ANMC Obstetric Hemorrhage Guidelines

ANMC Obstetric Hemorrhage Guideline

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Background

The definition of early postpartum hemorrhage (PPH) is “Cumulative blood loss of $\geq 1000\text{ml or bleeding associated with signs or symptoms of hypovolemia within 24h following the birth process regardless of mode of delivery}”. PPH is an increasing cause of maternal morbidity and mortality. It accounts for 30% of all maternal deaths worldwide and 10% of maternal deaths in the U.S. The rate of postpartum hemorrhage is steadily increasing throughout developed countries including the U.S. Between 1994 and 2006, pregnancy-related hemorrhage in the U.S. has increased 26-27%. Worldwide it is the leading cause of maternal death.

The most common etiology for PPH ($\approx 70$-$80\%$) is uterine atony, or a soft, non-contracted uterus. Other causes include retained placenta, lacerations of the perineum, vagina, cervix, uterus or retroperitoneum, uterine rupture, pre-existing coagulopathy (inherited or acquired). For a more detailed list, review the next page on the differential diagnosis organized by the 4 Ts of Tone, Tissue, Trauma and Thrombin. Because most of the pregnant population is young and healthy, they don’t show signs of cardiovascular stress until the last stage of bleeding. Therefore, recognition of blood loss before cardiovascular changes occur is paramount. Cardiovascular collapse in a young, healthy woman is an emergent, life-threatening situation, which can only be predicted by keeping track of the blood loss throughout the labor course.

Although 50% of PPH cases occur in women without any risk factors, there is a group of patients who are at “high risk” of hemorrhage based on their medical or obstetrical history, including distended uterus (twin-gestation, large infants, polyhydramnios) or long labors with prolonged Pitocin use, prior uterine surgery and other risk factors indicated in the risk assessment. Patients with a known or suspected abnormal placentation (placenta increta, percreta, accreta) are at extreme risk for PPH. For detailed management of these cases, review the ANMC Guideline: Abnormal placentation management.

Due to the alarming increase in PPH events and the potential morbidity and mortality associated with PPH, it is prudent to develop a response system. This system includes standardization of risk factor identification, guidelines on management, and continued training and evaluation of the care given to our patients. From expert reviews it is clear that the direct response to a PPH is multidisciplinary and should be practiced as such in order to keep the tasks and responsibilities pragmatic and clear. For example, if uterotonic medication, Bakri balloon, dilation and curettage, or other surgical methods are not immediately successful, then emergent consultation with an anesthesiologist, maternal–fetal medicine subspecialist, or critical care subspecialist to discuss second-line intervention may be recommended.

This guideline is developed to be a centrally available tool to use for development and implementation of best practices, as well as a source of review regarding recognition and management of postpartum hemorrhage at ANMC. This guideline relies on information from protocols, guidelines and research summarized or done by the American College of Gynecologist (ACOG), the California Maternal Quality Care Collaborative (CMQCC) and World Health Organization in addition to local experiences and recommendations from the PPH advisory committee and the OB simulation committee. We endorse the response algorithm and have adjusted this to complement our HEART for PPH campaign. This mnemonic has proven to be very effective for communication and task division in the acute moment of the PPH (research article in submission). HEART for PPH explanation is available in team response to PPH on page 5 and in Appendix I-III.
Differential Diagnosis

Effective management of postpartum hemorrhage requires understanding the potential causes. There are four main causes of postpartum hemorrhage that account for the majority of cases. Also known as the “Four T’s”, these are Tone (uterine atony), Tissue (retained placenta), Trauma (laceration), and Thrombin (coagulopathy).

**TONE/Uterine atony**: Lack of active contraction of the uterine smooth muscle. Accounts for 70-80% of postpartum hemorrhages. Can be caused by:
- Infection – chorioamnionitis
- Prolonged induction of labor
- Prolonged oxytocin use
- Prolonged second stage of labor
- Over-distention – LGA, multi-fetal pregnancies, polyhydramnios
- Forceps delivery – especially mid-forceps or rotational forceps
- Previous history of PPH - regardless of etiology
- Multiparity – grand multiparity carries a 4x risk of PPH over baseline
- Uterine inversion
- Maternal infusion of magnesium sulfate
- Full bladder

**TISSUE/Retained products of conception**:  
- Will cause uterine atony
- Caused by amnion/chorion (fetal membranes), placental tissue or blood clots
- Abnormal placentation - accreta, increta, percreta, succenturiate lobe, etc.

**TRAUMA/Vascular and soft tissue injury**:  
- Higher occurrence of tissue trauma with precipitous first and second stages of labor
- Trauma can be at the level of the: perineum, vagina, cervix or uterus.
- Increased risk with operative vaginal delivery
- Hematomas- vulvar, paravaginal, broad ligament, retroperitoneal may be concealed.
- Consider non-visible internal trauma and bleeding if there is change in vital signs out of proportion to witnessed blood loss.

**THROMBIN/Coagulopathy**:  
- Inherited
- Acquired
- Acute due to dilution or hypothermia in response to a PPH
- Consumptive – Disseminated Intravascular Coagulopathy (DIC), Amniotic Fluid Embolism (AFE)
- A change of 0.2 of the INR suggests that almost 80% of clotting proteins have been used.
**Intervention Strategies:** With current strategies in prenatal care and with modern birthing facilities, there are multiple opportunities to limit risk of PPH as well as maximize response to PPH.

