Postpartum Hemorrhage
Part II: Management Strategies
Nursing Considerations

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Introduction

This monograph presents best practice recommendations for the active management of postpartum hemorrhage immediately following birth. Part I focused on PPH preparation and prevention. These strategies are formulated by drawing upon evidence from peer reviewed literature, clinical practice guidelines from Association of Women’s Health, Obstetric and Neonatal Nurses (AWHONN), the American College of Nurse-Midwives (ACNM), the American College of Obstetricians and Gynecologists (ACOG), national patient safety initiatives, and professional liability risk management strategies. After completion, nurses will be able to identify PPH early and actively perform a variety of non-surgical interventions to reduce blood loss.

Postpartum Hemorrhage (PPH)

PPH is not a diagnosis. It is a clinical symptom defined as excessive blood loss following delivery of the placenta having an underlying etiology of uterine, vaginal, placental or maternal origin. Effective PPH management depends upon accurate diagnosis and treatment of the underlying cause.

Best Practice Recommendation: Focus on diagnosing the underlying cause of PPH.

The postpartum interval most frequently associated with PPH is the time immediately after delivery of the placenta until one hour postpartum (NYC-BMIRH, 2005). This monograph will focus on management during this period.
The nursing strategies and medical management outlined will focus on patient care typically delivered during intrapartum in a Labor and Delivery unit. Nurses who care for women during the antepartum and postpartum timeframes can benefit from using these early PPH detection techniques and strategies.

The second highest frequency of PPH occurs seven to 30 days after birth. Therefore multiple healthcare, obstetric and non-obstetric, providers may encounter a patient with PPH. Here are some examples:

- **Emergency Department- MD or RN**
- **Physician Office Staff- RN, NP, PA or MD**
- **Family Practice Office Staff- RN, NP, PA or MD**
- **Emergency Medical Personnel- EMT, Paramedic, or Firemen**

**Nursing Tip:**

If any healthcare worker encounters a female patient within 30 days of birth with complaints that include vaginal blood loss or instability from unknown causes, PPH should be considered.
PPH Case Study

- **Antepartum:**
  - **PPH Risk Factors?:**
    - Obesity
    - Preeclampsia
    - Thrombocytopenia
  - **Insulin dependent, obese, 34 yr old, G3P0020, diagnosed at 27 weeks with mild preeclampsia.**
  - **34 weeks gestation: Admission & medical induction for severe preeclampsia (BP:197/94) & low platelets (126)**

- **Intrapartum:**
  - **Labor: 37 hrs, ended with primary cesarean section for second stage arrest; Magnesium sulfate infusion; No antihypertensive medications given**

- **Postoperative Anesthesia Note:**
  - **Preoperative BP: 191-161/117-90; no antihypertensive medications given**
  - **Intraoperative BP: 200-90/120-38**
  - **Estimated Blood Loss (EBL): 700 ml; IVF Total: 3 Liters LR**
  - **Postoperative Vital Signs: BP-120/67, Pulse-111, Respirations-14**
  - **Condition Stable**

- **Physician’s Post-Operative Note:**
  - “...There was noted to be a laceration extending from the uterine incision down the left paravaginal tissue. This was closed... there was a tiny bit of oozing... good hemostasis at closure...”; Patient stable to PACU

- **Post Anesthesia Care Unit (PACU)-Nursing Notes:**
  - **0910/Admission:** Fundus firm, no clots or oozing, lochia moderate; color pale & skin cool; BP 118/64, Pulse 110, Respirations 14 (shallow), Temperature 96.5; Pulse Oximeter: 100%
  - **0925:** BP 120/78, Pulse 120, Respirations 20; Patient sleeping.
  - **0940:** BP 70/46 (Mean Arterial Pressure[MAP]=54), Pulse 105
  - **0945:** BP 72/36, Pulse 110; IV fluids increased to 250cc/hr;
  - **0950:** BP 70/52, Pulse 108;MD paged
  - **1000:** BP 78/36, Pulse 100; MD gives verbal orders over the phone: Hespan & ↑ IV fluids to 350cc/hr
  - **1005:** BP 76/34, Pulse 96. Fundus firm; Lochia moderate-small
  - **1008:** MD at bedside; Vaginal exam: negative
  - **1009:** Head of bed lowered and foot of bed elevated
  - **1010:** Fundus firm. Hemabate given; #3 bag of LR hung
  - **1015:** BP 82/38, Pulse 100, Pulse Oximeter: 92%. Fundus firm.
  - **1030:** “Starting to look pale. Patient nauseous: emesis basin at bedside”
  - **1040:** Physician leaves the PACU
  - **1030-1100:** BP 90-70/40-28, Pulse 140-98, Pulse Oximeter: 98%.
  - **1100:** Repositioned for comfort. Fundus firm.
  - **1130:** Physician paged at 1115, received call back at 1125 with phone orders obtained for emergency release of 2 units of PRBCs, blood bank notified. Will monitor vital signs. MD aware of fluid status.
  - **1145:** #1 unit/PRBCs hung. Patient states “my stomach & back hurt”.

