Obstetric and Postpartum Hemorrhage

Rose Mary Ainsworth, MSN, RN
Shari Crowe, MSN, MPH, RNC-OB
October 21, 2016

Causes of Maternal Mortality

- Hemorrhage 35%
- Other Direct Causes** 11%
- Unsafe Abortion 9%
- Hypertension 8%
- Infection 8%
- Indirect Causes* 10%
- Malaria, HIV, accident etc..
- Obstructed labor, embolism etc..

Source: Countdown to 2015, 2010.
Causes of Pregnancy-related deaths
United States in 2011

- Cardiovascular disease: 15.1%
- Other diseases: 14.1%
- Infection/sepsis: 14%
- Hemorrhage: 11.3%
- Cardiomyopathy: 10.1%
- Thrombotic PE: 9.8%
- Hypertension: 8.4%
- Amniotic fluid embolism: 5.6%
- Stroke: 5.4%

Indirect Causes = 39.3%
Cardiovascular disease + Cardiomyopathy + Other diseases
AKA Co-morbidities

Maternal Deaths in the U.S. Are on the Rise
Maternal mortality ratio (number of maternal deaths per 100,000 live births)

- United States
- Developed Regions

Maternal Mortality Ratio

1990: World 380, Developed Regions 26, United States 12
2013: World 210, Developed Regions 16, United States 28

Source: World Health Organization, Mashable, Statista
Alabama Maternal Mortality Rate

- 2007 - 9.6 per 100,000
- 2010 - 11.6 per 100,000
- State Ranking 33
- Grade S-

**INTERESTING FACTS IN ALABAMA:**
- In 1924, there were 58,840 births and 519 maternal deaths (MMR=002).4
- In 2002, there were 58,867 births and 6 maternal deaths (MMR=10).

National Women’s Law Center http://hrw.nwlc.org/states/alabama

---

Melissa’s Story

Melissa Price had a late postpartum hemorrhage. Melissa recalls asking the nurses how they could tell how much blood she was losing – the nurses never weighed the blood, and dumped it from a bed pan into a portable toilet.

Melissa tells of feeling sheer panic when the bleeding started up again.

- “enormous clots...I screamed and I will never forget the look on the nurse’s face when she lifted up that blanket. ..... I just kept thinking, ‘God give them more time. They need more time to save me.’”

Melissa ended up with a hysterectomy and about 12 units of blood transfused.

Melissa Price is a patient representative on the OHS Hemorrhage Task Force and has given her permission to use her real name and story.
Hemorrhage: How much is too much?

- >500mL for vaginal birth or 1000mL for C/S
  - But 500mL for vaginal birth is average
  - 1000mL for C/S is average
  - And for most women tolerated well
- WHO defines
  - EBL of >500mL is an “alert line”
  - EBL>1000mL is an “action line”
- ACOG (reVITAlize)
  - Cumulative blood loss of ≥1000mL or blood loss accompanied by sign/symptoms of hypovolemia
- 4-5% of women >1000mL - a clinically significant amount

1/3 of women with >1000mL loss have NO risk factors
How much is too much?

- 10% drop in hemoglobin or hematocrit
  - Hct/Hgb 35/11 → 31.5/9.9 = 10%
  - Not useful in emergency, since doesn’t correlate with acute blood loss
  
  or

- Any amount of blood loss that threatens the hemodynamic stability of the woman

B/P Pulse

Shock

- Inadequate oxygen delivery and tissue perfusion secondary to decreased intravascular volume
- It may progress to cellular hypoxia, acidosis, organ system damage and death
- Pale, clammy skin
- Confusion
- Loss of consciousness

(Gutierrez, Reines, & Wulf-Gutierrez, 2004) AWHONN
Percentage of maternal hemorrhage-related deaths that could have been prevented with improved clinical response

54 – 93%

Why do we need to be ready?

- OB Hemorrhage incidence is increasing.
- When reviewed, a high percentage of deaths from OB Hemorrhage are preventable.
- Mortality reviews shows that system breakdowns and other factors we can control lead to mortality.
Remember this

“The most important thing that can be done when a woman has a postpartum hemorrhage is to recognize the situation as early as possible. This will help cut down on the chances that it will become life-threatening.”

The major factor in adverse outcomes is delay in initiating appropriate management.

