INDIANA PERINATAL QUALITY IMPROVEMENT COLLABORATIVE [IPQIC]

MATERNAL HEMORRHAGE TOOLKIT

Approved by the IPQIC Governing Council June 2019

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We want to acknowledge the California Maternal Quality Care Collaborative (CMQCC) and the Florida Perinatal Quality Collaborative (FPQC) for their comprehensive work on obstetric hemorrhage. With permission, we have incorporated portions of the California and Florida hemorrhage toolkits into the Indiana Hemorrhage Toolkit.

Overview

Maternal morbidity and mortality are national and Indiana state health problems. Obstetric hemorrhage is a leading cause of **preventable** maternal morbidity and mortality. Rates of postpartum hemorrhage have increased over the past two decades, primarily due to an increase in cases of uterine atony. Reviews have shown that delays in recognition and response to hemorrhage contribute to poor maternal outcomes. Delivering facilities that implement standardized protocols for obstetric hemorrhage and have multidisciplinary teams trained in the management of hemorrhage have improved maternal outcomes.

The American College of Obstetricians and Gynecologists published an updated definition of postpartum hemorrhage in their Practice Bulletin Number 183, October 2017. Postpartum hemorrhage is defined as: Cumulative blood loss of greater than or equal to 1000 mL, or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after the birth process (includes intrapartum loss) regardless of the route of delivery. Emphasis on cumulative blood loss combined with attention to maternal vital signs presents an opportunity to improve the care of postpartum patients.

Indiana has partnered with The Alliance for Innovation on Maternal Health (AIM), a national data-driven maternal safety and quality improvement initiative.[1] The Indiana Hemorrhage Toolkit provides information on obstetric hemorrhage in four domains following the AIM Patient Safety Bundle on Obstetric Hemorrhage: READINESS, RECOGNITION AND PREVENTION, RESPONSE, REPORTING/SYSTEMS LEARNING. Development and implementation of standardized protocols may be individualized for each delivering facility based on available resources.

The potential for hemorrhage exists following every birth. Within our state, delivering facilities of varying sizes and resources are present. Special attention must be paid to preparedness for hemorrhage in facilities with low volume deliveries and in resource-limited settings. Racial disparities in health care for black women and the medical conditions that increase their risks of hemorrhage must be addressed. With implementation of our Indiana Hemorrhage Toolkit, our goal is that women in Indiana will have the same opportunity for a safe birth at all delivering facilities.

[1] www.safehealthcareforeverywoman.org

Health Equity

Nationally, maternal morbidity and mortality in black women is at an all-time high of 47.2 deaths per 100,000 live births, compared to white women mortality of 18.1 deaths per 100,000 live births.[2] Further, severe maternal morbidity affects minority and low-income pregnant women more often than any other race or social class.[3]

> *Black women in the United States experience unacceptably poor maternal health outcomes, including disproportionately high rates of death related to pregnancy or childbirth. Both societal and health system factors contribute to high rates of poor health outcomes and maternal mortality for black women, who are more likely to experience barriers to obtaining quality care and often face racial discrimination throughout their lives*.[4]

Recent studies have suggested the rising rates of maternal morbidity may be contributing to the changes in women's overall health, which leads to the increasing complications and mortality. Statistics show in 2011-2013, 15.1 percent of maternal deaths were caused by cardiovascular diseases, and 14.5 percent by non-cardiovascular diseases, 12.7 percent by infection and sepsis, and 11.4 percent by hemorrhage.[5]

Postpartum Hemorrhage continues to lead as the number one contributor to maternal morbidity and mortality. According to BioMed Central Pregnancy and Childbirth, 2017, "the strongest risk factors associated to Postpartum Hemorrhage (PPH) are anemia, severe preeclampsia or Hemolysis, elevated liver enzymes, low platelet counts (HELLP syndrome), uterine fibromas, pregnancies with multiples, and assisted reproductive technologies."[6] Some other factors that contribute to PPH are obesity, previous uterine surgery, and previous history of PPH. Black women have higher incidences of anemia, preeclampsia, uterine fibromas, and obesity.

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[2] America's Health Rankings United Health Foundation. (2018). Health of women and children: Maternal mortality 2018

[3] Auerbach, M, & Landy, J. H. (2018). Anemia in pregnancy. *UpToDate.com.* Retrieved from: https://www.uptodate.com/contents/anemia-in pregnancy?search=anemia%20in%20pregnancy&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

[4] Mohamed, M. A., Ahmad, T., Marci, C., and Aly, H. (2012) Racial disparities in maternal hemoglobin concentrations and pregnancy outcomes. *US National library of Medicine National Institutes of Health. 40*(2). doi: 10.1515/jpm.2011.137

[5] Fingar, R. K., Hambrick, M. M., Heslin, C. K., and Moore, E. J. (2018). Statistical brief # 243: Trends and disparities in delivery hospitalizations involving severe maternal morbidity, 2006-2015. *The healthcare Cost and Utilization Project.* Retrieved from: https://www.hcup-us.ahrq.gov/reports/statbriefs/sb243-Severe-Maternal-Morbidity-Delivery-Trends-Disparities.jsp

[6] Mohamed, M. A., Ahmad, T., Marci, C., and Aly, H. (2012) Racial disparities in maternal hemoglobin concentrations and pregnancy outcomes. *US National library of Medicine National Institutes of Health. 40*(2). doi: 10.1515/jpm.2011.137

Women throughout the United States commonly suffer from anemia for many reasons such as menstrual blood loss, poor nutrition, and hemoglobinopathies (Sickle cell disease and Thalassemia).[7] According to the research study, Racial Disparities in Maternal Hemoglobin Concentrations and Pregnancy Outcome, (2012), "In African-American women, the prevalence of anemia during pregnancy is 27 percent, which is significantly higher than among non-Hispanic white women (7 percent)".[8] Furthermore, certain diseases such as Sickle cell disease are commonly seen in black women compared to white women.

Black women tend to suffer more from uterine fibro than any other race. Uterine fibroids are typically found to be two-to-three folds greater in black women than white women.[9] Increased uterine fibroids also impact not only maternal mortality but also fetal morbidity and mortality. Women who suffer from uterine fibroids have a higher incidence of preterm labor in the second trimester.[10]

Medical conditions, socioeconomic factors, and black women's educational level have all been deemed contributing factors to the disparity in healthcare for black women.[11] Although statistical data validate that increased risk factors contribute to the morbidity and mortality, not all patients have these known characteristics. Many stories have been told of near misses or maternal deaths in black women with known and unknown medical conditions or complications. A large number of these situations could be prevented or corrected. "Evidence suggests that factors such as stereotyping and implicit bias on the part of health care providers may contribute to racial and

[7] Auerbach, M, & Landy, J. H. (2018). Anemia in pregnancy. *UpToDate.com.* Retrieved from: https://www.uptodate.com/contents/anemia-in pregnancy?search=anemia%20in%20pregnancy&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

[8] Fingar, R. K., Hambrick, M. M., Heslin, C. K., and Moore, E. J. (2018). Statistical brief # 243: Trends and disparities in delivery hospitalizations involving severe maternal morbidity, 2006-2015. *The healthcare Cost and Utilization Project.* Retrieved from: https://www.hcup-us.ahrq.gov/reports/statbriefs/sb243-Severe-Maternal-Morbidity-Delivery-Trends-Disparities.jsp

[9] Auerbach, M, & Landy, J. H. (2018). Anemia in pregnancy. *UpToDate.com.* Retrieved from: https://www.uptodate.com/contents/anemia-in pregnancy?search=anemia%20in%20pregnancy&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

[10] Ibid

[11] Nyflot, T. L., Sandvan, I., Stray-Pedersen, B., Pettersen, S., Al-Ziriqi, S., Rosenberg, M., …Vangen, S. (2017). Risk factors for severe postpartum hemorrhage: A case-control study. *BMC Pregnancy and Childbirth. 17*(17). doi: https://doi.org/10.1186/s12884-016-1217-0

ethnic disparities in health".[12] Racial and ethnic disparities in women's health and outcomes are prevalent and persistently growing. To provide the best outcome for all women, healthcare providers must become knowledgeable about implicit bias and ways to eliminate stigma in the workplace.

The question that remains is what we can do as a nation to address this issue. Some studies suggest implementing "meditation" training. Meditation training is designed to increase healthcare providers' mindfulness skills.[13] The program is thought to be a promising and potentially sustainable way to address the issue of implicit bias.

> *Emerging evidence suggests that mindfulness practice can reduce the provider's contribution to healthcare disparities through several mechanisms including: reducing the likelihood that implicit bias will be activated in the mind, increasing providers' awareness of the ability to control response to implicit biases once activated, increasing self-compassion and compassion toward patients, and reducing internal sources of cognitive load.*

Other approaches that have been used to address implicit bias in healthcare are collaborating with community organizations to improve health and equity. Studies suggest implementing a self-assessment tool for health care organizations to gauge their current focus on and efforts to improve health equity.[14] Effective education and training will help to reduce implicit bias in the healthcare system.

[12] The American College of Obstetricians and Gynecologists. Number 649. (2018). Racial and ethnic disparities in obstetrics and gynecology. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Racial-and-Ethnic-Disparities-in-Obstetrics-and-Gynecology

[13] Burgess, J. D., Beach, C. C., and Saha, S. (2016). Mindfulness practice: A promising approach to reducing the effects of clinician implicit bias on patients. *100*(2). doi: http://doi.org/10.1016/j.pec.2016.09.005

Please follow the links for additional resources:

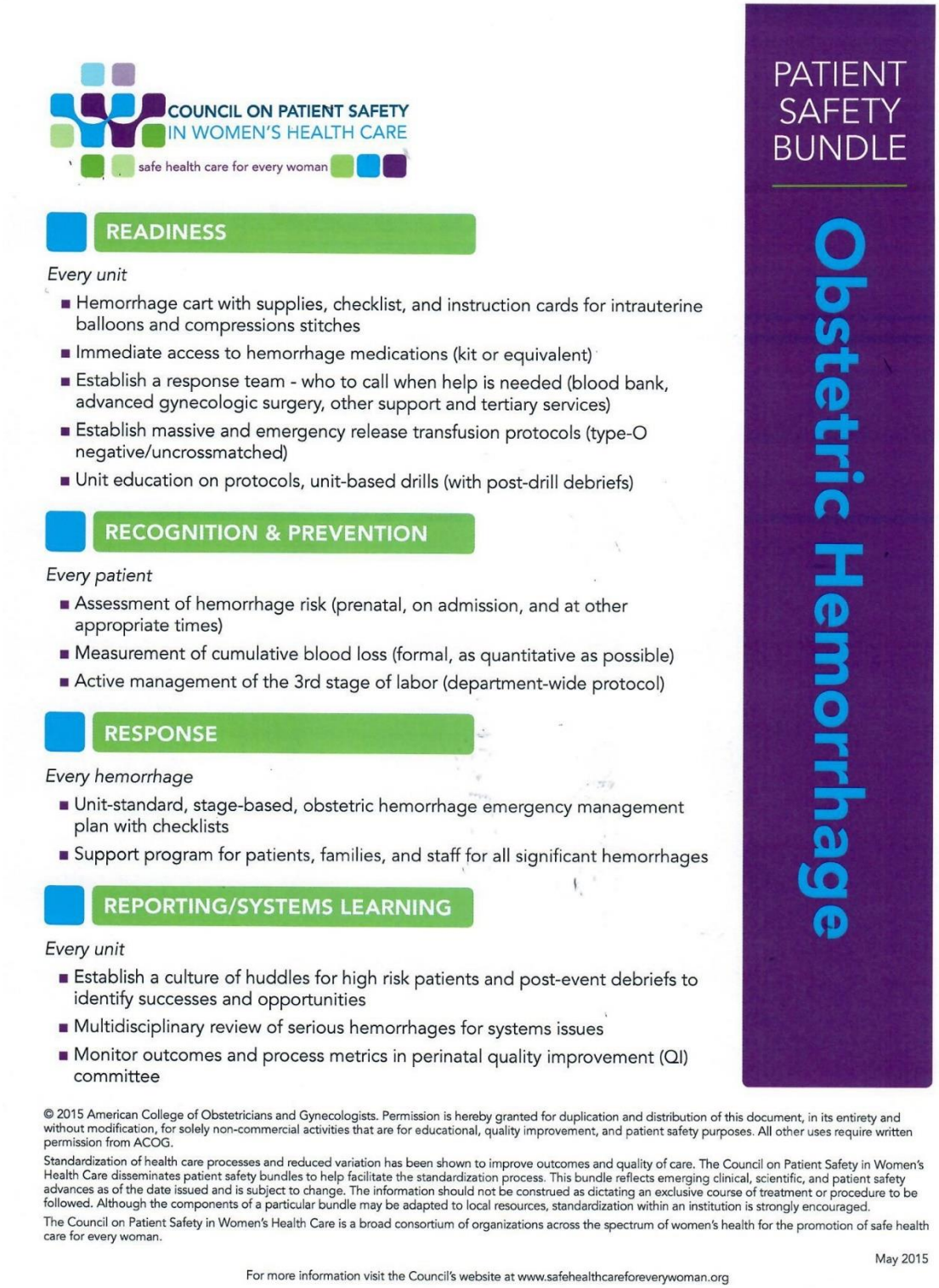
Kirwan Institute: Implicit Bias Module Series: http://kirwaninstitute.osu.edu/implicit-bias-training/

Implicit Bias Awareness: Resources and Activities: https://vpfa.uoregon.edu/implicit-bias-awareness-monthevents-and-resources-february-2018

The Training Associates: Implicit Bias Training: https://thetrainingassociates.com/implicit-bias-training/

https://www.cmqcc.org/resource/strategic-framework-improving-racialethnic-minority-health-and-eliminating-racialethnic This provides a framework for improving disparities. From the CMQCC toolkits.

https://www.cmqcc.org/resource/racial-disparities-perinatal-outcomes-and-pregnancy-spacing-among-women-delaying-initiation


COUNCIL ON PATIENT SAFETY
IN WOMEN'S HEALTH CARE
safe health care for every woman
PATIENT
SAFETY
BUNDLE
Obstetric Hemorrhage
READINESS
Every unit
Hemorrhage cart with supplies, checklist, and instruction cards for intrauterine balloons and compressions stitches
Immediate access to hemorrhage medications (kit or equivalent)
Establish a response team - who to call when help is needed (blood bank, advanced gynecologic surgery, other support and tertiary services)
Establish massive and emergency release transfusion protocols (type-O negative/uncrossmatched)
Unit education on protocols, unit-based drills (with post-drill debriefs)
RECOGNITION & PREVENTION
Every patient
Assessment of hemorrhage risk (prenatal, on admission, and at other appropriate times)
Measurement of cumulative blood loss (formal, as quantitative as possible)
Active management of the 3rd stage of labor (department-wide protocol)
RESPONSE
Every hemorrhage
Unit-standard, stage-based, obstetric hemorrhage emergency management plan with checklists
Support program for patients, families, and staff for all significant hemorrhages
REPORTING/SYSTEMS LEARNING
Every unit
Establish a culture of huddles for high risk patients and post-event debriefs to identify successes and opportunities
Multidisciplinary review of serious hemorrhages for systems issues
Monitor outcomes and process metrics in perinatal quality improvement (QI) committee
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Standardization of health care processes and reduced variation has been shown to improve outcomes and quality of care. The Council on Patient Safety in Women's Health Care disseminates patient safety bundles to help facilitate the standardization process. This bundle reflects emerging clinical, scientific, and patient safety advances as of the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Although the components of a particular bundle may be adapted to local resources, standardization within an institution is strongly encouraged.
The Council on Patient Safety in Women's Health Care is a broad consortium of organizations across the spectrum of women's health for the promotion of safe health care for every woman.
May 2015
For more information visit the Council's website at www.safehealthcareforeverywoman.org

Section I: Readiness

Postpartum hemorrhage (PPH) is an obstetrical emergency on labor and delivery units. For a rapid response to the emergency, the medical provider must have ready access to supplies, medications, a rapid response team and blood products. Unit education on protocols, with scheduled simulations of PPH, further improve the readiness for hemorrhage events.

Hemorrhage Cart

To be prepared for a maternal hemorrhage, the use of "hemorrhage carts" has been identified as a key component of a unit's "Readiness" to respond. A list of supplies to include in a hemorrhage cart has been compiled. Ready access to these supplies at the patient's bedside is needed to manage the hemorrhage. These supplies are the essential items recommended for all delivering facilities. Also included is a list of supplies needed in those hemorrhage events that are not easily controlled at the bedside and require the patient be moved to the operating room for additional interventions.

Par levels of equipment will need to be determined at each facility in order to maintain adequate supplies without a major concern for expiration dates.

The following chart contains the basic supplies recommended for hemorrhage carts for all delivering facilities.

Basic Hemorrhage Cart Materials	
1000 mL Lactated Ringers IV solution	X-ray 4x4 squares
1000 mL Normal Saline IV solution	4x4 gauze squares
1000 mL Normal Saline Irrigation	Sterile towels
10 mL saline flush syringes	Chux underpads
Pressure infusing bag	Rolled gauze for vaginal packing
20g angiocath	Foley catheter tray
18g angiocath	Urine meter with bag
16g angiocath	Uterine balloon kit
IV start kits	Red rubber catheter (in & out catheter)
Primary IV tubing	Arterial blood gas kit
IV pump tubing	Vacutainer blood tubes (pink, lavender, blue, green)
IV extension sets	Vacutainer and needles
Blood administration tubing	Tape

Basic Hemorrhage Cart Materials	
22g IM needles	Alcohol prep pads
5 mL syringes	Speculum (lighted or flashlight/lamp)
10 mL syringes	Right angle retractor
Sterile gloves (6, 6.5, 7, 7.5, 8)	Ring forceps
Lap sponges	Weighted speculum

Appendix A[15] provides a sample inventory form listing the items in the chart. This form allows delivering facility staff to track the materials that were used and supports updating the cart after each use to make sure all equipment and supplies are ready for the next use.

Important Note: All lap sponges and gauze squares that are used during the hemorrhage event must be counted before and after the event. Any sponge or gauze square that is inserted into a body cavity must have radiopaque markers so they would be detectable by X-ray if inadvertently left in the patient at the end of the event. If your facility utilizes radio frequency (RF) scanning devices, the sponges/gauze squares must have an embedded RF tag. Even if RF scanning is utilized, a count of the sponges and gauze squares still needs to occur.

The hemorrhage cart used by Indiana delivering facilities can be as basic as a toolbox or as elaborate as carts pictured in Appendix B.[16]

[15] https://www.in.gov/laboroflove/files/Basic%20Post%20Partum%20Hemorrhage%20Cart%20Contents.pdf
[16] https://www.in.gov/laboroflove/files/hemorrhage-cart-examples.pdf

Recommendations for a reference book to be kept with the cart

A binder for quick reference to the following should be placed on the hemorrhage cart. Posters of this information for ready access may also be displayed in appropriate locations.

- Placement of intrauterine tamponade balloon (Appendix C)[17]
- B-Lynch suture (Appendix D)[18]
- CMQCC Stages of Hemorrhage with interventions (Appendix E)[19]
- Medication Reference sheet (page 16 and Appendix F)[20]
- AWHONN Blood Component Reference Chart[21] *

Additional Equipment for Surgical Intervention

For hemorrhage events that are not easily controlled and require the patient be moved to the operating room for additional interventional procedures, the following equipment is recommended.

Item Description	
Heaney retractor	Patient warming device
Deaver retractor	Rapid Infuser
Needle holder	Fluid warmer
Curettes	Cell Saver
Hysterectomy tray instruments	Topical Sealants
D&C instrument tray	Interventional Radiology (if available)
Suture	Central Line tray
Suction D&C machine and curettes	Femoral line tray

[17] https://www.in.gov/laboroflove/files/Placement%20of%20Tamponade%20Balloon.pdf
[18] https://www.in.gov/laboroflove/files/B-Lynch%20Suture.pdf
[19] https://www.in.gov/laboroflove/files/CMQCC%20stages%20of%20hemorrhage%20guidelines.pdf
[20] https://www.in.gov/laboroflove/files/Uterotonic%20Agents%20for%20Postpartum%20Hemorrhage.pdf
[21] https://www.in.gov/laboroflove/files/blood-component-reference-AWHONN.pdf
* Reprinted with permission from the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) (www.awhonn.org). Transfusion of Blood Components: Recommendations Based on Serial Laboratory Values. From AWHONN (2019) High Risk and Critical Care Obstetrics, 4th Edition. Philadelphia:Wolters Kluwer.

Medications for Prevention and Treatment of Postpartum Hemorrhage

The following medications should be readily available through a medication dispensing system. These hemorrhage medications can be made into a kit or equivalent for ease of access to all medications.

- Pitocin® (oxytocin) 10-40 units per 500-1000 mL - 1 prepared bag for IV use
- Pitocin® (oxytocin) 10 unit vial for IM use (1 vial in medication kit)
- Methergine® (Methylergonivine) 0.2 mg/mL (1 vial in medication kit)
- Hemabate® (15-methyl PG F2a) 250mcg/mL (1 vial in medication kit)
- Cytotec® (Misoprostol) 100 or 200 mcg tablets (minimum of 800 mcg in medication kit)

UTEROTONIC AGENTS FOR POSTPARTUM HEMORRHAGE[22]						
Drug	Dose	Route	Frequency	Side Effects	Contraindications	Storage
Pitocin® (Oxytocin) 10 units/mL	10-40 units per 500-1000mL, rate titrated to uterine tone	IV Infusion	Continuous	Usually none Nausea, vomiting, hyponatremia ("water intoxication") with prolonged IV admin. Decreased BP and increased HR with high doses, esp IV push	Hypersensitivity to drug	Room temp
Cytotec® (Misoprostol) 200mcg tablets	600-800 mcg	Sublingual, oral or rectal	One time	Nausea, vomiting, diarrhea, shivering, fever (transient), headache	Rare, known allergy to prostaglandin, Hypersensitivity to drug	Room temp
Hemabate® (15-methylPGF2a) 250mcg/mL	250mcg	IM or intramyometrial (NOT given IV)	Q 15-90 min Not to exceed 8 doses/24 hours If no response after 3 doses, it is unlikely that additional doses will be of benefit	Nausea, vomiting, diarrhea, fever (transient), headache, chills, shivering, hypertension, bronchospasm	Caution in women with hepatic disease, asthma, hypertension, active cardiac or pulmonary disease Hypersensitivity to drug	Refrigerate
Methergine® (Methylergonivine) 0.2mg/mL	0.2mg	IM (NOT given IV)	Q2-4 hours If no response after 1 dose, it is unlikely that additional doses will be of benefit	Nausea, vomiting, severe hypertension, esp if given IV, which is not recommended	Hypertension, Preeclampsia, Cardiovascular disease, Hypersensitivity to drug. Caution if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/ possible cerebral hemorrhage	Refrigerate. Protect from light

[22] This chart is available in Appendix F
https://www.in.gov/laboroflove/files/Uterotonic%20Agents%20for%20Postpartum%20Hemorrhage.pdf

Recommendations

1. All labor and delivery and postpartum units should have a standardized medications regimen. Choose a standard second line uterotonic agent.
2. All relevant uterotonic medications should be readily available for emergent use.
3. Special preparation for treatment such as kits and carts should be in place in all labor and delivery and postpartum units.
4. Clinicians should stay abreast of emerging literature regarding the use of uterotonic agents.

Use of Tranexamic acid

Administration of tranexamic acid (TXA) can reduce death from bleeding in women with postpartum hemorrhage related to uterine atony or trauma. TXA is not a uterotonic. TXA is an antifibrinolytic that blocks the breakdown of fibrin clots. TXA can be given concomitantly with other drugs and procedures for control of bleeding. Delay in treatment, even if short, reduces the benefit of TXA administration. At this time, data is insufficient to recommend the use of TXA as prophylaxis against postpartum hemorrhage outside of the context of research.

- Where should TXA fit in a hemorrhage management protocol?