- **Possible Risk FLAGS:**
  - Wide BP fluctuations
  - VS & EBL disparity
  - 120/67 is not stable for this patient

- **Modified Early OB Warning System (MEOWS)—High Risk Parameter FLAGS:**
  - SBP: < 90 or > 160
  - DBP: > 100
  - Pulse: < 40 or > 120
  - Respirations: < 10 or > 30
  - Oxygen Saturation: < 95%

  *Source Data: ACOG, 2014*

- **Clinical Triggers:**
  - No consideration given to patient’s admission presentation to current clinical conditions
  - Routine care given during unstable patient conditions
  - NO underlying cause of PPH identified
  - Fundus remains firm; underlying cause NOT atony
  - Communication poor between Perinatal Team

- **Clinical Risk FLAGS:**
  - VS improve briefly or not at all following treatment

- **Possible Risk FLAGS:**
  - Prolonged Labor
  - MgSo4

- **Clinical Risk FLAGS:**
  - VS improve briefly or not at all following treatment
Clinical Risk FLAGS:

- Administration of narcotic during unstable conditions
- Lack of response to mechanical alarms
- Absence of urgency
- Delay in Rapid Response Team notification

Clinical Risk FLAGS:

- Acute renal failure undiagnosed
- Excessive IVF may contribute to coagulopathy
- Unstable patient X 4hrs

- **1205**: #2 unit/PRBCs hung; States “mouth dry”, requesting ice or drink, remains NPO.
- **1245**: Requesting pain medications; MD paged at 1240. Lasix 40mg slow IV push given per MD phone order.
- **1300**: MD at bedside; PCA with morphine started per MD order
- **1315**: Poor urinary output after Lasix = 20cc per Foley; Foley irrigated. Pulse oximeter alarming, not working turned off.
- **1345**: MD in to do ultrasound for fluid accumulation; formal scan ordered
- **1410**: Apneic & asystolic, lips purple and foaming at mouth; Code called and CPR started by primary RN
- **1441**: Code X 31 minutes; ACLS initiated at 1415 by Rapid Response Team-see code sheet. PACU IVF total = 7 Liters, Patient pronounced dead by MD.

### PPH Case Study Postmortem

- **Medical-Legal (Plaintiff) Allegations:**
  - Failure to diagnose underlying cause of hemorrhage
  - Delay or failure to recognize signs and symptoms of hemorrhage
  - Delay or failure in communication among perinatal team members
  - Delay or failure in moving the patient to a location with the best immediate resources for the management of severe hemorrhage (i.e., the operating room)
  - Delay in administering blood and blood products
  - Failure in obtaining diagnostic testing
  - Failure to rescue the unstable patient

- **Autopsy:**
  - Cause of Death: severe PPH with disseminated intravascular coagulation (DIC); intraabdominal blood loss:1200cc; source: left perivaginal laceration

This case illustrates the elevated risk of PPH morbidity and mortality in the absence of an underlying diagnosis. Three key factors contributed to a plaintiff’s verdict: 1) failure to diagnosis the underlying cause of PPH, 2) failure to take into account the patient’s obstetrical history of severe preeclampsia into her care plan, and 3) a disorganized response to PPH.

The patient care administered by the physician and hospital nursing staff was negligent. Nursing negligence that contributed to the outcome of this case included a failure or delay to: 1) recognize, communicate, and treat severe preeclampsia; 2) accurately quantify blood loss intraoperatively; and 3) identify, communicate, and treat PPH and patient instability.
PPH Diagnostic Error: Nurses played an important role in the misdiagnosis of PPH in this patient. Postoperative fundal assessments revealed a firm uterus at each exam with normal amounts of lochia. Therefore, uterine atony was consistently ruled out as a hemorrhagic cause. A negative vaginal exam also eliminated vaginal trauma or lacerations as a cause. Due to the patient’s declining postoperative condition, blood loss from internal sources should have been considered once external sources were ruled out. The labor and delivery nurse responsible for postanesthesia care should have notified the physician of these findings earlier.

