2014</td>
<td>23.8</td>
</tr>
</tbody>
</table>

Rates back-estimated from reported 2014 rate for states with the standard pregnancy question using a weighted average of the slopes from groups 1–4; see “Materials and Methods.”

* Excludes California and Texas.

*Note: Number of pregnancy-related deaths per 100,000 live births per year.

Moaddab, Amirhossein; Dildy, Gary A.; Brown, Haywood L.; Bateni, Zhoobin H.; Belfort, Michael A.; Sangi-Haghpeykar, Haleh; Clark, Steven L.


doi: 10.1097/AOG.0000000000001628

U.S. Is Among Countries Where Maternal Mortality Is On The Rise In Recent Decades

Annualized percent change in maternal deaths per 100,000 live births, 1990-2013

Source: The Institute for Health Metrics and Evaluation/The Lancet
## Maternal deaths

<table>
<thead>
<tr>
<th>ICD Revision</th>
<th>Year of use</th>
<th>ICD Codes</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1900-09</td>
<td>151-159</td>
<td>Deaths where the cause-of-death codes were identified as complications of pregnancy, childbirth, and the puerperium</td>
</tr>
<tr>
<td>2nd</td>
<td>1910-20</td>
<td>134-141</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>1921-29</td>
<td>143-150</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>1930-38</td>
<td>140-150</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>1939-48</td>
<td>140-150</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>1949-57</td>
<td>640-689</td>
<td>Change in DC format, UCD, rules for coding</td>
</tr>
<tr>
<td>7th</td>
<td>1958-67</td>
<td>640-689</td>
<td></td>
</tr>
<tr>
<td>8th</td>
<td>1968-78</td>
<td>630-678</td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td>1979-92</td>
<td>630-676</td>
<td>Until 42 days of the end of pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More Indirect Obstetric causes</td>
</tr>
<tr>
<td>10th</td>
<td>1993-2014?</td>
<td>000-099</td>
<td>Late maternal death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pregnancy related death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Box in DC</td>
</tr>
<tr>
<td>11th</td>
<td>2014</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Maternal mortality ratio, USA, 1915-2003](chart.png)

NOTE: Prior to 1933, data for birth-registration states only. Line breaks are shown between successive International Classification of Diseases revisions.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Percentage of all pregnancy-related deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-cardiovascular disease</td>
<td>15.3</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>14.7</td>
</tr>
<tr>
<td>Infection/sepsis</td>
<td>12.7</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>11.3</td>
</tr>
<tr>
<td>Cardiomiopathy</td>
<td>10.8</td>
</tr>
<tr>
<td>Thrombotic pulmonary embolism</td>
<td>9.0</td>
</tr>
<tr>
<td>Hypertensive disorder of pregnancy</td>
<td>7.6</td>
</tr>
<tr>
<td>Cerebrovascular accident</td>
<td>6.5</td>
</tr>
<tr>
<td>Amniotic fluid embolism</td>
<td>5.7</td>
</tr>
<tr>
<td>Anesthesia complications</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Note: The cause of death is unknown for 6.2% of all pregnancy-related deaths.
U.S. Maternal Mortality Ratio by Cause of Death
Maternal deaths per 100,000 live births

2013
- 0.9 Hemorrhage
- 1.1 Obstructed Labor
- 1.4 Sepsis
- 1.4 Hypertension
- 2.1 Abortive Outcome
- 3.2 Indirect
- 3.2 Late*
- 5.1 Other direct

1990
- 1.3

* Maternal deaths in the U.S. that took place between 43 days after pregnancy and a year after the end of pregnancy.

Source: Institute for Health Metrics and Evaluation

Graphic by Tiffany Farrant-Gonzalez, for Scientific American
Maternal Mortality: United States

For women in the United States, each year:

50,000 suffer severe morbidities due to pregnancy-related complications

650 die due to pregnancy-related complications

This means that for every 1 woman who dies due to a pregnancy-related condition, another 76 women experience a severe co-morbidity.

Rate per 10,000 delivery hospitalizations

## Pregnancy-Related Deaths
### West Virginia

### Maternal Deaths 2007-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>All deaths</th>
<th>Deaths related to medical conditions</th>
<th>Pregnancy-related deaths</th>
<th>Resident Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>13</td>
<td>5*</td>
<td>2</td>
<td>22,017</td>
</tr>
<tr>
<td>2008</td>
<td>10</td>
<td>5**</td>
<td>2</td>
<td>21,493</td>
</tr>
<tr>
<td>2009</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>21,275</td>
</tr>
<tr>
<td>2010</td>
<td>11</td>
<td>8</td>
<td>4</td>
<td>20,471</td>
</tr>
<tr>
<td>2011</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>20,955**</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>21</td>
<td>10</td>
<td>106,211</td>
</tr>
</tbody>
</table>

*1 additional death received out-of-state care, medical records unavailable.
**1 additional death occurred out-of-state, medical records unavailable.
*** Tentative data
Pregnancy-Related Deaths
West Virginia 2007-11 (n=52)

- During Pregnancy/Delivery: 4
- <15 Days Post Partum: 13
- 15-60 Days Postpartum: 19
- 2-6 Months Postpartum: 31
- >6 Months Postpartum: 33
Pregnancy-Related Deaths
West Virginia 2007-11

Chart Title

- Unknown: 4
- Fire: 2
- Uterine Abruption: 2
- HELLP: 6
- Infection: 6
- Cancer: 6
- Neurologic: 6
- Cardiovascular: 19
- Drugs: 23
- Suicide: 4
- Homicide: 6
- MVA: 17
Pregnancy-Related Deaths
West Virginia 2011

• -57/100,000
• -11/12 occurred after 60 days postpartum
• -1/12 within 15 days postpartum
Annual Postpartum Hemorrhage Rates (United States, 1994–2006)

William M. Callaghan,   Elena V. Kuklina,   Cynthia J. Berg

Trends in postpartum hemorrhage


http://dx.doi.org/10.1016/j.ajog.2010.01.011
Chance to alter outcome among major causes of pregnancy-related death (n=205*), California, 2002–2005. *The California Pregnancy-Associated Mortality Review Committee was unable to determine preventability in one cardiovascular disease death and one eclampsia death. †Significantly more likely to have good-to-strong chance than cardiovascular disease deaths and amniotic fluid embolism deaths. ‡Significantly less likely to have good-to-strong chance than all causes.