**Antepartum:** Pregnant patients experience a 50% increase in circulating blood volume by 24 weeks gestational age; this persists until delivery. Red blood cell (RBC) mass increases to a lesser degree (25%) than serum volume causing a dilutional anemia. Additionally, there is a dilutional thrombocytopenia and to a lesser extent dilution of coagulation factors. Pregnancy increases iron requirements due to fetal needs as well as maintenance of maternal red blood cell mass. The majority of women can account for iron needs in the non-pregnant state by diet alone. The 2.5-fold increased need for iron during pregnancy is rarely achieved with diet alone. The antepartum period is an opportunity to maximize maternal RBC mass as well as iron stores. Studies clearly demonstrate that the less anemia and more iron stores a woman has in late pregnancy, the less likely she is to suffer morbidity or need a blood transfusion, even in the setting of mild to moderate PPH. There is a clinical guideline available for management of iron in pregnancy. If women refuse blood products, details regarding their care should be addressed and documented antenatally. See ANMC Anemia In Pregnancy Guideline and Appendix IV: Iron therapy in pregnancy flow chart.

**Admission:** Every opportunity should be utilized to identify women at risk. About 60% of PPH cases can be predicted with risk assessment tools, however 40% in the high risk category have no PPH. This supports the need for identification of those at risk as well as preparedness for those who have no risk factors. Health facility admission to L&D or the postpartum unit represents an ideal time for screening patients for risk factors. The risk assessment should be included on any SBAR (Situation, Background, Assessment, Recommendation) regarding the parturient. Please see Appendix V: PPH risk assessment tool with recommended management pathways. This risk assessment is dynamic and will change throughout a patient’s labor, delivery and postpartum period. As new risk factors develop, this prompts a new PPH risk evaluation. A new PPH risk evaluation will also occur as patients transition from labor and delivery to the postpartum unit. The presence of multiple risk factors should place them in the high-risk category. Ideally each patient should receive an 18 g IV on admission. If additional IV access is needed, then use 18 g IVs or larger, if possible.

**Prevention:** Pitocin and uterine massage are the most effective management options for prevention of postpartum hemorrhage. Together with controlled cord traction this is considered active stage of 3rd phase of labor. Pitocin and uterine massage can be implemented during delayed cord clamping. Pitocin (30U) is premixed in 500ml NS and causes contraction of uterine smooth muscle, effectively closing the maternal circulation to the placental insertion site. Initial rate of infusion is 350ml/hr for 30 minutes (~10 units) after delivery of the neonate followed by continued infusion of Pitocin at 125ml/hr for at least 4 more hours. With a precipitous labor 10 units of Pitocin can also be given intra-muscular.

**Team response to PPH:** If despite the above actions bleeding becomes audible or QBL exceed 500cc the team must work together to prevent severe morbidity. At ANMC we use HEART for PPH as a vision of teamwork. Escalation is dependent on severity of bleeding and maternal status and requires quick availability of medication, equipment and additional resources conveniently available in a hemorrhage medication kit and a cart (Appendix VI & VII). The HEART mnemonic stands for Help: One person is responsible for seeking assistance and directing roles (likely the charge RN), Equipment will be gathered and delivered effectively by an additional RN or staff member. Continued Assessment is performed by the primary L&D RN and changes in the patient states are communicated to the team by this person. Resuscitation with IVF, O2 and all other indicated medication interventions are done by an assisting RN and the 4Ts (see PPH differential p.7) are addressed by the provider (CNM/OBGYN). (Appendix I-III) if quick response is needed the RN or provider can call for an L&D STAT team (Appendix VIII)
ANMC Obstetric Hemorrhage Guidelines

Qualitative Blood Loss
A visual estimation of blood loss (EBL) is proven very inaccurate. With each delivery the provider and nursing team will strive to give a quantification of the blood loss (QBL) for increasing accuracy and recognition of PPH. Frequent updates to the provider regarding QBL is imperative to ensure timely interventions during a PPH response.

Quantification can be accomplished by weighing any delivery materials soaked in blood, by measuring blood in a buttocks drape, and by keeping ongoing record of those measurements. See Appendix IX: QBL tool. Strive to quantitate at every delivery. Every person in the labor room should be able to evaluate blood loss and trigger responses as needed. Trigger points are graded I through IV with the first trigger point at 500mL, followed by 1000mL, 1500mL and over 2000 mL. Details on management of the 4 stages are outlined below in the post-partum hemorrhage response algorithms. The response algorithms are important and help to provide effective communication and collaboration as the stages escalate.