Nursing Tip:

The Joint Commission (TJC) requires that OB patients receive comparable perioperative care as provided by the main hospital OR and post anesthesia care unit (PACU). Regardless of location, nurses who care for these patients require critical thinking and assessment skills regarding surgical complications. Early recognition of patient decline due to external or internal causes is important. The outcome of this case study could have been different with attentive nursing care.

Obstetrical History: Women with severe preeclampsia do not have normally expanded blood volumes typical of pregnancy (Zeeman et al., 2009). When excessive hemorrhage is suspected in these patients, efforts should be made immediately to identify those clinical and laboratory findings that would prompt vigorous resuscitation with crystalloid and blood administration to alleviate hypovolemia (Cunningham et al., 2014). Antepartum and intrapartum PPH risk factors were not integrated into the patient’s plan of care.

No Hospital PPH Protocol: The deficiency of a standardized PPH protocol contributed to delays in treatment and miscommunication between perinatal team members. In this Level I trauma center, a total of 25 clinical triggers (symptoms) exhibited by the patient went undetected by 7 perinatal team members over a period of 4.5 hours. Two labor and delivery nurses and three postpartum nurses participated in the care of this patient.

Closed Claim Outcome

This case was settled out of court with significant financial implications for all defendants:

- Case filed within 4 months of patient’s death and settled after 22 months
- Settlement paid to plaintiff: $2.2 million (Anesthesiologist: $75,000, Hospital: $900,000 and Obstetrician: $1.3 M)

(Case Source: submitted by C.Curran RNC, MS, OGNP)
PPH Etiology

There are multiple underlying causes of obstetric hemorrhage. Immediate PPH causes are outlined here:

**Figure 2: PPH Timing & Causation** (*Source: ACOG, 2013; Haeri & Dildy, 2012)

ACOG identifies several clinical risk factors that may contribute to the threat of hemorrhage (2013). Length of labor, preeclampsia, chorioamnionitis, operative delivery, and administration of certain medications may contribute to excessive blood loss. Maternal age, multiple gestation, and cesarean section also contribute to PPH risk.

**PPH Risk Management**

In 2008, Hospital Corporation of America (HCA) evaluated individual causes of death from 1.5 million births within 124 hospitals over a 6 year period (Clark et al., 2008). This study identified two recurrent preventable errors among the deaths: 1) failure to pay attention to vital signs following Cesarean section, and 2) improper or inadequate treatment of hemorrhage following cesarean section. Prevention, identification, and timely intervention are keys to limiting the adverse outcomes related to PPH.

Best Practice Recommendations for PPH nursing and medical management include 4 steps:

1. **Make a specific diagnosis**
2. **Stop the bleeding**
3. **Stabilize clinical conditions**
4. **Document**
How much blood was lost? PPH diagnostic error may be precipitated by a nurse, physician, or both. Nurses are considered first responders once the delivering practitioner completes the birth. An accurate quantitative assessment of blood loss is imperative to guide management. Perform a rapid diagnostic workup within 5 minutes of excessive bleeding. Consider the patient’s specific clinical conditions when arriving at a diagnosis.

Did prolonged labor, chorioamnionitis, high dose oxytocin induction, or MgSO4 infusion occur during intrapartum? Uterine atony is typically the primary culprit.

Was operative vaginal delivery or vaginal birth after cesarean delivery (VBAC) performed? Lacerations or scar rupture may result. Nurses should inspect the labia, perineum, and opening to the vagina while the delivering practitioner will inspect the cervix, posterior fornix, vagina, and perineum for tears or dehiscence of the surgical scar.

Was the placenta difficult to deliver? Any pieces retained? Both the labor and delivery nurse and delivering practitioner should inspect the entire placenta; document any abnormalities such as missing cotyledons or tears.

Has the patient experienced clinical complications that may precipitate DIC? If a placental abruption or amniotic fluid embolus (AFE) has occurred, consider a thorough hematologic workup (e.g., CBC, DIC screen, coagulation studies). Be prepared for an unstable patient.

**Best Practice Recommendation:** Simultaneous administration of uterotonic agents & bimanual compression is highly effective in stopping blood loss due to atony.

