

**ANMC Obstetric Hemorrhage Guideline**

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## Background

The definition of early postpartum hemorrhage (PPH) is “**Cumulative blood loss of  $\geq 1000$ 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 3<sup>rd</sup> 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 **H**elp: One person is responsible for seeking assistance and directing roles (likely the charge RN), **E**quipment will be gathered and delivered effectively by an additional RN or staff member. Continued **A**ssessment is performed by the primary L&D RN and changes in the patient states are communicated to the team by this person. **R**esuscitation 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**)

### 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 the quantified volume, subtracting the weight of the drape and any laps or chux used.
  - d. Continue this process by cumulation of all bleeding postpartum.
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**
      - Do not give if still suspicious of retained placenta, as it clamps down lower uterine segment and may impede uterine evaluation.
    - 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
  - After manual sweep and uterine atony is the confirmed cause of PPH: consider placement of a Bakri balloon or JADA suction system.
- ➔ **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 1<sup>st</sup> 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 vaginal deliveries with >500mls of bloodloss and cesarean deliveries with more than 1000mls of bloodloss. 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

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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.



# HEART POSTPARTUM HEMORRHAGE

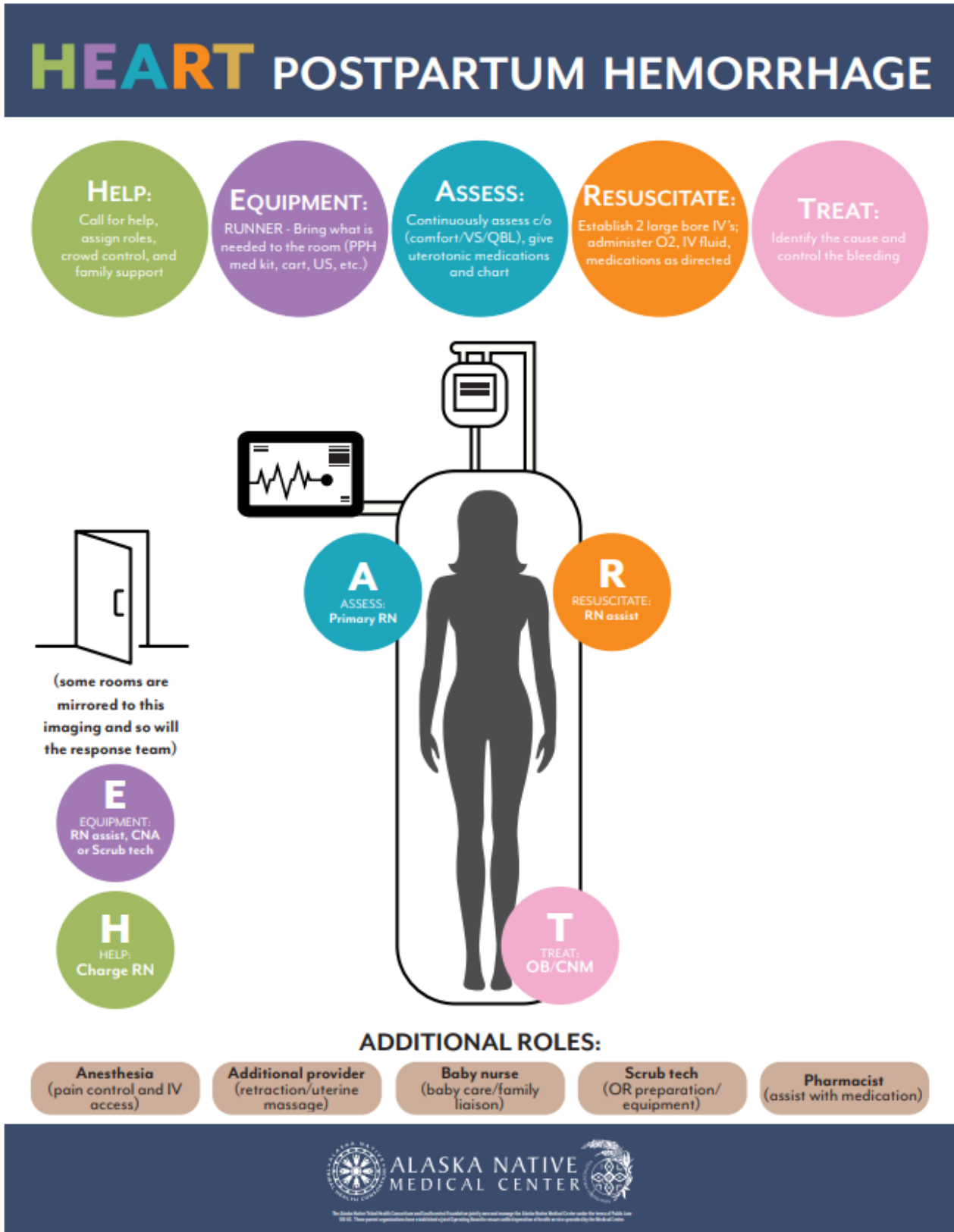
<p><b>H</b> HELP</p>	<ul style="list-style-type: none"> <li>• MD</li> <li>• Charge RN</li> <li>• Anesthesia</li> <li>• OR</li> <li>• Additional RN/Runner/Recorder</li> </ul>	<p><b>CONSIDER:</b></p> <ul style="list-style-type: none"> <li>&gt;500cc: extra RNs / T&amp;C 2 Units</li> <li>&gt;1000cc: extra provider / Anesthesia</li> <li>&gt;1500cc or unstable: OR / ICU</li> <li>&gt;2000cc: Massive transfusion</li> </ul>