TXA should be considered as an adjunctive treatment and NOT an alternative treatment for postpartum hemorrhage. TXA should be considered for inclusion in the unit OB Hemorrhage medication kit for rapid accessibility. The exact placement in your facility's hemorrhage protocol will depend on local resources. Consideration of TXA is recommended in the following settings:

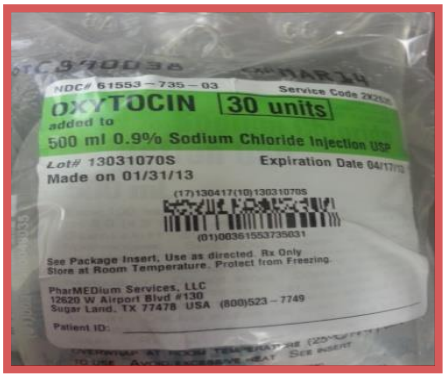
  - Bleeding continues after higher dose oxytocin and a secondary agent have been administered (end of CMQCC Hemorrhage Stage 1)
  - Additional interventions (e.g. surgical interventions, compression balloons, packing etc.) are being considered (beginning of CMQCC Hemorrhage Stage 2)
  - Within three hours after the diagnosis of postpartum hemorrhage
  - Concomitantly with oxytocin and other uterotonics

- Recommended Dosing
  - TXA solution for intravenous use is available as 1 gram per 10 mL. Preferred method of administration is 1 gram diluted in 50 mL normal saline (NS) IV piggyback and should be infused over 10 minutes. TXA can be given as a slow IV injection but must watch for hypotension. To avoid hypotension, do not exceed 100 mg per minute (i.e. administer 1 gram over 10 minutes)

- TXA should be given within 3 hours of the diagnosis of postpartum hemorrhage
- May repeat with a second dose of TXA (1-gram IV piggyback over 10 minutes) 30 minutes after initial administration if bleeding continues
- Prepare the same day the solution is to be used; discard any remaining solution after single-use
- May be mixed with most solutions for infusion such as electrolyte, carbohydrate, amino acid, and dextran solutions
- Do not add heparin to injection or mix with blood; do not mix with solutions containing penicillin

Examples: Hemorrhage Medications

- Located in Labor and Delivery, Operating Room, and postpartum medication dispensing systems
- Contains:
  - Hemabate® 250 mcg IM
  - Methergine® 0.2 mg IM
  - Oxytocin 10 units IM
  - Cytotec® 800 mcg SL, PO, PR
- Oxytocin 30 units/500mL to be pulled separately from medication dispensing system.



Rapid Response Team

Each delivering facility needs to establish the criteria or critical event in which a Rapid Response Team (RRT) is activated. For example, postpartum hemorrhage, emergent or STAT cesarean section, hypertensive crisis or eclamptic seizure. Delivering facilities may vary in available resources. Every shift/every day, each facility should determine the members of the RRT and the method of notifying the team. Examples of notification include an operator-assisted paging system within a facility using codes such as Condition H or Code Red for OB hemorrhage. The operator or charge nurse may also have access to group notification via personal devices. A notification and communication plan is vital.

The section below provides recommendations for the Rapid Response Team based on Levels of Care:

Level III and Level IV Facilities[23]: Composition of Team and roles:

- Obstetric Hospitalist and Obstetric Attending: These individuals serve as the team lead: Performs initial assessment, prescribes diagnostic and therapeutic interventions directly related to the problem, determines need for activation of delivering facility wide response team or code blue, consults with attending if appropriate.
- Anesthesia Provider: Team Lead if necessary: Assists with initial assessment and therapeutic interventions, manages airway, assists in oxygenation and ventilation, administers treatments as necessary.
- Obstetric Resident or Family Practice Resident: Functions as Team Lead until arrival of OB: Assists with evaluation and treatment under the direction of the OB Attending, remains with patient until stabilization or resolution of the problem as directed by the OB Attending.
- Charge Nurse: Assists the Primary RN or assigns someone to assist the Primary RN in implementation of interventions as directed by the OB Attending (establishing IV access, administering medications, etc), delegates Recorder, remains with patient until stabilization or resolution of the problem, coordinates bed placement if going to a higher level of care, assists with direct hand-off.
- Primary Registered Nurse: Directs Unit Personnel to notify Attending OB of the OB Rapid Response Team activation and communicates rationale for call. Communicates to initial responders the patient's condition and rationale for call, assists in implementing interventions as ordered by Team Leader, remains with patient until stabilization or resolution of the problem with direct hand-off if patient going to higher level of care.

[23] As defined in Administrative Rule 410 IAC 39-5-3 and 39-5-4.

- Respiratory Therapist: Assists with therapeutic interventions, management of airway, assists in oxygenation and ventilation, administers treatments as necessary.
- Certified Surgical Tech: Preparation of Operating Room, assists surgeon and charge nurse as directed.
- Neonatology: Team Lead of newborn care if delivery involved with emergency. Ensure warmer/supplies for any gestational age delivery.

Note: Blood Bank, Main OR Staff, Emergency Department/Trauma, Advanced Gynecology Surgery may be on the list of first responders

Level I and II Facilities[24]: Composition of Team and Roles**:**

The composition of Initial Responders may be a combination of Certified Nurse Midwife, ER Physician, Hospitalist, Charge Nurse, Primary Registered Nurse and Nursing Supervisor with Obstetric Attending and Anesthesia on-call, coming in from home.

- Obstetrician on call (if available) or ED physician until OB arrives: Team Lead: Performs initial assessment, prescribes diagnostic and therapeutic interventions directly related to the problem, determines need for activation of delivering facility wide response team or code blue, consults with attending if appropriate.
- Anesthesia Provider: Team Lead if necessary: Assists with initial assessment and therapeutic interventions, manages airway, assists in oxygenation and ventilation, will administer treatments as necessary. *Respiratory Therapy may manage airway until anesthesia arrives if not in house.*
- In House Physician or Nurse Practitioner: Functions as Team Lead until arrival of OB: Assists with evaluation and treatment under the direction of the OB Attending, remains with patient until stabilization or resolution of the problem as directed by the OB Attending.
- Charge Nurse or Nursing Supervisor: Assists the Primary RN or assigns someone to assist the primary RN in implementation of interventions as directed by the OB Attending (establishing IV access, administering medications, etc.), delegate recorder, remains with patient until stabilization or resolution of the problem, coordinates bed placement if going to a higher level of care, assists with direct hand-off.
- Primary Registered Nurse: Directs Unit Personnel to notify Attending OB of the OB Rapid Response Team activation and communicates rationale for call. Communicates to initial responders the patient's condition and rationale for call, assists in implementing interventions

[24] As defined in Administrative Rule 410 IAC 39-5-1 and 39-5-2.

as ordered by Team Leader, remains with patient until stabilization or resolution of the problem with direct hand-off if patient going to higher level of care.

- Neonatology/Pediatrician: Team Lead of newborn care if delivery involved with emergency. Ensure warmer/supplies for any gestational age delivery.

Note: All delivering facilities must know their limitations. Level I and Level II facilities must have a written plan for contingencies, to include:

- *Access to a Level III or Level IV facility for consultation or transfer of the patient; and*
- *Access to additional resources such as blood products and personnel.*

Transfusion Protocol

The goal of a protocol is to provide guidelines for transfusion of blood and blood components to support peri-partum women experiencing massive hemorrhage. Transfusions should be considered supportive therapy in the treatment of postpartum hemorrhage (PPH) to maintain hemodynamic stability while simultaneously identifying and treating the cause of blood loss.

Definitions:

- Blood Components: Packed Red Blood Cells, Platelets, Plasma, and Cryoprecipitate
  - *Packed Red Blood Cells* (PRBCs) increase the oxygen-carrying capacity of the blood by increasing red cell volume.
  - *Platelets* are cell fragments essential to clot formation; platelets are provided in a small volume of plasma.
  - *Plasma* is the serous portion of the blood that provides clotting factors for patients with coagulopathy or to create whole-blood equivalents during the treatment of massive hemorrhage. Plasma is generally stored frozen and must be thawed before use. Units of plasma are commonly known as FFP (Fresh Frozen Plasma). (Allow 30-35 minutes for thawing, if applicable.)
  - *Cryoprecipitate* (cryo) is a plasma derivative that contains concentrated clotting factors; cryo is generally used for the replacement of fibrinogen. Cryo is stored frozen and must be thawed before use. (Allow 30 – 35 minutes for thawing.)
  - A blood component reference is provided as Appendix G.[25]*

[25] https://www.in.gov/laboroflove/files/blood-component-reference-AWHONN.pdf

* Reprinted with permission from the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) (www.awhonn.org). Transfusion of Blood Components: Recommendations Based on Serial Laboratory Values. From AWHONN (2019) High Risk and Critical Care Obstetrics, 4th Edition. Philadelphia: Wolters Kluwer.

Note: The Perinatal Levels of Care rules (410 IAC 39-4-1(b)(E)) require all delivering facilities have the following at the facility at all times:

- *ABO-Rh-specific or O-Rh-negative blood;*
- *Fresh frozen plasma; and*
- *Cryoprecipitate.*

- Informed Consent: The dialogue between the patient and the healthcare provider in which both parties exchange information and questions resulting in the patient agreement or refusal to proceed with a specific medical or surgical procedure or intervention. Indiana Code 34-18-12-2 states that a presumption is created that a patient has given informed consent if the consent is:
  - Signed by the patient or the patient's authorized representative;
  - Witnessed by an individual at least eighteen (18) years of age, who may be the consenting provider; and
  - The medical or surgical procedure or intervention is explained, verbally or in the written consent, to the patient or the patient's authorized representative before a treatment, procedure, examination or test is undertaken. In order to qualify, the explanation given to the patient must include: The general nature of the patient's condition; the proposed treatment, procedure, examination or test; the expected benefits and outcome of the treatment, procedure, examination or test; material risks; reasonable alternatives including refusal; risks and benefits of the alternatives; potential complications; any potential problems that may occur during recuperation.
- Massive Transfusion**:** Generally defined as 10 units of PRBCs within 24 hours or transfusion of 4 units of PRBCs within 1 hour when ongoing need for more blood is anticipated (ACOG Practice Guideline) or a replacement of a complete blood volume.
- Massive Transfusion Protocol**:** An agreement between the blood bank and the clinical staff where large amounts of blood components are rapidly provided in a 1:1:1 (red cells: plasma: platelets) ratio designed to mimic replacement of whole blood in the treatment of a patient experiencing a hemorrhage emergency.
- Postpartum Hemorrhage: cumulative blood loss of greater than or equal to 1000 mL OR blood loss accompanied by signs/symptoms of hypovolemia within 24 hours following the birth process (includes intrapartum loss) regardless of route of delivery.
- Quantitative Blood Loss: A method for measuring blood loss by utilizing scales and calibrated equipment that is significantly more accurate than estimation (e.g. graduated blood collection containers and weighing blood-soaked materials where 1Gm = 1mL of blood).

Pre-transfusion Lab Tests:

- Clot Only**:** A blood bank specimen held in the lab for a patient who is low-risk for bleeding; this specimen would be used to perform a type and crossmatch if it is determined that blood is needed.
- Crossmatch: A process that ensures survival of transfused red blood cells (RBCs) by either electronically or serologically identifying donated RBCs that are compatible with the blood of a potential recipient; a current type and screen must be on file in order to provide crossmatched blood.
- Type and Screen (T&S): A blood test that determines a person's red cell ABO group, Rh status, and whether atypical RBC antibodies are present in the plasma. The sample may be retained up to 3 days to perform RBC crossmatching.
- Type and Crossmatch (T&C): An order that is inclusive of both a T&S plus identification of crossmatched units for transfusion.
- Uncrossmatched PRBCs: ABO type compatible Red Blood Cells that have not been tested for compatibility with the patient's blood. Universal donor Type O-negative units are generally given when the patient's blood type is unknown or not verified with a current Type and Screen.

Protocol statements:

A. All delivering facilities who accept patients for Labor and Delivery (L&D):
   a) Must have access to blood components for the treatment of excessive bleeding.
   b) In settings with adequate blood banking, a written massive transfusion protocol for treating massive hemorrhage events is needed.
   c) A massive transfusion protocol should include:
      i) Criteria for activation,
      ii) Who may initiate the protocol, and
      iii) Standard pack or cooler contents
   d) In settings that do not have adequate blood banking, there must be a written plan for either obtaining additional blood components to support massive transfusion or for stabilizing and transporting an at-risk mother to a higher level of care.

B. Pre-transfusion testing will be done according to facility policy.
   a) Pre-transfusion testing strategies may be based on local capability and determined in collaboration with the blood banking service.
   b) A hemorrhage risk assessment should be used to determine which patients are at-risk for bleeding; risk assessment should be an ongoing process throughout labor and birth.

c) Pre-transfusion testing will be done according to the risk for bleeding and may include 1) clot sent to blood bank to hold in case testing is needed, 2) Type and Screen (T&S), or 3) Type and Crossmatch.

d) CMQCC table of admission risk factors:

Table 1: Pregnancy/Admission Risk Factors

Low (Clot only)	Medium (Type and Screen)	High (Type and Crossmatch)
No previous uterine incision	Prior cesarean birth (s) or uterine surgery	Placenta previa, low lying placenta
Singleton pregnancy	Multiple gestation	Suspected placenta accreta, percreta, increta
≤ 4 previous vaginal births	> 4 previous vaginal births	Hematocrit <30 AND other risk factors
No known bleeding disorder	Chorioamnionitis	Platelets < 100,000
No history of postpartum hemorrhage	History of postpartum hemorrhage	Active bleeding (greater than show) on admit
	Large uterine fibroids	Known coagulopathy

C. A minimum of two units of Red Blood Cells must be available on site for patients who have risk factors for hemorrhage as determined by the facility's risk assessment tool.
   a) A T&S is all that is needed if electronic crossmatching is available, the antibody screen is negative, and the facility has a well-stocked blood bank on site.
   b) Two (2) units of PRBCs should be crossmatched and placed on hold if electronic crossmatching is not available, if the antibody screen is positive, or if there is not a well-stocked blood bank on site.

D. The treating practitioner will obtain Informed Consent for blood administration prior to ordering blood components.
   a) Informed consent may be waived in emergent life-threatening situations where the patient is unable to provide consent; the reason for not obtaining consent must be documented in the patient's record.
   b) The patient has the right to decline blood components.

c) Informed consent or refusal must be documented in the patient's record according to facility policy.
d) Timing of consent:
   i) It is prudent to determine whether a patient will accept blood products prior to or during the admission assessment for labor.
   ii) A signed consent for transfusion should be obtained upon admission from patients at risk for hemorrhage or at the point where clinical signs indicate risk for excessive bleeding.

E. Blood loss will not be visually estimated; Quantitative Blood Loss tools will be used to determine as accurately as possible the total amount of bleeding that has occurred.
F. It is the facility's responsibility to ensure that the lab has a protocol for the emergency release of components.
G. Patients will be transfused according to assessed needs.
   a) Stage 0 Hemorrhage –Cumulative blood loss ≤ 500mL for vaginal delivery, ≤ 1000mL cumulative blood loss for C-section
      i) Active management of the third stage of labor
      ii) Ongoing quantitative evaluation of blood loss
      iii) Ongoing evaluation of vital signs.
   b) Stage 1 Hemorrhage – Cumulative blood loss > 500mL for vaginal delivery, ≤ 1000mL cumulative blood loss for C-section with continued bleeding – OR – Greater than 15% change in vital signs (VS) or HR ≥ 110, BP ≤ 85/45 and OT saturation less than 95%, - OR - increased bleeding during recovery or postpartum.
      i) Ensure 2 units of PRBCs are crossmatched for the patient
      ii) Transfuse as needed to maintain stable VS
   c) Stage 2 Hemorrhage – Continued bleeding or continued VS instability, and < 1500mL cumulative blood loss
      i) If not previously done, alert the Blood Bank:
         (1) Obtain 2 units of PRBCs and bring to the bedside, and
         (2) Prepare for the possibility of needing plasma, platelets, and cryoprecipitate for massive transfusion.
      ii) Set up a blood administration set and blood warmer for transfusion.
      iii) If available, set up rapid infusion pump with blood warming capability for transfusion
      iv) Transfuse PRBCs as needed, based on clinical signs and response to maintain stable vital signs. DO NOT wait for lab results.
         (1) Crossmatched PRBCs are safest for the patient.

(2) If crossmatched PRBCs are not available, consider emergency uncrossmatched units when the risk of not transfusing is greater than the risk of uncrossmatched cells.
(a) If the ABO/Rh type is known, uncrossmatched cells may be ABO type specific or ABO type compatible.
(b) If the ABO/Rh type is unknown, type O-negative cells should be provided.

v) If adequate blood components are not readily available to support massive transfusion, the healthcare provider may want to consider transfer to a facility with higher level of care.

d) Stage 3 Hemorrhage – Cumulative blood loss > 1500mL, > 2 units of PRBCs given, VS unstable or suspicion for Disseminated Intravascular Coagulopathy (DIC).

i) MD to initiate OB Code Red or Massive Transfusion (MT) Protocol.
(1) Use a blood warmer during MT to prevent hypothermia, which may exacerbate coagulopathy.
(2) Monitor for MT induced hypocalcemia, which may also exacerbate coagulopathy.

ii) After the first 2 units of PRBCs are given (see above), aggressively transfuse based on VS and Blood Loss using near equal amounts of PRBCs, FFP, and Platelets (e.g. 4-6 PRBCs: 4 FFP: 1 apheresis Platelets or 6 pooled whole blood derived platelet units).

iii) The normal range for Fibrinogen levels based on mg/dL is 233-496 for non-pregnant adults, 244-510 for first trimester pregnancy, 291-538 for second trimester pregnancy, and 373-619 for third trimester pregnancy.[1] Therefore, it is recommended to consider 1) giving 10 pooled units of cryoprecipitate to replace fibrinogen if levels are less than 150mg/dL, and, 2) including cryoprecipitate in the MT protocol.

H. Adjunctive (Not Primary) Treatments

Note: Refer to Medication Section of this document for additional pharmaceutical information.

a) Tranexamic Acid (TXA) may be given to support clot stability by inhibiting fibrinolysis.

i) Should be used if bleeding continues after higher dose oxytocin and Methergine® have been administered (end of CMQCC Hemorrhage Stage 1), or after additional interventions (e.g. Hemabate® or compression balloons) are being considered.

ii) When used, TXA must be given within three (3) hours of the diagnosis of postpartum hemorrhage.

iii) Dosing: TXA for IV use is available as 1 gram/10mL. Preferred method of administration is 1gram diluted in 50mL normal saline to be infused over 10 minutes. Can be given as a slow IV injection over 10 minutes but must watch for hypotension. A second 1 gram dose of TXA can be given after 30 minutes if bleeding persists.

b) Prothrombin Complex Concentrates (PCCs)
   i) Three factor (II, IX and X) and four factor (II, VII, IX and X) preparations are available
   ii) Used primarily for the reversal of vitamin-K antagonists such as warfarin
   iii) Data in the setting of PPH and DIC are limited; should only be used after multiple rounds of standard MT agents and in consultation with an expert in MT.

c) rFactor VIIa: After 8-10 units PRBCs and full coagulation factor replacement, may consider
   i) Hematology Consult to evaluate the risk/benefit of administering rFactor VIIa.[5]
   ii) Factor VIIa is one of the protein factors that cause blood to clot.[7]
   iii) It is suggested as an adjunctive medication in severe life-threatening post-partum hemorrhage, but there is little data to support the use.[7]
   iv) Factor VIIa has been known to improve hemostasis in hemorrhaging OB patients, but there is a 2-9% risk of life-threatening thrombosis.

d) Cell salvage: For facilities with cell salvage equipment and trained staff, auto-transfusion of shed blood may be an option.
   i) This may be an acceptable alternative to patients who refuse allogeneic blood transfusions.
   ii) Cost effectiveness of using cell salvage versus standard of care is inconclusive.
   iii) Effectiveness may be greater in resource limited locations or where PRBCs are scarce.

I. Post Massive Transfusion Risks that may need to be addressed.
   a) Hyperkalemia from PRBCs and citrate, the preservative used in the storage of blood components.
   b) Hypocalcemia related to binding of calcium to citrate.
   c) Worsening coagulopathy and morbidity related to the combination of acidosis, hypocalcemia, and hypothermia.
   d) Dilution-related coagulopathy and pulmonary edema related to overzealous resuscitation with crystalloid.
   e) Transfusion-associated complications such as febrile non-hemolytic (0.8 per 1000 units), acute hemolytic (0.19 per 1000 units), and transfusion-related acute lung injury (TRALI, 0.1 per 1000 units).
   f) Transfusion-associated infections are rare (less than 1/100,000-1,000,000) e.g. hepatitis, human immunodeficiency virus, West Nile virus, Chagas disease, malaria and Lyme disease).

Simulation Education

Labor and delivery units are environments where emergencies are expected. The American College of Obstetricians and Gynecologists states that establishing protocols with standardized interventions and onsite drills will improve patient care in OB emergencies. Simulation of obstetric hemorrhage improves teamwork and communication skills of staff members while assessing unit protocols and system strengths and weaknesses.

Simulation Guidelines

1. Scenario Overview - The case history can be created to fit the desired learning objective or taken from an actual patient case.
2. Learning Objectives for OB Hemorrhage
   a) Cognitive Skills (What you want participants to know)
      i) Knowledge of signs and symptoms of hemorrhage during pregnancy
      ii) Major causes of hemorrhage in pregnancy
      iii) Maternal physiology changes during hemorrhage
      iv) Protocols for hemorrhage management
   b) Technical Skills {What you want participants to be able to do)
      i) Provide adequate and continuous uterine massage
      ii) Quantify blood loss
      iii) Administer uterotonic medications in correct dose, route and time
      iv) Application of devices (tamponade devices, uterine packing) to control bleeding
      v) Obtain, verify and proceed with blood component transfusions
   c) Behavioral Skills (How you want the team to perform)
      i) Team leader announces assumption of role
      ii) Team leader assigns roles if not already assigned or key role not filled
      iii) SBAR communication
      iv) Closed loop communication
3. Debrief for OB Hemorrhage - Review the sequence of events, successes and barriers to a swift and coordinated response to OB hemorrhage. See debrief form in Appendix H. Debrief is recommended in all obstetric hemorrhages that progress to Stage 2 or greater. The debrief is to be completed as soon as possible, but no later than 24 hours after the event. Participants in the debrief are to include the primary RN, primary physician and all other participants as able.

Simulation Recommendations

- **Adopt regularly scheduled simulation drills for practicing the response to obstetric hemorrhage.** Optimal implementation would include members of all disciplines (OB physicians, nursing, anesthesia, blood bank) to improve coordination among team members. Conduct the OB hemorrhage simulation in the actual patient care setting.
- **Scheduled OB hemorrhage drills should take place on an annual basis.** Consider more frequent OB hemorrhage simulations in units with low volume deliveries and less frequent OB hemorrhage occurrences. Unscheduled drills may provide additional information about preparedness.
- **Debrief following OB hemorrhage simulations** with attention to the following questions:
  - What did we do well?
  - What can we do differently?
  - Did we have the necessary equipment and resources?
  - Goals for improvement?