**Nursing Tip:**

PPH outcomes improve with a multidisciplinary approach. Every perinatal provider must acknowledge and understand their role and responsibilities of other team members. As clinical conditions change responsibilities may change. Be alert and flexible as the patient’s condition evolves.
PPH Management: Uterine Assessments
Management of clinical emergencies requires two separate distinct components: identification that the patient is in pending crisis and effective interventions to manage it. Early diagnosis of PPH etiology is key to successful management. With over 80% of PPH caused by uterine atony, the focus should be on assessing and improving uterine tone (ACOG, 2013). Nurses play a key role in periodic evaluation of the fundal tone during postpartum. Frequency of assessments is defined by AWHONN (2010), ACOG, and AAP (2015) to be completed every 15 minutes during the first two hours following birth. Performing more frequent assessments, every 10 minutes, can reduce the incidence and severity of PPH (Hofmeyr et al, 2008). Educating patient’s on how to perform fundal massage between routine nursing assessments may be helpful. Initiation of breastfeeding can also assist with maintaining uterine tone. To further improve early detection of PPH, AWHONN recommends quantifying blood loss at every birth with direct weight measurements (2014).

PPH Management: Uterotonic Medications
Active management of third stage of labor (AMTSL) includes prophylactic administration of uterotonic agents. This intervention is typically performed by the labor and delivery nurse during delivery of the anterior shoulder of the newborn. During excessive blood loss, increased medication dosing or administration of alternative drugs may be required. Intravenous or intramuscular administration of oxytocin is universally accepted as the first line drug of choice for PPH (ACOG, 2013). Uterotonic agents, dosing and potential complications are listed here:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose/Route</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin</td>
<td>IV: 10-40 u/ 1000 cc NS/ LR IM: 10 u</td>
<td>100-125 cc/hr</td>
<td>Avoid undiluted or rapid administration causes Hypotension</td>
</tr>
<tr>
<td>Methylgynovine (Methergine)</td>
<td>IM or IMM: 0.2 mg</td>
<td>Every 2-4 hrs</td>
<td>Avoid in Hypertensive Patient</td>
</tr>
<tr>
<td>Carboeprin Tromethamine 15-Methyl PGF2 (Hemabate)</td>
<td>IM or IMM: 0.25 mg</td>
<td>Every 15-90 min, 8 Dose Max</td>
<td>Avoid in Asthmatic, Hepatic, Renal, Cardiac patient; May cause diarrhea, fever, and tachycardia</td>
</tr>
<tr>
<td>15-Methyl Dinoprostone (Prostin E2)</td>
<td>Suppository: vaginal or rectal, 20 mg</td>
<td>Every 2 hrs</td>
<td>Avoid if Hypotensive; Must thaw to room temperature</td>
</tr>
<tr>
<td>Misoprostil (Cytotec, PGE1)</td>
<td>Rectal: 200-800 mcg Initial Dose, Max: 800-1000 mcg Oral/Sublingual: 400 mcg</td>
<td>Hyperpyrexia &amp; Chills at ≥ 600 mcg Oral Doses</td>
<td></td>
</tr>
</tbody>
</table>

Table 1:


EXAMPLE of initial treatment for PPH (first 15-30 minutes)- Individual physician preference and clinical conditions will guide the selection of an uterotonic agent; May repeat dosing regimen 1-4 if ongoing bimanual compression controls bleeding (Clark, 2014):
1. Oxytocin: 30-40 units in 500-1000 cc rapidly infused
2. Misoprostil (PGE1): 400-600 mcg oral or rectal; rectal preferred (faster results)
3. Hemabate (if not contraindicated): 250 mcg IM
4. Methergine: 0.2 mg IM
PPH Management: Uterine Compression

Early active management of hemorrhage includes uterine tamponade, blood component therapy, or both. ACOG reaffirmed in 2013 that when “uterotonics fail to cause sustained uterine contractions and satisfactory control of hemorrhage, tamponade of the uterus can be effective in decreasing hemorrhage secondary to uterine atony”.

Uterine tamponade may be performed manually or mechanically. Administration of bimanual uterine compression is illustrated in Figure 2. To stop bleeding, several minutes of sustained pressure may be required. Stabilization of blood loss and maternal vital signs will guide application time. Support and assistance is provided by the labor and delivery nurse. Keeping time and assessing the mother’s response to this maneuver are important nursing interventions.

PPH Management: Tamponade Options

Gauze packing offers a quick and inexpensive option at the risk of masking active bleeding. An alternative to gauze is the placement of a Foley catheter into the uterine cavity. The open tip allows for external drainage and is removed once the patient has stabilized.

Balloon tamponade catheters can provide safety benefits of speed and success in 80-98% of cases. Multiple single and double-balloon devices are available for the treatment of uterine atony or placentation abnormalities (Dildy et al., 2014). Balloon tamponade therapy involves intrauterine placement of the device, inflation with 300-500ml of saline, and removal within 24 hours. Outcomes are similar to surgical options.