Fig. 3. Main. Pregnancy-Related Mortality in California. Obstet Gynecol 2015.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Good-to-strong chance</th>
<th>Some chance</th>
<th>No chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease</td>
<td>29</td>
<td>63</td>
<td>8</td>
</tr>
<tr>
<td>Preeclampsia or eclampsia†</td>
<td>60</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>Obstetric hemorrhage†</td>
<td>70</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>Venous thromboembolism</td>
<td>50</td>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td>Amniotic fluid embolism‡</td>
<td>83</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>39</td>
<td>39</td>
<td>22</td>
</tr>
<tr>
<td>All deaths</td>
<td>41</td>
<td>48</td>
<td>11</td>
</tr>
</tbody>
</table>

Main, Elliott K.; McCain, Christy L.; Morton, Christine H.; Holtby, Susan; Lawton, Elizabeth S.


doi: 10.1097/AOG.0000000000000746
## Causes of Pregnancy-Related Deaths (North Carolina)

**Table 2. Distribution of Causes of Pregnancy-Related Deaths and Percent of Preventable Deaths by Cause, North Carolina, 1995–1999**

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>% of All Pregnancy-Related Deaths</th>
<th>% Preventable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiomyopathy</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>14</td>
<td>93</td>
</tr>
<tr>
<td>Pregnancy-induced hypertension</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>Cerebrovascular accident</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Chronic condition</td>
<td>9</td>
<td>89</td>
</tr>
<tr>
<td>Amniotic fluid embolus</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Infection</td>
<td>7</td>
<td>43</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Microangiopathic hemolytic syndrome</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Cardiovascular condition</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>Choriocarcinoma</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>3</td>
<td>38</td>
</tr>
</tbody>
</table>

Preventability of Pregnancy-Related Deaths: Results of a State-Wide Review

Berg, Cynthia J.; Harper, Margaret A.; Atkinson, Samuel M.; Bell, Elizabeth A.; Brown, Haywood L.; Hage, Marvin L.; Mitra, Avick G.; Moise, Kenneth J. Jr; Callaghan, William M.


doi: 10.1097/01.AOG.0000187894.71913.e8
Preventing Obstetric Hemorrhage

• Provider
  • Assessment and Point of entry into care
  • Diagnosis/Recognition of high risk
  • Refer to expert
  • Treatment
  • Management hierarchy
  • Education
  • Documentation
  • Discharge

• System
  • Communication
  • Policy and Procedures
  • Delay/Timeliness

• Patient

• 54% of cases potentially preventable
  • 88% at least one factor related to provider care
    • Delay in treatment 70%
    • Delay in diagnosis 43%
  • 32% at least one system related factor
  • 15% at least one patient related factor

Contributing Factors To Pregnancy-Related Death (California)

Contributing factors among major causes of pregnancy-related death, California, 2002–2005. Health care provider factors (A), facility factors (B), and patient factors (C).Fig. 4. Main. Pregnancy-Related Mortality in California. Obstet Gynecol 2015.

Main, Elliott K.; McCain, Christy L.; Morton, Christine H.; Holtby, Susan; Lawton, Elizabeth S.


doi: 10.1097/AOG.0000000000000746
Protocols to improve outcomes
• ACOG
• AWHOON
• SMFM
• HRSA
• ACN-M
ABOUT AIM

• Help improve maternal outcomes across the US
• National data-driven quality improvement initiative
• Works through state teams and health systems
• Open access program
  • Funded by Maternal and Child Health Bureau (MCHB)-Health Resource Services Administration
Why Team Up With AIM?

- Access Bundles & Tools proven to save lives and reduce maternal morbidity
- Join a growing community dedicated to maternal safety and quality
- Champion a culture of maternal safety in the US
Patient Safety Bundles

**Maternal Safety**
- Maternal Mental Health: Depression and Anxiety
- Maternal Venous Thromboembolism (+AIM)
- Obstetric Hemorrhage (+AIM)
- Reduction of Peripartum Racial/Ethnic Disparities (+AIM)
- Safe Reduction of Primary Cesarean Birth (+AIM)
- Severe Hypertension in Pregnancy (+AIM)
- Severe Maternal Morbidity Review (+AIM)
- Support After a Severe Maternal Event (+AIM)

**Non-Obstetric**
- Prevention of Surgical Site Infections After Gynecologic Surgery
<table>
<thead>
<tr>
<th>AIM STATES</th>
<th>BUNDLE(S)</th>
<th>LEAD COORDINATION BODY FOR THE AIM PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oklahoma</td>
<td>Obstetric Hemorrhage Severe HTN/Preeclampsia</td>
<td>Oklahoma Perinatal Quality Improvement Collaborative</td>
</tr>
<tr>
<td>Maryland</td>
<td>Safe Reduction of Primary Cesarean Section</td>
<td>Maryland Patient Safety Center</td>
</tr>
<tr>
<td>Louisiana</td>
<td>Obstetric Hemorrhage Severe HTN/Preeclampsia</td>
<td>Louisiana Dept. of Health and Hospitals</td>
</tr>
<tr>
<td>Michigan</td>
<td>Obstetric Hemorrhage Severe HTN/Preeclampsia</td>
<td>MDHHS MHA</td>
</tr>
<tr>
<td>Florida</td>
<td>Obstetric Hemorrhage</td>
<td>Florida Perinatal Quality Collaborative</td>
</tr>
<tr>
<td>Illinois</td>
<td>Severe HTN/Preeclampsia</td>
<td>Illinois Perinatal Quality Collaborative</td>
</tr>
<tr>
<td>Mississippi</td>
<td>Severe HTN/Preeclampsia</td>
<td>Mississippi Perinatal Quality Collaborative</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Obstetric Hemorrhage Severe HTN/Preeclampsia</td>
<td>NJ State Dept. of Health</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Obstetric Hemorrhage</td>
<td>Perinatal Quality Collaborative of NC</td>
</tr>
<tr>
<td>Utah</td>
<td>Severe HTN/Preeclampsia</td>
<td>Utah Department of Health</td>
</tr>
</tbody>
</table>
Patient Safety Bundles