Simulation Setup

Conduct the OB hemorrhage simulation in the actual patient care setting, with the option for transfer from the delivery room to the operating room. Recommended supplies include:

- Mannequin or staff member as simulated patient
- Delivery table with standard equipment
- Simulated blood on the under buttocks drape/pads - can substitute red fabric
- Hemorrhage kit or cart, with medications and tamponade balloon
- Stage of Hemorrhage treatment protocol
- IV tubing and IV fluids
- Lab tubes for blood draw
- Simulated blood products
- Scale for quantified blood loss
- Oxygen via facemask
- Foley catheter

- Serial vital signs (as scenario progresses) - laminate for team review
- Serial lab results (as scenario progresses) - laminate for team review

Simulation example

- Simulation length: 10-30 minutes depending on chosen endpoint
- Simulation location: Delivery room with option for transfer to operating room
- Simulation objective: Assess staff knowledge and treatment of OB hemorrhage , including effective communication and unit preparedness

Scenario:
Ms. A.N. is a 37yo G4 now P3013 who just delivered a 4100 g male infant. She had poorly controlled gestational diabetes and polyhydramnios.
Her vital signs prior to delivery are:

- BP 128/72;
- P 102;
- R 20; and
- T 98.7F

The placenta delivers and there is a large amount of vaginal bleeding. She is alert, but begins to "feel funny"
Additional information:

- Weight 225 pounds
- Prior vaginal delivery x 2
- Past medical history - gestational diabetes Past surgical history – none
- Current medications: Glyburide 5mg daily No known medication allergies
- Labs: Admission Hb/Hct 11.7/33.1 Platelets 180k
- Blood type B+ Type and screen is done

Participants:

- Primary obstetrician
- Delivery room nurse
- Support nurse
- Anesthesia provider
- Concerned family member

- Additional physician
- Runner for blood bank
- Simulation recorder

Objectives: Participants go through the following steps:

1. Patient has received Pitocin prior to delivery of placenta
2. RN and MD have a cumulative assessment of quantitative blood loss
3. Call for additional help
4. Call for hemorrhage cart
5. Start second IV line
6. Begin use of uterotonic medications, then devices
7. Monitor vital signs
8. Provide supplemental oxygen
9. Empty bladder
10. Obtain baseline labs:
    - CBC;
    - PT;
    - PTT;
    - Fibrinogen; and
    - T&C
11. Keep patient and family informed

Simulation end options:

- Bleeding responds in delivery room with use of medications
- Bleeding responds in OR following D&C for retained products or identification of laceration
- Bleeding responds in OR following placement of tamponade balloon
- Bleeding responds in OR following laparotomy with placement of compression sutures or hysterectomy
- Patient develops DIC

Debrief: A sample form is included in Appendix H.[26]

- What did we do well?
- What can we do differently?
- Did we have the necessary equipment and resources?
- Goals for improvement?

References:

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10) Indiana Code 34-18-12-9 (Emergency Treatment) https://codes.findlaw.com/in/title-34-civil-law-and-procedure/in-code-sect-34-18-12-9.html
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[26] https://www.in.gov/laboroflove/files/Hemorrhage%20Debrief%20Form.pdf

13) Nursing for Women's Health (NWH), *Developing Protocols for Obstetric Emergencies*, Volume 18, Issue 5

14) *Society of OBGYN Newsletter Sim Corner January 2018*

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Section II: Recognition and Prevention

The risk of obstetric hemorrhage is present in every pregnancy. Early recognition of abnormal blood loss is critical for prompt intervention and prevention of progression to severe hemorrhage. Early intervention requires assessment of risk factors leading to heightened surveillance, recognition of clinical symptoms and signs of hypovolemia, and the use of early warning systems for maternal patients. Further, the use of a standardized approach to determine cumulative, quantified blood loss and the use of a protocol for the active management of the third stage of labor are recommended preventive measures to decrease maternal hemorrhage.[27]

Assessment of Hemorrhage Risk[28]:

Obstetric hemorrhage risk assessment, awareness of the clinical signs of hypovolemia and the use of an early warning system improve the response to hemorrhage. Early identification of risk factors for postpartum hemorrhage allows for advanced planning and increased surveillance following birth that may prevent adverse outcomes. Pregnancy, labor and delivery and the postpartum period require ongoing assessment of hemorrhage risks. RISK ASSESSMENT SHOULD BE PERFORMED AT MULTIPLE TIMES THROUGHOUT PATIENT CARE, ESPECIALLY AS A PATIENT'S STATUS CHANGES.

- Antepartum: Assess hemorrhage risks at initial prenatal visit and as the pregnancy progresses to establish care plan and arrange for antenatal consultations.
- Intrapartum: Complete hemorrhage risk upon admission and initiate care plan. Review and update hemorrhage risk:
    - Every 12 hours antepartum through labor
    - Upon patient handoff
    - Prior to delivery (approximately 8-10 cm dilation)
- Postpartum:
    - Assess patient 2-4 hours post-delivery as per Quantitative Blood Loss protocol.

[27] Patient Safety Bundle: Obstetric Hemorrhage, Council on Patient Safety in Women's Health Care https://safehealthcareforeverywoman.org/patient-safety-bundles/obstetric-hemorrhage/

[28] Adapted from CMQCC Improving Health Care Response to Obstetric Hemorrhage, Version 2.0 March 24, 2015

- Consider 24-hour QBL for patients meeting postpartum hemorrhage blood loss criteria, patients requiring uterotonics in addition to oxytocin and patients with high risk hemorrhage scores.
- Continue patient hemorrhage assessments every 12 hours through discharge
- Counsel patients on normal versus abnormal postpartum bleeding upon discharge

Obstetric Hemorrhage Risk Factors[29]

Various lists of OB hemorrhage risk factors exist. Risk factor assessment may be completed in paper form or within the electronic health record. Risk factors to be assessed should include the following:

- Antepartum Risk Factors:
  - Suspected previa/accreta/increta/percreta;
  - History of postpartum hemorrhage;
  - Clinically significant bleeding disorder; or
  - Other significant medical/surgical risk (including patients who decline transfusion or have positive antibody screen);

  Intervention:
  - Antenatal consultations – anesthesia, hematology, maternal fetal medicine
  - Plan for transfer to appropriate level of care for delivery.

- Intrapartum Risk Factors:

Low (Clot Only)	Medium (Type and Screen)	High (Type and Crossmatch)
No previous uterine incision	Prior cesarean birth(s) or uterine surgery	Placenta previa, low lying placenta
Singleton pregnancy	Multiple gestation	Suspected placenta accreta, percreta, increta
≤ 4 previous vaginal births	> 4 previous vaginal births	Hematocrit < 30 AND other risk factors
No known bleeding disorder	Chorioamnionitis	Platelets <100,000

[29] Adapted from CMQCC Improving Health Care Response to Obstetric Hemorrhage, Version 2.0 March 24, 2015

Low (Clot Only)	Medium (Type and Screen)	High (Type and Crossmatch)
No history of postpartum hemorrhage	History of previous postpartum hemorrhage	Active bleeding (greater than show) on admit
	Large uterine fibroids	Known coagulopathy

Additional risk factors that may develop in labor include:

- Prolonged second stage (as defined by your facility)
- Prolonged oxytocin use (as defined by your facility)
- Active bleeding
- Chorioamnionitis
- Magnesium Sulfate treatment.

- Postpartum Risk Factors
  - Vacuum or forceps delivery;
  - Cesarean delivery, especially urgent or emergent;
  - Retained placenta; or
  - History of postpartum hemorrhage.

  Intervention:

  - Quantified blood loss
  - Use of alert and action triggers
  - Early warning system for maternal patients

Early Recognition of Obstetric Hemorrhage and Rapid Response Using Triggers

Early recognition is critical for prompt intervention and prevention of progression to severe hemorrhage. Changes in vital signs can be subtle in the initial stages of obstetric hemorrhage based on a patient's ability to compensate for blood loss. A pregnant patient may compensate for as much as 20- 25% blood loss, approximately 1000 mL - 1500 mL, before prominent clinical signs of hypovolemia are present. The use of the following alert and action triggers has the potential to limit overall blood loss and prevent hemorrhage complications.

Trigger: Definition of Significant Blood Loss

The American College of Obstetricians and Gynecologists defines ***postpartum hemorrhage*** *as cumulative blood loss of greater than or equal to 1000 mL OR blood loss accompanied by signs/symptoms of hypovolemia within 24 hours following the birth process (includes intrapartum loss) regardless of route of delivery.*

Trigger: Clinical Signs of Hypovolemia

Typical signs of blood loss or hypovolemia include elevated heart rate and respiratory rate, decrease in urine output, dizziness, altered level of consciousness and pallor. The following table correlates clinical signs of hypovolemia with the amount of blood loss. Note that many clinical signs do not occur until the blood loss reaches high volumes.

Amount of Blood Loss	Clinical Signs
1000 mL	Slight change in blood pressure, heart rate normal, palpitations, respiratory rate normal, dizziness, normal urine output
1500 mL	Narrowed pulse pressure, heart rate over 100, respiratory rate 20-30, diaphoretic, weak, urine output 20-30 mL per hour
2000 mL	Hypotension, narrowed pulse pressure, heart rate over 120, respiratory rate 30-40, pale, extremities cool, restlessness, urine output 5-15 mL per hour
2500 mL	Profound hypotension, heart rate over 140, respiratory rate over 40, slight urine output or anuria

Early Warning System for Maternal Patients

Timeliness in recognition of postpartum hemorrhage, determining the cause, and initiating treatment is critical, as nearly 90% of deaths from postpartum hemorrhage occur within four hours of giving birth. Early warning systems for maternal patients are scoring systems which help identify changes in the status of a patient to facilitate early intervention. In addition to identifying patients at risk, the use of an early warning system for maternal patients improves the reliability of taking and recording a full set of vital signs, as respiratory rate is often not measured. Respiratory rate is one of the most sensitive parameters for identifying patients at risk of deterioration.

The Maternal Early Warning Criteria	
Measure	Value
Systolic Blood Pressure (mm Hg)	<90 or >160
Diastolic Blood Pressure (mm Hg)	>100
Heart rate {beats per minute)	<50 or >120
Respiratory rate (breaths per min)	<10 or >30
Oxygen saturation on room air, at sea level %	<95
Oliguria, mL/hour for 2 hours	<35
Maternal agitation, confusion, or unresponsiveness	
Woman with preeclampsia reporting a non-remitting headache or shortness of breath	

It is important to verify isolated abnormal measurements, particularly for blood pressure, heart rate, respiratory rate and oxygen saturation.

Urgent bedside evaluation is usually indicated if any of these values persist for more than one measurement, are present in combination with additional abnormal parameters, or recur more than once.

Indiana birthing facilities will have a plan for:

- Appropriate personnel to notify in response to patient deterioration;

- How to notify appropriate personnel; and
- When and how to activate the clinical chain of command in order to ensure an appropriate response.

While awaiting the arrival of the evaluating clinician, the bedside nurse should follow basic resuscitation principles:

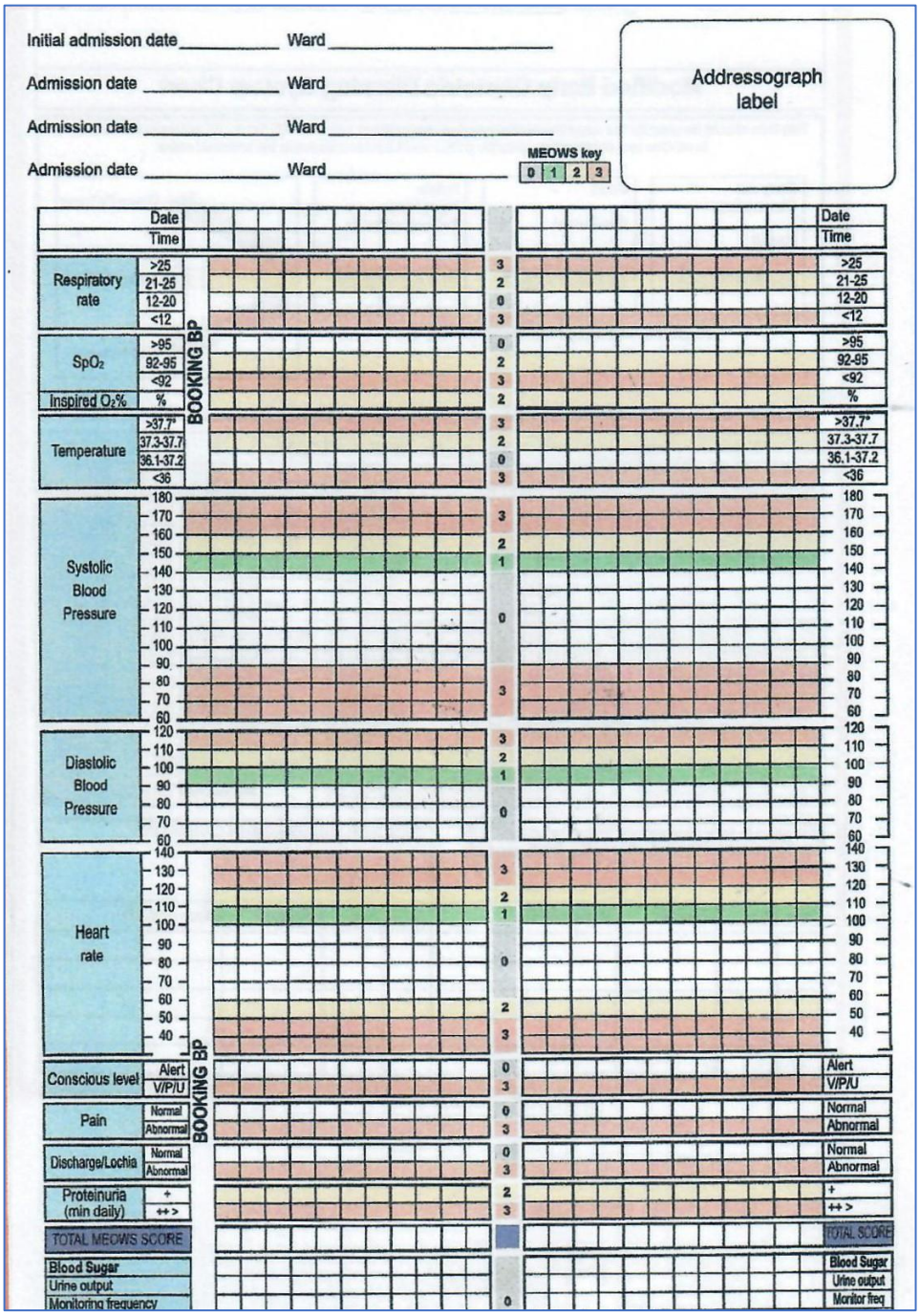
- Achieve free-flowing appropriate venous access
- Increase frequency of vital signs
- If woman still pregnant - left uterine displacement
- Supplemental oxygen therapy

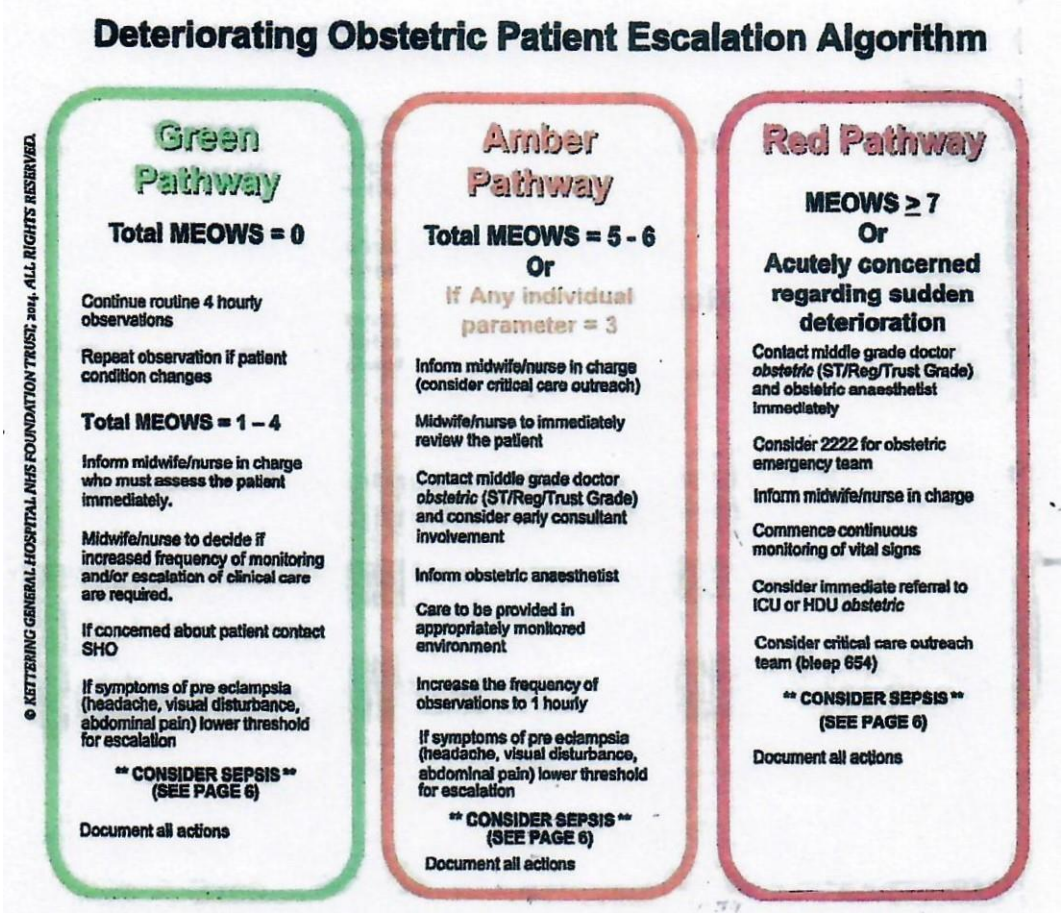
Appropriate standing orders may be needed to allow the bedside nurse to administer these resuscitative measures.

Several early warning systems for maternal patients exist. Tracking of maternal vital signs may be completed in chart form or incorporated into an electronic health record (EHR) system. Examples of a paper form and an EHR form follow. An additional example is included in Appendix I.[30]

[30] https://www.in.gov/laboroflove/files/Early%20Warning%20System%20Chart%20Sample.pdf

Modified Early Obstetric Warning System (MEOWS)




Deteriorating Obstetric Patient Escalation Algorithm
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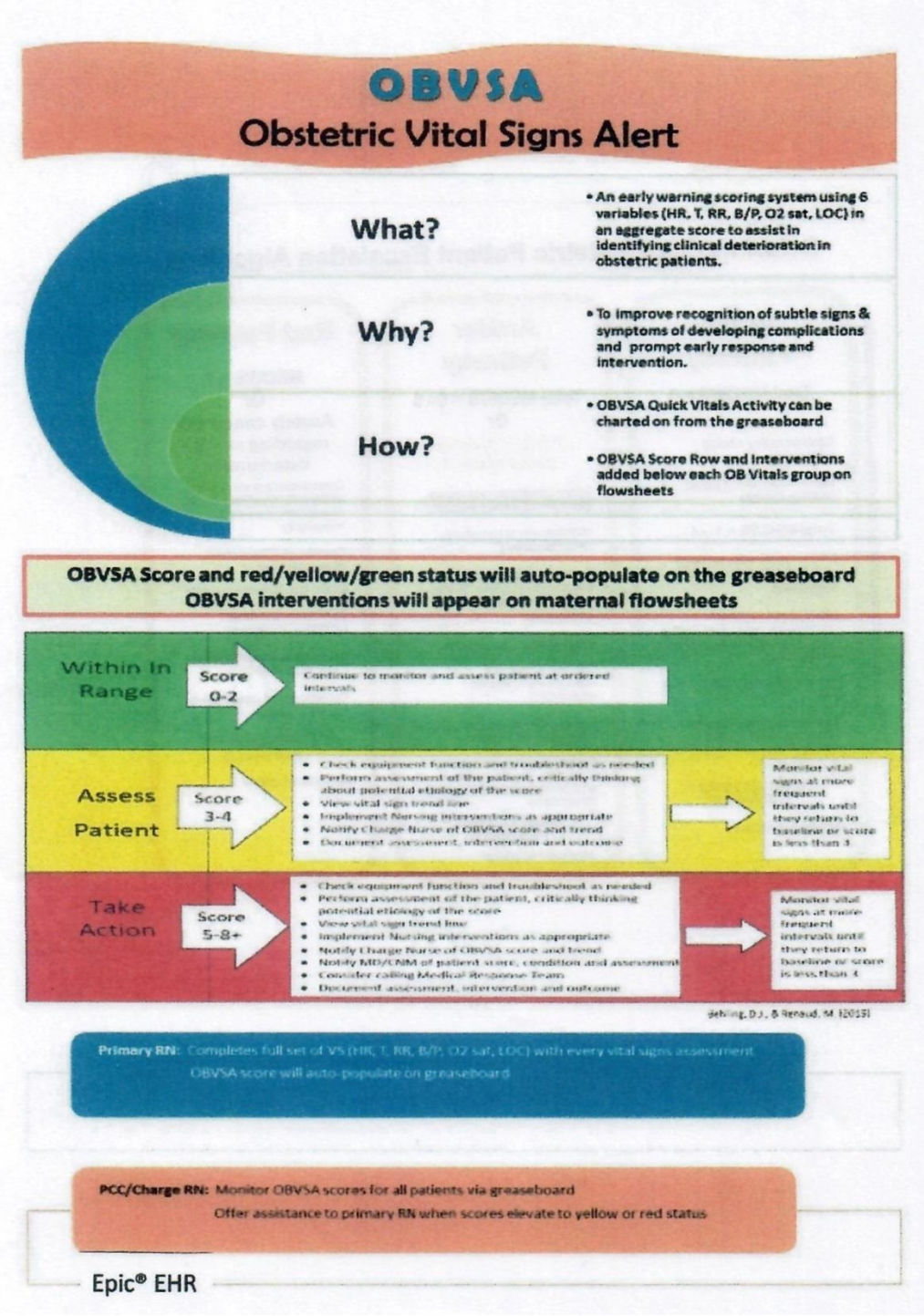
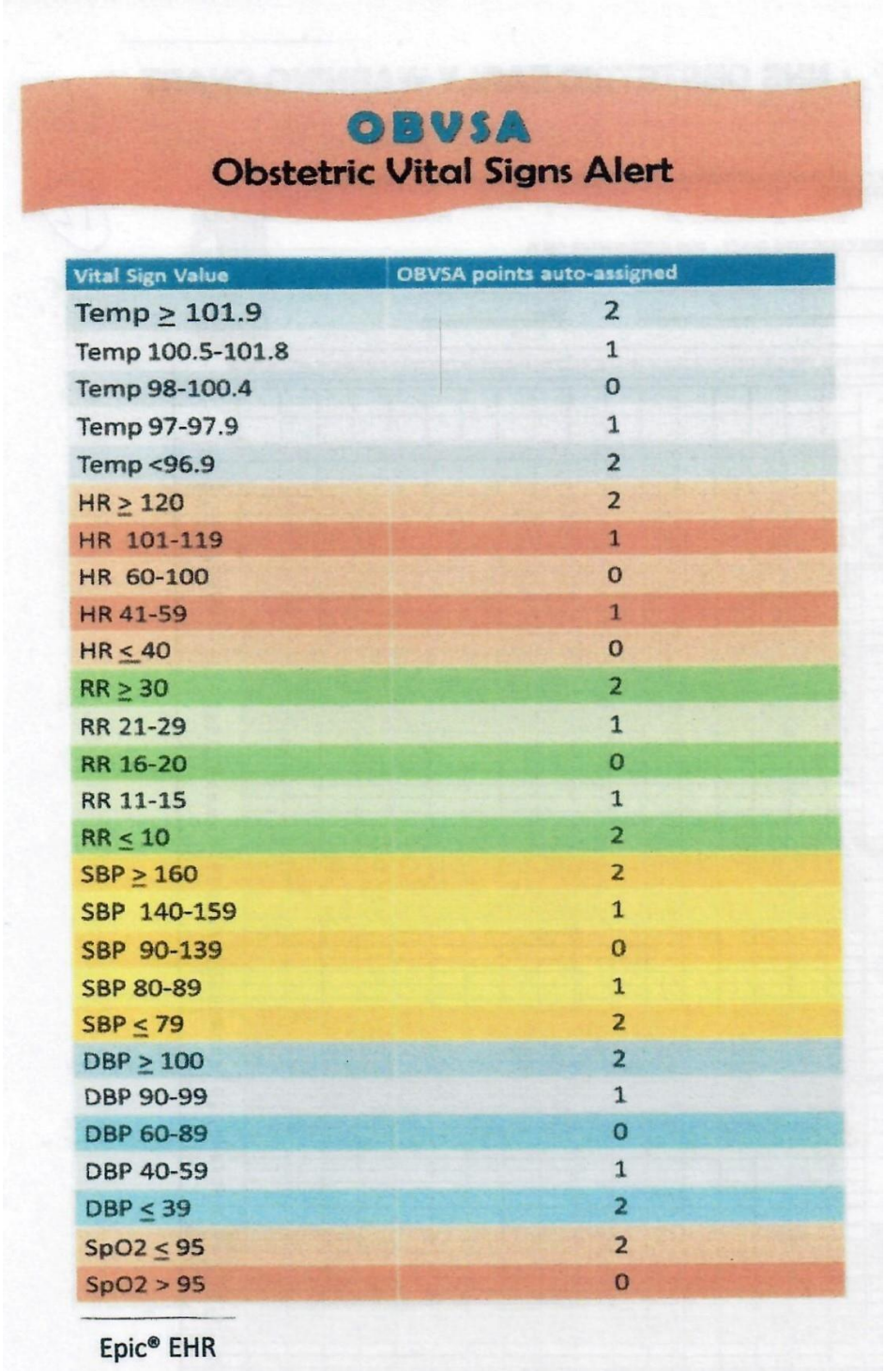
Green Pathway
Total MEOWS = 0
Continue routine 4 hourly observations
Repeat observation if patient condition changes
Total MEOWS = 1 – 4
Inform midwife/nurse in charge who must assess the patient immediately.
Midwife/nurse to decide if increased frequency of monitoring and/or escalation of clinical care are required.
If concerned about patient contact SHO
If symptoms of pre eclampsia (headache, visual disturbance, abdominal pain) lower threshold for escalation
** CONSIDER SEPSIS ** (SEE PAGE 6)
Document all actions
Amber Pathway
Total MEOWS = 5 - 6
Or
If Any individual parameter = 3
Inform midwife/nurse in charge (consider critical care outreach)
Midwife/nurse to immediately review the patient
Contact middle grade doctor obstetric (ST/Reg/Trust Grade) and consider early consultant involvement
Inform obstetric anaesthetist
Care to be provided in appropriately monitored environment
Increase the frequency of observations to 1 hourly
If symptoms of pre eclampsia (headache, visual disturbance, abdominal pain) lower threshold for escalation
** CONSIDER SEPSIS ** (SEE PAGE 6)
Document all actions
Red Pathway
MEOWS ≥ 7
Or
Acutely concerned regarding sudden deterioration
Contact middle grade doctor obstetric (ST/Reg/Trust Grade) and obstetric anaesthetist immediately
Consider 2222 for obstetric emergency team
Inform midwife/nurse in charge
Commence continuous monitoring of vital signs
Consider immediate referral to ICU or HDU obstetric
Consider critical care outreach team (bleep 654)
** CONSIDER SEPSIS ** (SEE PAGE 6)
Document all actions