“**The more blood a patient loses, the more blood she loses.”**

**Excessive bleeding leads to a loss of critical clotting factors, increasing blood loss. A depletion in clotting factors places the woman at risk for disseminated intravascular coagulation or DIC.”**

-Haywood L. Brown MD, the Roy T. Parker Professor and Chair of the Department of Obstetrics & Gynecology at Duke University Medical Center in Durham, NC (Gorman, 2011)
PPH Management: Uterine Curettage or Laparotomy

Uterine curettage or laparotomy may be indicated if the patient is diagnosed with retained placental fragments or products of conception. In the absence of a previous uterine scar, curettage is typically selected. In the presence of a previous scar, a laparotomy may be indicated.

PPH Management: Compression Sutures

Advanced surgical options to alleviate exacerbated uterine atony are listed in Table 2. Uterine compression sutures, systemic pelvic devascularization, angiography with selective embolization, and hysterectomy are performed as a last resort during postpartum hemorrhage. Uterine salvage and maintenance of fertility are primary goals. Procedure selection is based on the patient’s clinical condition, physician skill and hospital resources. Nurses should be prepared to assist with these procedures when indicated.

<table>
<thead>
<tr>
<th>Invasive Surgical Options for PPH Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technique</strong></td>
</tr>
<tr>
<td>Uterine Artery Ligation</td>
</tr>
<tr>
<td>B-Lynch Suture</td>
</tr>
<tr>
<td>Arterial Embolization</td>
</tr>
<tr>
<td>Rupture Repair</td>
</tr>
<tr>
<td>Hysterectomy</td>
</tr>
</tbody>
</table>

**Table 2: Sources: ACOG, 2013; Cunningham et al., 2014**
**Bilateral uterine artery ligation**, or O'Leary sutures, appear to be quicker and easier to perform than other procedures (ACOG, 2013). B-Lynch sutures exert continuous vertical compression on the uterine corpus. Studies show in the case of postpartum hemorrhage from placenta previa, a transverse lower segment compression suture is effective. One study reported more than 1,000 B-Lynch procedures with only seven failures (Allam & B-Lynch, 2005). A recent 2 year study involving over 17,000 deliveries, found that B-Lynch sutures successfully controlled uterine atony in 95.8% of cases (Kaoiean, 2013).

**Arterial Embolization** can be used for bleeding that continues after hysterectomy or can be used as an alternative to preserve fertility. A stable patient with slow chronic bleeding may be a candidate for arterial embolization (ACOG, 2013). Radiographic identification of bleeding vessels allows embolization with sterile compressed sponges, coils, or glue.

**PPH Management: Hysterectomy**

The nursing staff must begin preoperative preparations if earlier interventions are unsuccessful or patient instability remains evident. A hysterectomy is indicated as a last resort if other options fail or if physician skill or hospital resources are limited. If the procedure is performed for uterine atony, there should be documentation of other therapy attempts (ACOG, 2013). In a recent retrospective analysis, more than 76,000 deliveries resulted in 67 hysterectomies for an overall incidence rate of 0.87 per 1000 live births (Ibrahim et al., 2014). The researchers found the most prevalent indication for hysterectomy was abnormal placentation at 64.2% and postpartum hemorrhage at 26.9%. The incidence of massive hemorrhage was reduced when the hysterectomy was performed by an experienced surgeon.

**Recombinant factor VII:**

In cases of intractable PPH with no obvious indication for hysterectomy, administration of recombinant activated factor VII should be considered (Shields et al., 2009). Recombinant factor VII promotes local hemostasis at the site of vascular injury. Recombinant factor VII has no measurable lab parameter for efficacy, and cost is considered high. Use is limited; it is a last resort once all other therapies have been unsuccessful.

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"No woman should die waiting on a radiologist. If resources are not immediately available, select an alternative that is. Hysterectomy may be the only solution to the patient’s bleeding”.

(SL Clark, Management of Postpartum Hemorrhage, MMIC Webinar, 3.19.14)

**Best Practice Recommendation:** Stabilize clinical conditions swiftly & anticipate early use of blood component therapy during episodes of severe hemorrhage.
PPH: Hemodynamic Instability & Hemorrhagic Shock

In the majority of postpartum patients, the transition from hemorrhage to shock occurs gradually rather than precipitously. In Table 3, normal clinical parameters of pregnancy are compared to clinical values that may signal maternal compromise. Tolerance to blood loss is increased and symptoms are delayed due to normal adaptations of pregnancy. Hypotension is typically a late clinical finding and impaired urinary function is an early sign of central hypoxemia.