Maternal Safety
- Maternal Mental Health: Depression and Anxiety
- Maternal Venous Thromboembolism (+AIM)
- Obstetric Hemorrhage (+AIM)
- Reduction of Peripartum Racial/Ethnic Disparities (+AIM)
- Safe Reduction of Primary Cesarean Birth (+AIM)
- Severe Hypertension in Pregnancy (+AIM)
- Severe Maternal Morbidity Review (+AIM)
- Support After a Severe Maternal Event (+AIM)

Non-Obstetric
- Prevention of Surgical Site Infections After Gynecologic Surgery
OB Hemorrhage: We Can Do Better

- Most maternal mortalities and near misses due to hemorrhage are preventable
- 1/3 of patients will have no risk factors prior to labor
  - Must be prepared for every patient
  - QBL every delivery so can respond early
- Requires reliance not on individuals but on team approach
Design Goals for Quality Improvement

- Make it easy to do the right thing
- Hardwire changes into routine practice:
  - Education, training, order sets, protocols, the environment
- All improvement is change, not all change is improvement.
- We must know the difference:
  - Build measurement into the process
Obstetric Hemorrhage

- Readiness
- Recognition & Prevention
- Response
- Reporting/Systems Learning
Obstetric Hemorrhage

• Readiness
  • Every Unit
    • Hemorrhage cart
      • Supplies
      • Checklist
      • Instruction Cards
    • Immediate access to hemorrhage medications
    • Establish response team
      • Blood bank, advanced gyn surgery, other support and tertiary services
    • Establish massive and emergency release transfusion protocols
      • Type-O negative/uncrossmatched
    • Unit education on protocols
      • Unit based drills
      • Post drill debriefs
Obstetric Hemorrhage

- Recognition & Prevention
  - Every Patient
    - Assessment of Hemorrhage Risk
      - Prenatal
      - On admission
      - Other appropriate times
    - Measurement of cumulative blood loss
      - Formal
      - As quantitative as possible
    - Active management of the 3rd stage of labor
      - Department-wide protocol
  - Avoid Denial and Delay
California OB Hemorrhage Guidelines

**Stage 0 (BE PREPARED)**

- Risk assessment on admission
- Active management 3rd stage of labor
- Antepartum care and counseling
  - Previa, accreta, Jehovah’s witness, iron deficiency anemia
- Appropriate blood bank specimens on admission
- **Quantify** blood loss for all births
Clinical Validation of Risk Stratification Criteria for Peripartum Hemorrhage

California Maternal Quality Care Collaborative Peripartum Hemorrhage Risk Groups and Prenatal Pretransfusion Testing Recommendations

<table>
<thead>
<tr>
<th>Low (No Prenatal Pretransfusion Testing Required)</th>
<th>Medium (Prenatal Type and Screen Performed, No RBC Units Cross-Matched)</th>
<th>High (2 Units of RBCs Cross-Matched)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous uterine incision</td>
<td>Previous cesarean delivery or uterine surgery</td>
<td>Placenta previa, low-lying placenta</td>
</tr>
<tr>
<td>Singleton pregnancy</td>
<td>Multiple gestation</td>
<td>Suspected placenta accreta or percreta</td>
</tr>
<tr>
<td>4 or fewer previous vaginal deliveries</td>
<td>More than 4 previous vaginal deliveries</td>
<td>Hematocrit less than 30 and other risk factors</td>
</tr>
<tr>
<td>No known bleeding disorder</td>
<td>Chorioamnionitis</td>
<td>Platelets less than 100,000</td>
</tr>
<tr>
<td>No history of peripartum hemorrhage</td>
<td>History of peripartum hemorrhage</td>
<td>Active bleeding (greater than show) on admission</td>
</tr>
<tr>
<td></td>
<td>Large uterine leiomyoma</td>
<td>Known coagulopathy</td>
</tr>
<tr>
<td></td>
<td>Estimated fetal weight more than 4 kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Morbid obesity (BMI greater than 35 kg/m²)</td>
<td></td>
</tr>
</tbody>
</table>

RBC, red blood cell; BMI, body mass index.

Data modified from Bingham, D., Melsop, K., Main, E; The California Maternal Quality Care Collaborative (CMQCC). CMQCC Obstetric Hemorrhage Hospital Level Implementation Guide. Palo Alto (CA): California Maternal Quality Care Collaborative; 2010.

Dilla, Andrew J.; Waters, Jonathan H.; Yazer, Mark H.


doi: 10.1097/AOG.0b013e3182941c78
Obstetric Hemorrhage Emergency Management Plan: Checklist Format

Stage 0: All Births – Prevention & Recognition of OB Hemorrhage
Prenatal Assessment & Planning

- Identify and prepare for patients with special considerations: Placenta Previa/Accreta, Bleeding Disorder, or those who Decline Blood Products
- Screen and aggressively treat severe anemia: if oral iron fails, initiate IV Iron Sucrose Protocol to reach desired Hgb/Hct, especially for at risk mothers.