Tips and tricks for QBL:
1. For vaginal birth:
   a. Labor and Delivery has under-the-buttocks drapes for delivery which have a calibrated graduated collection bag. Use of this graduated collecting system has been demonstrated to be an accurate way to quantitate blood loss at delivery. For accurate quantification of blood loss, it is calibrated to measure fluids only when hanging of the bed or when lifted up by the provider to show the level of fluid collected.
   b. Immediately after the birth of the baby, note the amount of amniotic fluid in the drape. Another option is to delay placing the drape until immediately after birth of the baby to measure bleeding.
   c. At the completion of the delivery/recovery period weigh all blood clots and blood soaked materials (which are placed in a kick-bucket after usage) to determine cumulative volume, subtracting the weight of the drape and any laps or chux used.
2. For cesarean birth:
   a. Be aware of the total irrigation fluid used in the OR. Suction all irrigation fluid at the end of the procedure.
   b. Weigh all sponges and laps; deduct the weight of the sponges and laps.
   c. Add the total amount of fluid in the suction canister
   d. Deduct total irrigation fluid and deduct estimated amniotic fluid (see point 3).
3. For birth without prior rupture of membranes, the following volumes can be used to estimate the contribution of amniotic fluid at term: Brace, et al. found normal fluid volume 700 mL; oligohydramnios 300 mL; polyhydramnios 1400 mL. During a cesarean birth the suctioned amniotic fluid will precede the blood loss and can be noted from the canister.
4. Unusual visual and auditory cues to excessive bleeding should be urgently investigated. Such cues include blood on the floor, walls, or ceiling, blood dripping of the bed, table, or stretcher, continuously vibrating suction tubing or continuous full suction.
5. For all cases of ongoing hemorrhage, intake and output measurements should be documented, tallied, and reported to the team at frequent intervals (q5-15min). This data provides important direction to the team.
6. Antepartum bleeding should be taken into account when assessing total blood loss.
PPH management

**TONE: Uterine ATONY (Appendix VI: PPH medication kit)**

- Uterine massage, make sure Pitocin is running
- Misoprostol 400mcg-1000mcg buccal or SL. If not able to tolerate, place rectally.
- Use of the 2 main injectable uterotonic medications per provider discretion
  - 0.2mg IM Methergine® (may repeat x 1 in 15 minutes and again in 2hr if effective)
    - CAUTION WITH HYPERTENSION
  - 250mcg Hemabate® IM
    - CAUTION WITH ASTHMA.
  - Give with loperamide 4mg PO to prevent diarrhea
- Empty bladder with foley, consider leaving foley in place with urometer

➔ To the operating room if not able to evaluate or if atony is in need of surgical management

**TISSUE:**

- Evaluate the placenta for missing lobes. Bedside ultrasound for evaluation of endometrium.
- Manual sweep for clots or retained products, followed by a single dose Ampicillin or other 1st generation cephalosporin for infection prophylaxis within 1 hour of sweep.
- Uterine-inversion; stop Pitocin, replace uterus if possible. If not, give Nitroglycerine SL 1-2 sprays just prior to replacement of the uterus. If the placenta is still attached, replace uterus with placenta and consider placenta accreta as differential and prepare as such (anesthesia, OR, blood products, Bakri-balloon and GYN-ONC and Interventional Radiology (IR) on standby).

➔ To the operating room if not able to evaluate or remove products completely in labor room

**TRAUMA: Perineal, labial, vaginal, cervical or uterine lacerations**

- Evaluate if repair is possible in L&D or if there is need for better lighting in the OR with dedicated Anesthesia-provider for pain control.
- Have extra hand from CNM/MD for retraction
- RN runner/scrub tech available for assistance in supply need (laps, sutures, instruments)
- Pain control can be given locally, lidocaine perineal block or local infiltration.

➔ To the operating room if not able to evaluate or continued bleeding

**THROMBUS: coagulopathic.** Replace with blood products. 4:4:1 PRBC:FFP:PLT

Consider: Cryoprecipitate, Tranexamic acid (Lysteda®), rFactor VIIa (Appendix X)

For all PPH regardless of cause: Tranexamic acid (Lysteda) within 3 hours postpartum, 1 gram (100mg/ml IV to be given over 10 min) and repeat if ongoing PPH in 30 min or rebleed within 24 hours. This is advised for all PPH >1000 mls and can be considered for bleeding >500mls. Contraindicated with known h/o thrombophilia, on anticoagulation prophylaxis, or active VTE in pregnancy. (Appendix X)

If patient’s vital signs suggest significantly worse anemia or hypovolemia than the visualized/measured blood loss suggests, this is concerning for a retroperitoneal or internal bleeding. Patient should receive IVF and blood products and taken to the OR immediately. **APPENDIX XI: Surgical options for PPH**
Post Stabilization of PPH

RN
- Discuss with the provider if standard recovery is enough or whether more frequent fundal checks and vital signs are indicated
- Continue Pitocin at 350ml/hr for 30 minutes, then decrease rate to Pitocin to 125ml/hr x 4 hours.
- Although counterintuitive, post massive transfusion patients are at higher risk of VTE and should receive appropriate prophylaxis with SCDs, early ambulation and Subcutaneous heparin.
- Consider an incentive spirometer for recovery, specifically if the patient was ventilated or intubated at some point during the resuscitation, even if no surgical management was required.

Providers:
- Management should be tailored to the etiology of the bleeding event, and co-existing conditions.
- After massive transfusion, intense fluid resuscitation or the need for respiratory or vasopressor support and co-management with the ICU should be considered.
- After a hemorrhage event, ensure proper documentation of the event including cumulative blood loss, interventions and outcomes. This should be communicated with the teams taking care of this patient.
- If Methergine was effective and no contraindications exist, consider an oral Methergine series for 24hr.
- The providers involved will meet with the patient and escorts to explain the event, provide support, and answer questions.
- Organize follow-up in 1-2 weeks post-event for anemia check and touch base on mental wellbeing.