**Comparison of Normal Physiologic Parameters of Pregnancy & High Risk Clinical Triggers**

<table>
<thead>
<tr>
<th>Normal Physiologic Parameters of Pregnancy</th>
<th>Modified Early OB Warning System (MEOWS) -- High Risk Parameter FLAGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse: 60-90</td>
<td>Pulse: &lt; 40 or &gt; 120</td>
</tr>
<tr>
<td>Respirations: 12-22</td>
<td>Respiration: &lt; 10 or &gt; 30</td>
</tr>
<tr>
<td>Blood Pressure: 90/60-135/85</td>
<td>Blood Pressure: SBP: &lt; 90 or &gt; 160; DBP: &gt; 100</td>
</tr>
<tr>
<td>Mean Arterial Pressure (MAP) = [(2 x diastolic) + systolic] / 3</td>
<td>Oxygen Saturation: &lt; 95%</td>
</tr>
<tr>
<td>Normal MAP: 70-110mmHg</td>
<td></td>
</tr>
<tr>
<td>Pulse Pressure: 30-50mmHg</td>
<td></td>
</tr>
</tbody>
</table>

*Table 3:* (Sources: Gregory et al., 2009; Curran, 2003; ACOG, 2014)

The Advanced Trauma Life Support Course offered by the American College of Surgeon’s Committee on Trauma defines shock as an arterial systolic blood pressure less than 90 mmHg during an initial assessment (2005). This value may or may not represent a state of shock in pregnant patients. Hypotension, dizziness, pallor, and oliguria do not occur until blood loss is substantial. Hemorrhagic shock is defined by percentage of blood loss and clinical response. Most healthy pregnant women can tolerate up to a 20% volume loss before decompensating.

**Classification of Hemorrhage**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Blood Loss (%)</td>
<td>15 - 30</td>
<td>30 - 40</td>
<td>&gt;40</td>
<td></td>
</tr>
<tr>
<td>Pulse (beats/minute)</td>
<td>&lt;100</td>
<td>&gt;100</td>
<td>&gt;140</td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>14-20</td>
<td>20-30</td>
<td>&gt;40</td>
<td></td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Normal or ↑</td>
<td>Mild ↓</td>
<td>Moderate ↓</td>
<td></td>
</tr>
<tr>
<td>Pulse Pressure</td>
<td>Normal</td>
<td>Mild ↓</td>
<td>Moderate ↓</td>
<td></td>
</tr>
<tr>
<td>Urinary Output (mL/minute)</td>
<td>&gt;30cc/hour</td>
<td>20-30cc/hour</td>
<td>5-15cc/hour: Dysfunction</td>
<td></td>
</tr>
<tr>
<td>CNS Symptoms</td>
<td>Normal</td>
<td>Anxious</td>
<td>Confused</td>
<td></td>
</tr>
<tr>
<td>Physiologic Tolerance</td>
<td>Mild</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Compensation</td>
<td>Compensation</td>
<td>Decompensation</td>
<td>Decompensation</td>
</tr>
</tbody>
</table>

*Table 4:* (Sources: Harvey & Dildy, 2013; SOGC, 2000; ACS, 1997)
The American Society of Critical Care Anesthesiologists and the American Society of Anesthesiologists confirm that in practice, recognizing that a patient is in crisis is far more difficult than effectively responding to the emergency. Hemorrhagic shock management involves restoring hemodynamic stability while avoiding hypoxemia, hypoxia and acidosis (2008).

**Nursing Tip:**

Perinatal nurses play an important role in early identification of PPH. Be prepared at every Q 10-15 minute assessment for the possibility of excessive blood loss. Be thorough, pull back the bed sheet and raise the patient’s gown to obtain a clear view of the perineum. Ask the patient to lift their buttocks or roll to their side to accurately assess for blood that may pool under the patient’s back. Replace the under pad that collects lochia at every Q 10-15 minute assessment, perform a quantitative assessment, and document. If values rise, clots accumulate, and or products of conception/membranes are expelled notify the delivering practitioner immediately.

**PPH Stabilization: Fluid resuscitation**

The American College of Surgeons recommends Ringer’s lactate over normal saline as the preferred solution during volume replacement in an effort to avoid hyperchloremic acidosis associated with prolonged use of sodium solutions (2009). Management for mild to moderate hypotension involves crystalloid fluid resuscitation with lactated Ringer’s solution or normal saline at a ratio of 3 to 1; administering 3 cc of IV fluid for every 1 cc of blood loss (ACS, 2009). The main disadvantage of using crystalloid solutions is their rapid movement from the intravascular to the extravascular space which may lead to pulmonary edema in critically ill patients.