OBVSA
Obstetric Vital Signs Alert
What?
• An early warning scoring system using 6 variables (HR, T, RR, B/P, O2 sat, LOC) in an aggregate score to assist in identifying clinical deterioration in obstetric patients.
Why?
• To improve recognition of subtle signs & symptoms of developing complications and prompt early response and intervention.
How?
• OBVSA Quick Vitals Activity can be charted on from the greaseboard
• OBVSA Score Row and Interventions added below each OB Vitals group on flowsheets
OBVSA Score and red/yellow/green status will auto-populate on the greaseboard
OBVSA interventions will appear on maternal flowsheets
Within In Range
Score 0-2
Assess Patient
Score 3-4
Take Action
Score 5-8+
Primary RN: Completes full set of VS (HR, T, RR, B/P, O2 sat, LOC) with every vital signs assessment
OBVSA score will auto-populate on greaseboard
PCC/Charge RN: Monitor OBVSA scores for all patients via greaseboard
Offer assistance to primary RN when scores elevate to yellow or red status
Epic® EHR



OBVSA
Obstetric Vital Signs Alert

Vital Sign Value	OBVSA points auto-assigned
Temp ≥ 101.9	2
Temp 100.5-101.8	1
Temp 98-100.4	0
Temp 97-97.9	1
Temp <96.9	2
HR ≥ 120	2
HR 101-119	1
HR 60-100	0
HR 41-59	1
HR ≤ 40	0
RR ≥ 30	2
RR 21-29	1
RR 16-20	0
RR 11-15	1
RR ≤ 10	2
SBP ≥ 160	2
SBP 140-159	1
SBP 90-139	0
SBP 80-89	1
SBP ≤ 79	2
DBP ≥ 100	2
DBP 90-99	1
DBP 60-89	0
DBP 40-59	1
DBP ≤ 39	2
SpO2 ≤ 95	2
SpO2 > 95	0

Epic® EHR

Planning for Those Women (Jehovah's Witnesses and Others) Who May Decline Blood and Blood Products

It is important to assess a woman's stance toward blood products well in advance of labor or planned surgery. Be mindful of the approach and treatment of women who decline blood and blood products. Some women welcome the opportunity to discuss privately, while other women may view a private discussion as not respectful of previously stated desires. Validate the refusal of blood products by asking, "I want to confirm that you do not want to receive blood products."

In the event the Jehovah's Witness patient does not speak English, an independent interpreter must be provided to the patient when the "consent for blood product administration" discussion occurs. It is not permissible to allow a family member, friend, or church member to interpret for the patient.

Not all blood products are out of consideration. There is a wide range of acceptable blood interventions within the Jehovah's Witness community and among others who may decline blood and blood products. The following link may help facilitate the discussion of blood products with patients who are Jehovah's Witnesses: https://www.jw.org/en/medical-library/strategies-downloads/ob-gyn-hemorrhage-anemia/

Prenatal optimization of hemoglobin and developing a detailed management plan for delivery are critical steps for women who may decline transfusion of some or all blood products. The goals of these discussions are the following:

- To find common ground between the patient and the provider to manage the birth as safely as possible
- To facilitate transfer of care, if requested by patient or provider, to a program amenable with the delivery plan
- To develop a well thought out delivery plan to minimize blood loss and to employ non-transfusion options for the patient

General Principles of Bloodless Medicine Management

- Employ a multidisciplinary treatment approach to blood conservation
- Formulate a plan of care for avoiding/controlling blood loss
- Consult promptly with senior specialist experienced in blood conservation
- Promptly investigate and treat anemia
- Use decisive intervention, including surgery
- Be prepared to modify routine practice when appropriate
- Restrict blood drawing for laboratory tests
- Decrease or avoid the use of anticoagulants and antiplatelet agents
- Stimulate erythropoiesis
- Transfer a stabilized patient, if necessary, to a major center before the patient's condition deteriorates

Specific Checklist for Management of Pregnant Women Who Decline Transfusions

- Prenatal Care:
  - Comprehensive discussion with a checklist specifying acceptable interventions
  - Aggressively prevent anemia (goal: HCT 36-40%)
    - Iron-PO or IV (iron sucrose or ferric carboxymaltose) with Folate and B12 as needed
    - Rh-Erythropoeitin 600 u/kg SQ 1-3x per weekly as needed (most preparations have 2.5 mL of albumin so may be refused by some Jehovah's Witnesses but others do accept)
    - Line-up Consultants (consider MFM, Hematology, Anesthesiology)
- Labor and Delivery:
  - Anesthesia consultation early
  - Reassessment of hemorrhage risk and discussion of options (e.g. surgery, interventional radiology)

- Review specific techniques (e.g. options checklist and fibrin/thrombin glues)
- Review references
- Be decisive -Have a plan

- Postpartum
  - Maintain volume with crystalloids and bloodsubstitutes
  - Aggressively treat anemia:
    - Iron- IV (iron sucrose or ferric carboxymaltose)
    - Rh-Erythropoeitin 600 u/kg SQ weekly (3x week)

SAMPLE: BLOOD PRODUCT AND TECHNIQUE INFORMED CONSENT/DECLINE CHECKLIST

My signature below indicates that I request no blood derivatives other than the ones that I have designated in this consent be administered to me during this delivering hospitalization. My attending physician, _____ has reviewed and fully explained to me, the risks and benefits of the following blood products and methods for alternative non-blood medical management and blood conservation available to me. My attending physician has also fully explained to me the potential risks associated by not authorizing blood and/or non-blood management during this delivering hospitalization.

	Accept	Do Not Accept
Components of Human Blood		
Red Blood Cells		
Fresh Frozen Plasma		
Platelets		
Cryoprecipitate		
Albumin		
Plasma Protein Fraction		
Intravenous Fluids Which Are Not Components of Human Blood		
Hetastarch		
Balanced Salt Solutions		
Medications Which Contain A Fraction of Human Blood		
Rhogam		
Erythropoeitin		
Human Immunoglobulin		
Techniques For Blood Conservation/Processing		
Hemodilution		
Cell Saver		
Autologous Banked Blood		
Cardiopulmonary Bypass		
Chest Drainage Autotransfusion		
Plasmapheresis		
Hemodialysis		
Other:		

Circle which one applies:

I do (do not) have a durable power of attorney.

I accept (do not accept) this consent as an Appendix to my durable power of attorney.

I fully understand the options available to me and hereby release the delivering facility, its personnel, the attending physician and any other person participating in my care from any responsibility whatsoever for unfavorable reactions or any untoward results due to my decision not to permit the use of blood or its derivatives. The possible risks and consequences of such refusal on my part have been fully explained to me by my attending physician. I fully understand such risks and consequences may occur as a result of my decision.

Date:_____ Time:_____

Signature: _____
(patient/parent/guardian/conservator)

Relationship: _____

Witness: _____

Morbidly Adherent Placenta (Placenta Accreta ,Increta, Percreta): Risks, Diagnosis, Counseling and Preparation for Delivery

The rising incidence of morbidly adherent placenta (MAP) is due to the increasing numbers of primary and repeat cesarean births. The risk of MAP is highest in patients with both prior cesarean birth and placenta previa.

Providers caring for patients with prenatally suspected MAP should counsel patients extensively about potential risks and complications well in advance of their estimated due date. Patients with MAP are at increased risk for hemorrhage, blood transfusion, hysterectomy, bladder/ureteral damage, infection, need for intubation, prolonged delivering hospitalization, ICU admission, need for reoperation, thromboembolic events and death.

In patients with strong suspicion for MAP, it is highly advised to perform the delivery before labor begins or hemorrhaging occurs. Advanced planning with anesthesia, blood bank, nursing (OB and OR) and a surgeon with advanced skills (e.g. gynecologic oncologist) is an essential first step. Referral to an appropriate facility is required when a provider lacks appropriate support services or surgical experience with managing MAP.

At the time of cesarean, the hysterotomy should be made away from the location of the placenta. A pre-delivery discussion with the patient should involve the relative likelihood for hysterectomy and subsequent infertility. The results of conservative surgery have been recently reviewed with many complications noted (e.g. infection, delayed hemorrhage, re-operation requiring hysterectomy, disseminated intravascular coagulation), and should only be considered in the most select situations.

Recommendations:

- Screen:
    - Screen all women with prior cesarean birth for placenta previa with ultrasound
    - Screen all women with placenta previa for MAP first with ultrasound, then with MRI if ultrasound results are suspicious or inconclusive

- Counsel:

  - Counsel all patients with MAP about delivery risks and complications and future infertility if hysterectomy is performed
- Prepare
  - Prepare a multi-disciplinary approach for delivery, including a plan for emergent surgery prior to scheduled delivery.
  - Plan for delivery of patients with MAP between 34 0/7 - 35 6/7 weeks gestation before labor and after antenatal corticosteroids for fetal benefit.
  - Perform the delivery/surgery in the main OR with a surgical scrub team.
  - Actively involve surgeon with advanced skills for controlling heavy pelvic bleeding and repairing bladder or ureteral injury.
  - Strongly consider hysterectomy (without removal of placenta) if no further children are desired.
  - Notify blood bank for potential of massive hemorrhage and ensure immediate availability of 4-6 units of PRBCs, FFP and platelets and cryoprecipitate.

Inherited coagulation disorders in pregnancy

Inherited coagulation disorders place women at risk for obstetric hemorrhage. It is crucial to identify women with inherited coagulation disorders early in pregnancy to plan for a safe birth. Maternal fetal medicine, hematology and anesthesia consultation should be obtained in advance to coordinate antepartum, intrapartum and postpartum care for women with inherited coagulation disorders.

The most commonly identified coagulation disorders are von Willebrands Disease (Factor VIII platelet adhesion and coagulant deficiency), Hemophilia A (Factor VIII coagulant deficiency), Hemophilia B (Factor IX deficiency) and Hemophilia C (Factor XI deficiency). Less common disorders are Factor XIII deficiency, congenital fibrinogen deficiency and dysfibrinogenemia.

von Willebrand Disease

von Willebrands Disease is the most common of the inherited bleeding disorders. vWD is a disorder of impaired synthesis or function of von Willebrand Factor (vWF). vWF plays an important role in primary hemostasis by binding to both platelets and endothelial components, forming an adhesive bridge between platelets and vascular subendothelial

structures, and between adjacent platelets at sites of endothelial injury. vWF also contributes to fibrin clot formation by acting as a carrier protein for Factor VIII, which has a greatly shortened half-life unless it is bound to vWF.

Consultation early in the pregnancy with a hematologist with expertise in the management of vWD is recommended. Levels of vWF rise in normal individuals and in most patients with vWD during the second and third trimester of pregnancy to two to three times baseline. Consequently, many patients with vWD reach normal levels of both vWF and Factor VIII at term. However, the qualitative abnormalities in patients with Type 2 vWD will persist, and thrombocytopenia in Type 2B vWD may worsen. For delivery, the patient should be delivering in a center where vWF and Factor VIII levels can be monitored. Although antepartum treatment is not needed in the majority of women with vWD, many require treatment during delivery and during the 1 to 3 weeks postpartum. Knowledge of the woman's type of vWD, activity of Factor VIII and vWF, current and prior responses to DDAVP, and past bleeding episodes is useful for guiding peripartum therapy.

Hemophilia

Hemophilia is an inherited bleeding disorder caused by deficiency of coagulation Factor VIII (hemophilia A), Factor IX (hemophilia B), or Factor XI (hemophilia C). Inheritance is X-linked recessive; hence males are affected while females are carriers and rarely display a mild phenotype. Female carriers have variable levels of coagulation factors. Those with a factor activity level near or above 50 percent of normal are not expected to have a clinical bleeding disorder. Other female carriers may have factor activity levels less than 50 percent of normal, and have a greater risk of bleeding. The diagnostic evaluation in cases of suspected hemophilia typically begins with a thorough review of the patient's personal bleeding history and family history. Suspected female carriers should have genetic testing considered as first-line evaluation, with subsequent measurement of factor levels in identified carriers. Awareness of factor levels will allow for the appropriate risk assessment and management of potential obstetric hemorrhage. Individuals with low factor activity level may be at risk for increased bleeding during labor, delivery and postpartum. In hemophilia A, the mother's factor VIII level generally decreases after delivery, and therefore the risk of postpartum bleeding is more of a concern for a carrier with a low baseline Factor VIII level. Plans should be made to

manage the pregnancy and delivery in a setting in which there is access to diagnostic testing (e.g., factor activity levels), replacement factor, and expertise in hemophilia management.

Recommendations

1. Review family, surgical and pregnancy history for possible clinical symptoms of excessive bleeding following surgery (including dental procedures), noticeable easy bruising, joint hemorrhage or menorrhagia (heavy periods).
2. Request the following laboratory screening tests for patients with suspected disorders:

- von Willebrand Disease: Ristocetin co-factor activity and von Willebrand antigen {Vlll:Ag) activity
- Hemophilia A: Factor VIII activity (Factor Vlll: C assay)
- Hemophilia B: Factor IX activity (if Factor Vlll:C is normal)
- Hemophilia C: Factor XI activity
- Other tests performed for patients with bleeding problems: complete blood count (especially platelet counts), aPTT (activated partial thromboplastin time), prothrombin time, thrombin time and fibrinogen level. Note that patients with von Willebrand disease typically display normal prothrombin time and variable prolongation of aPTT.

3. Affected patients or carriers, or patients with suspected history should consult with a hematologist who has specific interest and knowledge of coagulation disorders. Obtain perinatal consultation for planning and coordination of antepartum and intrapartum management.
4. Refer patients for genetic counseling regarding possible testing and evaluation of the fetus and newborn.
5. Develop intrapartum and postpartum management plans well in advance of the anticipated date of birth so specific medications and blood components are available at the time of delivery and given in consultation with a hematologist.

- von Willebrand disorder: Mild forms can be treated with desmopressin acetate (DDAVP) but more severe forms require vWF and Factor VIII replacement. DDAVP challenge testing can identify whether patients will respond to this medication.

- Hemophilia A/B: Concentrates of clotting Factor VIII (for hemophilia A) or clotting Factor IX (for hemophilia B) are slowly dripped in or injected into a vein. Consider DDAVP adjunctive therapy.
- Hemophilia C: FFP is the first product used to treat patients with hemophilia C. The main advantage of FFP is its availability. Disadvantages of its use include the large volumes required, the potential for transmission of infective agents and the possibility of allergic reactions.

6. Factor XI activity: Factor XI concentrates provide the best source for Factor XI replacement

Measurement of Cumulative Blood Loss

Quantification of Blood Loss (QBL) is the method of determining and evaluating blood loss by utilizing formal methods such as calibrated drapes, graduated containers/canisters, and weighing items that are blood-soaked.

Inaccuracy of Visual Estimation

Accurate measurement of blood loss is essential for 1) recognizing potentially life-threatening hemorrhage and 2) managing blood product replacement. Visual estimation has consistently been shown to significantly underestimate large volume blood loss by 35%-50% when compared to direct measurement. Visual estimation of blood loss may also be complicated by the presence of a large volume of amniotic fluid, stool or sponges.

Challenges to QBL

Challenges in implementing routine QBL may include clinicians' concerns for the workflow changes involved in routine QBL and desire to reserve QBL for the severe hemorrhage. Clinicians may also be concerned that QBL will not provide an exact quantification, especially in cases where there is an excess of amniotic fluid or irrigation fluids.

Rationale for QBL

Delay in recognition of excess blood losses is a common finding in cases of maternal morbidity and mortality from hemorrhage. Waiting to quantify blood loss only after excessive loss is

recognized does not address this problem. Standardization of all procedures is an important aspect of improving safety and quality. If QBL is used only for severe cases, staff may be unfamiliar with the procedures and less likely to obtain valid data. QBL provides early recognition where otherwise an opportunity to intervene is missed. With practice and routine adoption, quantification of blood loss generally requires only minutes to perform in the majority of births. Standardization of the processes involved and building the experience of team members through QBL in all cases develops the skills needed to quantify blood loss in an actual hemorrhage situation. The purpose of quantification of blood loss is not to obtain an "exact" number as there will always be a degree of imprecision of this measurement. Instead, the goal is to improve evaluation of blood loss compared to estimation techniques, which are known to be inaccurate. QBL is meant to promote early recognition of large volume blood loss and is just one component of an overall strategy to facilitate effective recognition and response to hemorrhage.

Methods to determine Quantified Blood Loss

Measurement of blood loss by weight is the most accurate and practical method for determining the volume of blood not captured in graduated containers. This can be accomplished by subtracting the dry weight of absorbing materials (pads, sponges, etc.) from the weight of blood-containing materials and using the conversion 1 gm weight = 1 mL to quantify the blood volume contained in the materials. QBL is determined from volume in drape/canister plus the calculated weight of blood-soaked items.

- For Vaginal Birth:
    - Use under-buttocks drapes, preferably with graduated markers, to collect blood with vaginal birth.
    - Immediately after the birth of the baby, stop to assess the amount of fluid in the under-buttocks calibrated drape. This value becomes the 'baseline' and all subsequent fluid represents blood loss.
    - At the completion of the delivery/recovery period, weigh all blood clots and blood-soaked materials and add the volume of blood collected in the pouch of the under-buttocks drape to determine cumulative blood loss.
- For Cesarean Birth:

- After birth of the baby, suction all amniotic fluid and stop to assess the amount of collected fluid before delivery of the placenta. This value is the "baseline." All subsequent fluid represents blood loss (except use of measured irrigation fluid volume).
- In addition to counting lap sponges, the circulating nurse should assess volume of blood loss by weighing all blood clots and blood-soaked items.
- At the completion of the delivery/recovery period, weigh all blood clots and blood-soaked materials and add the volume of blood collected in the graduated container/canisters to determine cumulative blood loss.

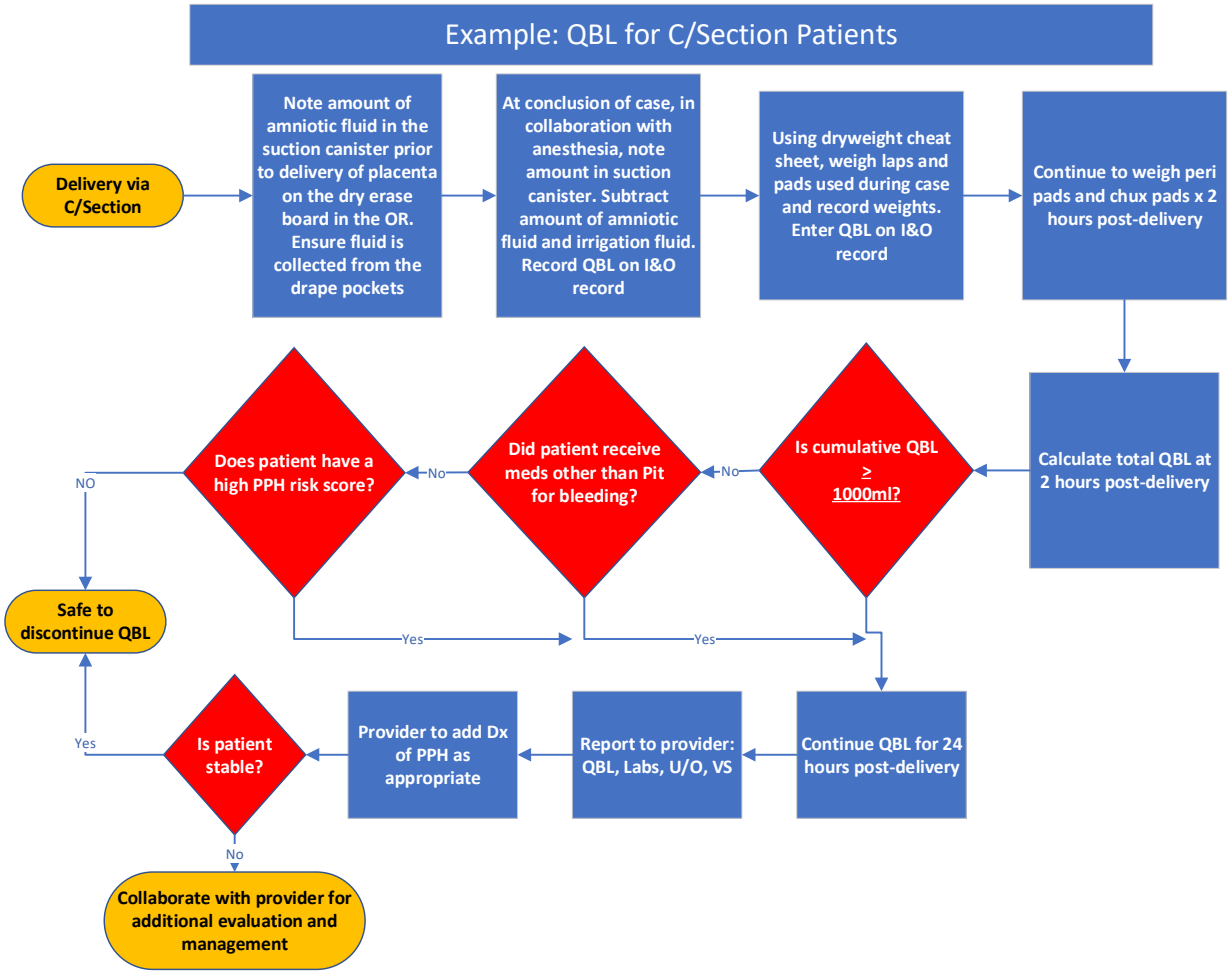
NOTE: Average amniotic fluid volumes have been described across gestational ages from 8-43 weeks and can be approximated using a published nomogram when necessary. For birth without prior rupture of membranes, the following volumes can be used to estimate the contribution of amniotic fluid at term: Brace, et al. found normal fluid volume 700 mL; oligohydramnios 300 mL; polyhydramnios 1400 mL.