<p><b>E</b> EQUIPMENT</p>	<ul style="list-style-type: none"> <li>• PPH Medication Kit with Uterotonics</li> <li>• PPH Cart including Bakri balloon</li> <li>• TXA, Antibiotics, Lidocaine, Fentanyl</li> <li>• US / Scale for QBL</li> <li>• Suture/Laps</li> <li>• Lighting</li> <li>• Nitrous Oxide</li> </ul>	<p><b>MAIN ROLE:</b></p> <ul style="list-style-type: none"> <li>• Get supplies</li> <li>• Assist with QBL</li> <li>• Laps and instrument count</li> </ul>
<p><b>A</b> ASSESS</p>	<ul style="list-style-type: none"> <li>• Frequent VS (pulse ox, BP/q5min)</li> <li>• Ongoing QBL</li> <li>• Record</li> <li>• Pain/Comfort Level</li> <li>• Give uterotonic medications</li> </ul>	<p><b>UTEROTONIC MEDS:</b></p> <ul style="list-style-type: none"> <li>• Pitocin IV 30U/500ml or IM 10U</li> <li>• Methergine IM 0.2mg q 15min x2</li> <li>• Hemabate IM 250mcg IM q15-90 x8</li> <li>• Misoprostol SL/buc/PR 400-800 mcg</li> </ul>
<p><b>R</b> RESUSCITATE</p>	<ul style="list-style-type: none"> <li>• 2 IV's with labs</li> <li>• O2</li> <li>• Fluid Bolus</li> <li>• Blood Transfusion</li> </ul>	<p><b>LABS:</b></p> <ul style="list-style-type: none"> <li>• CMP: Light green top</li> <li>• CBC, Ionized Ca2+: Purple Top</li> <li>• Coags/Fibrinogen: Light Blue Top</li> </ul>
<p><b>T</b> TREAT THE 4 Ts</p>	<p><b>TONE</b></p> <ul style="list-style-type: none"> <li>• Uterotonic Meds</li> <li>• Bimanual Massage</li> <li>• Foley</li> <li>• Bakri/Uterine Packing</li> <li>• OR</li> </ul> <p><b>TISSUE</b></p> <ul style="list-style-type: none"> <li>• Manual Sweep w ABX US</li> <li>• OR/D&amp;C</li> </ul> <p><b>TRAUMA</b></p> <ul style="list-style-type: none"> <li>• Repair: OR/Bedside</li> </ul> <p><b>THROMBIN/DIC</b></p> <ul style="list-style-type: none"> <li>• RBC:FFP:PLT = 4:4:1</li> <li>• Cryoprecipitate</li> </ul>	<p><b>TXA (Tranexemic Acid):</b></p> <ul style="list-style-type: none"> <li>• Give for all PPH &gt;1000mL regardless of cause</li> <li>• 1g (100mg/ml) IV over 10 minutes, within 3 hours postpartum. Repeat if ongoing PPH in 30 minutes or rebleed within 24 hours</li> </ul>