The major benefit of colloid solutions is their ability to remain in the intravascular compartment. Molecules such as albumin, hydroxyethyl starch, dextran, and gelatin increase oncotic pressure pulling extracellular fluid into the vascular compartment increasing volume. However, neither crystalloid nor colloid solutions provide oxygen-carrying capacity and may produce dilutional coagulopathy or an acquired von Willebrand Disease state.
### Volume Expanders

<table>
<thead>
<tr>
<th>Agent</th>
<th>Na⁺ mEq/L</th>
<th>Cl⁻ mEq/L</th>
<th>Lactate mEq/L</th>
<th>Osmolarity Mosm/L</th>
<th>Oncotic Pressure mm Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactated Ringers: LR</td>
<td>130</td>
<td>109</td>
<td>28</td>
<td>275</td>
<td>0</td>
</tr>
<tr>
<td>Normal Saline: NS</td>
<td>154</td>
<td>154</td>
<td>0</td>
<td>310</td>
<td>0</td>
</tr>
<tr>
<td>Hypertonic Saline (3%)</td>
<td>513</td>
<td>513</td>
<td>0</td>
<td>1025</td>
<td>0</td>
</tr>
<tr>
<td>Albumin (5%)</td>
<td>130-160</td>
<td>130-160</td>
<td>0</td>
<td>310</td>
<td>20</td>
</tr>
<tr>
<td>Dextran-70 (6%)</td>
<td>154</td>
<td>154</td>
<td>0</td>
<td>310</td>
<td>60</td>
</tr>
<tr>
<td>Hetastarch (6%)</td>
<td>154</td>
<td>154</td>
<td>0</td>
<td>310</td>
<td>30</td>
</tr>
</tbody>
</table>

*Table 5: Volume Expanders* *(Sources: SOGC, 2002; ASA, 2008; ACS, 2009)*

Studies show that attempting to achieve normal blood pressure in the setting of active bleeding through extensive fluid resuscitation is associated with disruption of hemostatic mechanisms, dilution of clotting factors, accumulation of edema, increased blood loss, and decreased survival (ACS, 2009; ASA, 2006). If a patient remains unstable after rapid infusion of 3 to 4 liters of crystalloid fluid, practitioners should consider adding blood component therapy.

**PPH Stabilization: Blood Transfusion**

The purpose of a blood transfusion is not volume replacement. The procedure replaces coagulation factors and red blood cells for increased oxygen-carrying capacity. Clinical judgment is the most important factor in the decision to transfuse blood and blood products. Given that estimates of blood loss are often inaccurate and that determination of hematocrit or hemoglobin concentrations may not accurately reflect the current hematologic status, consideration for transfusion should be sooner rather than later.

**Estimated blood loss is frequently only half of the actual amount (Cunningham et al., 2014). Therefore, practitioners should anticipate the need for PPH management if EBL, regardless of delivery mode, exceeds 500cc.**

As signs and symptoms of hemorrhage may not occur until blood loss exceeds 15%, the decision to transfuse a patient is based on several factors: rate and magnitude of blood loss, vital sign volatility, complexity of the patient’s health history, and laboratory results (Harvey &
During an episode of acute significant hemorrhage, the initial hematocrit result does not reflect the patient’s current clinical status (Cunningham et al., 2014). It may take up to 4-8 hours before laboratory values accurately coincide with the patient’s current status.

Once laboratory results become available and consistent with the clinical picture, values may guide further management decisions. A hemoglobin value between 6 and 10 or a hematocrit value between 12 and 24 are acceptable thresholds (ASA, 2006).

**How would YOU decide to transfuse a patient?**

- a. Hemoglobin: 6-10g/dL
- b. Hematocrit: 21-24%
- c. Acute organ ischemia
- d. Rate & magnitude of bleeding
- e. Intravascular volume status
- f. Risk of hypovolemic complications

**Answer:** Any answer, a-f, is acceptable. Evidence supports that most physicians transfuse at hemoglobin values between 7.5 and 8 (Matot et al., 2004). The American College of Surgeons and International Guidelines recommend accepting a hemoglobin level of 7 if the patient is stable and free of clinically evident coronary artery disease (ACS, 2009).

Type & screen should be drawn on each pregnant patient at admission. With an unstable patient, intervention should not be withheld while awaiting laboratory results.