Summary of Recommendations

- Quantification of blood loss for all
- Active management of the 3rd stage for all
- Vital sign triggers
- "Move along" on uterotonic medications
- Intrauterine balloon/B-Lynch suture
- A new approach to blood products
- The value of a formal protocol
- Toolkit at www.cmqcc.org/ob_hemorrhage
The Nurse’s Role

- Understand the normal physiologic adaptations of pregnancy
- Recognize signs and symptoms of obstetric hemorrhage
- Quantify blood loss
- Notify and update team
- Intervene appropriately
- Evaluate the patient’s response to interventions

Cardiovascular Adaptations
- Increased blood volume (50%)
- Increased cardiac output
- Increased blood flow to the uterus
- Myocardial hypertrophy
- Decreased SVR, PVR, BP and colloid osmotic pressure

Hematologic Adaptations
- Increased production of RBCs
- Hypercoagulable state
- Increased fibrinogen, WBCs, sedimentation rate
- Decreased fibrinolysis
Keep these things in mind:

- Uterine cavity:
  - Prepregnancy 10mL
  - Third trimester: 5000mL

- Blood Flow
  - Prepregnancy 2% cardiac output
  - Third trimester: 17% cardiac output: 600-800mL/min

- Result: Mother can exsanguinate in 8-10 minutes
- BUT . . . It can also occur over hours
- Be alert to the signs and symptoms of hemorrhage and hypovolemia

Placental Abruption

- Premature separation of a normally implanted placenta from the decidual lining of the uterus after 20 weeks of gestation
- 1% of all pregnancies - of these only 10% a threat to the fetus
Grading System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 0</td>
<td>&lt; 10%</td>
<td>Asymptomatic</td>
</tr>
<tr>
<td>Grade I (mild)</td>
<td>10-20%</td>
<td>Minimal vaginal bleeding and tenderness, no evidence of coagulopathy, hemodynamic stability, reassuring FHR tracing</td>
</tr>
<tr>
<td>Grade II (moderate)</td>
<td>20-50%</td>
<td>External vaginal bleeding may or may not be present, possible tetanic contractions, maternal hemodynamic stability with tachycardia, nonreassuring FHR patterns, hypofibrinogenemia</td>
</tr>
<tr>
<td>Grade III (severe)</td>
<td>&gt; 50%</td>
<td>Heavy vaginal bleeding</td>
</tr>
</tbody>
</table>

Risk Factors Include

- Prior history of abruption
- Hypertensive disorders
- Substance use (cocaine, tobacco)
- Trauma
- Thrombophilia
- Sudden decompression of uterus in polyhydramnios and multiple gestation (rare)
Clinical Manifestations

- Classic presentation:
  - Vaginal Bleeding
  - Abdominal pain
  - Uterine tenderness
  - Contractions
- Not always that clear:
  - No vaginal bleeding in 20-30% of patients
  - Pain and tenderness may be absent
  - Patient may present with vague symptoms such as restlessness and back pain

Diagnosis

- Primarily based on clinical presentation
- Ultrasonography is not always reliable in diagnosing
  - A retroplacental clot is the classic finding, but is not always present
  - Sensitivity of ultrasound findings for diagnosis of abruption is only 25 to 50 percent, but the positive predictive value is high (88 percent) when ultrasound findings suggestive of abruption are present
Management

Determined by:
- Severity of blood loss
- Associated complications
- Maternal hemodynamic status
- Fetal status
- If mild - expectant management if fetus <36 weeks, no distress

Disseminated Intravascular Coagulation (DIC)
- As the placenta separates
  - Thromboplastin released → thrombin enters maternal circulation → overwhelms hemostatic control mechanisms → DIC
- A pathologic form of clotting
- Large amounts of clotting factors are consumed, causing widespread bleeding
- Over activation of the clotting cascade and the fibrinolytic system resulting in depletion of platelets and clotting factors
- Occurs secondary to abruption, AFE, dead fetus syndrome, severe preeclampsia, septicemia, cardiopulmonary arrest and hemorrhage
- The presence of fibrin split products and an elevated D-dimer indicate that clots are being broken down in the body
- May see evidence such as bleeding from intravenous (IV) or injection sites, hemorrhage, and cardiovascular collapse.
Lab Values
- Decreased platelets, fibrinogen
- Increased FSP
- PT, PTT, INR usually prolonged (Due to decreased clotting factors)
- Elevated D-Dimer (indicates excessive fibrinolysis)

Nursing Considerations
- Expectant management
- Blood and fluid replacement
- Monitoring of bleeding, hemodynamics
- Delivery - vaginal versus cesarean
- Monitor for complications - DIC, hypovolemic shock and organ failure, postpartum hemorrhage
Uterine Rupture

- After previous C/S
  - Complete disruption of all layers leading to changes in maternal or fetal status
  - NOT uterine dehiscence
  - NIH consensus report places overall incidence at 0.325% in women undergoing TOLAC

- Unscarred uterus
  - Rare
  - Usually after previous transmyometrical surgery
  - Higher rates in countries without good access to operative deliveries for obstructed labor
Risk Factors