DEBRIEF AFTER EACH EVENT WITH CUSTOMER OWNER, FAMILY, AND TEAM MEMBERS

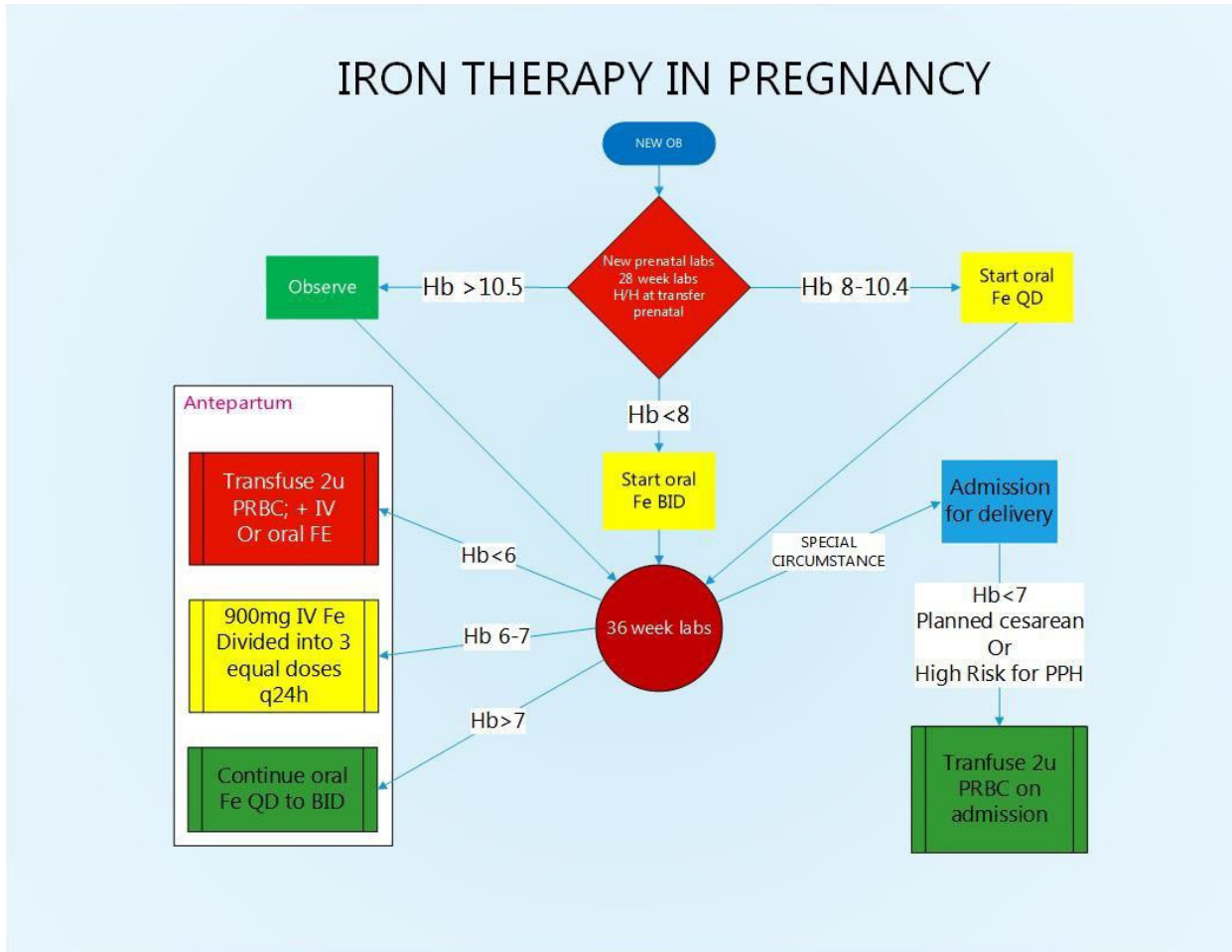
Appendix II: 4-tiered PPH response algorithm



Appendix III: Placing of HEART team members



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

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

**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®

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### 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.