Recommendations for Implementing QBL

1) All facilities should provide chart tools (calculation sheets) and regularly scheduled standardized training in formal quantitative measurement of blood loss, which is critical for early recognition and response to maternal hemorrhage.
2) Quantitative measurement of blood loss should be a collaborative effort that includes key personnel such as: nurses, anesthesia, obstetric providers and rapid response teams.
3) All facilities should establish a standardized process for calculating and documenting QBL. Tips for documentation of QBL include:
   a) Document QBL at birth, then ongoing QBL until the patient is stable (approximately ***2 to 4 hours*** following delivery
   b) Maintain real-time, vigilant surveillance of blood loss
   c) QBL is entered at each peripad or chux change but items may be grouped together
   d) Ensure that blood loss is totaled and communicated to other team members at regular intervals
   e) Have formulas and/or calculators inserted into the electronic medical record (EMR) that automatically deduct dry weights from wet weights of standard supplies such as chux and peripads

f) Determine who will document QBL and where QBL will be documented consistently in the electronic medical record. Ensure there is a running total of blood loss to provide a cumulative assessment

4) In addition to QBL at delivery, cumulative blood loss should be recorded until the patient is physiologically stable (throughout recovery and up to 24 hours after delivery).



Note: A PowerPoint regarding QBL can be found at
https://www.in.gov/laboroflove/files/QBL%20final.pdf

Active Management of the 3rd Stage of Labor

One crucial element in the reduction of postpartum hemorrhage is the active management of the third stage of labor (AMTSL). The third stage of labor is the period of time from delivery of the infant to expulsion of the placenta. Active management of this stage of labor consists primarily of the administration of oxytocin. However, uterine massage and controlled cord traction are additional aspects that should be used in conjunction with oxytocin. Delayed cord clamping and skin to skin have not been shown to interfere with active management. Therefore, active management of the third stage of labor is recommended.

It should be noted there is distinct difference between active management for prevention of hemorrhage and the treatment of hemorrhage, which initially will use similar methods.

Medications:

1. Facilities should utilize a standard formulation of oxytocin for both intrapartum and postpartum to minimize risk of medication errors. Facilities should also have standard guidelines for the routine administration of oxytocin during the immediate postpartum period.
    a. 10-40 units in 500-1000 mL of Normal Saline (NS) or Lactated Ringers (LR) is most common.
    b. Provide a bolus dose (10-30 units) via an infusion device over 30 minutes followed by a continuous infusion. Each facility should determine standard infusion rates and durations. This may be based upon risk assessment.
    c. Institute for Safe Medication Practices lists oxytocin as a high-alert medication. Therefore, oxytocin should NOT be administered as an infusion without the use of an infusion device (i.e., no oxytocin off the pump).
2. Overall rate and duration should be titrated according to uterine tone and bleeding.
3. If no IV access, oxytocin 10u IM is recommended.
4. There is no evidence-based recommendation for timing of the administration of oxytocin, i.e., after delivery of the anterior shoulder or placenta.

Additional Aspects

1. Uterine massage is recommended. Controlled cord traction is an additional component to AMTSL but is less supported by evidence. However, both uterine massage and controlled cord traction should be used in conjunction with oxytocin administration whenever possible.
2. Skin to skin and delayed cord clamping have not been shown to interfere with AMTSL.
3. In low risk women that have received no interventions, physiologic management versus pharmacologic management of the third stage of labor is a viable alternative. However, physiologic management does require a different skill set; patients will require counseling on the risks, benefits and alternatives of AMTSL.

EXAMPLE A: Oxytocin 30 units in 500 mL of NS

1. Give 10 unit bolus within 30 minutes
2. Once the bolus is complete, maintain uterine tone with maintenance rate in recovery (approx. 2 hours)
    a. If 20 units in 1000mL – maintenance rate of 125mL/hour while in recovery
    b. If 30 units in 500mL – maintenance rate of 42mL/hour while in recovery
    c. May be saline locked at the end of vaginal recovery if bleeding and vital signs are stable.
    d. Saline lock access maintained by PPH risk assessment
        i. Low – 4 hours
        - ii. Medium – 8 hours
        - iii. High/ cesarean delivery – 24 hours

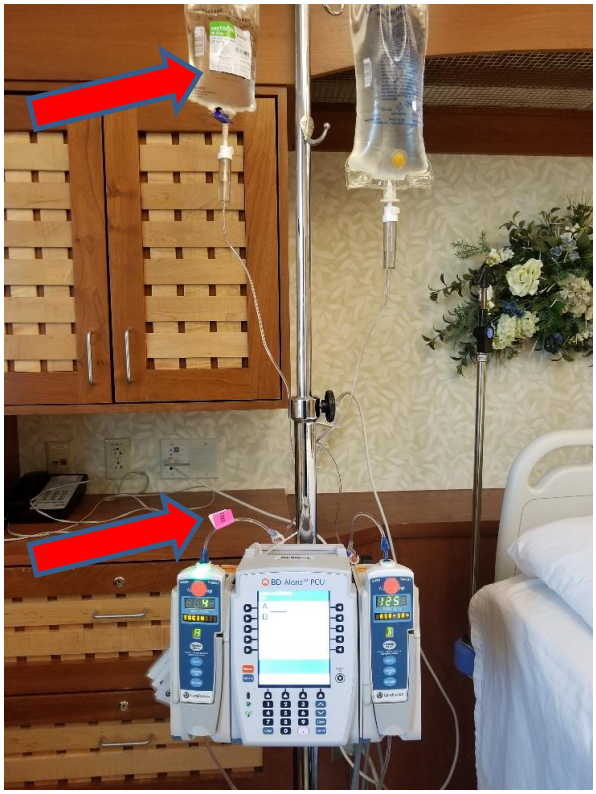
EXAMPLE B: Oxytocin 30 units in 500 mL of NS

1. Low risk: 10 unit bolus (334 mL/hour) over 30 minute then 95mL/hour x3.5 hours
2. Moderate risk: 20 unit bolus (668 mL/hour) over 30 minutes, then 95mL/hour x 3.5 hours
3. High risk: 30 unit bolus (997 mL/hour) over 30 minutes, then 95/hour x 3.5 hours

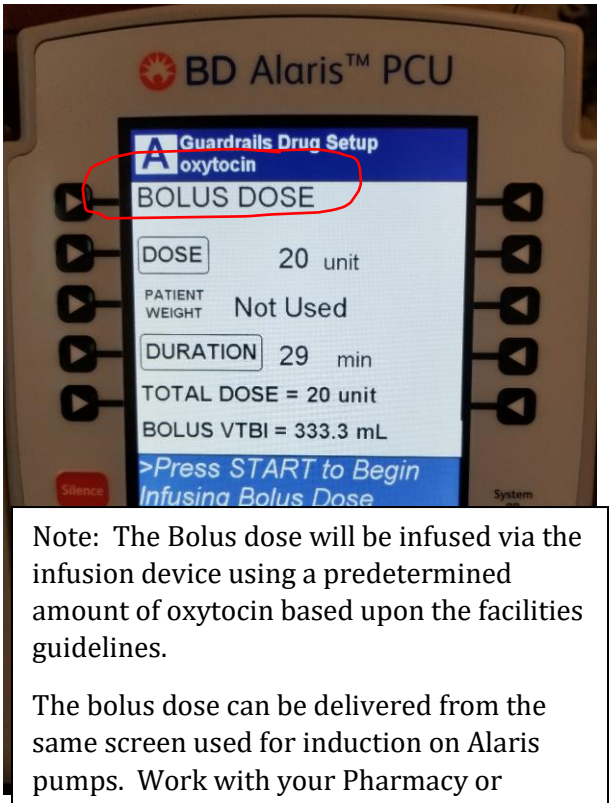
EXAMPLE C: Oxytocin 30 units in 500 mL of NS

1. Bolus 20 units Oxytocin bolus (667 mL/hour) over 30 minutes then run at 83 mL/hour x3.5 hours or until recovery complete.

Disclaimer: Collaboration with nursing, physicians and pharmacy is necessary to ensure appropriate medication safety guidelines are discussed and established for your facility.



Note: Standard concentration of oxytocin in use via infusion device and the labeling on the IV line



Note: The Bolus dose will be infused via the infusion device using a predetermined amount of oxytocin based upon the facilities guidelines.

The bolus dose can be delivered from the same screen used for induction on Alaris pumps. Work with your Pharmacy or device representative for programming functionality on this and other models.

TIPS – Immediately prior to starting the bolus dose of oxytocin, adjust your rate of oxytocin to the postpartum maintenance rate to ensure the infusion will default to the appropriate rate.

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Section III: Response

Maternal hemorrhage is an obstetric emergency. For the best maternal outcome, it is important to follow a standardized emergency response plan. The stages of hemorrhage-based protocol with checklists provides guidelines for patient assessment, recommended interventions and the use of a multidisciplinary team.

Medical providers must also be prepared for secondary postpartum hemorrhage, which occurs greater than 24 hours following delivery and up to 12 weeks postpartum. An algorithm for the diagnosis and management of secondary postpartum hemorrhage provides guidelines for use in the emergency room and/or labor and delivery rooms settings.

Obstetric Emergency Management Plan with Checklist

The following is an example of a unit-standard, stage-based obstetric hemorrhage emergency management plan with checklists. **Any adaption of these materials should be in alignment with your delivering facility's policies and procedures.** Additional examples may be found in Appendix J[31].

Sample:

Stage 0: All Births: Prevention & Recognition of OB Hemorrhages
Active Management of Third Stage ☐ Oxytocin infusion: **Bolus** 20 units oxytocin/500mL solution over 60 minutes; or 10 units IM with delivery of infant or placenta ☐ Controlled cord traction, Cord clamping not delayed beyond 2 minutes ☐ Vigorous, two-handed fundal massage for at least 15 seconds <u>after placenta</u> **Ongoing Quantitative Evaluation of Blood Loss** ☐ Use formal methods, such as graduated containers/drapes, and weight of blood soaked materials (**1gm = 1mL**) **Ongoing Evaluation of Vital Signs**
<u>If: Cumulative Blood Loss</u> greater than 500mL vaginal birth or greater than 1000mL cesarean birth <u>-OR-</u> <u>Vital signs</u> greater than 15% change or <u>heart rate greater than or equal to</u> 110, <u>blood pressure less than or equal to</u> 85/45, O2 sat less than 95% <u>-OR- Increased bleeding</u> during recovery or postpartum,

[31] https://www.in.gov/laboroflove/files/Emergency%20Management%20Plan.pdf

Proceed to STAGE 1

Stage 1: OB Hemorrhage

If: Cumulative Blood Loss greater than 500mL vaginal birth or greater than 1000mL cesarean birth -OR-
Vital signs greater than 15% change or heart rate greater than or equal to 120, blood pressure less than or equal to 85/45, O2 sat less than 95% -OR-
Increased bleeding during recovery or postpartum

MOBILIZE	ACT	THINK
Primary nurse, Physician to: ☐ Activate OB Postpartum Hemorrhage Care Guidelines and Checklist **Primary Nurse** to: ☐ Notify OB Physician /provider ☐ Notify charge nurse ☐ Notify anesthesiologist **Charge Nurse:** ☐ Assist primary nurse as needed or assign staff member(s) to help **Phone #'s:** **ICU:** **IR:** **AA:** **Hematology:** **Trauma Surgeon:** **General Surgeon:** **Rapid Response:**	**Primary nurse(s)** ☐ Establish IV access if not present, at least 18 gauge ☐ Increase IV Oxytocin rate to 30-36 unit bolus over 60 minutes (500-600mL/hr); (see medication reference sheet on cart). Additional dose per provider order ☐ Perform vigorous fundal massage ☐ Administer 2nd line uterotonic medication: (Methergine, Cytotec, Hemabate) (see medication reference sheet on cart) per provider order ☐ Vital Signs with O2 Sats & Level of Consciousness (LOC) q 5 min ☐ Weigh materials, calculate, and **announce** cumulative blood loss q 5-15 min ☐ Administer oxygen to maintain O2 Sats greater than 95% ☐ IV bolus LR/NS (1 L) ☐ SBAR to key personnel entering room **First Responder (Charge Nurse):** ☐ Bring PPH cart and scale to room when PPH protocol activated ☐ Bring PPH medication ***kit and pit*** to room	Consider potential etiology: ▪ Uterine atony ▪ Trauma/Laceration ▪ Retained placenta ▪ Amniotic Fluid Embolism ▪ Uterine Inversion ▪ Coagulopathy ▪ Placenta Accreta **Physician:** ☐ Rule out retained Products of Conception, laceration, hematoma ☐ Order additional medications as needed (see medication reference sheet) ☐ Time out to confirm all steps are complete **Surgeon (if cesarean birth and still open):** □ Inspect for uncontrolled bleeding at all levels, esp. broad ligament, posterior uterus, and retained placenta **Once stabilized:** Modified postpartum management with increased surveillance and

Stage 1: OB Hemorrhage If: Cumulative Blood Loss greater than 500mL vaginal birth or greater than 1000mL cesarean birth -OR- Vital signs greater than 15% change or heart rate greater than or equal to 120, blood pressure less than or equal to 85/45, O2 sat less than 95% -OR- Increased bleeding during recovery or postpartum		
MOBILIZE	ACT	THINK
Blood Bank: Anesthesia:	☐ Designate recorder Second Nurse: ☐ Empty bladder; straight/Red Rubber cath or place Foley with urimeter ☐ If blood ordered per provider, call blood bank to obtain blood products ☐ Keep patient warm (warm blankets or bair hugger) Recorder ☐ **Document and record** (may utilize PPH Recorder sheet) ☐ Give updates on med times, last labs drawn, etc. q 15min (or as needed) Inspect for	ensure Postpartum Hemorrhage order set is utilized in EMR and document appropriately.
IF Continued Bleeding or continued Vital Sign instability, and less than 1500 mL cumulative blood loss Proceed to STAGE 2		

Stage 2: OB Hemorrhage Continued bleeding or Vital Sign instability, and less than 1500 mL cumulative blood loss		
MOBILIZE	ACT	THINK
Primary nurse (or charge nurse): ☐ Call OB Physician to bedside ☐ Call anesthesiologist to bedside ☐ Consider calling Rapid Response Team ***# 44***	Team Leader (OB Physician): ☐ Additional uterotonic medications: (Methergine, Cytotec, Hemabate) (see medication reference sheet) per provider order ☐ Continue IV oxytocin bolus at 30-36 units/hr (500-600 mL/hr)	**Sequentially advance through procedures** and other interventions based on etiology. Assist with medical evaluation and procedures to correct potential source of hemorrhage. Vaginal birth:

Charge nurse : ☐ Notify MFM or 2nd OB provider ☐ Ensure PPH ***Cart, Pit and Kit*** in room ☐ Notify manager, shift coordinator, or CNS ☐ Assign single person to communicate with Blood Bank ☐ Ask excess family support members to move to waiting room – leave 1 support member at bedside, if appropriate ☐ Call social worker as family support person **Phone #'s:** **ICU:** **IR:** **AA:** **Hematology:** **Trauma Surgeon:** **General Surgeon:** **Rapid Response:** **Blood Bank:** **Anesthesia:**	and provide additional IV crystalloid solution per provider order **Do not delay other interventions (see right column) while waiting for response to medications** ☐ Bimanual uterine massage ☐ **Move to OR** (if on postpartum unit, move to L&D or OR) ☐ Order 2 units PRBCs and bring to the bedside ☐ Order labs STAT (CBC, CMP, Coags PT/aPTT, Fibrinogen and ABG) ☐ **Transfuse PRBCs based on clinical signs** and response, **do not wait for lab results** **Primary nurse:** ☐ Establish 2nd large bore IV, at least 18 gauge (16 gauge preferred) ☐ Assess and **announce** Vital Signs & O2, LOC, and cumulative blood loss q 5-10 minutes ☐ Administer meds, blood products and draw labs, per provider order ☐ Keep patient warm (bair hugger, if needed) **Second nurse (or charge nurse):** ☐ Place Foley with urimeter (if not already done) ☐ Obtain portable light if needed from Hemorrhage Cart ☐ Obtain blood products from the Blood Bank ☐ Set up blood administration; set up blood warmer for transfusion ☐ Assist with move to OR (if indicated) **Recorder:**	If **trauma (vaginal, cervical or uterine):** ▪ visualize and repair If **retained placenta:** ▪ D&C If **uterine atony** or lower uterine segment bleeding**:** ▪ Intrauterine Balloon (Bakri) If **above measures unproductive:** ▪ Selective embolization (Interventional Radiology if available & adequate experience) **C-section:** ▪ B-Lynch Suture ▪ Intrauterine Balloon If **Uterine Inversion:** ▪ Anesthesia and uterine relaxation drugs for manual reduction If **Amniotic Fluid Embolism:** ▪ Maximally aggressive respiratory, vasopressor and blood product support If **vital signs are worse than estimated or measured blood loss:** possible uterine rupture or broad ligament tear with internal bleeding; **move to laparotomy** **Once stabilized:** Modified postpartum management with increased surveillance and ensure Postpartum Hemorrhage order set is utilized in EMR and document appropriately

	☐ **Document and record** (may utilize PPH Recorder sheet) ☐ Give updates on med times, last labs drawn, etc. q 15 min (or as needed) **Blood Bank:** ☐ Determine availability of thawed plasma, fresh frozen plasma, and platelets, initiate delivery of platelets if not present on-site ☐ Consider administering FFP (takes 30 min to thaw), use if transfusing greater than2 units PRBCs ☐ Prepare for possibility of massive hemorrhage	
Re-Evaluate Bleeding and Vital Signs **If cumulative blood loss greater than 1500mL, greater than 2 units PRBCs given, vital signs unstable or suspicion for DIC, Proceed to STAGE 3**		

Stage 3: OB Hemorrhage **Cumulative blood loss greater than 1500 mL, greater than 2 units PRBCs given, vital signs unstable or suspicion for DIC**		
MOBILIZE	**ACT**	**THINK**
Nurse or Physician: ☐ Activate Massive Hemorrhage Protocol. See Policy NADM 2.23. **PHONE# 962-3555** **Charge Nurse or designee**: ☐ Activate surgical team; may need 2nd anesthesia provider, Gyn-Onc surgeon, and/or Intensivist ☐ Call Rapid Response ☐ Obtain Rapid Infuser	**Establish team leadership and assign roles:** **Team leader** (OB physician + OB anesthesiologist, and/or MFM and/or intensivist): ☐ **Initiate Massive Blood Transfusion Protocol** as appropriate, per provider order. ***Ask if Cryo is needed*** ☐ **Move to OR** if not already there ☐ Repeat CBC, CMP, Coags (PT/aPTT, Fibrinogen, D Dimer) STAT q 30-60 min. Consider TEG testing. **Anesthesiologist** (as indicated):	• **Selective Embolization (IR)** • **Interventions based on etiology not yet completed** • **Prevent hypothermia, academia, and coagulopathy** **Conservative or Definitive Surgery** ▪ Uterine Artery Ligation ▪ Hysterectomy FOR RESUSCITATION:

Stage 3: OB Hemorrhage Cumulative blood loss greater than 1500 mL, greater than 2 units PRBCs given, vital signs unstable or suspicion for DIC		
MOBILIZE	**ACT**	**THINK**
from OB OR Hallway; Call OR ICU for assistance if needed ☐ Notify Manager, shift coordinator, or CNS ☐ Continue PPH Hemorrhage Record (In OR, anesthesiologist will assess and document VS) ☐ Notify AA of possible transfer to ICU **Blood Bank:** ☐ Prepare to issue additional blood products per provider order as needed – **stay ahead** **Phone #'s:** **ICU:** **IR:** **AA:** **Hematology:** **General Surgeon:** **Trauma Surgeon:** **Rapid Response:** **Blood Bank:** **Anesthesia:**	☐ Arterial blood gases ☐ Central hemodynamic monitoring ☐ CVP or PA line ☐ Arterial line ☐ Vasopressor support ☐ Intubation ☐ Calcium replacement ☐ Electrolyte monitoring **Primary nurse:** ☐ **Announce** VS and cumulative measured blood loss q 5-10 minutes ☐ Apply upper and/or lower bair hugger if not already done ☐ Use fluid warmer and/or rapid infuser for fluid and blood product administration ☐ Apply sequential compression stockings to lower extremities ☐ Circulate in OR **Second nurse and/or anesthesiologist:** ☐ Continue to administer meds, blood products and draw labs, per provider order ☐ Consider **Tranexamic Acid 1 gram in 0.9% NaCl 50 mL**, infuse over 15 minutes for persistent bleeding, to infuse over 10 minutes) May repeat x 1 PRN for ongoing hemorrhage. **Recorder:** ☐ **Document and record** (may use PPH recorder sheet) ☐ Give updates on med times, last lab draws, etc. q 15 min (or as	**Aggressively Transfuse per provider order** **Based on Vital Signs & Blood Loss** ***MTP Ratio 1:1:1*** **6 PRBC: 6 FFP: 1 apheresis Platelets** **Unresponsive Coagulopathy:** ▪ After 8-10 units PRBCs and coagulation factor replacement with ongoing hemorrhage, may consider risk/benefit rFactor VIIa in consultation with hematologist or trauma surgeon **Once stabilized:** Modified postpartum management and ensure Postpartum Hemorrhage order set is utilized in EMR and document appropriately; consider ICU.

Stage 3: OB Hemorrhage Cumulative blood loss greater than 1500 mL, greater than 2 units PRBCs given, vital signs unstable or suspicion for DIC		
MOBILIZE	ACT	THINK
	needed)	

Secondary Postpartum Hemorrhage Algorithm

ACOG Practice Bulletin Number 183 (October 2017) defines secondary postpartum hemorrhage as "excess bleeding that occurs more than 24 hours after delivery and up to 12 weeks postpartum." An algorithm for the diagnosis and management of secondary postpartum hemorrhage allows for prompt and concise treatment for patients in the emergency room and/or labor and delivery room settings.