**PPH: Massive Hemorrhage Transfusion Protocol**

American Society of Anesthesiologists offers a dynamic definition of massive transfusion (2008):

1. *Replacement of four or more red cell concentrates within one hour when ongoing need is foreseeable, or*
2. *The replacement of 50% of the total blood volume within three hours*

Current research recommends concomitant use of packed RBCs, fresh frozen plasma or FFP, and platelets at a 1 to 1 to 1 ratio (CMQCC, 2010). The combination of high plasma and high platelet to RBC ratios are associated with (Cotton et al., 2009; Maegele et al., 2008):

- Increased 6-hour, 24-hour, and 30-day survival,
- Increased intensive care unit (ICU), ventilator, and hospital-free days, and
- No change in multiple organ failure deaths
Severe hemorrhage is often a primary cause of cardiac dysrhythmia and dysfunction. Therefore, clinical conditions may warrant integration of advanced cardiac life support treatment algorithms such as tachycardia, bradycardia, and pulseless electrical activity.

An obstetric hemorrhage and massive transfusion protocol and algorithm are provided on the CMQCC website. Web links are provided at the end of this monograph.

**Figure 4: Obstetric Massive Transfusion Protocol**
(Source: Shields et al., 2009; CMQCC, 2010)

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**Obstetric Massive Transfusion Protocol**
- **Packed Red Blood Cells (PRBCs):** 4-6 Units (O neg until crossmatch available)
- **Fresh Frozen Plasma (FFP):** PRBCs to FFP ratio not to exceed 3:2
  - GOAL = PRBCs to FFP (1.5:1 or 1:1)
  - Infuse FFP to maintain INR <1.5
- **Platelets:** Single donor apheresis platelet pack
  - Infuse to maintain platelet count >50,000-100,000/uL in the face of ongoing hemorrhage
- **Cryoprecipitate:** 10 units cryoprecipitate if fibrinogen is less than 100mg/dL
  - Additional units to maintain fibrinogen concentration ≥100-125mg/dL
- **Recombinant Factor VIIa (rVIIa): Rescue Option**
  - if available, use only after all other blood replacement therapies have failed (ie., after the use of 10-12 units PRBC, 6-10 units FFP and 2-3 units platelets).

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**PPH Risk & Clinical Management Strategies**

<table>
<thead>
<tr>
<th>PPH Risk &amp; Clinical Management Strategies</th>
<th>Clinical</th>
<th>Time</th>
<th>Risk</th>
</tr>
</thead>
</table>
| **1. Diagnosis PPH etiology EARLY**      | Rapid Diagnostic Workup: 5 minutes |      | • FIND the underlying cause (bleeding is only a symptom)  
• FOCUS on atony (80% of PPH). If ruled out:  
• CONSIDER vaginal/cervical trauma or lacerations, or placentation abnormalities if the uterus remains firm  
• CONSIDER internal sources of bleeding if uterus remains firm AND postoperative lochia amount is within normal limits |
### 2. Stop the bleeding

**Rapid Treatment Protocol:**

- **5-15 minutes**

- DEVELOP a multidisciplinary PPH Protocol to include:
  1. Uterotonic medication administration +
  2. Bimanual compression (Atony Rx)
  3. Advanced surgical options, as needed

### 3. Stabilize the clinical conditions

**Rapid Volume Resuscitation:**

- **5-15 minutes**

- ORDER/PLACE #2 PIV at admission for all patients at risk for PPH OR place #2 PIV early
- FOCUS on crystalloid resuscitation, 2-4 Liters, if no success:
  - CONSIDER Colloids OR
  - Blood Transfusion (Avoid delay: time from decision to transfuse to actual administration of blood component therapy may take up to 1 hour in some facilities)
- MONITOR until stable laboratory results (Hgb & Hct) are obtained

The goal of an Obstetric Hemorrhage Active Management Protocol should be a 15 to 30 minute timeframe from unstable hemorrhage to stable resolution.

### RISK MANAGEMENT CONCERNS & NURSING CONSIDERATIONS

1. Postpartum hemorrhage is not a diagnosis. It’s essential to identify the etiology of the bleeding in order to treat it. Nurses are first responders.
2. If patient is high risk for PPH, perform postpartum assessments more frequently Q 10 versus 15 minutes. **Quantify blood loss at every assessment.** If amount increases, clots form, and or products of conception/membranes are expelled notify the delivering practitioner.
3. There are PPH management guidelines and protocols that have been shown to reduce mortality. Be familiar with the professional guidelines of your specialty society, and take advantage of the protocols and resources available from sources such as AWHONN, ACOG, IHI, and the CMQCC. Be an advocate for patient safety.

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Postpartum Hemorrhage Part II: Management Strategies- Nursing Considerations

KEY RESOURCES AND LINKS (Accessed Links: May 1, 2015)

3. Top #3 Selection: AWHONN. (2014). Quantification of Blood Loss (Video). https://www.youtube.com/watch?v=F_ac-aCbEn0&list=UUPrOhL3Od7ZeFDq27ycS00g

CITATIONS