Instrument Name	Number	Quantity
Straight Sponge Forceps	GL650	2
Uterine Tenaculum Forceps	GL850	1
Needle Holder Straight Jaws Carbide inserts 10 3/8"	CH2442	1
Uterine Packing Forceps Curved	GL600	1
1x2 Tissue Forceps 10"	SU2337	1
Russian Tissue Forceps 10"	SU2454	2
Gelpi Retractor 7 1/2"	GA500	2
Heaney Simon Retractor 4 1/2x1"	GL350	2
Breitsky-Navratil Retractor 12"	GL467	2
STEAM INDICATOR, Class D	264101	1
Banjo Curette	ER628R GL1625	1

**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)
- Credentialed 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).



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Appendix IX: QBL tool

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.

ITEM	Dry weight (grams)	Number used (per category)	Total dry weight: All per category	Total wet weight: All per category	Wet weight - dry weight = blood loss in ml.
Blue chux	45				
Light blue chux	20				
Green chux	70				
Peach chux	100				
Ray-tek sponge	5				
Lap sponge	20				
Blue towel	60				
Green towel	80				
Peach/pink peri-pad	30				
XL-peach pad for OR	140				
White peri-pad	10				
White "old fashioned" peri-pad	15				
Cloth bed pad	345				
Large linen towel	395				
Washcloth	35				
Gown	125				
¾ sheet	80				
Graduated delivery drape	135				
OR Foam pads	480				
OR Lap holders	25				
OR CS drape	450				
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

Blood Product Guide

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

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.

**Appendix XI: Surgical Options for PPH****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 manual sweep or uterine curettage and placement of an JADA suction system or intrauterine balloon (Bakri). See further instructions in addendum XIV.
- **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 post-partum 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
    - 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)

## ANMC Obstetric Hemorrhage Guidelines

### ○ **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: _____																																					
<div style="border: 1px solid black; width: 100%; height: 80px; display: flex; align-items: center; justify-content: center;">                 Patient Sticker Goes Here             </div>																																					
<b>****Not Part of the Medical Record****</b> <b>** Protected by AS 18.23.030 &amp; AS 18.23.070(5)**</b>																																					
Type of Incident (check all that apply)	Staff Involved/Role																																				
Postpartum hemorrhage w/o severe morbidity <input type="checkbox"/> Stat cesarean delivery <input type="checkbox"/> Shoulder dystocia <input type="checkbox"/> Eclampsia <input type="checkbox"/> Code White (Neonatal code) <input type="checkbox"/> Maternal Code <input type="checkbox"/> Uterine rupture <input type="checkbox"/> Unplanned ICU admission <input type="checkbox"/> Unplanned hysterectomy <input type="checkbox"/> Severe maternal morbidity (unplanned ICU admission and/or transfusion > 4 units PRBCs) <input type="checkbox"/> Other _____ <input type="checkbox"/>																																					
<b>Event Description</b> - 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?	What Could Have Gone Better?																																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%;">Yes</th> <th style="width: 10%;">No</th> </tr> </thead> <tbody> <tr><td>Communication with Providers &amp; RNs</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Communication with other Departments</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Equipment/ Supplies</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Staffing</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Policies and Protocols</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Recording</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Medications</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Teamwork</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Role Clarity</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Clear Leader</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>Other _____</td><td></td><td></td></tr> </tbody> </table>		Yes	No	Communication with Providers & RNs	<input type="checkbox"/>	<input type="checkbox"/>	Communication with other Departments	<input type="checkbox"/>	<input type="checkbox"/>	Equipment/ Supplies	<input type="checkbox"/>	<input type="checkbox"/>	Staffing	<input type="checkbox"/>	<input type="checkbox"/>	Policies and Protocols	<input type="checkbox"/>	<input type="checkbox"/>	Recording	<input type="checkbox"/>	<input type="checkbox"/>	Medications	<input type="checkbox"/>	<input type="checkbox"/>	Teamwork	<input type="checkbox"/>	<input type="checkbox"/>	Role Clarity	<input type="checkbox"/>	<input type="checkbox"/>	Clear Leader	<input type="checkbox"/>	<input type="checkbox"/>	Other _____			
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Suggestions for Improvement	Submit an Incident Report & Use the Post-Severe Event Guide for:																																				
	<ul style="list-style-type: none"> <li>• Eclampsia</li> <li>• Maternal Code</li> <li>• Unplanned ICU Adm</li> <li>• Severe Maternal Morbidity (unplanned ICU admission and/or transfusion &gt; 4 units PRBCs)</li> <li>• Other Severe Event</li> <li>• Code White</li> <li>• Uterine Rupture</li> <li>• Unplanned hysterectomy</li> </ul>																																				
Email completed form to <a href="mailto:aknbcriticalevents@anmc.org">aknbcriticalevents@anmc.org</a> (on scanner use Scan and Send One Touch: Debrief Form) and place in folder in charge nurse drawer <b>***CONFIDENTIAL MEDICAL QUALITY ASSURANCE PROGRAM***</b>																																					