- Prior uterine rupture
- Induction
- Labor
- Other possible risk factors
  - Increasing maternal age
  - Gestational age > 40 weeks
  - Birth Weight > 4000 grams
  - Inter-delivery interval < 18-24 months
  - Single layer uterine closure or closure with a locked stitch
  - Multiple Prior cesareans

Clinical Manifestations - Developing Rupture

- Abnormal FHR
- Hemodynamic instability
- Weakening contractions
- Loss of presenting part
- Abdominal pain (may be masked)
- Vaginal bleeding
- Hematuria
Clinical Manifestations - Complete Rupture

- Immediately apparent signs
- Sharp tearing pain
- Contractions cease
- Fetus palpable through abdominal wall
- Bleeding may be apparent or concealed (if intra-abdominal - tense, acute abdomen with shoulder pain)
- Can be quickly followed by shock

Management

- Maternal stabilization
- Immediate cesarean section
Nursing considerations

- May be slow in onset
- Recognize and be aware of early S&S
- If bleeding is undetected or underestimated, hypotension can be followed quickly by shock and the cardiovascular collapse
- Careful administration of oxytocin

3 approaches to identifying postpartum coagulopathy

- Clinical observation and diagnosis—key to early, rapid recognition
  - Evidence of abnormal clotting:
    - blood oozes excessively from many areas of minor trauma
    - suturing lacerations fails to stanch bleeding
    - blood is more “watery” and less deeply red than ordinarily encountered (the so-called Kool-Aid sign).

- The whole blood clotting test
  - Red-top–tube test—a simple test that can be performed at the patient’s bedside
    - Draw a tube of blood in red-topped tube
    - Will normally clot in 5 to 8 minutes @ room temperature
    - When it takes longer than 10 minutes to clot, the patient has a coagulopathy

- Clinical laboratory measurement of the coagulation profile
  - at the same time, send a specimen of venous blood to the lab for a stat coagulation profile
Massive hemorrhage

- Unusual visual and auditory cues to excessive bleeding should be urgently investigated
  - Blood on floor, walls & ceiling
  - Blood dripping off stretcher, bed, or stretcher
  - Continuously vibrating suction tubing or continuous full suction

- For all cases of ongoing hemorrhage, I&O should be documented, tallied, & reported to the team at frequent intervals.

Postpartum Hemorrhage and Measurement of Blood Loss
## Pregnancy & Admission Risk Factors

<table>
<thead>
<tr>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous uterine incision</td>
<td>Prior Cesarean or uterine surgery</td>
<td>Placenta previa or low lying placenta</td>
</tr>
<tr>
<td>Singleton pregnancy</td>
<td>Multiple pregnancy</td>
<td>Suspected placenta accreta, percreta, increta</td>
</tr>
<tr>
<td>≤4 previous vaginal births</td>
<td>&gt;4 previous vaginal births</td>
<td>Hematocrit &lt;30 AND other risk factor</td>
</tr>
<tr>
<td>No known bleeding disorder</td>
<td>Chorioamnionitis</td>
<td>Platelets &lt;100,000</td>
</tr>
<tr>
<td>No history of postpartum hemorrhage</td>
<td>History of previous postpartum hemorrhage</td>
<td>Active bleeding (greater than show) on admission</td>
</tr>
<tr>
<td></td>
<td>Large uterine fibroids</td>
<td>Known coagulopathy</td>
</tr>
<tr>
<td></td>
<td>Obesity</td>
<td></td>
</tr>
</tbody>
</table>

### Risk Factors that may develop in labor
- Prolonged oxytocin use
- Prolonged second stage
- Active bleeding
- Chorioamnionitis
- Magnesium sulfate use

### Risk Factors that may develop as a result of delivery
- Cesarean birth (especially urgent or emergent)
- Retained placenta
- Vacuum or forceps-assisted delivery
- 3rd or 4th degree tear
Clinical signs of PPH

- Excessive bleeding that makes the patient symptomatic
  - Pallor
  - Lightheadedness
  - weakness, palpitations
  - Diaphoresis
  - Restlessness
  - Confusion
  - Air hunger
  - Syncope

- And/or results in signs of hypovolemia
  - Hypotension
  - Tachycardia
  - Oliguria
  - Oxygen saturation <95 percent

Signs of Postpartum Hemorrhage

- Heart rate ≥ 110
- Blood Pressure ≤ 85/45 (> 15% drop)
  - 100/65 – 15% = 85/55
  - 120/80 – 15% = 102/68
  - 135/85 – 15% = 115/72
- Oxygen saturation < 95%
Secondary Postpartum Hemorrhage

- Occurs more than 24 hours after delivery & up to 6 weeks
- The most common causes are:
  - Infection - endometritis
  - Retained products of conception (RPOC)
  - Inherited coagulation defects
  - Incomplete involution of placental site
- Occurs in 1-3% after spontaneous vaginal delivery.
- The most common occurrence of postnatal morbidity between days 2 and 10