Causes of secondary postpartum hemorrhage:

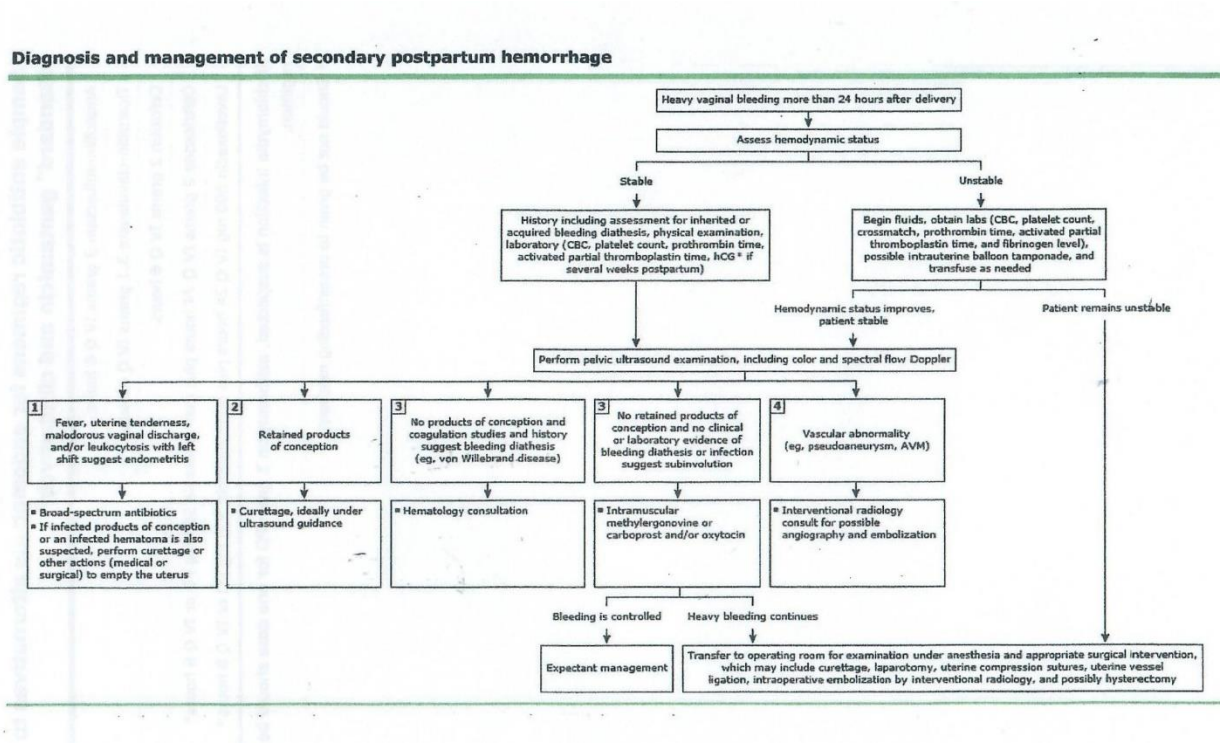
- Sub-involution of the placental site – usually occurs 7-14 days postpartum. Suspected when hypoechoic tortuous vessels are seen along the inner 1/3 of the myometrium on ultrasound
- Retained products of conception (risks – preterm delivery, retained placenta)
- Infection – suspect endometritis in the presence of uterine tenderness and fever
- Inherited coagulation defects – coagulation factors may decrease postpartum contributing to increased bleeding

Diagnosis and management of secondary postpartum hemorrhage

Patient stabilization -2 large bore IVs, labs including CBC, fibrinogen, PT, PTT, T&C

- Consultation with OB provider
- Imaging – pelvic ultrasound
- Use of uterotonics
- Uterine curettage may be necessary
- Use of intrauterine tamponade balloon, Foley bulb, uterine packing with thrombin soaked gauze (5000 units thrombin in 5 mL saline)
- Antibiotics – gentamicin and clindamycin

- Rapid treatment is required to prevent progression to DIC



Sample antibiotic regimens for endometritis alternatives to the "Gold Standard" gentamicin and clindamycin
Ampicillin – sulbactam 3 grams IV Q 6 hours
Ticarcillin – clavulanate 3.1 grams IV Q 4 hours
Cefoxitin – 2 grams IV Q6 hours
Ceftriaxone – 2 grams IV Q24 hours plus metronidazole 500 mg PO of IV Q 8 hours*
Levofloxacin 500 mg IV Q 24 hours plus metronidazole 500 mg PO of IV Q 8 hours*

If chlamydia infection is suspected, azithromycin 1 gram PO for one dose should be added to the regimen.

*Should not be given to breastfeeding mothers

Support program for patients, families, and staff for all significant hemorrhages

Experiencing a stressful event such as a postpartum hemorrhage has both physical and emotional impacts. Women having a significant hemorrhage may experience transient hypotensive episodes, pituitary ischemia or infarction, and other consequences such as elevated cortisol levels. The physical and emotional stress has the potential to negatively impact the woman and her family in multiple ways including breastfeeding, bonding, concern for future pregnancies and long-term emotional health. Consider a referral to psychiatric, psychosocial, and social support services for women who experience obstetric hemorrhage.

Examples of support programs for families and staff for all significant hemorrhages:

Parkview Medical Center

The Holistic Response Team, formally known as Code Lavender, is a Rapid Response Team which responds to staff members who are in crisis and, therefore, in urgent need of emotional and/or spiritual support. The code can be called by any staff member. The team is able to intervene during an employee's time of need and help to de-escalate the situation through holistic interventions, education, and continued support in the future. These interventions include aromatherapy, massage, therapeutic communication, breathing exercises, prayer, progressive relaxation, mindful movement, yoga, meditation, healing touch, affirmation cards, stress doll, and nourishments.

Riley Maternity and Newborn Health at Indiana University Methodist

Code Lavender is a compassionate and nurturing response carried out voluntarily by members of Riley Delivering facility staff for their co-workers. It consists of providing a supportive presence and nourishment to bring comfort to staff having had a particularly difficult time in the very recent past. Code Lavender can be requested by anyone. However, it is most frequently initiated by the unit manager. Coordinated through the Chaplaincy Department, a variety of comfort items are offered to any staff including calming music, positive quotations, essential oils, healthy snacks (fruit, cheese, granola bars), tea, and chocolate. The purpose of Code Lavender is to act quickly to help these individuals deal with their stress. The need can be from a higher-than-usual level of stress from a single event or from stress over a period of time.

It is meant to complement, not replace, other staff supports including an ethics consultation or Critical Incident Response Team.

Plymouth Medical Center

Tea for the Soul is initiated as a "time out" for the department after a serious event that has been emotionally difficult for the staff. Chaplain brings tea and goodies to the department with the hope of sharing thoughts and feelings about the event and providing support on moving forward.

Jasper Memorial Hospital

Jasper Memorial Hospital and Health Care Center has developed a policy entitled "Critical Incident Stress Debriefing – Postvention Services. The debriefing is designed to provide assessment and triage of people in crisis, provide support, and to educate about trauma reactions. The policy is included as Appendix K.[32]

[32] https://www.in.gov/laboroflove/files/Sample%20Stress%20Debriefing%20Policy.pdf

Section IV: Reporting/Systems Learning[33]

Hemorrhage reporting and structured learning from hemorrhage events are important for improving patient outcomes. Systems improvement should be implemented by every unit providing maternity care. Three key components of Reporting/Systems Learning are:

1. Establish a culture of huddles for high-risk patients and post event debriefs to identify successes and opportunities
2. Conduct multidisciplinary reviews of serious hemorrhages for systems issues
3. Monitor outcomes and process metrics in an established perinatal quality improvement committee

Culture of Huddles and Debriefs

Establishing a culture of huddles and debriefs identifies successes and opportunities for improvement, promotes a culture of safety and aids in the successful implementation of maternal safety bundles.

- *Briefs* are planned meetings that are used to form the team, designate roles and responsibilities, establish goals and engage the entire team in patient planning. Including the patient in the plan of care and briefings is an important strategy that will promote active involvement in her care and decision making.
- *Huddles* are brief ad hoc team meetings designed to regain situational awareness, discuss critical issues and emerging events, anticipate outcomes and contingencies, assign resources, and express any concerns.
- *Debriefs* are short, informal feedback sessions that occur after events and are designed to identify opportunities to improve teamwork, skills, and outcomes.

Multidisciplinary Review of Serious Hemorrhages

Multidisciplinary reviews are different from debriefs; they are formal meetings including staff involved in the incident, unit and facility leadership, and risk management personnel. The purpose of these reviews is to identify systems issues or breakdowns that influence the outcome of the event. These reviews should be

[33] Adapted from AIM eModule 2: Obstetric Hemorrhage, Reporting /Systems Learning

accomplished as soon as possible after a severe event. Reviews should be sanctioned by the facility, protected from discovery in legal proceedings, and include:

- A thorough record review
- Event timeline
- Focused root-cause analysis

Examples of questions the team can ask include:

- Could the outcome have been changed?
- Were the hemorrhage and/or signs of hypovolemia recognized in a timely fashion?
- Were transfusions administered in an anticipated timeframe?
- Were appropriate interventions, e.g. medications, balloons or sutures, used?
- Were modifiable risk factors, such as oxytocin, induction of labor or chorioamnionitis, managed appropriately?
- Was sufficient assistance from additional team members requested and received?

When standards are not met, or there is room for improvement, the case should be referred for further review to determine how the team can improve. A sample "Patient Clinical Summary After a Severe Maternal Event" form is included in Appendix L.[34]

Process and Outcome Measures

Monitoring process and outcomes measures is essential for the successful reduction in the number of hemorrhages resulting in undesired outcomes.

- Process measures[35] are the specific steps in a process that lead to a particular outcomes metric and represent a system's efforts to incorporate evidence-based practices into its improvement efforts. Process measures typically document how often a new approach is occurring, such as:
  - The use of risk screening tools
  - Quantitative measurement of blood loss
  - Frequency of multidisciplinary education and unit drills

[34] https://www.in.gov/laboroflove/files/Patient%20Clinical%20Summary%20SME.pdf

[35] Instructions for a process measure and a sample "Hospital Audit Tool: Risk Assessment for OB Hemorrhage" is included in Appendix M https://www.in.gov/laboroflove/files/hospital-audit-tool.pdf

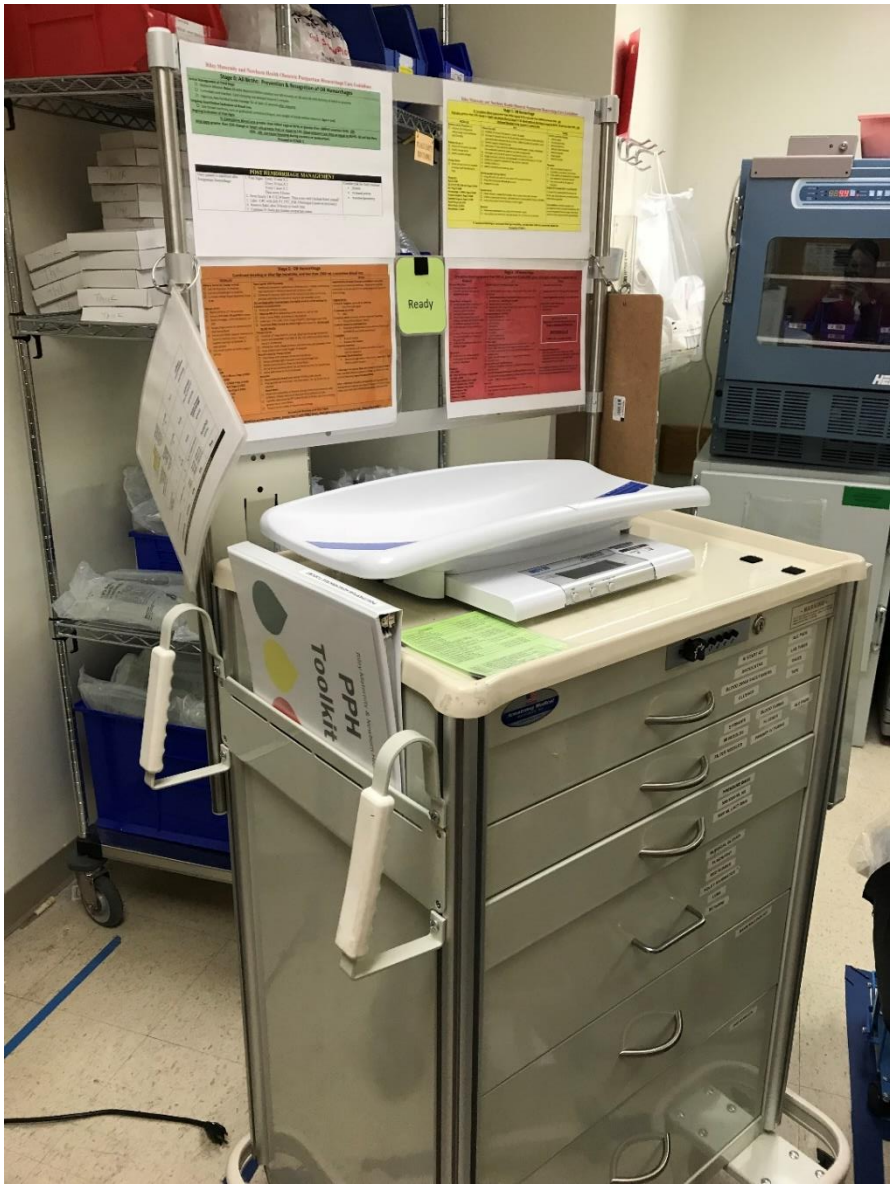
- Outcomes metrics evaluate the results of specific interventions against the intended goal to determine project success. The goal of implementing an obstetric hemorrhage bundle is to reduce the number of obstetric hemorrhages resulting in severe maternal morbidity or mortality. Use of an obstetric hemorrhage bundle may reduce the use of blood products by 20-30%. The incidence of hemorrhage can be tracked through:
  - ICD coding of obstetric hemorrhage
  - Number of women who receive four or more units of blood
  - Number of women transferred to an intensive care unit

Appendix A: Basic Postpartum Hemorrhage Cart Contents

Par level	Item Description	QTY Used	Replaced
	1000 mL Lactated Ringers IV solution		
	1000 mL Normal Saline IV solution		
	1000 mL Normal Saline Irrigation		
	10 mL saline flush syringes		
	Pressure infusing bag		
	20g angiocath		
	18g angiocath		
	16g angiocath		
	IV start kits		
	Primary IV tubing		
	IV pump tubing		
	IV extension sets		
	Blood administration tubing		
	22g IM syringes		
	5 mL syringes		
	10 mL syringes		
	Sterile gloves (6, 6.5, 7, 7.5, 8)		
	Lap sponges		
	X-ray 4x4 squares		
	4x4 gauze sponges		
	Sterile towels		
	Chux underpads		
	Kerlex rolls		
	Foley cath tray		
	Urine meter with bag		
	Uterine balloon kit		
	Red rubber catheter (in & out catheter)		
	Arterial blood gas kit		

Par level	Item Description	QTY Used	Replaced
	Vacutainer blood tubes (pink, lavender, blue, green)		
	Vacutainer and needles		
	Tape		
	Alcohol prep pads		
	Speculum (lighted or flashlight/lamp)		
	Right angle retractor		
	Ring forceps		
	Weighted speculum		

Appendix B: Sample Hemorrhage Carts



Riley Maternity & Newborn Health at Methodist

St. Vincent Evansville

Hancock Regional Hospital

Appendix C: Placement of Tamponade Balloon

Bakri®

POSTPARTUM BALLOON WITH RAPID INSTILLATION COMPONENTS

Tamponade technique for postpartum hemorrhage

Refer to the Instructions for Use for complete information on product usage and a complete list of precautions, warnings, and contraindications.

1 Confirm before placement.

Confirm that these statements are true:
- The uterus is free of placental fragments.
- The genital tract has no trauma or lacerations.
- The source of the bleeding is not arterial.
- The patient does not present with any contraindications for use of this device.

2 Determine the uterine cavity's volume.

- For transvaginal placement, determine uterine volume by direct examination or ultrasound examination. For transabdominal placement, determine uterine volume by direct examination.
- Place the predetermined volume of sterile fluid in a separate container.
- If you will use the rapid instillation components, note the predetermined volume for rapid instillation.
- The maximum balloon volume is 500 mL.

3 Place the balloon.

Transvaginal placement, postvaginal delivery (Fig. 1)
- Insert the balloon portion of the catheter into the uterus, making certain that the entire balloon is inserted past the cervical canal and internal ostium.

Transabdominal placement, postcesarean delivery (Fig. 2)
- Pass the uninflated balloon, inflation port first, through the cesarean incision and into the uterus and cervix. Remove the stopcock to aid in placement and reattach it prior to filling the balloon.
- Have an assistant pull the balloon shaft through the vaginal canal until the base of the balloon contacts the internal cervical ostium.
- Close the incision, being careful not to puncture the uninflated balloon while suturing.

4 Fill the balloon with sterile liquid.

- **Never inflate the balloon with air, carbon dioxide, or any other gas.**
- **Do not fill with more than 500 mL. Overinflation may result in the balloon being displaced into the vagina.**
- **Ensure that all product components are intact and that the hysterotomy is securely sutured prior to balloon inflation.**

- Place a Foley catheter in the patient's bladder to collect urine and monitor urine output.
- Use the enclosed syringe or rapid instillation components to fill the balloon to the predetermined volume through the stopcock.
- If desired, apply traction to the balloon's shaft. In order to maintain tension, secure the balloon shaft to the patient's leg or attach to a weight, not to exceed 500 grams. **Note:** To prevent displacement of the balloon into the vagina, counterpressure can be applied by packing the vaginal canal with iodine- or antibiotic-soaked gauze.
- **Use ultrasound to confirm that the balloon is properly placed.**

5 Flush the lumen and monitor hemostasis.

- Connect the drainage port to a fluid collection bag to monitor hemostasis.
- The balloon drainage port and tubing may be flushed clear of clots with sterile isotonic saline to facilitate monitoring.
- Monitor the patient for signs of increased bleeding and uterine cramping.

6 Remove the balloon.

- **Maximum indwelling time: 24 hours.**
- **The attending clinician determines when the balloon is removed after bleeding is controlled and the patient is stable.**

- Release the tension on the shaft and remove any vaginal packing.
- Aspirate balloon contents until the balloon is completely empty. The fluid may be removed incrementally to allow for periodic observation of the patient. In an emergency, the shaft may be cut to rapidly deflate the balloon.
- Gently retract the balloon and discard it.
- Monitor the patient for signs of bleeding.

COOK® MEDICAL

Illustrations for placing the Bakri balloon (step 3)

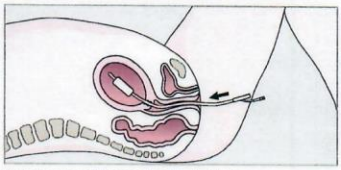


Fig. 1: Transvaginal placement, postvaginal delivery

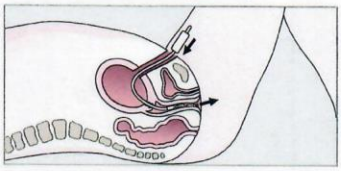


Fig. 2: Transabdominal placement, postcesarean delivery

Proper placement

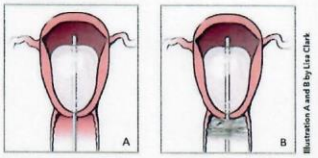


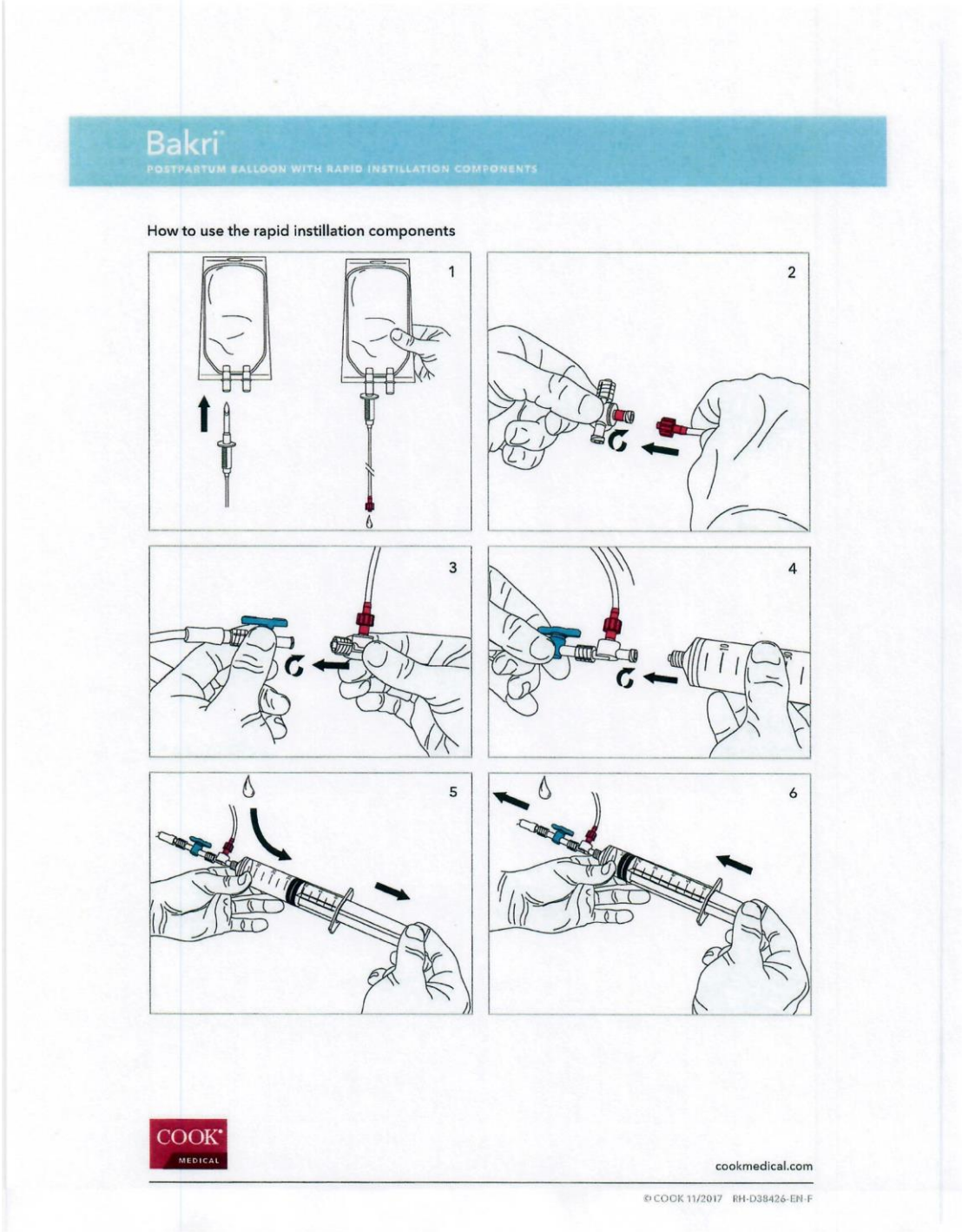
Illustration A and B by Lisa Clark

- Make sure that the entire balloon is inserted past the cervical canal and internal ostium.
- After the balloon is inflated to the predetermined volume, use ultrasound to confirm that it is properly placed.
- If necessary, pack the vagina with iodine- or antibiotic-soaked gauze.
- Do not extend the packing into the uterus.

CONTRAINDICATIONS
- Arterial bleeding requiring surgical exploration or angiographic embolization
- Cases indicating hysterectomy
- Pregnancy
- Cervical cancer
- Purulent infections in the vagina, cervix, or uterus
- Untreated uterine anomaly
- Disseminated intravascular coagulation
- A surgical site that would prohibit the device from effectively controlling bleeding

WARNINGS
- This device is intended as a temporary means of establishing hemostasis in cases indicating conservative management of postpartum uterine bleeding.
- The Bakri Postpartum Balloon is indicated for use in the event of primary postpartum hemorrhage within 24 hours of delivery.
- The device should not be left indwelling for more than 24 hours.
- The balloon should be inflated with a sterile liquid such as sterile water, sterile saline, or lactated Ringer's solution. The balloon should never be inflated with air, carbon dioxide, or any other gas.
- The maximum inflation is 500 mL. Do not overinflate the balloon. Overinflation of the balloon may result in the balloon being displaced into the vagina.
- Patients in whom this device is being used should be closely monitored for signs of worsening bleeding and/or disseminated intravascular coagulation (DIC). In such cases, emergency intervention per hospital protocol should be followed.
- There are no clinical data to support the use of this device in the presence of DIC.
- Patient monitoring is an integral part of managing postpartum hemorrhage. Signs of a deteriorating or unimproving condition should lead to a more aggressive treatment and management of the patient's uterine bleeding.
- The patient's urine output should be monitored while the Bakri Postpartum Balloon is in use.

PRECAUTIONS
- Avoid excessive force when inserting the balloon into the uterus.
- This product is intended for use by physicians trained and experienced in obstetrics and gynecological techniques.