Admission Assessment & Planning

- Verify Type & Antibody Screen from prenatal record
  - If not available,
    - Order Type & Screen (lab will notify if 2nd specimen needed for confirmation)
  - If prenatal or current antibody screen positive (if not low level Anti-D from Rho-GAM),
  - Type & Crossmatch 2 units PRBCs
  - All other patients,
    - Send specimen to blood bank

- Evaluate for Risk Factors on admission, throughout labor, and postpartum. (At every handoff)
  - If medium risk:
    - Order Type & Screen
    - Review Hemorrhage Protocol
  - If high risk:
    - Order Type & Crossmatch 2 units PRBCs
    - Review Hemorrhage Protocol
    - Notify OB Anesthesia
  - Identify women who may decline transfusion
    - Notify OB provider for plan of care
    - Early consult with OB anesthesia
    - Review Consent Form

Ongoing Risk Assessment

- Evaluate for development of additional risk factors in labor:
  - Prolonged 2nd Stage labor
  - Prolonged oxytocin use
  - Active bleeding
  - Chorioamnionitis
  - Magnesium sulfate treatment
- Increase Risk level (see below) and convert to Type & Screen or Type & Crossmatch
- Treat multiple risk factors as High Risk
- Monitor women postpartum for increased bleeding

Admission Hemorrhage Risk Factor Evaluation

<table>
<thead>
<tr>
<th>Low (Clot only)</th>
<th>Medium (Type and Screen)</th>
<th>High (Type and Crossmatch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous uterine incision</td>
<td>Prior cesarean birth(s) or uterine surgery</td>
<td>Placenta previa, low lying placenta</td>
</tr>
<tr>
<td>Singleton pregnancy</td>
<td>Multiple gestation</td>
<td>Suspected Placenta accreta or percreta</td>
</tr>
<tr>
<td>≤ 4 previous vaginal births</td>
<td>&gt; 4 previous vaginal births</td>
<td>Hematocrit &lt; 30 AND other risk factors</td>
</tr>
<tr>
<td>No known bleeding disorder</td>
<td>Chorioamnionitis</td>
<td>Platelets &lt; 100,000</td>
</tr>
<tr>
<td>No history of PPH</td>
<td>History of previous PPH</td>
<td>Known coagulopathy</td>
</tr>
<tr>
<td></td>
<td>Large uterine fibroids</td>
<td></td>
</tr>
</tbody>
</table>

All Births – Prophylactic Oxytocin, Quantitative Evaluation of Blood Loss, & Close Monitoring

- Active Management of Third Stage
  - Oxytocin infusion: 10-40 units oxytocin/1000 ml solution titrate infusion rate to uterine tone; or 10 units IM; do not give oxytocin as IV push
- Ongoing Quantitative Evaluation of Blood Loss
  - Using formal methods, such as graduated containers, visual comparisons and weight of blood soaked materials (1 gm = 1 ml)
- Ongoing Evaluation of Vital Signs

  If: Cumulative Blood Loss > 500ml vaginal birth or > 1000ml C/S with continued bleeding OR
  Vital signs > 15% change or HR ≥ 110, BP ≥ 85/55, O2 sat < 95% - OR - Increased bleeding during recovery or postpartum, proceed to STAGE 1
Clinical Validation of Risk Stratification Criteria for Peripartum Hemorrhage

California Maternal Quality Care Collaborative Risk Groups and the Relative Risk of Experiencing a Severe Peripartum Hemorrhage

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>No. of Patients</th>
<th>No. of Patients With Severe Hemorrhage (%)</th>
<th>Relative Risk (95% CI)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>7,260</td>
<td>60 (0.8)</td>
<td>0.30 (0.22–0.42)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Medium</td>
<td>2,462</td>
<td>49 (2.0)</td>
<td>1.67 (1.20–2.40)</td>
<td>.002</td>
</tr>
<tr>
<td>High</td>
<td>412</td>
<td>30 (7.3)</td>
<td>6.50 (4.39–9.61)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

CI, confidence interval.

* P values compare the risk of a significant peripartum hemorrhage between one group and the aggregate of the other two groups combined. For example, the P value for the low-risk group compares the risk of a peripartum hemorrhage in this group with that in the medium-risk and high-risk groups combined.

Dilla, Andrew J.; Waters, Jonathan H.; Yazer, Mark H.
doi: 10.1097/AOG.0b013e3182941c78
Obstetric Hemorrhage

• Response
  • Every Hemorrhage
    • Unit-standard, stage-based, obstetric hemorrhage emergency management plan with checklists
    • Support program for patients, families, and staff for all significant hemorrhages
Hemorrhage Guidelines: Staged Responses

Pre-Admission: All patients-Assess Risk

Stage 0: All birth- Routine Measures

Stage 1: $\text{QBL} > 500 \text{ mL vag or 1000 mL CS or VS}$ unstable with continued bleeding

Stage 2: $\text{QBL} 1000-1500 \text{ mL with continued bleeding}$

Stage 3: $\text{QBL exceeds 1500 mL}$
# STAGE 1: OB Hemorrhage

**Cumulative Blood Loss** >500ml vaginal birth or >1000ml C/S with continued bleeding **OR**

- Vital signs >15% change or HR ≥110, BP ≥85/45, O2 sat <95% **OR**
- Increased bleeding during recovery or postpartum

## MOBILIZE

- **Primary nurse, Physician or Midwife to:**
  - **☐** Activate OB Hemorrhage Protocol and Checklist
  - **☐** Notify obstetrician or midwife (in-house and attending)
  - **☐** Notify charge nurse
  - **☐** Notify anesthesiologist

- **Charge nurse:**
  - **☐** Assist primary nurse as needed or assign staff member(s) to help