Blood volume changes in pregnancy

- Average Woman has blood volume of 65mL/kg
- During pregnancy, increases 40-50%
- Woman weighing 50 kg = 110 lb
  - Blood volume pre-pregnancy = 3250 mL
  - Blood volume at term = 4710 mL
- Woman weighing 68 kg = 150 lb
  - Blood volume pre-pregnancy = 4420 mL
  - Blood volume at term = 6410 mL
- Woman weighing 91 kg = 200 lb
  - Blood volume pre-pregnancy = 5915 mL
  - Blood volume at term = 8575 mL
Causes of PPH
The 4 Ts

Tone
- Uterine muscle fails to contract after delivery of the newborn
- Overdistension due to multiple gestation, polyhydramnios
- Induction of labor
- Long labor
- Infection
- Obesity
- Hypertension

Tissue
- Incomplete removal of Placenta & membranes
- Placenta accreta, increta, percreta
- Uterine surgery
- Placenta previa
- Placental abruption

Trauma
- Physical injury
  - Laceration of cervix, vagina, or perineum
  - Injury during Cesarean
- Uterine rupture
- Uterine inversion
- Grand multiparity

Thrombin
- Congenital coagulation disorders e.g. hemophilia, von Willebrand
- Acquired coagulopathy e.g. DIC, hyperfibrinolysis, anticoagulants
- Low FIBRINOGEN levels

Uterine Atony

- Relaxation of the uterus till it lacks normal muscle tone
- If the fundus does not become firm after massage & after clots have been expelled, get help, stay with mother, & notify the physician

About 70% of PPH is caused by uterine atony

First Response of Uterine Atony

- Bimanual massage in L&D
- Manual massage in Postpartum
  - Stabilize uterus above pubis
  - Cup upper fundus with other hand and massage
  - Continue until firm & clots removed
- Empty the bladder!
- Insert Foley catheter with urimeter
- Measure I&O

Start an IV
Start 2nd line before vasoconstriction sets in!

- 14-gauge IV line delivers twice as much fluid as an 18-gauge
- Restore effective circulating blood volume
  - Crystalloid IVF until cross matched blood available (Infuse 4x blood loss because only 25% remains in intravascular space.)
- Clinical signs of improvement
  - Improved vital signs
  - Urine output >30mL/hr
Medications

Tissue - placenta and membranes

- Previous scarring makes more likely
Causes of PPH: Trauma

- Vaginal wall laceration
- Vaginal wall hematoma (pain, no visible blood)
- Cervical laceration
- Uterine rupture
- Laceration of broad ligament
- Laceration of uterine artery
- Uterine inversion

Signs of Lacerations

- May present as a small steady bleeding or free-flowing blood
- Over time can cause significant blood loss
- Uterus is usually firm
- Blood will be bright red
- May come from the cervix, vagina, or perineum
- Remember that blood loss can also be internal

Nursing Considerations

- Have equipment ready for physician
  - Bedpan to lift hips
  - Speculum
  - Sponge forceps and sponges
  - Light
- Notify L&D or OR of possible need for surgery

Causes of PPH: Thrombin Coagulation cascade
Causes of PPH: Thrombin

- Congenital coagulopathies
  - Von Willebrand disease - Antibodies to Factor VIII - 1%
  - Factor X, XI, XIII deficiencies
- Diseases that can cause acquired postpartum coagulopathy include:
  - placental abruption
  - preeclampsia
  - amniotic fluid embolism
  - acute fatty liver of pregnancy
  - prolonged intrauterine retention of a fetal demise
  - sepsis
  - a previously undiagnosed coagulation disorder
- PPH causes coagulopathies
  - Coagulation factors used up (consumption)
    - DIC Disseminated intravascular coagulation
  - IV fluids dilute blood (dilutional)

3 approaches to identifying postpartum coagulopathy

- Clinical observation and diagnosis—key to early, rapid recognition
  - Evidence of abnormal clotting:
    - blood oozes excessively from many areas of minor trauma
    - suturing lacerations fails to stanch bleeding
    - blood is more “watery” and less deeply red than ordinarily encountered (the so-called Kool-Aid sign).
- The whole blood clotting test
  - Red-top tube test—a simple test that can be performed at the patient’s bedside
    - Draw a tube of blood in red-topped or gold-topped tube
    - Will normally clot in 5 to 8 minutes @ room temperature
    - When it takes longer than 10 minutes to clot, the patient has a coagulopathy
- Clinical laboratory measurement of the coagulation profile
  - at the same time, send a specimen of venous blood to the lab for a stat coagulation profile
Order of lab draw

- Blue top routine coagulation studies
- Gold top blood bank & chemistry or Red top
- Lavender top – hematology