Bakri
POSTPARTUM BALLOON WITH RAPID INSTILLATION COMPONENTS
How to use the rapid instillation components
1
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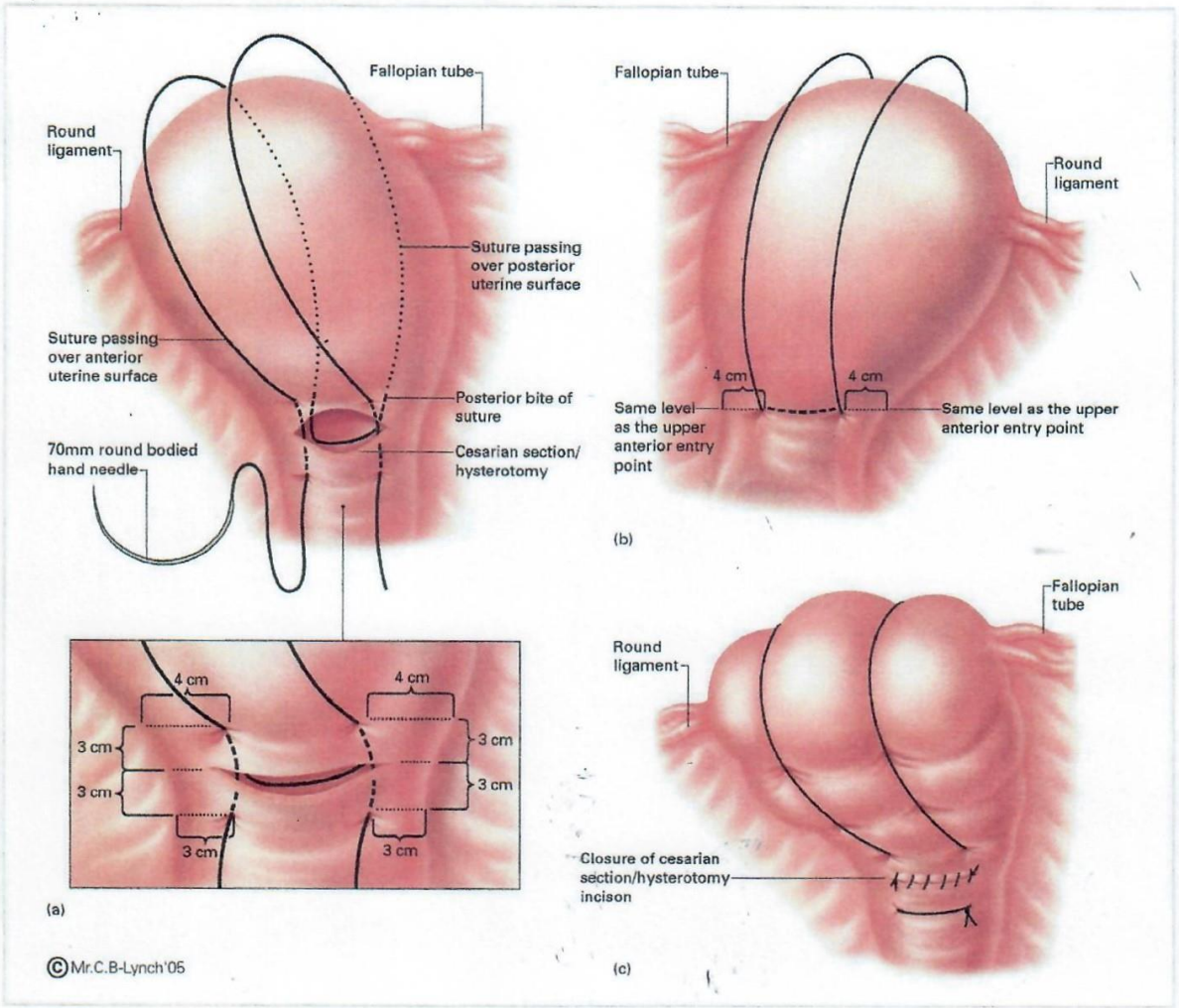
Appendix D: B-Lynch Suture

B-Lynch Compression Suture as an Alternative to Paripartum Hysterectomy

B-Lynch suture illustration of technique



In vitro illustration of the B-Lynch suture application

EMERGENCY MANAGEMENT PLANS

OBSTETRIC HEMORRHAGE EMERGENCY MANAGEMENT PLAN: CHECKLIST FORMAT

CMQCC **Obstetric Hemorrhage Emergency Management Plan: Checklist Format** Revision 9/10/14

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

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

Admission Assessment & Planning		Ongoing Risk Assessment
Verify Type & Antibody Screen from prenatal record ***If not available,*** ☐ Order Type & Screen (lab will notify if 2nd specimen needed for confirmation) ***If prenatal or current antibody screen positive (if not low level anti-D from Rho-GAM),*** ☐ Type & Crossmatch 2 units PRBCs ***All other patients,*** ☐ Send specimen to blood bank	☐ Evaluate for ***Risk Factors*** on admission, throughout labor, and postpartum. (At every handoff) ***If medium risk:*** ☐ Order Type & Screen ☐ Review Hemorrhage Protocol ***If high risk:*** ☐ Order Type & Crossmatch 2 units PRBCs ☐ Review Hemorrhage Protocol ☐ Notify OB Anesthesia ***Identify*** women who may decline transfusion ☐ Notify OB provider for plan of care ☐ Early consult with OB anesthesia ☐ Review Consent Form	☐ **Evaluate for development of additional risk factors in labor:** • Prolonged 2nd Stage labor • Prolonged oxytocin use • Active bleeding • Chorioamnionitis • Magnesium sulfate treatment ☐ **Increase Risk level** (see below) **and convert to Type & Screen or Type & Crossmatch** ☐ **Treat multiple risk factors as High Risk** ☐ **Monitor women postpartum for increased bleeding**

Admission Hemorrhage Risk Factor Evaluation

Low (Clot only)	Medium (Type and Screen)	High (Type and Crossmatch)
No previous uterine incision	Prior cesarean birth(s) or uterine surgery	Placenta previa, low lying placenta
Singleton pregnancy	Multiple gestation	Suspected Placenta accreta or percreta
≤ 4 previous vaginal births	> 4 previous vaginal births	Hematocrit < 30 AND other risk factors
No known bleeding disorder	Chorioamnionitis	Platelets < 100,000
No history of PPH	History of previous PPH	Active bleeding (greater than show) on admit
	Large uterine fibroids	Known coagulopathy

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

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

If: Cumulative Blood Loss > 500ml vaginal birth or > 1000ml C/S with continued bleeding -OR-
Vital signs > 15% change or HR ≥ 110, BP ≤ 85/45, O2 sat < 95% -OR- increased bleeding during recovery or postpartum,
proceed to STAGE 1

Page 1 of 5

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STAGE 1: OB Hemorrhage

Cumulative Blood Loss >500ml vaginal birth or >1000ml C/S with continued bleeding -OR-
Vital signs >15% change or HR ≥110, BP ≤85/45, O2 sat <95% -OR-
Increased bleeding during recovery or postpartum

MOBILIZE	ACT	THINK
Primary nurse, Physician or Midwife to: ☐ Activate OB Hemorrhage Protocol and Checklist **Primary nurse** to: ☐ Notify obstetrician or midwife (in-house and attending) ☐ Notify charge nurse ☐ Notify anesthesiologist **Charge nurse:** ☐ Assist primary nurse as needed or assign staff member(s) to help	**Primary nurse or designee**: ☐ Establish IV access if not present, at least 18 gauge Increase IV Oxytocin rate, 500 mL/hour of 10-40 units/500-1000 mL solution; Titrate infusion rate to uterine tone ☐ Apply vigorous fundal massage ☐ Administer Methergine 0.2 mg IM per protocol (if not hypertensive); give once, if no response, move to alternate agent; if good response, may give additional doses q 2 hr (If Misoprostol standard, misoprostol 800 mcg SL per protocol) ☐ Vital Signs, including O2 sat & level of consciousness (LOC) q 5 minutes ☐ Weigh materials, calculate and **record** cumulative blood loss q 5-15 minutes ☐ Administer oxygen to maintain O2 sats at >95% ☐ Empty bladder: straight cath or place Foley with urimeter ☐ Type and Crossmatch for 2 units Red Blood Cells STAT (if not already done) ☐ Keep patient warm **Physician or midwife:** ☐ Rule out retained Products of Conception, laceration, hematoma **Surgeon (if cesarean birth and still open)** ☐ Inspect for uncontrolled bleeding at all levels, esp. broad ligament, posterior uterus, and retained placenta	Consider potential etiology: • Uterine atony • Trauma/Laceration • Retained placenta • Amniotic Fluid Embolism • Uterine Inversion • Coagulopathy • Placenta Accreta **Once stabilized:** Modified Postpartum management with increased surveillance

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

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CMQCC OBSTETRIC HEMORRHAGE TOOLKIT
Version 2.0
3/24/15

STAGE 2: OB Hemorrhage

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

MOBILIZE

Primary nurse (or charge nurse):
- ☐ Call obstetrician or midwife to bedside
- ☐ Call Anesthesiologist
- ☐ Activate Response Team: **PHONE #:**_____
- ☐ Notify Blood bank of hemorrhage; order products as directed

Charge nurse:
- ☐ Notify Perinatologist or 2nd OB
- ☐ Bring hemorrhage cart to the patient's location
- ☐ Initiate OB Hemorrhage Record
- ☐ If considering selective embolization, call-in Interventional Radiology Team and second anesthesiologist
- ☐ Notify nursing supervisor
- ☐ Assign single person to communicate with blood bank
- ☐ Assign second attending or clinical nurse specialist as family support person or call medical social worker

ACT

Team leader (OB physician or midwife):
- ☐ Additional uterotonic medication: Hemabate 250 mcg IM [if not contraindicated] **OR** Misoprostol 800 mcg SL
  - Can repeat Hemabate up to 3 times every 20 min; (note-75% respond to first dose)
- ☐ Continue IV oxytocin and provide additional IV crystalloid solution

Do not delay other interventions (see right column) while waiting for response to medications
- ☐ Bimanual uterine massage
- ☐ Move to OR (if on postpartum unit, move to L&D or OR)
- ☐ Order 2 units PRBCs and bring to the bedside
- ☐ Order labs STAT (CBC/PLTS, Chem 12 panel, Coag Panel II, ABG)
- ☐ **Transfuse PRBCs based on clinical signs** and response, **do not wait for lab results; consider emergency O-negative transfusion**

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

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

Blood Bank:
- ☐ Determine availability of thawed plasma, fresh frozen plasma, and platelets; initiate delivery of platelets if not present on-site
- ☐ Consider thawing 2-4 FFP (takes 30 min), use if transfusing > 2 units PRBCs
- ☐ Prepare for possibility of massive hemorrhage

THINK

Sequentially advance through procedures and other interventions based on etiology:

Vaginal birth
If **trauma (vaginal, cervical or uterine):**
- Visualize and repair

If **retained placenta**:
- D&C

If **uterine atony** or lower uterine segment bleeding:
- Intrauterine Balloon

If **above measures unproductive:**
- Selective embolization (Interventional Radiology if available & adequate experience)

C-section:
- B-Lynch Suture
- Intrauterine Balloon

If **Uterine Inversion**:
- Anesthesia and uterine relaxation drugs for manual reduction

If **Amniotic Fluid Embolism**:
- Maximally aggressive respiratory, vasopressor and blood product support

If **vital signs are worse than estimated or measured blood loss**: possible uterine rupture or broad ligament tear with internal bleeding; **move to laparotomy**

Once stabilized: Modified Postpartum management with increased surveillance

Re-Evaluate Bleeding and Vital Signs
If cumulative blood loss > 1500ml, > 2 units PRBCs given, VS unstable or suspicion for DIC, proceed to STAGE 3

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Version 2.0
3/24/15

STAGE 3: OB Hemorrhage

Cumulative blood loss > 1500ml, > 2 units PRBCs given, VS unstable or suspicion for DIC

MOBILIZE

Nurse or Physician:
- ☐ Activate Massive Hemorrhage Protocol

PHONE #:_____

Charge Nurse or designee:
- ☐ Notify advanced Gyn surgeon (e.g. Gyn Oncologist)
- ☐ Notify adult intensivist
- ☐ Call-in second anesthesiologist
- ☐ Call-in OR staff
- ☐ Ensure hemorrhage cart available at the patient's location
- ☐ Reassign staff as needed
- ☐ Call-in supervisor, CNS, or manager
- ☐ Continue OB Hemorrhage Record (In OR, anesthesiologist will assess and document VS)
- ☐ If transfer considered, notify ICU

Blood Bank:
- ☐ Prepare to issue additional blood products as needed – **stay ahead**

ACT

Establish team leadership and assign roles

Team leader (OB physician + OB anesthesiologist, anesthesiologist and/or perinatologist and/or intensivist):
- ☐ **Order Massive Hemorrhage Pack** (RBCs + FFP + 1 apheresis pack PLTS—see note in right column
- ☐ **Move to OR** if not already there
- ☐ Repeat CBC/PLTS, Coag Panel II STAT and Chem 12 panel q 30-60 min

Anesthesiologist (as indicated):
- ☐ Arterial blood gases
- ☐ Central hemodynamic monitoring
- ☐ CVP or PA line
- ☐ Arterial line
- ☐ Vasopressor support
- ☐ Intubation
- ☐ Calcium replacement
- ☐ Electrolyte monitoring

Primary nurse:
- ☐ Announce VS and cumulative measured blood loss q 5-10 minutes
- ☐ Apply upper body warming blanket if feasible
- ☐ Use fluid warmer and/or rapid infuser for fluid & blood product administration
- ☐ Apply sequential compression stockings to lower extremities
- ☐ Circulate in OR

Second nurse and/or anesthesiologist:
- ☐ Continue to administer meds, blood products and draw labs, as ordered

Third Nurse (or charge nurse):
- ☐ Recorder

THINK

Selective Embolization (IR)

Interventions based on etiology not yet completed

Prevent hypothermia, academia

Conservative or Definitive Surgery:
- Uterine Artery Ligation
- Hysterectomy

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

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

Once Stabilized: Modified Postpartum Management with increased surveillance; consider ICU

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Appendix F: Uterotonic Agents for Postpartum Hemorrhage

UTEROTONIC AGENTS FOR POSTPARTUM HEMORRHAGE						
Drug	Dose	Route	Frequency	Side Effects	Contraindications	Storage
Pitocin® (Oxytocin) 10 units/mL	10-40 units per 500-1000mL, rate titrated to uterine tone	IV Infusion	Continuous	Usually none Nausea, vomiting, hyponatremia ("water intoxication") with prolonged IV admin. Decreased BP and increased HR with high doses, esp IV push	Hypersensitivity to drug	Room temp
Cytotec® (Misoprostol) 200mcg tablets	600-800 mcg	Sublingual, oral or rectal	One time	Nausea, vomiting, diarrhea, shivering, fever (transient), headache	Rare, known allergy to prostaglandin, Hypersensitivity to drug	Room temp
Hemabate® (15-methylPGF2a) 250mcg/mL	250mcg	IM or intramyome trial(NOT given IV)	Q 15-90 min Not to exceed 8 doses/24 hours If no response after 3 doses, it is unlikely that additional doses will be of benefit	Nausea, vomiting, diarrhea, fever (transient), headache, chills, shivering, hypertension, bronchospasm	Caution in women with hepatic disease, asthma, hypertension, active cardiac or pulmonary disease Hypersensitivity to drug	Refrigerate
Methergine® (Methylergonivine) 0.2mg/mL	0.2mg	IM (NOT given IV)	Q 2-4 hours If no response after 1 dose, it is unlikely that additional doses will be of benefit	Nausea, vomiting, severe hypertension, esp if given IV, which is not recommended	Hypertension, Preeclampsia, Cardiovascular disease, Hypersensitivity to drug. Caution if multiple doses of ephedrine have been used, may exaggerate hypertensive response w/ possible cerebral hemorrhage	Refrigerate. Protect from light

Appendix G: Blood Component Reference from AWHONN

Table 8: Transfusion of Blood Components: Recommendations Based on Serial Laboratory Values

Component	Content	Volume	Expected Change in Labs	Indication/ Trigger	Goals of Transfusion
Warm Fresh Whole Blood (WFWB)	Same components in same percentages as blood loss	400-500 mL	1 unit WFWB replaces all components of blood loss in similar ratio without loss of individual component function from storage. 1unit WFWB increases Hgb approximately 1 g/dL or Hct by 3%.	Hgb < 8.0 g/dL in bleeding patient. If patient stable and not bleeding, Hgb < 6.0 g/dL; or Hgb < 8.0 g/dL and patient is symptomatic.	Hgb 10 g/dL or Hct 30%
Packed red blood cells (PRBCs)	Red blood cells, preservative and anticoagulant solutions may vary. Hct of packed cells: 50%-65%; contains approximately 42.5-80 g of hemoglobin; contains approx 147-278 mg of iron.	128–240 mL red blood cells; plus contains average 50 mL donor plasma (range 20–150 mL); plus anticoagulant and preservative.	1 unit PRBC increases Hgb approximately 1 g/dL or Hct by 3% (assumes pt not bleeding or hemolyzing).	Hgb < 8.0 g/dL in bleeding patient. If patient stable and not bleeding, Hgb < 6.0 g/dL; or Hgb < 8.0 g/dL and patient is symptomatic.	Hgb 10 g/dL or Hct 30%
Platelets	Random Donor Platelets (RDP) should contain ≥5.5 x 10^{10} platelets in 50 mL plasma. Four to 10 RDPs are pooled prior to transfusion. Platelets Apheresis – Single Donor Platelets (SDP) should contain ≥3.0 x 10^{11} (average is 3.5-4.0 x 10^{11} per bag) in 250 mL plasma. SDP are ready for transfusion – no thawing needed.	Platelets (RDP) - 50 mL plasma x number of RDP in the pool. Platelets Apheresis (SDP) - 250 mL of plasma.	For each RDP given – increase count 7,000-10,000/mm^3. For each SDP apheresis pack given – increase count 30,000-60,000/mm^3	Platelets <50,000 – 70,000/ mm^3 in actively bleeding patients; <20,000/mm^3 in unstable non-bleeding patients; and <10,000/mm^3 in stable, non-bleeding patients.	>100,000/mm^3 in active bleeding patients
Fresh frozen plasma (FFP)	Non-cellular portion of blood that is separated from whole blood and frozen. Contains all coagulation factors. Dosing is based on patient current weight; or in uncontrolled bleeding, given as close as possible to a 1:1 PRBC:FFP ratio.	Approximately 200- 250 mL in one unit. Apheresis-derived units may be 400-600 mL.		PT >1.5 times the mid range of normal; aPTT >1.5 time high normal range; or factor assay less than 25%.	PT ≤ 1.5 x control; aPTT ≤ 1.5 x control; Fibrinogen > 100
Cryo-precipitated Antihemolytic Factor (AHF)	Each unit of cryoprecipitate AHF (Cryo) should contain at least 80 IU Factor VIII:C, and 150 mg of fibrinogen in 5 to 20mL of plasma. Cryo also contains Factor VIII:VWF (von Willebrand factor), Factor XIII and fibronectin.	5–20 mL per unit; see label for total number of units included.	Typical dose for stable hypo-fibrinogenemia is one unit per 7–10 kg of body weight; increases fibrinogen levels by 50 mg/dL in the absence of bleeding or consumption. In hemorrhage, Cryo may be given in increased doses of 1 unit/5 kg or 2 units/10 kg; and repeated as needed to maintain fibrinogen levels >100 mg/dL.	Fibrinogen <100 mg/dL	Fibrinogen >100 mg/ dL

mL- milliliter, Hgb - hemoglobin, g/dL – grams per deciliter, Hct – hematocrit, g – gram, mm^3 – millimeter cubed, PT – prothrombin time, aPTT – activated partial thromboplastintime, IU – international units, kg – kilogram, mg/dL – milligrams per deciliter

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From CMQCC

BLOOD PRODUCTS	
Packed Red Blood Cells (PRBC) (approx. 35-40 min. for crossmatch—once sample is in the lab and assuming no antibodies present)	Best first-line product for blood loss 1 unit = 200 ml volume If antibody positive, may take hours to days. for crossmatch, in some cases, such as autoantibody crossmatch compatible may not be possible; use "least incompatible" in urgent situations
Fresh Frozen Plasma (FFP) (approx. 35-45 min. to thaw for release)	Highly desired if > 2 units PRBCs given, or for prolonged PT, PTT 1 unit = 180 ml volume
Platelets (PLTS) Local variation in time to release (may need to come from regional blood bank)	Priority for women with Platelets < 50,000 Single-donor Apheresis unit (= 6 units of platelet concentrates) provides 40-50 k transient increase in platelets
Cryoprecipitate (CRYO) (approx. 35-45 min. to thaw for release)	Priority for women with Fibrinogen levels < 80 10 unit pack (or 1 adult dose) raises Fibrinogen 80-100 mg/dl Best for DIC with low fibrinogen and don't need volume replacement Caution: 10 units come from 10 different donors, so infection risk is proportionate.

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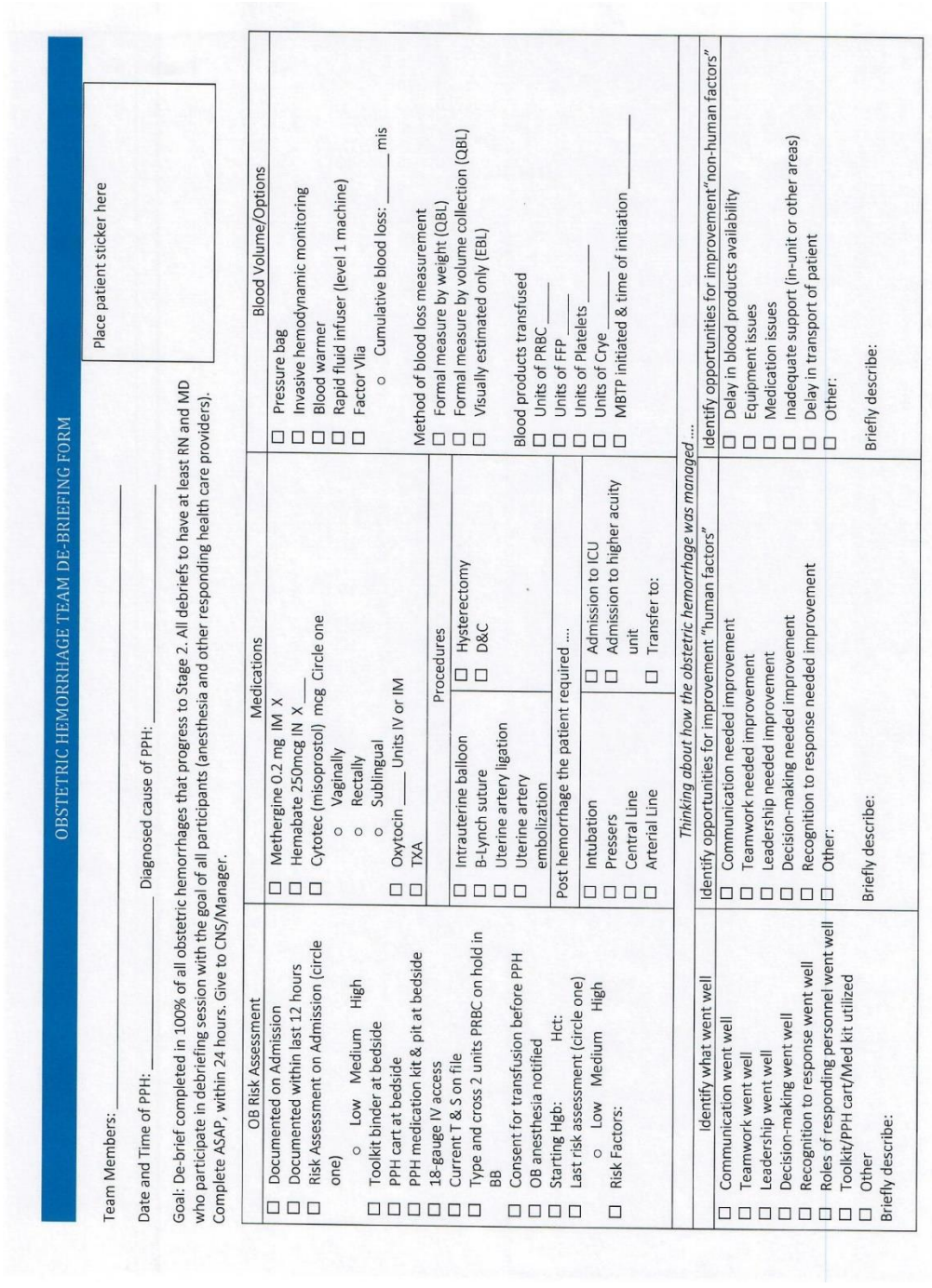
Appendix H. Hemorrhage Debrief Form



OBSTETRIC HEMORRHAGE TEAM DE-BRIEFING FORM

Team Members: _____

Date and Time of PPH: _____ Diagnosed cause of PPH: _____

Place patient sticker here

Goal: De-brief completed in 100% of all obstetric hemorrhages that progress to Stage 2. All debriefs to have at least RN and MD who participate in debriefing session with the goal of all participants (anesthesia and other responding health care providers). Complete ASAP, within 24 hours. Give to CNS/Manager.