## ACT

- **Primary nurse or designee:**
  - **☐** Establish IV access if not present, at least 18 gauge
  - Increase IV Oxytocin rate, 500 mL/hour of 10-40 units/500-1000 mL solution;
  - Titrate infusion rate to uterine tone
  - **☐** Apply vigorous fundal massage
  - **☐** 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 (if Misoprostol standard, misoprostol 800 mcg SL per protocol)
  - **☐** Vital Signs, including O2 sat & level of consciousness (LOC) q 5 minutes
  - **☐** Weigh materials, calculate and record cumulative blood loss q 5-15 minutes
  - **☐** Administer oxygen to maintain O2 sats at >95%
  - **☐** Empty bladder: straight cath or place Foley with urimeter
  - **☐** Type and Crossmatch for 2 units Red Blood Cells STAT (if not already done)
  - **☐** Keep patient warm

- **Physician or midwife:**
  - **☐** Rule out retained Products of Conception, laceration, hematoma

- **Surgeon (if cesarean birth and still open)**
  - **☐** Inspect for uncontrolled bleeding at all levels, esp. broad ligament, posterior
    - uterus, and retained placenta

## THINK

- **Consider potential etiology:**
  - Uterine atony
  - Trauma/Laceration
  - Retained placenta
  - Amniotic Fluid Embolism
  - Uterine Inversion
  - Coagulopathy
  - Placenta Accreta

- **Once stabilized:** Modified Postpartum management with increased surveillance

---

If: Continued bleeding or Continued Vital Sign instability, and < 1500 mL cumulative blood loss proceed to **STAGE 2**
## STAGE 2: OB Hemorrhage

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

<table>
<thead>
<tr>
<th>MOBILIZE</th>
<th>ACT</th>
<th>THINK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary nurse (or charge nurse):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Call obstetrician or midwife to bedside</td>
<td>Team leader (OB physician or midwife):</td>
<td>Sequentially advance through procedures and other interventions based on etiology:</td>
</tr>
<tr>
<td>- Call Anesthesiologist</td>
<td>- Additional uterotonic medication: Hemabate 250 mcg IM [if not contraindicated] OR Misoprostol 800 mcg SL</td>
<td>Vaginal birth</td>
</tr>
<tr>
<td>- Activate Response Team: PHONE #:</td>
<td>- Can repeat Hemabate up to 3 times every 20 min; (note-75% respond to first dose)</td>
<td>If trauma (vaginal, cervical or uterine):</td>
</tr>
<tr>
<td></td>
<td>- Continue IV oxytocin and provide additional IV crystalloid solution</td>
<td>- Visualize and repair</td>
</tr>
<tr>
<td></td>
<td>- Do not delay other interventions (see right column) while waiting for response to medications</td>
<td>if retained placenta:</td>
</tr>
<tr>
<td></td>
<td>- Bimanual uterine massage</td>
<td>- D&amp;C</td>
</tr>
<tr>
<td></td>
<td>- Move to OR (if on postpartum unit, move to L&amp;D or OR)</td>
<td>If uterine atony or lower uterine segment bleeding:</td>
</tr>
<tr>
<td></td>
<td>- Order 2 units PRBCs and bring to the bedside</td>
<td>- Intrauterine Balloon</td>
</tr>
<tr>
<td></td>
<td>- Order labs STAT (CBC/PLTS, Chem 12 panel, Coag Panel II, ABG)</td>
<td>If above measures unproductive:</td>
</tr>
<tr>
<td></td>
<td>- Transfuse PRBCs based on clinical signs and response, do not wait for lab results; consider emergency O-negative transfusion</td>
<td>- Selective embolization (Interventional Radiology if available &amp; adequate experience)</td>
</tr>
<tr>
<td><strong>Charge nurse:</strong></td>
<td></td>
<td>C-section:</td>
</tr>
<tr>
<td>- Notify Perinatologist or 2nd OB</td>
<td></td>
<td>- B-Lynch Suture</td>
</tr>
<tr>
<td>- Bring hemorrhage cart to the patient’s location</td>
<td>- Intrauterine Balloon</td>
<td></td>
</tr>
<tr>
<td>- Initiate OB Hemorrhage Record</td>
<td></td>
<td>If Uterine Inversion:</td>
</tr>
<tr>
<td>- If considering selective embolization, call-in Interventional Radiology Team and second anesthesiologist</td>
<td></td>
<td>- Anesthesia and uterine relaxation drugs for manual reduction</td>
</tr>
<tr>
<td>- Notify nursing supervisor</td>
<td></td>
<td>If Amniotic Fluid Embolism:</td>
</tr>
<tr>
<td>- Assign single person to communicate with blood bank</td>
<td>- Maximally aggressive respiratory, vasopressor and blood product support</td>
<td></td>
</tr>
<tr>
<td>- Assign second attending or clinical nurse specialist as family support person or call medical social worker</td>
<td>Blood Bank:</td>
<td>If vital signs are worse than estimated or measured blood loss: possible uterine rupture or broad ligament tear with internal bleeding; move to laparotomy</td>
</tr>
<tr>
<td></td>
<td>- Determine availability of thawed plasma, fresh frozen plasma, and platelets; initiate delivery of platelets if not present on-site</td>
<td>Once stabilized: Modified Postpartum management with increased surveillance</td>
</tr>
<tr>
<td></td>
<td>- Consider thawing 2-4 FFP (takes 30 min), use if transfusing &gt; 2 units PRBCs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Prepare for possibility of massive hemorrhage</td>
<td></td>
</tr>
</tbody>
</table>

**Primary nurse (or designee):**

- Establish 2nd large bore IV, at least 18 gauge
- Assess and announce Vital Signs and cumulative blood loss q 5-10 minutes
- Set up blood administration set and blood warmer for transfusion
- Administer meds, blood products and draw labs, as ordered
- Keep patient warm