Appendix XIII: Optional PPH recording sheet

**\*OBP\***

Alaska Native Medical Center  
Post-Partum Hemorrhage Flow Sheet

Recorder: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Time	VITALS		In's		Out's			Results	Events
	Pulse	BP	O2 Sat	IVF mls / hr / cumulative total	Medication uterotonics, anesthetics, etc	UOP mls / hr / cumulative total	QBL mls / event / cumulative total		

**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: \_\_\_\_\_

**Appendix XIV:** Appendix XIV: Bakri<sup>®</sup> balloon and JADA<sup>®</sup> system instructions

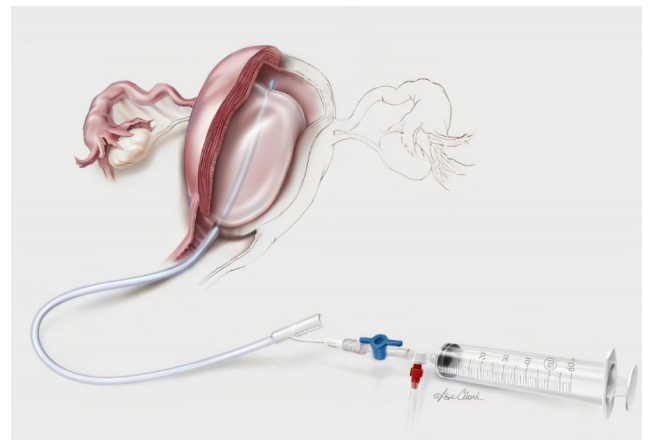
For PPH caused by uterine atony we have two devices that can assist us in the management. The Bakri balloon is designed to assist with pressure to the uterine vessels and musculature and stop the bleeding through that mechanism. The JADA system has aids the uterus in clamping down by low suction on the inside of the uterus. Only one product can be used at a time.

Before using the Bakri<sup>®</sup> Balloon or the JADA<sup>®</sup> ensure and caution:

1. Ensure adequate anesthesia for the patient (consider assistance from CRNA)
2. Ensure an empty uterus (with a manual sweep or (suction) D&C.
3. Caution with placement in settings of prior uterine incisions, chorioamnionitis or suspicion of intraabdominal bleeding.

Bakri<sup>®</sup> balloon details:

Place the balloon intrauterine, 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 outlet 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.



JADA<sup>®</sup> system details:

The JADA system works by PPH control through low level vacuum. Guide the JADA loop into the intrauterine cavity. Fill the cervical seal with 60-120cc of NS and add the tubing to the low-level wall suction to 80mmHG (+-10mmHg). Leave this in as long as blood is removed by the JADA<sup>®</sup> system. When for 1 hour the uterus remains contracted and there is no further blood suctioned through the JADA<sup>®</sup> cannister the suction can be removed. After an additional 30 min of a controlled situation, meaning a contracted uterus and no further vaginal bleeding, the JADA<sup>®</sup> system can be fully removed from the patient while the suction remains off.