Charge RN
- Blood products that have been pulled but not used must be “released” back to the blood bank
- Debrief the situation with those who were involved, this is not documented in the chart. (Appendix XII: Debrief tool)
- Enter into the ANMC incident and accident reporting system if indicated. Report online or call 729-2329.
Appendix I: HEART for PPH

HEART POSTPARTUM HEMORRHAGE

HELP
- MD
- Charge RN
- Anesthesia
- OR
- Additional RN/Runner/Recorder

CONSIDER:
- >500cc, extra RN / T&C 2 Units
- >1000cc, extra provider / Anesthesia
- >1500cc or unstable: OR / ICU
- >2000cc: Massive transfusion

EQUIPMENT
- PPH Medication Kit with Uterotonic
- PPH Cart including Bakri balloon
- TXA, Antibiotics, Lidocaine, Fentanyl
- US / Scale for QBL
- Suture/Top
- Lighting
- Nitrous Oxide

MAIN ROLE:
- Get supplies
- Assist with QBL
- Laps and instrument count

ASSESS
- Frequent V5 (pulse ox, BPq3min)
- Ongoing QBL
- Record
- Pain/Comfort Level
- Give uterotonic medications

UTEROTONIC MEDS:
- Pitocin IV 30U/500ml or IM 10U
- Mephentermine IM 0.2mg q 15min x2
- Hemabate IM 250mcg IM q6-90 x8
- Misoprostol SL buc PR 400-800 mcg

RESUSCITATE
- 2 IVs with labs
- O2
- Fluid Bolus
- Blood Transfusion

LABS:
- CMP: Light green top
- CBC, Ionized Ca2+: Purple Top
- Coags/Fibrinogen: Light Blue Top

TREAT THE 4 Ts
- Uterotonic Meds
- Bimanual Massage
- Foley
- Bakri/Uterine Packing
- OR

TONE
- Manual Sweep w ABX US
- OR/D&C

THROMBIN/DIC
- Repair: OR/Bedside
- THROMBIN/DIC
- RBC: FFP: PLT - 4:4:1
- Cryoprecipitate

TXA (Thrombin Exemic Acid):
- Give for all PPH >1000mL regardless of cause
- 1g (100mg/ml) IV over 10 minutes, within 3 hours postpartum. Repeat if ongoing PPH in 30 minutes or rebleed within 24 hours

DEBRIEF AFTER EACH EVENT WITH CUSTOMER OWNER, FAMILY, AND TEAM MEMBERS
# HEART POSTPARTUM HEMORRHAGE

<table>
<thead>
<tr>
<th>STAGE I – QBL &gt;500mL</th>
<th>STAGE II – QBL &gt;1000mL (or 10% change BP/pulse, O2:92%)</th>
<th>STAGE III – QBL &gt;1500mL (or 10% change BP/pulse, O2:92%)</th>
<th>STAGE IV – QBL &gt;2000mL (or 10% change BP/pulse, O2:92%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H</strong> HELP: Charge RN</td>
<td>Assign roles</td>
<td>Extra provider/CRNA/scrub tech and OR to be aware</td>
<td>Consider additional OB-GYN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crowd control/family support</td>
<td>Heads-up to blood bank</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Crowd control/family support</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Activate massive blood transfusion</td>
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<td></td>
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<td></td>
<td>Suggest contacting GYN/ONC or IR</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Crowd control/family support</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>E</strong> EQUIPMENT: RN ass vol, CNA or Scrub tech</td>
<td>PPH medication kit</td>
<td>Scale for QBL, Ultrasound, Nitrous oxide as indicated</td>
<td>Assist going to operating room or assure retractors/fighting/sutures to the L &amp; D room</td>
</tr>
<tr>
<td></td>
<td>PPH card</td>
<td>Assist with continued QBL</td>
<td>Assist with continued QBL</td>
</tr>
<tr>
<td></td>
<td>1 XA, Fentanyl, Lidocaine and Antibiotics</td>
<td></td>
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<tr>
<td><strong>A</strong> ASSESS: Primary RN</td>
<td>Pulse ox, BP q5min</td>
<td>Continue with assessment and recording</td>
<td>Continues with assessment and recording</td>
</tr>
<tr>
<td></td>
<td>Gives uterotonics as directed by provider</td>
<td>Gives SBAR to new team members</td>
<td>Gives SBAR to new team members</td>
</tr>
<tr>
<td></td>
<td>Records interventions and ongoing QBL</td>
<td>Support for customer-owner</td>
<td>Support for customer-owner</td>
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<tr>
<td></td>
<td>Support for customer-owner</td>
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<tr>
<td><strong>R</strong> RESCUE: RN assist</td>
<td>Consider O2 via face mask for Sat &lt;94%, IVF bolus</td>
<td>Second IV, CBC/CMP/coag/T&amp;C for 2 uRBC</td>
<td>Gives IVF or blood products as indicated by provider</td>
</tr>
<tr>
<td></td>
<td>Gives medications as directed by provider</td>
<td>Gives medications as directed by provider</td>
<td>Repeat labs every 30-60min as indicated (coag, CBC/CMP)</td>
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<tr>
<td><strong>T</strong> TREAT: OB/CNM</td>
<td>Assesses cause of bleeding and timing of interventions</td>
<td>Pain control, manual sweep/D&amp;C, (redose) uterotonics, Tamponade, Antibiotics, TXA</td>
<td>Consider going to the operating room</td>
</tr>
<tr>
<td></td>
<td>Indicate findings to patient and team</td>
<td>Summarize interventions and findings</td>
<td>Consider blood products</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Consider definite operative management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Consider GYN/ONC or IR</td>
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</tbody>
</table>

Additional roles: Anesthesia pain control and IV access / additional provider with retraction and uterine massage / Baby RN – baby care and family liaison / Scrub tech help with equipment / Pharmacist with medication.
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Appendix III: Placing of HEART team members

HEART POSTPARTUM HEMORRHAGE

HELP:
Call for help, assign roles, crowd control, and family support

EQUIPMENT:
RUNNER - Bring what is needed to the room (PPH med kit, cart, US, etc.)