**Second nurse (or charge nurse):**

- Place Foley with urimeter (if not already done)
- Obtain portable light and OB procedure tray or Hemorrhage cart
- Obtain blood products from the Blood Bank (or send designee)
- Assist with move to OR (if indicated)

**Blood Bank:**

- Re-Evaluate Bleeding and Vital Signs

If cumulative blood loss > 1500mL, > 2 units PRBCs given, VS unstable or suspicion for DIC, proceed to STAGE 3
# STAGE 3: OB Hemorrhage
Cumulative blood loss > 1500ml, > 2 units PRBCs given, VS unstable or suspicion for DIC

<table>
<thead>
<tr>
<th>MOBILIZE</th>
<th>ACT</th>
<th>THINK</th>
</tr>
</thead>
</table>
| Nurse or Physician:  
- Activate Massive Hemorrhage Protocol  
PHONE #: ____________  
Charge Nurse or designee:  
- Notify advanced Gyn surgeon (e.g. Gyn Oncologist)  
- Notify adult intensivist  
- Call-in second anesthesiologist  
- Call-in OR staff  
- Ensure hemorrhage cart available at the patient's location  
- Reassign staff as needed  
- Call-in supervisor, CNS, or manager  
- Continue OB Hemorrhage Record (In OR, anesthesiologist will assess and document VS)  
- If transfer considered, notify ICU  
Blood Bank:  
- Prepare to issue additional blood products as needed – stay ahead | Establish team leadership and assign roles  
Team leader (OB physician + OB anesthesiologist, anesthesiologist and/or perinatologist and/or intensivist):  
- Order Massive Hemorrhage Pack (RBCs + FFP + 1 apheresis pack PLTS—see note in right column  
- Move to OR if not already there  
- Repeat CBC/PLTS, Coag Panel II STAT and Chem 12 panel q 30-60 min  
Anesthesiologist (as indicated):  
- Arterial blood gases  
- Central hemodynamic monitoring  
- CVP or PA line  
- Arterial line  
- Vasopressor support  
- Intubation  
- Calcium replacement  
- Electrolyte monitoring  
Primary nurse:  
- Announce VS and cumulative measured blood loss q 5-10 minutes  
- Apply upper body warming blanket if feasible  
- Use fluid warmer and/or rapid infuser for fluid & blood product administration  
- Apply sequential compression stockings to lower extremities  
- Circulate in OR  
Second nurse and/or anesthesiologist:  
- Continue to administer meds, blood products and draw labs, as ordered  
Third Nurse (or charge nurse):  
- Recorder | Selective Embolization (IR)  
Interventions based on etiology not yet completed  
Prevent hypothermia, academia  
Conservative or Definitive Surgery:  
- Uterine Artery Ligation  
- Hysterectomy  

For Resuscitation:  
Aggressively Transfuse Based on Vital Signs, Blood Loss  
After the first 2 units of PRBCs use  
Near equal FFP and RBC for massive hemorrhage:  
4-6 PRBCs: 4 FFP: 1 apheresis Platelets  

Unresponsive Coagulopathy:  
- Role of rFactor VIIa is very controversial. After 8-10 units PRBCs and coagulation factor replacement with ongoing hemorrhage, may consider risk/benefit of rFactor VIIa in consultation with hematologist or trauma surgeon  

Once Stabilized: Modified Postpartum Management with increased surveillance; consider ICU
# UTEROTONIC AGENTS for POSTPARTUM HEMORRHAGE

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Route</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 500-1000 ml, rate titrated to uterine tone</td>
<td>IV infusion</td>
<td>Continuous</td>
<td>Usually none Nausea, vomiting, hyponatremia (“water intoxication”) with prolonged IV admin. ↓ BP and ↑ HR with high doses, esp IV push</td>
<td>Hypersensitivity to drug</td>
<td>Room temp</td>
</tr>
<tr>
<td>Methergine® (Methylergonovine)</td>
<td>0.2 mg</td>
<td>IM (not given IV)</td>
<td>- Q 2-4 hours - If no response after first dose, it is unlikely that additional doses will be of benefit</td>
<td>Nausea, vomiting Severe hypertension, esp. if given IV, which is not recommended</td>
<td>Hypertension, Preeclampsia, Cardiovascular disease Hypersensitivity to drug Caution if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/possible cerebral hemorrhage</td>
<td>Refrigerate Protect from light</td>
</tr>
<tr>
<td>Hemabate® (15-methyl PG F2a)</td>
<td>250 mcg</td>
<td>IM or intramyometrial (not given IV)</td>
<td>- Q 15-90 min - Not to exceed 8 doses/24 hrs - If no response after several doses, it is unlikely that additional doses will be of benefit</td>
<td>Nausea, vomiting, Diarrhea Fever (transient), Headache Chills, shivering Hypertension Shivering 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>Cytotec® (Misoprostol)</td>
<td>600-800 mcg</td>
<td>Sublingual or oral</td>
<td>One time</td>
<td>Nausea, vomiting, diarrhea Shivering, Fever (transient) Headache</td>
<td>Rare Known allergy to prostaglandin Hypersensitivity to drug</td>
<td>Room temp</td>
</tr>
</tbody>
</table>

## BLOOD PRODUCTS

- **Packed Red Blood Cells (PRBC)**
  - (approx. 35-40 min. for crossmatch—once sample is in the lab and assuming no antibodies present)
  - Best first-line product for blood loss
  - 1 unit = 200 ml volume
  - If antibody positive, may take hours to days for crossmatch, in some cases, such as autoantibody crossmatch compatible may not be possible; use “least incompatible” in urgent situations

- **Fresh Frozen Plasma (FFP)**
  - (approx. 35-45 min. to thaw for release)
  - Highly desired if ≥ 2 units PRBCs given, or for prolonged PT, PTT
  - 1 unit = 180 ml volume