Important Things to Know

- Caregivers consistently underestimate blood loss by as much as 50%
- The volume of clotted blood represents half the blood needed to form that clot
- Most OB patients are healthy & compensate for blood loss very well
- Symptoms may not appear until blood loss is >1000mL
- Changes in H&H not evident for at least 4 hours, not helpful for early recognition & treatment
Hypothermia (<95°F) makes hemorrhage worse

- Each 1°C = 10% ↓ in the function of clotting factors.
- Hypothermia ↓ platelet function = fibrinolysis
- ↓ enzymes in clotting cascade

The patient’s core temperature should be communicated to laboratory personnel when blood samples are obtained and assessed. Otherwise, laboratory results may not accurately reflect the patient’s coagulation status.

- Prevent hypothermia by use of operating room table warmers, heating blankets, intravenous fluid infusion warmers, blood warmers.

Quantification of Blood Loss (QBL)
Goals of Formal Quantification of Blood Loss at Birth (QBL)

- More accurate measurement
- Improved communication among caregivers
- Should be a collaborative effort that includes nurses, anesthesia and obstetric providers

Quantify Blood Loss for All Births

- Estimate
  - recording percent (%) saturation of blood soaked linens with the use of visual cues such as pictures/posters
- Measure Blood Loss
  - Weigh saturated pads/linens
  - Pour into measuring device
- Assess patient’s clinical condition
  - Vital signs
  - Level of Consciousness
Estimating blood loss using familiar objects in emergent situation

- 1 cup = 250ml
  = 5 cm clot (orange)
  = 1 unit PRBCs

- 12 oz soda can = 355 ml
- 2 cups = ~ 500 ml
  = 10 cm clot (softball)
  = 2 unit PRBCs

Floor Spills
- 23 inches (50 cm) : 500 ml
- 34 inches (75 cm) : 1000 ml
- 45 inches (100 cm) : 1500 ml

Estimate with equipment used at your hospital

- 2000mL Blood
- 85mL
- 50mL
- 25mL
- 12" x 12" lap sponge
QBL in vaginal birth

- Using a device such as an underbuttocks drape to collect & measure blood flowing from the vagina in L&D
- All fluid before delivery of the placenta can be considered amniotic fluid
- All fluid after delivery of the placenta can be considered blood
- Note fluid level before delivery of placenta
QBL in cesarean birth

- Note fluid level in suction before delivery of placenta
- Subtract that amount from total in suction canister
- Count soaked or partially soaked lap sponges
- Or, change suction canister after birth & before placenta

Quantify Blood Loss by Weighing

- Establish dry weights of common items
- Standardize use of pads
- Build weighing of pads into routine practice
- Develop worksheet for calculations
- Weigh all blood clots & items saturated with blood (1 ml blood = approximately 1 gm)
### Weight of Dry Items
#### Huntsville Hospital

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight (oz)</th>
<th>Weight (gms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Chux pad</td>
<td>2.1</td>
<td>60</td>
</tr>
<tr>
<td>Ray-Tec sponge</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Lap Sponge</td>
<td>0.7</td>
<td>20</td>
</tr>
<tr>
<td>Towel-sterile green</td>
<td>2.8</td>
<td>80</td>
</tr>
<tr>
<td>Under buttocks cloth pad</td>
<td>12.5</td>
<td>360</td>
</tr>
<tr>
<td>Fitted sheet</td>
<td>1# 2.5 oz</td>
<td>525</td>
</tr>
<tr>
<td>Flat sheet</td>
<td>1# 2 oz</td>
<td>500</td>
</tr>
<tr>
<td>Bath Towel</td>
<td>7 oz</td>
<td>200</td>
</tr>
<tr>
<td>Blue/ green gown</td>
<td>12.4</td>
<td>353</td>
</tr>
<tr>
<td>Large gown</td>
<td>1# 2 oz</td>
<td>514</td>
</tr>
<tr>
<td>Wash cloth</td>
<td>0.8 oz</td>
<td>25</td>
</tr>
<tr>
<td>Blanket</td>
<td>3#</td>
<td>1370</td>
</tr>
<tr>
<td>CapriPlus maternity pad</td>
<td>1.3 oz</td>
<td>39</td>
</tr>
<tr>
<td>Curity Maternity pad</td>
<td>0.4 oz</td>
<td>14</td>
</tr>
<tr>
<td>Ice pack</td>
<td>6 oz</td>
<td>170</td>
</tr>
<tr>
<td>Specipan</td>
<td>1.9 oz</td>
<td>55</td>
</tr>
<tr>
<td>Panties</td>
<td>0.4 oz</td>
<td>14</td>
</tr>
</tbody>
</table>