ASSESS:
Continuously assess c/o (comorbidities, VS/QBL), give uterotonic medications and chart

RESUSCITATE:
Establish 2 large bore IV’s, administer O2, IV fluid, medications as directed

TREAT:
Identify the cause and control the bleeding

ADDITIONAL ROLES:
- Anesthesia (pain control and IV access)
- Additional provider (retraction/uterine massage)
- Baby nurse (baby care/family liaison)
- Scrub tech (OR preparation/equipment)
- Pharmacist (assist with medication)

(some rooms are mirrored to this imaging and so will the response team)

EQUIPMENT: RN assist, CNA or Scrub tech

HELP: Charge RN

A
ASSESS: Primary RN

R
RESUSCITATE: RN assist

T
TREAT: OB/CNM

ALASKA NATIVE MEDICAL CENTER
Appendix IV: Iron therapy in pregnancy
Appendix V: PPH Risk Assessment Tool

We now use a risk calculator, which is built into Cerner, the assignment will be filled out by nursing with a prompted update if the labor course indicates this. The calculator assigns points as follows:
Low risk: 0 points
Minor risk: 5 points
Major risk: 11 points
All added risk factors above 11 (so 3 minor risk factors added up) will make a high risk for PPH.

Minor risk factors: each worth 5 points
- Prior uterine surgery (TOLAC)
- Multi-fetal pregnancy (or any uterine distention e.g. Polyhydramnios, large estimated fetal weight)
- >4 previous deliveries
- Chorioamnionitis
- Large uterine fibroids
  - $x1$ = Medium risk
  - $x3$ or more = High risk

Major risk factors: (each worth 11 points)
- Anemia with hematocrit less than 30
- Placenta previa or low lying
- Placenta accreta/percreta spectrum
- Thrombocytopenia <100K
- Antepartum bleeding
- Coagulopathy
- Active bleeding (more than 500 cc antepartum)
- Magnesium sulfate use
- Prolonged Pitocin use (>12 hours of continuous stimulation per our own case control study)
- Prolonged second stage (multip >2 hours, primip >3 hours)
  - High risk

Low risk (no risk factors identified) = routine type and screen, one IV advised
Medium risk= Routine T&S and 1 IV with consents for blood products signed in the chart.
High risk= Same as medium with 2nd IV and consider type and cross

**Outlier / Super high risk: + antibody, accreta, previa = type and cross

A note of caution since we are not able to adjust the Cerner algorithm; Consider a second IV for those who have difficult access, for example in those with morbid obesity or prior/current IV-drug use. Also be cognizant that this protocol needs to be individualized for women who refuse blood products. Furthermore, LGA or polyhydramnios is not an official risk factor in the Cerner calculator but could indicate this with adding the ‘twin factor’. Lastly, fibroids may or may not be impacting the PPH risk, indicate to RN if this should be counted as a risk factor (based on size, number, location).
Appendix VI: PPH medication kit

This “kit” contains single doses of the medications (see below) most useful for management of PPH (with exception of Pitocin). There is also a hemorrhage cart that includes syringes, needles and alcohol swabs to minimize the time to administer an injection. Two of the medications in this kit must be refrigerated; thus, the kits are located in the refrigerator in the medication room on Labor and Delivery. The critical trigger point of 500mL quantification of blood loss prompts this “kit” being brought to the bedside automatically.

**Uterotonic Medication Guide**

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>DOSE</th>
<th>ROUTE</th>
<th>FREQUENCY</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>oxytocin (Pitocin®)</td>
<td>30units in 500mL NS IV infusion 350mL/hr x 30min 125mL/hr x4hr</td>
<td>IVPB preferred 10units IM (using 10 unit/mL 1mL vial) in an emergency NEVER PUSH IV</td>
<td>Continuous IV piggyback, premixed</td>
<td>NO IV PUSH Hyponatremia and H2O overload with high doses or prolonged use</td>
</tr>
<tr>
<td>methergonovine (Methergine®)</td>
<td>0.2mg</td>
<td>IM Not given IV</td>
<td>Repeat (X 1) 15 minutes after 1st dose. Every 2-4hr thereafter. Max dose is 5 total doses in a 24 hour period</td>
<td>Contraindicated with current hypertension, cardiac disease or recent ephedrine use</td>
</tr>
<tr>
<td>carboprost prostaglandin E2 (Hemabate®)</td>
<td>250mcg</td>
<td>IM Not given IV</td>
<td>Every 15-90 minutes Max 8 doses in 24h May give loperamide for preventing diarrhea</td>
<td>Bronchospasm, N/V. Contraindicated with active cardiac or respiratory disease</td>
</tr>
<tr>
<td>misoprostol prostaglandin E1 (Cytotec®)</td>
<td>400-1000mcg</td>
<td>Buccal, SL, or PR</td>
<td>Once</td>
<td>Transient hyperthermia. Unlikely to work if Hemabate® ineffective</td>
</tr>
</tbody>
</table>