- **Platelets (PLTS)**
  - Local variation in time to release (may need to come from regional blood bank)
  - Priority for women with Platelets < 50,000
  - Single-donor Apheresis unit (≥ 6 units of platelet concentrates) provides 40-50 k transient increase in platelets

- **Cryoprecipitate (CRYO)**
  - (approx. 35-45 min. to thaw for release)
  - Priority for women with Fibrinogen levels < 80
  - 10 unit pack (or 1 adult dose) raises Fibrinogen 80-100 mg/dl
  - Best for DIC with low fibrinogen and don’t need volume replacement
  - Caution: 10 units come from 10 different donors, so infection risk is proportionate.
# Obstetric Hemorrhage Emergency Management Plan: Table Chart Format

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Assessments</th>
<th>Meds/Procedures</th>
<th>Blood Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every woman in labor/giving birth</td>
<td>• Assess every woman for risk factors for hemorrhage</td>
<td>• Active Management 3rd Stage: Oxytocin IV infusion or 10u IM</td>
<td>• If Medium Risk: T &amp; S &amp; C 2 U</td>
</tr>
<tr>
<td></td>
<td>• Measure cumulative quantitative blood loss on every birth</td>
<td>• Fundal Massage vigorous, 15 seconds min.</td>
<td>• If High Risk: T &amp; C 2 U</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• If Positive Antibody Screen (prenatal or current, exclude low level anti-D from RhoGam): T &amp; C 2 U</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Blood loss: &gt; 500ml vaginal or &gt;1000 ml Cesarean, or VS changes (by &gt;15% or HR ≥ 110, BP &lt; 85/45, O2 sat &lt; 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Activate OB Hemorrhage Protocol and Checklist</td>
</tr>
<tr>
<td></td>
<td>• Notify Charge nurse, OB/CNM, Anesthesia</td>
</tr>
<tr>
<td></td>
<td>• VS, O2 Sat q5</td>
</tr>
<tr>
<td></td>
<td>• Record cumulative blood loss q5-15''</td>
</tr>
<tr>
<td></td>
<td>• Weigh bloody materials</td>
</tr>
<tr>
<td></td>
<td>• Careful inspection with good exposure of vaginal walls, cervix, uterine cavity, placenta</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 2</th>
<th>Continued bleeding with total blood loss under 1500ml</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• OB back to bedside (if not already there)</td>
</tr>
<tr>
<td></td>
<td>• Extra help 2nd OB, Rapid Response Team (per hospital), assign roles</td>
</tr>
<tr>
<td></td>
<td>• VS &amp; cumulative blood loss q 5-10 min</td>
</tr>
<tr>
<td></td>
<td>• Weigh bloody materials</td>
</tr>
<tr>
<td></td>
<td>• Complete evaluation of vaginal wall, cervix, placenta, uterine cavity</td>
</tr>
<tr>
<td></td>
<td>• Send additional labs, including DIC panel</td>
</tr>
<tr>
<td></td>
<td>• If in Postpartum: Move to L&amp;D/OR</td>
</tr>
<tr>
<td></td>
<td>• Evaluate for special cases: Uterine Inversion</td>
</tr>
<tr>
<td></td>
<td>• Amn. Fluid Embolism</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 3</th>
<th>Total blood loss over 1500ml, or &gt;2 units PRBCs given or VS unstable or suspicion of DIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Mobilize team -Advanced GYN surgeon -2nd Anesthesia Provider -OR staff -Adult Intensivist</td>
</tr>
<tr>
<td></td>
<td>• Repeat labs including coags and ABG’s</td>
</tr>
<tr>
<td></td>
<td>• Central line</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>
Obstetric Emergency Management Plan: Flow Chart Format

Pre-Admission
- Identify patients with special consideration: Placenta previa/accreta, Bleeding disorder, or those who decline blood products
- Screen All Admissions for hemorrhage risk: Low Risk, Medium Risk and High Risk

Time of Admission

Stage 0
- All women receive active management of 3rd stage
  - Oxytocin IV infusion or 10 Units IM, 10-40 U infusion

Blood Loss:
- >500 ml Vaginal
- >1000 ml CS

Stage 1
- Activate Hemorrhage Protocol
- Increase IV Oxytocin Rate
- Metherine 0.2 mg IM (if not hypertensive)
- Vigorous Fundal massage; Empty Bladder; Keep Warm
- Administer O2 to maintain Sat >95%
- Rule out retained POC, laceration or hematoma
- Order Type & Crossmatch 2 Units PRBCs if not already done

Stage 2
- Blood Loss: 1000-1500 ml
- Sequentially Advance through Medications & Procedures
- Vaginal Birth:
  - Bimanual Fundal Massage
  - Retained POC: Dilatation and Curettage
  - Lower segment/implantation site/Atony: Intrauterine Balloon Laceration/Hematoma: Paeking, Repair as Required
  - Consider IR (if available & adequate experience)
- Cesarean Birth:
  - Continued Atony: B-Lynch Suture/Intrauterine Balloon
  - Continued Hemorrhage: Uterine Artery Ligation

Stage 3
- Blood Loss: >1500 ml
- Activate Massive Hemorrhage Protocol
- Unresponsive Coagulopathy:
  - After 10 Units PRBCs and full coagulation factor replacement, may consider rFactor VIII

To OR (if not there):
- Activate Massive Hemorrhage Protocol
- Mobilize Massive Hemorrhage Team
- TRANSFUSE AGGRESSIVELY
  - RBC:FFP:Pits → 6:4:1 or 4:4:1

Cumulative Blood Loss
- >1500 ml, 2 Units Given, Vital Signs Unstable
- Hemorrhage Continues
- Consider ICU Care; Increased Postpartum Surveillance