### Weighing Blood-Soaked Linens
- Gather all bloody linens & pads
- Place in plastic linen bag
- Weigh all on Nursery scale
- Subtract weight of clean linens & pads
- 1 gram = 1mL

1000mL Blood

\[
\text{Weight of bloody items} - \text{Weight of clean items} = \text{Weight of blood}
\]

Remember 1 gm = 1 mL
Handout for Nurses

### Estimating Blood Loss Using Familiar Objects

- **1 tee = 36 ml**
- **1 small cup = 6 oz**
- **1 large cup = 8 oz**
- **1 pint = 16 oz**
- **1 quart = 32 oz**
- **1 gal = 128 oz**

**Floor Spills**
- **2 inches (5 cm) = 300 ml**
- **3 inches (8 cm) = 600 ml**
- **4 inches (10 cm) = 1000 ml**

### Weighing Blood-Soaked Materials for Greatest Accuracy

<table>
<thead>
<tr>
<th>Material</th>
<th>Dry Weight</th>
<th>Wet Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Gauze roll</td>
<td>24 oz</td>
<td>8 oz</td>
</tr>
<tr>
<td>Raytex sponge</td>
<td>8 oz</td>
<td>20 gms</td>
</tr>
<tr>
<td>Lap Sponge</td>
<td>4 oz</td>
<td>10 gms</td>
</tr>
<tr>
<td>Sheet, strung cotton</td>
<td>1 oz</td>
<td>5 gms</td>
</tr>
<tr>
<td>Under sheet, cloth pad</td>
<td>1 oz</td>
<td>5 gms</td>
</tr>
<tr>
<td>Fitted sheet</td>
<td>3.5 oz</td>
<td>12 gms</td>
</tr>
<tr>
<td>Flat sheet</td>
<td>2 oz</td>
<td>8 gms</td>
</tr>
<tr>
<td>Adult towel</td>
<td>7 oz</td>
<td>20 gms</td>
</tr>
<tr>
<td>Montagry/pads</td>
<td>0.3 oz</td>
<td>5 gms</td>
</tr>
<tr>
<td>Large gown</td>
<td>0.7 oz</td>
<td>6 gms</td>
</tr>
<tr>
<td>Yarn cloth</td>
<td>0.8 oz</td>
<td>25 gms</td>
</tr>
<tr>
<td>Blanket</td>
<td>3 oz</td>
<td>10 gms</td>
</tr>
<tr>
<td>Towel</td>
<td>5.5 oz</td>
<td>20 gms</td>
</tr>
<tr>
<td>Pillow</td>
<td>0.4 oz</td>
<td>1 gms</td>
</tr>
<tr>
<td>Ice pack</td>
<td>6 oz</td>
<td>10 gms</td>
</tr>
<tr>
<td>Funtex</td>
<td>8 oz</td>
<td>25 gms</td>
</tr>
</tbody>
</table>

Reminder: 1 gm = 1 ml

Place soaked materials in bag & weigh. Subtract the weight of the dry material. Remainder is weight of blood.

LAU OR/ICU Room: 57350 - Div 45271; Main: 64-43807

WAC: 67-5719; Nurse Supervisor: 57560; LAU Charges: 57531

---

### Obstetric Hemorrhage Safety Bundle

- **Readiness**
- **Recognition**
- **Response**
- **Reporting / Systems Learning**

Denial or Delay?
Important Things to Know

- Caregivers consistently underestimate blood loss by as much as 50%.
- The volume of clotted blood represents half the blood needed to form that clot.
- Most OB patients are healthy & compensate for blood loss very well.
- Symptoms of hypovolemia may not appear until blood loss is >1000mL.
- Changes in H&H not evident for at least 4 hours, not helpful for early recognition & treatment.

Obstetric Hemorrhage Safety Bundle

Readiness: (every unit)
- Hemorrhage Cart / with Procedural Instructions (balloons, compression stitches)
- Rapid access to hemorrhage medications (kit or equivalent)
- Establish a response team: multiple partnerships // unit education, drills, debriefs
- Establish MTP and 0-neg/uncrossmatched transfusion protocols

Recognition: (every patient)
- Assessment of hemorrhage risk (prenatal, on admission, ongoing in labor & PP)
- Measurement of CUMMULATIVE blood loss
- Active Management of 3rd Stage (oxytocin after birth)
Obstetric Hemorrhage Safety Bundle

Response: (every hemorrhage)
- Unit-standard, stage-based OB Hemorrhage Emergency Management Plan with checklist
- Support program for patients, families and staff

Reporting / Systems Learning: (every unit)
- Establish a culture of Huddles for high-risk patients and post-event debriefings
- Review all stage 3 hemorrhages for systems issues
- Monitor outcome and process metrics in perinatal QI committee