**Misoprostol Pharmacokinetics:**

SL or Buccal: These are the preferred routes for acute bleeding – most rapid onset, most prolonged duration, greatest bioavailability: 400mcg SL = fewest side effects and equivalent efficacy to higher doses.
Half-life 20-40min. WHO recommends 800mcg SL; PO- 2nd line for acute bleeding, slower onset than SL; PR: Helpful in prevention, or for anticipated delayed PPH (variable, weak recommendations); *PR not effective if copious diarrhea from Hemabate®
Appendix VII: PPH Cart

On the inpatient OB floor, there are several “Hemorrhage carts” located in clinical area. These carts should be brought to the location of a PPH event with the initial trigger of 500mL. Carts are located in the following areas:

- **Labor and Delivery**: This cart is located at the nurse’s station on Labor and Delivery. It can be used to cover emergencies on Labor and Delivery as well as in OB Triage.
- **On Hold**: There will always be one cart on hold in Central Supply (CS). Once a cart is used, it should be traded for the one held in CS. At that point, it will be restocked up to PAR level.

Most equipment needed to manage an acute PPH event should be located on the cart. This includes:

- IV fluids and tubing
- IV start supplies
- Urinary foley catheter and collecting system
- Blood draw tubes
- Bakri balloon, Kerlix and fluid/syringes
- Headlamp for adequate lighting if needed
- Scale to measure QBL by weight

A PPH Instrument Tray is available in the medication room, bring in when the provider indicates laceration as the cause of the hemorrhage.

<table>
<thead>
<tr>
<th>Instrument Name</th>
<th>Number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight Sponge Forceps GL650</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Uterine Tenaculum Forceps GL850</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Needle Holder Straight Jaws Carbide inserts 10 3/8&quot;</td>
<td>CH2442</td>
<td>1</td>
</tr>
<tr>
<td>Uterine Packing Forceps Curved GL600</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1x2 Tissue Forceps 10&quot; SU2337</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Russian Tissue Forceps 10&quot; SU2454</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Gelpi Retractor 7 1/2” SU2337</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Heaney Simon Retractor 4 1/2x1&quot; GL350</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Breitsky-Navratil Retractor 12&quot; GL467</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>STEAM INDICATOR, Class D 264101</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Banjo Curette ER628R GL1625</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Appendix VIII: L&D Stat Team

In any given clinical situation on Labor and Delivery, the **L&D Stat Team** is appropriate and further hands-on deck can be called in separately. In the specific case of a PPH the Pediatric team may be informed that their assistance is not necessary or just limited to temporarily take care of the newborn while the focus of the L&D team is on the mother’s wellbeing.

Call 1111: Ask for L&D Stat Team and state location of emergency.

L&D Stat Team includes the following members:
- Patient primary RN (RN1)
- Credentialled OB provider
- CNM on L&D duty
- Scrub tech
- L&D charge RN
- Mother-Baby Unit RN (RN2)
- House supervisor
- Anesthesia staff on duty
- Respiratory Therapy on duty
- Pediatric hospitalist
- Inpatient Pediatric Unit Charge RN
- Neonatal Intensive Care Unit RN
- Security

When the operator is asked to call for an **L&D Stat Team** this will be communicated with an overhead page, which will be repeated 3 times. The on call OBGYN, Pediatrician and Anesthesia on duty will also receive a page, most times now through our secure text messaging.

The **L&D Stat Team** does not include an ICU doctor and is not the same as a rapid response or code.

With a **Rapid Response** the ICU nursing team, plus house supervisor and the respiratory therapist is called, for quick response to a rapidly declining clinical situation. Hospitalist can come if asked for.

With a **Code Blue**, which is appropriate for unresponsive, pulseless adult patients on L&D, the house supervisor, ICU nursing team (ACLS trained), ICU doctor, anesthesia, pharmacist and the respiratory therapist is called (on floor 4 and 5 the hospitalist instead of ICU doctor will come).
The following is a chart of typical products found on Labor and Delivery which may become blood-soaked during a delivery. To quantitate blood loss from these products, the dry weights have been measured. Using a 1gm:1ml conversion, the total weight is measured, and the dry weight subtracted, leaving the weight of blood.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Dry weight (grams)</th>
<th>Number used (per category)</th>
<th>Total dry weight: All per category</th>
<th>Total wet weight: All per category</th>
<th>Wet weight - dry weight = blood loss in ml.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue chux</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light blue chux</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green chux</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peach chux</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ray-tek sponge</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lap sponge</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue towel</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green towel</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peach/pink peri-pad</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XL-peach pad for OR</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White peri-pad</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White “old fashioned” peri-pad</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloth bed pad</td>
<td>345</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large linen towel</td>
<td>395</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washcloth</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gown</td>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>¾ sheet</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduated delivery drape</td>
<td>135</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR Foam pads</td>
<td>480</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR Lap holders</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR CS drape</td>
<td>450</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Graduated drape volume      | Subtract pre-delivery fluids | Subtract urine, amniotic fluid and irrigation after delivery | TOTAL QBL | Updated weights Jan 2021, includes RF tagged products
Appendix X: Blood product guide

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VOLUME</th>
<th>EXPECTED RESULT</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packed Red Blood Cells</td>
<td>450ml</td>
<td>Increase Hgb by 1gm and HCT by 3%</td>
<td>If AB screen +, may take 1-24 hours for a crossmatch</td>
</tr>
<tr>
<td>Fresh Frozen Plasma</td>
<td>180ml</td>
<td>Increase fibrinogen by 10mg/dl</td>
<td>1:1 or 2:1 PRBCs transfused. Use if PT or PTT &gt;1.5x normal</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td></td>
<td>Increase in fibrinogen 80-100mg/dl</td>
<td>30-45min thaw Priority for fibrinogen &lt; 80. Pooled donors</td>
</tr>
<tr>
<td>Platelets</td>
<td></td>
<td>Increase platelets by 40-50k Transient</td>
<td>Priority for plt&lt; 50k Single dose is a “6-pack”</td>
</tr>
</tbody>
</table>

Do not wait for lab results if transfusion is indicated by clinical signs (vitals) and QBL.