Follow appropriate workups, planning, preparing of resources, counseling and notification

Low Risk: Draw blood and hold specimen

Medium Risk: Type & Screen, Review Hemorrhage Protocol

High Risk: Type & Crossmatch 2 Units PRBCs; Review Hemorrhage Protocol

Verify Type & Screen on prenatal record; if positive antibody screen on prenatal or current labs (except low level anti-D from Rhogam), Type & Crossmatch 2 Units PBRCs

Cumulative Blood Loss:
- >500 ml Vag: >1000 ml CS
- >15% Vital Sign change or:
  - HR ≥110, BP ≤85/45
  - O2 Sat <95%, Clinical Sign

Increased bleeding

CALL FOR EXTRA HELP

Activate Hemorrhage Protocol

Continued heavy bleeding

Pallor

Increased Postpartum bleeding

Definitive Surgery

Hysterectomy

Consider IR (if available & adequate experience)

California Maternal Quality Care Collaborative (CMQCC), Hemorrhage Taskforce (2009) visit: www.CMQCC.org for details

This project was supported by funds received from the State of California Department of Public Health, Center for Family Health; Maternal, Child and Adolescent Health Division
Obstetric Hemorrhage

• Reporting/Systems Learning
  • Every Unit
    • Establish a Culture of huddles for high risk patients and post-event debriefs to identify successes and opportunities
    • Multidisciplinary review of serious hemorrhages for system issues
    • Monitor outcomes and process metrics in perinatal quality improvement committee
<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Assessment 1</th>
<th>Assessment 2</th>
<th>Change from baseline to assessment 2, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliveries, n</td>
<td>10,433</td>
<td>10,457</td>
<td>11,169</td>
<td>+7</td>
</tr>
<tr>
<td>Stage 2, n</td>
<td>73</td>
<td>99</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Stage 2 per 1000 deliveries, %</td>
<td>7.01</td>
<td>9.47</td>
<td>9.58</td>
<td>+37</td>
</tr>
<tr>
<td>Stage 3, n</td>
<td>28</td>
<td>32</td>
<td>48</td>
<td>+60</td>
</tr>
<tr>
<td>Stage 3 per 1000 deliveries, %</td>
<td>2.68</td>
<td>3.06</td>
<td>4.29</td>
<td></td>
</tr>
<tr>
<td>Packed red blood cells, n</td>
<td>232</td>
<td>180</td>
<td>197</td>
<td>−15 (P = .02)</td>
</tr>
<tr>
<td>Platelets, n</td>
<td>65</td>
<td>37</td>
<td>26</td>
<td>−60 (P &lt; .01)</td>
</tr>
<tr>
<td>Cryoprecipitate, n</td>
<td>43</td>
<td>18</td>
<td>18</td>
<td>−58 (P &lt; .01)</td>
</tr>
<tr>
<td>Fresh frozen plasma, n</td>
<td>35</td>
<td>24</td>
<td>56</td>
<td>+60 (P &lt; .01)</td>
</tr>
<tr>
<td>Total blood products, n</td>
<td>375</td>
<td>354</td>
<td>297</td>
<td></td>
</tr>
<tr>
<td>Blood products per 1000 deliveries, %</td>
<td>35.9</td>
<td>33.9</td>
<td>26.6</td>
<td>−25.9 (P &lt; .01)</td>
</tr>
<tr>
<td>Year</td>
<td>2011</td>
<td>2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemorrhage with peripartum hysterectomy, n</td>
<td>82</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysterectomy per 1000 births</td>
<td>1.22</td>
<td>1.04</td>
<td></td>
<td>−14.8 (P = .2)</td>
</tr>
</tbody>
</table>
Uterotonic, balloon tamponade, and cryoprecipitate use over time. Proportions of postpartum hemorrhage in which A, uterotonics, B, balloon tamponade, and C, cryoprecipitate were used over time, from August 2007 through December 2011.

Brett D. Einerson, Emily S. Miller, William A. Grobman
American Journal of Obstetrics and Gynecology, Volume 212, Issue 2, 2015, 140–144.e1
http://dx.doi.org/10.1016/j.ajog.2014.07.004
Examples of Success with Version 1.0!

- Saddleback Memorial
  - Reduction in hysterectomy with increased use of B-Lynch suture

- California Pacific Medical Center
  - Substantial reductions in blood product usage with protocol

- Dignity Health
  - Substantial reductions in blood product usage with protocol (Shields, et al 2013)

- Indiana University
  - 33% reduction in postpartum hemorrhage over 10 quarters with implementation of protocol
Maternal Mortality Rate, California and United States; 1999-2013

Lessons from the Field

- It takes a broad team
- Easy wins matter
- Goals and timelines are very useful
- It takes time and persistence to get the systems running smoothly
- Must have champions

<table>
<thead>
<tr>
<th>Disciplines &amp; Departments</th>
<th>Needed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetrics</td>
<td>YES</td>
</tr>
<tr>
<td>Nursing</td>
<td>YES</td>
</tr>
<tr>
<td>Anesthesia</td>
<td></td>
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<tr>
<td>Blood Bank</td>
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<td>Laboratory</td>
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<td>Operating Room</td>
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<td>Support personnel</td>
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<td>IT/EMR</td>
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<td>Others unique to your setting?</td>
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</table>
Summary

• Pregnancy related death appears to be increasing in the US
• Morbidity/Mortality from obstetrical hemorrhage is frequently preventable
• Checklists following best practices have been shown to reduce pregnancy related mortality
• California model has been shown to reduce maternal mortality
What’s Next

• WV Section ACOG working with the Perinatal Partnership to implement obstetric hemorrhage bundle (AIM) in WV

• Future
  • Severe Hypertension in Pregnancy bundle
  • Opioid dependence bundle (in development)
That's all Folks!