Hemorrhage Guidelines: Staged Responses

- Pre-Admission: All patients-Assess Risk
- Stage 0: All birth- Routine Measures
- Stage 1: QBL > 500 mL vag or 1000 mL CS or VS unstable with continued bleeding
- Stage 2: QBL 1000-1500 mL with continued bleeding
- Stage 3: QBL exceeds 1500 mL
Emergency Protocol

- Ensures staged response based on risk factors and hemorrhage level
- Enhances objective communication among providers
- Enhances consistency among providers
**PHYSICIAN’S ORDERS**

**HUNTSVILLE HOSPITAL       HUNTSVILLE, ALABAMA**

**Page 1 of 1**

**Postpartum Hemorrhage Protocol**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Orders</th>
</tr>
</thead>
</table>
| **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 |

*References:*
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

---

Stage 1: OB Hemorrhage

- Notify physician.
- Maintain patent IV access and increase IV oxytocin rate and titrate until uterine tone firm.
- Fundal massage every 15 minutes.
- Place Foley catheter.
- Vital signs q 15 minutes with continuous Pulse Ox.
- Measure blood loss every 15 minutes.
- Administer O₂ to maintain saturation at >95%.
- Maintain I&Os.
- Utilize warm blankets or warming blanket to maintain patient temp at 98.6.
- Type and Crossmatch 2 units PRBCs as ordered by physician. Notify Blood Bank for potential Massive Transfusion Protocol.
- Obtain CBC. If platelets <100,000 draw DIC profile.
Postpartum Hemorrhage Cart

Stage 2: OB Hemorrhage

- Continued bleeding with blood loss up to 1500 mL cumulative blood loss or continued vital sign instability.

- Actions:
  - Ensure OB/GYN is present.
  - Continue above orders plus:
  - Notify anesthesia of potential for operative intervention and proceed to OR.
  - Establish 2nd large bore IV.
  - Assess and announce VS and cumulative blood loss q5 min.
Blood Replacement

- Packed Red Blood Cells - Improves Oxygen-carrying capacity of blood
- Fresh Frozen Plasma (FFP) - Contains fluid and all clotting factors and is indicated when a patient has MULTIPLE factor deficiencies and is BLEEDING or after 2 units PRBC given. Allow 35 – 45 minutes to thaw.
- Platelets - When activated, combine with fibrin to form clot. Given if the platelet count is < 50,000/μL
- Cryoprecipitate - Contains fibrinogen, factor VIII coagulant, vonWillebrand's factor, and factor XIII. Allow 35 – 45 minutes to thaw.
- Recommended ratio for replacement is: RBC/FFP/Platelet 1:1:1

ACOG Statement

- If a patient receives 4 or more units of Packed Red Blood Cells or is admitted to the Intensive Care Unit, it is a Sentinel Event & must be reported to The Joint Commission
**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

**Cook “Bakri” Intrauterine Balloon**

- There are now several balloons, but the most available in the US is the Cook “Bakri” Balloon
  - Specifically designed for this purpose
  - Double lumen (for drainage from above)
  - Silicone (non-latex)
  - Uterine contour shape
  - Good filling capacity (saline)
  - Inexpensive
  - Easy to use
Stage 3: OB Hemorrhage

Cumulative blood loss $\geq 1500\text{mL}$

$>2$ units packed red blood cells given

Vital signs unstable

Continues to bleed

Suspicion for DIC
Lessons from Combat in Iraq

- Lowest losses ever from hemorrhage
- In massive hemorrhage or trauma, RBC/FFP/Platelet 1:1:1 given by military
- Postpartum hemorrhage has been compared to trauma, & similar management principles of treatment are recommended for obstetric practice

California OB Hemorrhage Guidelines

Stage 3: STILL BLEEDING and EBL >1500 mL or > 2 u PRBCs given or VS unstable or suspect coagulopathy
- Massive transfusion protocol
  - Transfuse aggressively
  - Near 1:1 ratio PRBC: FFP
  - Rapid use of FFP may be as important as ratio
  - 1 PLT pheresis pack per 4-6 units PRBC
- Invasive surgical techniques
- Mobilize help: Advanced surgeon (gyn, gyn onc, trauma, MFM)
**Whole Blood**

- Rarely given
- Contains all components
- Is divided into plasma and various cells, given separately

“Whole blood” is good for OB hemorrhage

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

**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
Packed Red Blood Cells (PRBC)

- Improves Oxygen-carrying capacity of blood
- In the **actively bleeding patient**, Hgb less than 8 g/dL indicates an immediate need for RBC replacement
- Each unit of PRBC increases the patient’s Hgb by ~ 1 g/dL (Hct by ~3%).
- Leuko-poor= remove WBCs to ↓ risk of reaction to blood
- Are made from a unit of whole blood by centrifugation and removal of most of the plasma