For ongoing, heavy bleeding the Massive Blood Transfusion protocol can be activated, the order is called **BLOOD Orders for Massive Blood Transfusion (Adult)**. With this order the blood bank will continue to send blood starting with O neg 2 units PRBC and 2 FFPs followed by every 30 min 4 packed red blood cells, 4 Fresh frozen plasma (FFP) and 1 platelets. This **4:4:1 (PRBC:FFP:PLT)** ratio is the current preferred ratio of transfusion. For low fibrinogen use cryoprecipitate to target fibrinogen >300.

In cases where high risk of coagulopathy exists (for reasons other than dilutional), attempt to mimic whole blood ratios is supported by various studies. In other cases, direction of component therapy by explicit assessment of coagulopathy by either specific clinical or lab criteria is preferred. If bleeding and replacement go on long enough, factor replacement due to dilution will eventually be needed.

- rFactor VIIa: 70-100mcg/kg IVPB. May repeat in 1 and 3 hours if bleeding continues
  - Off label use
  - No significant obstetric data. Use based on trauma and surgical cases with massive intraoperative blood loss
  - Conflicting evidence regarding thrombotic events post-administration (all uses, 95% off-label) 2-10%
  - 70-100mcg/kg
- **For all PPH regardless of cause:**
  - Tranexamic acid (Lysteda) to be given within 3 hours postpartum
  - 1 gram total (100mg/ml IV to be given over 10 min)
  - Repeat if ongoing PPH in 30 min or rebleed within 24 hours.
  - Contraindication is known h/o thrombophilia on anticoagulation prophylaxis or active VTE in pregnancy.
Surgical Options

Goal of surgical management is cessation of bleeding and vascular stability. Identification of source is paramount.

- Again, consider the 4 T’s: Tone, Tissue, Trauma, Thrombin.

- **Tone:** If bleeding is from atony consider a uterine curettage and placement of an intrauterine balloon (Bakri). Place the balloon, fill with up to 500cc sterile saline, assure correct placement and pack the vagina (preferably with Kerlix). Some will pack the vagina first and then inflate the balloon to keep this in the uterus. Regardless, be sure the balloon is not only in the lower uterine segment. Secure the vaginal pack to the Balloon drain. Attach a foley bag to drain out for uterine balloon and label as “Uterine”. Place a foley catheter for bladder drainage and document the placement and details including number of vaginal packing used. Review atony medications and use as needed. Removal can be done in 2-24 hours after placement depending on the clinical scenario. Document the removal and number of vaginal packing removed. Consider continued Pitocin around the time of removal.

- **Tissue:** If cervical or vaginal lacerations are present and there is no atony, proceed with vaginal exam in lithotomy position with adequate lighting, instruments, and assistance. Pack if necessary, repair if able. With packing always place a urinary foley catheter.

- **Trauma:** Consider the mechanics of delivery as well as other contributing historical data such as previous cesarean, operative vaginal delivery. Change in vital signs or change in patient status that is out of proportion to the amount of witnessed blood loss is concerning for internal bleeding. Most concealed bleeding is usually retroperitoneal, and laparotomy is indicated. Call out for backup/GYN ONC/trauma surgeon if this is expected.

- **Thrombin:** Pre-existing inherited or acquired coagulopathy can increase the amount of postpartum bleeding significantly. Many of these patients will have previously been identified and they should be discussed with MFM and/or hematology. Consideration should be made for coagulopathy when bleeding occurs under unusual circumstances. Identification of other signs of bleeding, such as at the IV site, may be the only indicators. Certain conditions can also cause a pregnancy/delivery related coagulopathy, such as disseminated intravascular coagulation (DIC), dilutional coagulopathy, hypofibrinogenemia, or amniotic fluid embolism (AFE). Suspicion of these conditions warrants aggressive blood product transfusion (FFP, CRYO). Possible use of tranexamic acid (Lysteda®) or rFactor VIIa may also be considered.

If no response with the above, proceed to laparotomy with the following options available.

- **Surgical/Laparotomy Options:** The following options all have some utility in managing PPH surgically.
  - Midline laparotomy preferred due to better exposure and access to upper abdomen if needed.
  - Uterine artery ligation- Decreases perfusion pressure to the uterus by 25-50%
    - 4 vessel ligation (Uterine and utero-ovarian 45-50% decrease in bleeding)
  - Compression sutures: very effective if indeed bleeding is from uterine atony. First attempt rolling up the uterus. If bleeding stops due to this temporary procedure
    - B-Lynch suture
ANMC Obstetric Hemorrhage Guidelines

- Placental bed hemostatic suturing
- Patterned compression with sutures in figures of 8.
- Bilateral hypogastric artery ligation (↓ perfusion pressure by 85%, ↓blood flow by 75%). Requires skill and experience consider GYN/ONC available for this procedure. If the posterior branch of the internal iliac is included this will lead to gluteal necrosis therefore do not attempt unless well-practiced in this procedure.
- If patient is hemodynamically stable, consider arterial embolization (2-4h lag time)

**Hysterectomy**

- Fast procedure is better for total blood loss: perform “clamp-cut, clamp-cut” until the uterine arteries are clamped. Once vascular isolation is accomplished (uterine and utero-ovarian vessel), then the pedicles can be sutured/tied.
- Supracervical hysterectomy less chances of clamping the ureters, go across the uterus at the place where you would normally do your lower uterine incision for cesarean section.
- If planned hysterectomy in setting of placenta abnormalities: (1) deliver the fetus through a portion where the placenta is not attached. (2) close this hysterectomy with the placenta still inside.
- Consider cystoscopy postoperatively.

An additional intervention available is that of **Interventional Radiology (IR)**. Interventional radiology suites have fluoroscopic capability and instruments to be able to float catheters into terminal arteries and can either have a temporary balloon tamponade, or injection of substances that can occlude the arteries downstream. Unfortunately, the complexity of interventional radiology and the time required to mobilize and technically be able to float a catheter into the required artery takes an inordinate amount of time and is not useful during an acute event. However, once a patient is stabilized, continued mild/moderate bleeding can potentially be addressed with interventional radiology.

ANMC has a fully functioning interventional radiology suite and has an IR on-call team. A monthly on call list is sent out and OB charge RN or House supervisor will have the contact number. Alternatively the OR-staff can connect with this service. Uterine artery embolization should be given consideration at any time during an event when the patient is stable and a 3-4h hour lag time would be acceptable. IR can be highly beneficial given the right circumstances.

Another use of interventional radiology could be in the setting of abnormal placentation (accreta, increta, percreta) or massive interfering anterior fibroid, when a cesarean or post-partum hysterectomy is planned. Uterine artery catheters can be placed pre-operatively. Once the neonate is delivered, the catheters can be used to occlude the uterine arteries with the goal to limit blood loss. This takes careful consideration and planning but could potentially, greatly limit morbidity associated with massive blood loss, transfusion and operating time.
Appendix XII: Debrief tool
(ANMC Family Birthing Services Debrief Procedure and Appendices APPROVED FINAL 3.9.21)

FAMILY BIRTHING SERVICES CRITICAL EVENT DEBRIEF FORM

Completed by: ________________________________
Date of Incident: ________________________________

Patient Sticker Goes Here

***Not Part of the Medical Record***

** Protected by AS 18.23.050 & AS 18.23.070(5) **

<table>
<thead>
<tr>
<th>Type of Incident [check all that apply]</th>
<th>Staff Involved/Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postpartum hemorrhage w/ severe mortality</td>
<td></td>
</tr>
<tr>
<td>Stillbirth</td>
<td></td>
</tr>
<tr>
<td>Shoulder dystocia</td>
<td></td>
</tr>
<tr>
<td>Exsanguination</td>
<td></td>
</tr>
<tr>
<td>Code White (Near-miss code)</td>
<td></td>
</tr>
<tr>
<td>Maternal Code</td>
<td></td>
</tr>
<tr>
<td>Uterine rupture</td>
<td></td>
</tr>
<tr>
<td>Unplanned ICU admission</td>
<td></td>
</tr>
<tr>
<td>Unplanned hysterectomy</td>
<td></td>
</tr>
<tr>
<td>Severe maternal morbidity (unplanned ICU admission and/or transfusion &gt; 4 units PRCB)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

Event Description - Include as much detail as you can. If you need more space for writing, you can attach a blank piece of paper with written description.

What Went Well?  Yes  No  What Could Have Gone Better?

| Communication with Providers & DPs |  |  |
| Communication with other Departments |  |  |
| Equipment/Supplies |  |  |
| Staffing |  |  |
| Policies and Protocols |  |  |
| Decision Making |  |  |
| Medications |  |  |
| Teamwork |  |  |
| Communication |  |  |
| Clear leadership |  |  |

Suggestions for Improvement

Submit an Incident Report & Use the Post-Event Guide For:

- Exsanguination
- Code White
- Maternal Code
- Uterine Rupture
- Unplanned ICU admission
- Unplanned hysterectomy
- Severe Maternal Morbidity (unplanned ICU admission and/or transfusion > 4 units PRCB)
- Other Severe Events

Email completed form to anmcdatabreach@cnmihs.org (on scanner use Scan and Send One Touch: Debrief Form) and place in folder in charge nurse drawer

***CONFIDENTIAL MEDICAL QUALITY ASSURANCE PROGRAM***

MCH CCBG Approval: 2/25/2021  Version 1 Revised 3/9/2021
# Alaska Native Medical Center

## Post-Partum Hemorrhage Flow Sheet

*OBP*

<table>
<thead>
<tr>
<th>VITALS</th>
<th>In's</th>
<th>Out's</th>
<th>Results</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Pulse</td>
<td>BP</td>
<td>IVF mls/hr / cumulative total</td>
<td>Medication, uterotonic, anesthetics, etc</td>
</tr>
</tbody>
</table>

### PATIENT IDENTIFICATION LABEL

**Signatures**

Provider: ___________________________ Primary Nurse: ___________________________

Provider’s Printed Name: ___________________________ Primary Nurse’s Printed Name: ___________________________

Charge Nurse: ___________________________ Other Personnel: ___________________________

Charge Nurse’s Printed Name: ___________________________ Other Personnel’s Printed Name: ___________________________