Frozen Fresh Plasma (FFP)

- Contains fluid and all clotting factors
- Recommend the addition of 1 Unit of FFP for every 2-5 Units of PRBCs (1:1 for massive hemorrhage)
- Must be ABO-compatible with the recipient or
- AB is the universal plasma donor
  - A & B antigens are on the RBC
  - Antibodies for A & B are in the plasma
  - AB blood has neither Anti-A nor Anti-B antibodies in the plasma
- ~180-250 ml per unit
- Needs ~35-45 minutes to thaw
Platelets

- When activated, combine with fibrin to form clot
- Normal count is 150,000-350,000 per microliter of blood
- Given if the platelet count is < 50,000/μL
- Must be ABO compatible, but not Rh
- Very delicate
  - Refrigeration shortens life of platelets
  - May be stored at room temp for 5 days
  - CANNOT be frozen.

Cryoprecipitate (cryo)

- Contains fibrinogen, factor VIII coagulant, vonWillebrand's factor, and factor XIII.
- Used for hypofibrinogenemia, vonWillebrand's disease, and in situations calling for a "fibrin glue."
- Cryo IS NOT a concentrate of FFP.
- Used for DIC with low fibrinogen & don’t need volume replacement
- Takes ~35-45 minutes to thaw
Other Medical Therapies

- Uterine artery embolization
- Uterine artery ligation
- B-Lynch Suture
- Hysterectomy

Rapid Recognition of PPH is Essential

- The biggest factor in the adverse outcomes associated with severe hemorrhage is a delay in initiating appropriate management.
Diagnosis is by Observing Blood Loss & Clinical Status

- Assess
  - Amount of blood lost
  - Level of consciousness
  - Vital signs are continually assessed
- Call for help
- Notify blood bank
- Designate an experienced person to document critical information and times
- Ensure the availability of an operating room

Clinical Findings in PPH

<table>
<thead>
<tr>
<th>Blood Loss Volume</th>
<th>500-1000 mL (10-5%)</th>
<th>1000-1500 mL (15-25%)</th>
<th>1500-2000 mL (25-33%)</th>
<th>2000-3000 mL (33-50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse</td>
<td>Normal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure (systolic)</td>
<td>Normal</td>
<td>Slight fall (80-100 mm Hg)</td>
<td>Moderate fall (70-80 mm Hg)</td>
<td>Marked fall (50-70 mm Hg)</td>
</tr>
<tr>
<td>Symptoms &amp; Signs</td>
<td>Palpitations, tachycardia, dizziness</td>
<td>Weakness, tachycardia, sweating</td>
<td>Restlessness, pallor, oliguria</td>
<td>Collapse, air hunger, anuria</td>
</tr>
<tr>
<td>Degree of Shock</td>
<td>Compensated</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
</tbody>
</table>
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

PPH 10 Most Common Mistakes

1. Treating “Postpartum Hemorrhage” as a diagnosis (as opposed to a sign) and not identifying underlying cause(s)
2. Underestimating blood loss
3. Inattention to vital sign trends
4. Delay in laboratory assessment for developing anemia and coagulopathy
5. Delay in instituting blood component therapy
6. Delay in surgical intervention
7. Not making the mental shift from “normal delivery” to “life-threatening emergency”
8. Poor perioperative communication between the Obstetrician and Anesthesiologist regarding who will primarily manage blood loss estimation, laboratory assessment, and blood component therapy
9. Poor postpartum communication between Nurse and Obstetrician regarding estimated blood loss, patient vital signs and other clinical indicators
10. Lack of preoperative preparation for massive hemorrhage (e.g. placenta previa with prior cesareans and suspected placenta accreta)

Dildy et al. HCA online PPH course, Advanced Practice Strategies
Resources

- AWHONN.org
- CMQCC.org

AWHONN Resources
- Postpartum Hemorrhage Project – Recognition, Readiness & Response Poster
- Quantification of Blood Loss Practice Brief
- Oxytocin Administration After Birth Practice Brief
- Ob Hemorrhage Monograph
- Ob Hemorrhage: Current Challenges and Solutions (webinar)
- Ob Hemorrhage: Simulation Based Training Strategies (webinar)
- Postpartum Hemorrhage: Why We Need to Take Action (webinar)
- JGNNN In Focus Series on Ob Hemorrhage
- PPH Online Education Modules

CMQCC.org
- California Maternal Quality Care Cooperative

Improving Health Care Response to Obstetric Hemorrhage Version 2.0
A California Quality Improvement Toolkit

Sources

- Performance Management Services, Inc. (2000) for case scenarios.
- Dildy et al. HCA Online PPH Course. Advanced Practices Strategies
- Medscape; JW.org; Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee
Sources