OB Risk Assessment

- ☐ Documented on Admission
- ☐ Documented within last 12 hours
- ☐ Risk Assessment on Admission (circle one)
  - ○ Low Medium High
- ☐ Toolkit binder at bedside
- ☐ PPH cart at bedside
- ☐ PPH medication kit & pit at bedside
- ☐ 18-gauge IV access
- ☐ Current T & S on file
- ☐ Type and cross 2 units PRBC on hold in BB
- ☐ Consent for transfusion before PPH
- ☐ OB anesthesia notified
- ☐ Starting Hgb: Hct:
- ☐ Last risk assessment (circle one)
  - ○ Low Medium High
- ☐ Risk Factors:

Medications

- ☐ Methergine 0.2 mg IM X
- ☐ Hemabate 250mcg IN X___
- ☐ Cytotec (misoprostol) mcg Circle one
  - ○ Vaginally
  - ○ Rectally
  - ○ Sublingual
- ☐ Oxytocin ____ Units IV or IM
- ☐ TXA

Procedures

- ☐ Intrauterine balloon
- ☐ B-Lynch suture
- ☐ Uterine artery ligation
- ☐ Uterine artery embolization
- ☐ Hysterectomy
- ☐ D&C

Post hemorrhage the patient required ....

- ☐ Intubation
- ☐ Pressers
- ☐ Central Line
- ☐ Arterial Line
- ☐ Admission to ICU
- ☐ Admission to higher acuity unit
- ☐ Transfer to:

Blood Volume/Options

- ☐ Pressure bag
- ☐ Invasive hemodynamic monitoring
- ☐ Blood warmer
- ☐ Rapid fluid infuser (level 1 machine)
- ☐ Factor Vlia
  - ○ Cumulative blood loss: _____ mis

Method of blood loss measurement

- ☐ Formal measure by weight (QBL)
- ☐ Formal measure by volume collection (QBL)
- ☐ Visually estimated only (EBL)

Blood products transfused

- ☐ Units of PRBC _____
- ☐ Units of FFP _____
- ☐ Units of Platelets _____
- ☐ Units of Crye _____
- ☐ MBTP initiated & time of initiation _____

Thinking about how the obstetric hemorrhage was managed ....

Identify what went well

- ☐ Communication went well
- ☐ Teamwork went well
- ☐ Leadership went well
- ☐ Decision-making went well
- ☐ Recognition to response went well
- ☐ Roles of responding personnel went well
- ☐ Toolkit/PPH cart/Med kit utilized
- ☐ Other

Briefly describe:

Identify opportunities for improvement "human factors"

- ☐ Communication needed improvement
- ☐ Teamwork needed improvement
- ☐ Leadership needed improvement
- ☐ Decision-making needed improvement
- ☐ Recognition to response needed improvement
- ☐ Other:

Briefly describe:

Identify opportunities for improvement "non-human factors"

- ☐ Delay in blood products availability
- ☐ Equipment issues
- ☐ Medication issues
- ☐ Inadequate support (in-unit or other areas)
- ☐ Delay in transport of patient
- ☐ Other:

Briefly describe:

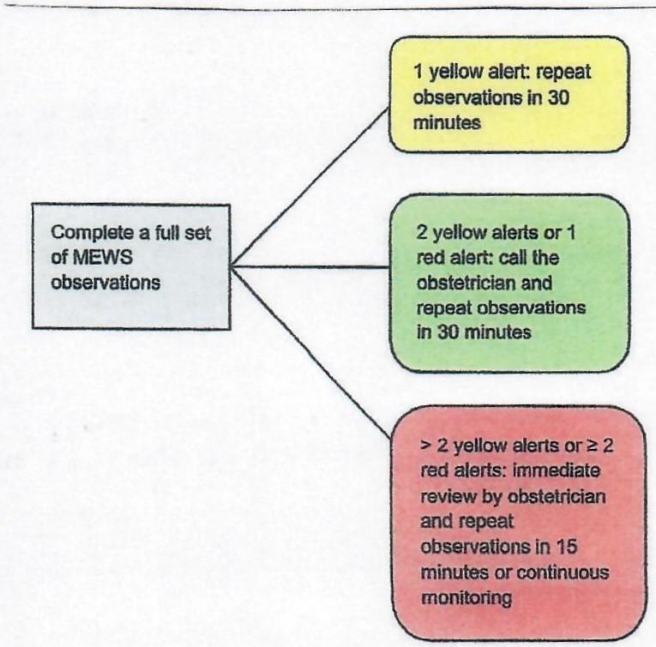
Appendix I: Early Warning System Chart Sample

Maternal Early Warning Scores (MEWS)

Take and record a full set of vital signs at appropriate intervals.
Note the patient's vital signs and assessment relative to the early warning scores below.

Physiological parameters	Normal values	Yellow alert	Red Alert
Respirator rate	10-20 breaths per minute	21-30 breaths per minute	< 10 or >30 breaths per minute
Oxygen saturation	96-100%		< 95 %
Temperature	36.0-37.4°C	35-36 or 37.5- 38°C	< 35 or > 38°C
Systolic blood pressure	100-139 mmHg	150 – 180 or 90 – 100 mmHg	>180 or < 90 mmHg
Diastolic blood pressure	50-89 mmHg	90–100 mmHg	>100 mmHg
Heart rate	50-99 beats per minute	100- 120 or 40 -50 beats per minute	>120 or < 40 beats per minute
Neurological response	Alert	Voice	Unresponsive, pain

Proceed with recommended interventions based on the number and severity of alerts as below.
Note: If a care giver is concerned about the status of a patient, the medical provider should be notified irrespective of the early warning score.



Adapted from Anesthesia Tutorial of the Week 383 – Maternal Early Warning Scores (July 10, 2018)

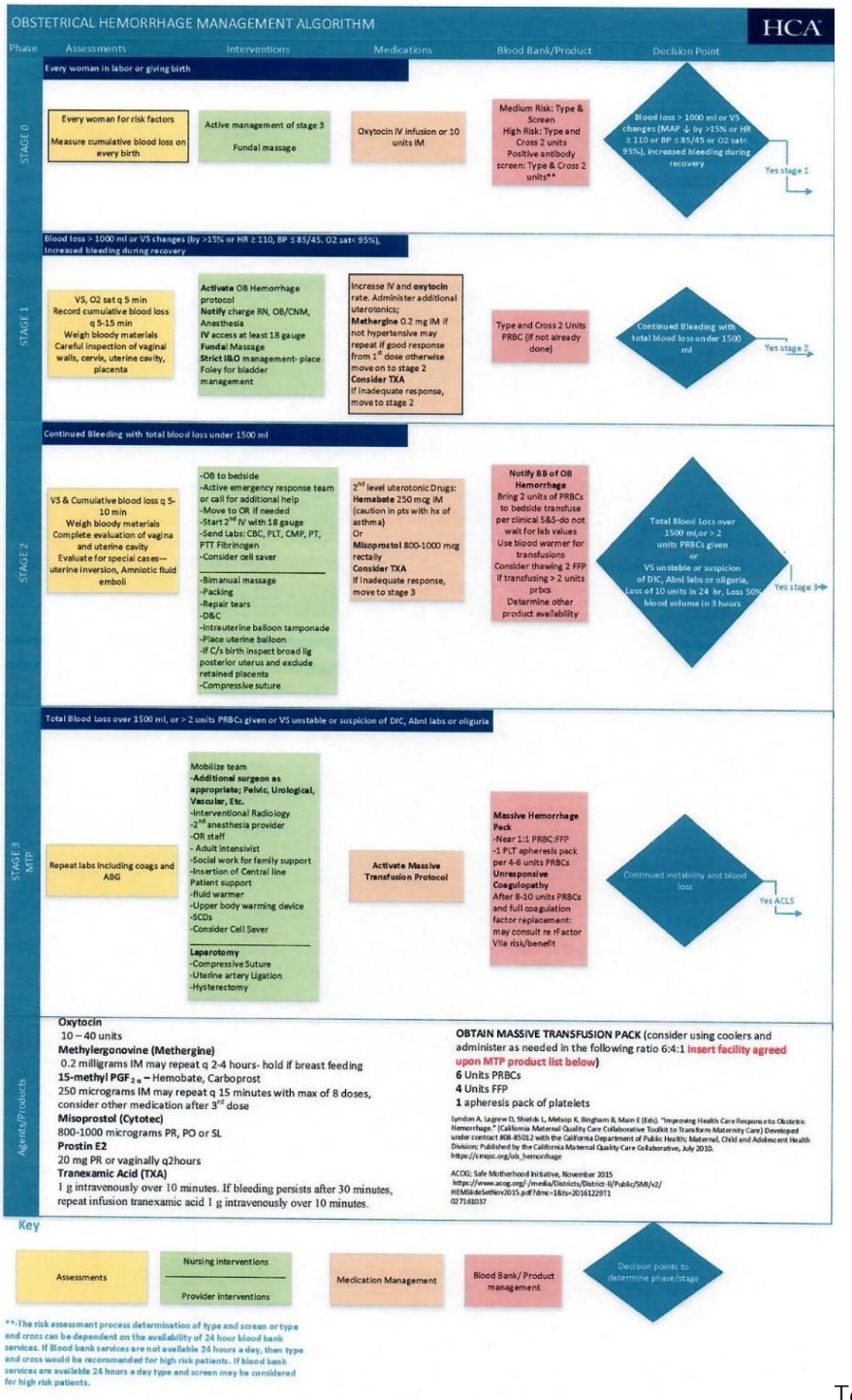
Appendix J: Emergency Management Plan

CMQCC CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE

Obstetric Hemorrhage Emergency Management Plan: Table Chart Format

version 2.0

	Assessments	Meds/Procedures	Blood Bank
Stage 0	**Every woman in labor/giving birth**		
Stage 0 focuses on risk assessment and active management of the third stage.	• Assess every woman for **risk factors** for hemorrhage • Measure **cumulative quantitative blood loss** on every birth	**Active Management 3rd Stage:** • **Oxytocin** IV infusion or 10u IM • **Fundal Massage**- vigorous, 15 seconds min.	• If **Medium Risk:** T & Scr • If **High Risk:** T&C 2 U • If **Positive Antibody Screen** (prenatal or current, exclude low level anti-D from RhoGam):T&C 2 U
Stage 1	**Blood loss: > 500ml vaginal or >1000 ml Cesarean, or VS changes (by >15% or HR ≥110, BP ≤85/45, O2 sat <95%)**		
Stage 1 is short: activate hemorrhage protocol, initiate preparations and give Methergine IM.	• Activate OB Hemorrhage Protocol and Checklist • Notify Charge nurse, OB/CNM, Anesthesia • VS, O2 Sat q5' • Record **cumulative** blood loss q5-15' • **Weigh** bloody materials • Careful inspection with good exposure of vaginal walls, cervix, uterine cavity, placenta	• **IV Access:** at least 18gauge • Increase IV fluid (LR) and **Oxytocin** rate, and repeat **fundal massage** • **Methergine** 0.2mg IM (if not hypertensive) May repeat if good response to first dose, BUT otherwise **move on** to 2nd level uterotonic drug (see below) • Empty bladder: straight cath or place foley with urimeter	• **T&C 2 Units PRBCs** (if not already done)
Stage 2	**Continued bleeding with total blood loss under 1500ml**		
Stage 2 is focused on sequentially advancing through medications and procedures, mobilizing help and Blood Bank support, and keeping ahead with volume and blood products.	**OB back to bedside** (if not already there) • **Extra help:** 2nd OB, Rapid Response Team (per hospital), assign roles • VS & **cumulative** blood loss q 5-10 min • Weigh bloody materials • **Complete evaluation** of vaginal wall, cervix, placenta, uterine cavity • Send additional labs, including DIC panel • If in Postpartum: Move to L&D/OR • Evaluate for special cases: -Uterine Inversion -Amn. Fluid Embolism	**2nd Level Uterotonic Drugs:** • **Hemabate** 250 mcg IM or • **Misoprostol** 800 mcg SL **2nd IV Access** (at least 18gauge) Bimanual massage **Vaginal Birth:** (typical order) • Move to OR • Repair any tears • D&C: r/o retained placenta • Place intrauterine balloon • Selective Embolization (Interventional Radiology) **Cesarean Birth:** (still intra-op) (typical order) • Inspect broad lig, posterior uterus and retained placenta • B-Lynch Suture • Place intrauterine balloon	• **Notify Blood Bank of OB Hemorrhage** • **Bring 2 Units PRBCs to bedside, transfuse per clinical signs – do not wait for lab values** • Use blood warmer for transfusion • Consider thawing 2 FFP (takes 35+min), use if transfusing > 2u PRBCs • Determine availability of additional RBCs and other Coag products
Stage 3	**Total blood loss over 1500ml, or >2 units PRBCs given or VS unstable or suspicion of DIC**		
Stage 3 is focused on the Massive Transfusion protocol and invasive surgical approaches for control of bleeding.	• **Mobilize team** -Advanced GYN surgeon -2nd Anesthesia Provider -OR staff -Adult Intensivist • **Repeat labs** including coags and ABG's • Central line • Social Worker/ family support	• **Activate Massive Hemorrhage Protocol** • Laparotomy: -B-Lynch Suture -Uterine Artery Ligation -Hysterectomy • Patient support -Fluid warmer -Upper body warming device -Sequential compression stockings	**Transfuse Aggressively** Massive Hemorrhage Pack • Near 1:1 PRBC:FFP • 1 PLT apheresis pack per 4-6 units PRBCs **Unresponsive Coagulopathy:** After 8-10 units PRBCs and full coagulation factor replacement: may consult re rFactor VIIa risk/benefit



Terre Haute Regional

Appendix K: Sample Stress Debriefing Policy

MEMORIAL HOSPITAL
And Health Care Center
Sponsored by the Little Company of Mary Sisters - USA
800 West 9th Street ▲ Jasper, IN 47546 ▲ 812/996-2345
www.mhhcc.org

CODE LAVENDER PROCESS

INTRODUCTION: The Code Lavender is a cooperative effort between the Pastoral Care Department, the Social Work Department, the Human Resources Department, Behavioral Health Services, Health and Wellness, and Volunteer Services. The service is based on Memorial Hospital and Health Care Center's Core Value of Compassion Caring, and the desire to assist employees in crisis. The program is made possible in cooperation with a grant funded by the Little Company of Mary.

The plan was developed to assist the Memorial Hospital and Health Care Center workforce in emergency situations in which staff support is needed immediately or in which resources have been stressed, resulting in difficult working conditions for our employees. When such crisis occurs, the Code Lavender will serve to lessen the impact that the crisis has on hospital employees or the unit directly affected by the incident. During these critical minutes, the following guidelines should be followed by our entire hospital workforce.

A Code Lavender is a response to an employee or a department is in crisis. The Code Lavender is an immediate measure to provide comfort and support to safeguard the mental health and well-being of our hospital staff during but not limited to perceived stressful events.

GENERAL GUIDELINES:

A. The Code Lavender Team at this hospital is comprised of the following primary roles-see attached for workflow of responsibilities:
   - The Department Director, Clinical Manager, or Charge Nurse for the Unit
   - House Supervision
   - Chaplain
   - Clinical Social Worker (when available or by referral)

B. The following secondary workforce members maybe be part of the Code Lavender Team, if requested:
    - Secondary Chaplains
    - Additional Volunteers
    - Human Resources (Only when Employee Assistance Program is necessary for employees)
    - Health and Wellness Educators
    - A representative from Administration

C. A Code Lavender may be initiated by a Department Director, House Supervisor, Clinical Manager (or Charge Nurse in the absence of the House Supervisor.)

D. The initiator of such event will immediately page the Hospital Chaplain. The Chaplain will respond to the department in need for the purpose of assessment, comfort and support of hospital employees. The Chaplain will make appropriate referrals to a clinical social worker when appropriate or when needs for counseling exceed sustaining pastoral care, or when such a visit will be beneficial to the well-being of staff.

INITIATION OF CODE LAVENDER:

A. **A Code Lavender should be initiated upon request from a Department Director, House Supervisor, Clinical Manager or Charge Nurse. The Chaplain will then be paged according to current paging protocol and respond to the Code Lavender.**
    - Page Pastoral Care during the working hours and the On-Call Chaplain after hours at (XXX) XXX-XXXX.

RESPONSE TO CODE LAVENDER PAGE:

Only the following workforce are expected to respond to any Code Lavender.

The hospital Chaplain will be the primary responder to the Code Lavender page. The chaplain will then respond the respective location with Code Lavender Basket and offer additional amenities if appropriate.

- The chaplain on duty will assess the event
- The chaplain will contact additional support personnel if the event is of great magnitude such as a Disaster Alert (See PolicyStat Disaster Alert policy).

- The chaplain will provide care for our staff members including but not limited to: spiritual care, opportunities for prayer or reflection, nutrition and hydration (especially for workers or departments who have not had that opportunity due to workload)
- The chaplain will be responsible for making referrals to appropriate support services and consider if a critical incident stress debriefing is warranted.
- The chaplain will consider and refer to Health and Wellness the names of individuals who may benefit from health and fitness programs after gaining the employees permission to do so.

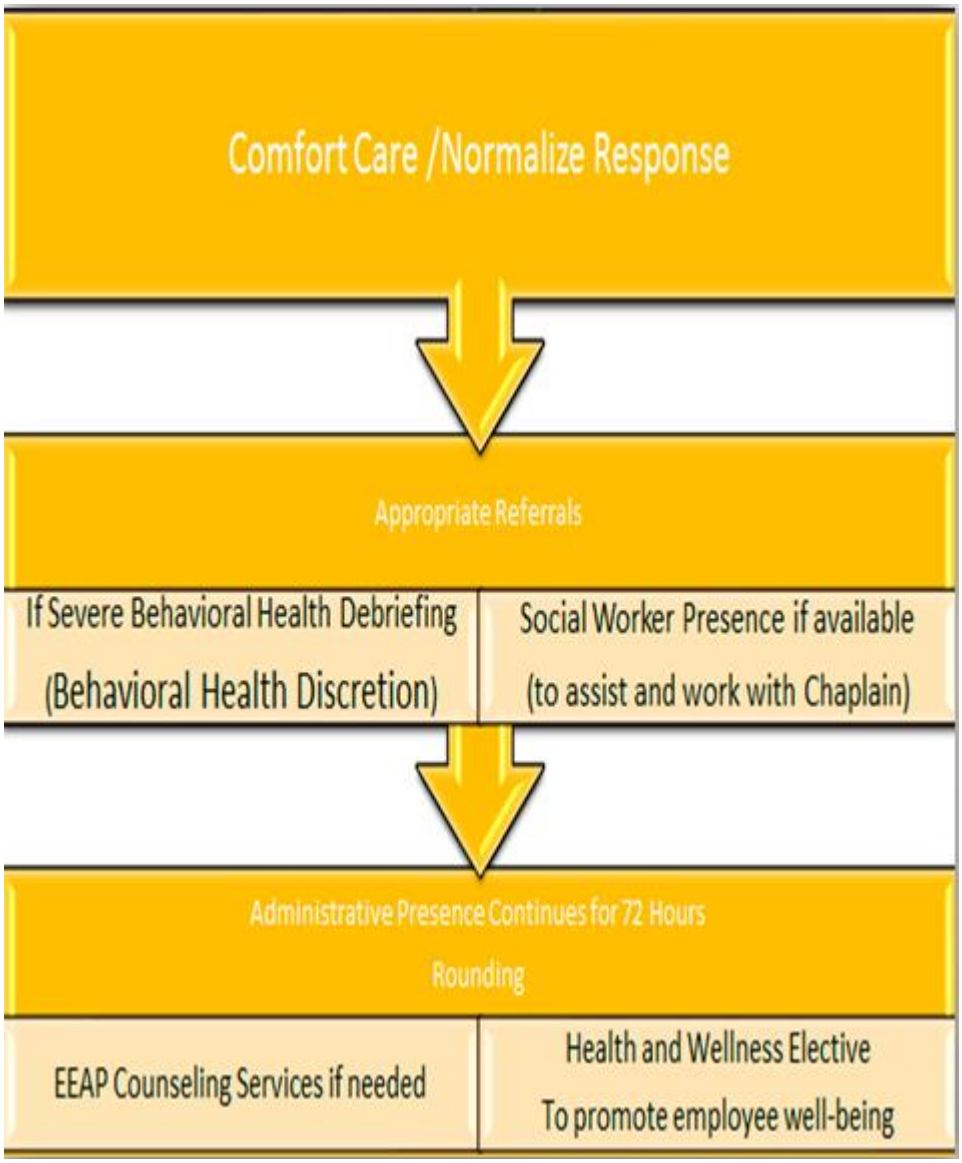
CODE LAVENDER EQUIPMENT AND SUPPLIES:

A. **Stocked Code Lavender Cart located in the Pastoral Care Office. The cart will be maintained with enough supplies for two Code Lavender responses and will be maintained in a standard format.**

REVIEW OF CODE LAVENDER PLAN:

A. The Pastoral Care Team will review the Code Lavender Plan on an annual basis and recommend changes or approve the existing process. The recommended changes and/or approval of the process will then be taken to the Executive Director of Mission Integration for final approval.

CODE LAVENDAR RESPONSE WORKFLOW

- 

Appendix L: Patient Clinical Summary After a Severe Maternal Event

Patient Information				
Patient Name				
Date of SME				
SME Clinician			Phone	
SME Type	☐ Obstetric Hemorrhage ☐ Severe Hypertension/Preeclampsia ☐ Venous Thromboembolism ☐ Other:			
Baby	GA (in weeks)	Birthweight	Length	
Clinical Summary				
Surgery	Date			
	Type			
	Organs Removed	List		
Interventional Radiology	☐ Yes ☐ No	Date		
		Type		
		Result		
Imaging Tests	☐ Yes ☐ No	Date		
		Type		
		Result		
Blood Transfusion	Type of Blood Products	☐ Red Blood Cells ☐ Platelets ☐ Plasma		
	# of Units	# ____ Red Blood Cells #____ Platelets # ____ Plasma		
Medical Treatments	List:			
Follow-up				
Clinician Name			Phone	
Pathology/Autopsy			Phone	
For further information, please contact the Hospital Medical Record Office to request your complete medical record.				
Medical Record Office			Phone	
Notes				

Reference: CMS Patient Clinical Summary Guidelines

Appendix M: Hospital Audit Tool: Risk Assessment of OB Hemorrhage

Process measure – Document how often a new approach is occurring.

Review 20 vaginal and cesarean randomly selected deliveries monthly – or – review 80% of all deliveries monthly if delivery volume is <500 deliveries annually.

Examples:

- Hemorrhage Risk Assessment:
  - Numerator = Number of charts with hemorrhage risk assessment on admission documented
  - Denominator = Total number of audited charts
  - Goal: 100% of patients have risk assessment on admission - See sample hospital audit tool that follows
- Quantification of Blood Loss:
  - Numerator = Number of charts with QBL by volume and weight measures
  - Denominator = Total number of audited charts
  - Goal: 100% of patients have blood loss assessed by QBL

HOSPITAL AUDIT TOOL: RISK ASSESSMENT FOR OB HEMORRHAGE

Topic: Risk Assessment for obstetric hemorrhage is documented in the chart at admission
Goal: 100% of women are assessed for risk of obstetric hemorrhage on admission

	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery
Risk Assessment is documented in the chart	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery
Risk Assessment is documented in the chart	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery
Risk Assessment is documented in the chart	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery	MR# ☐ Vaginal Delivery ☐ Cesarean Delivery
Risk Assessment is documented in the chart	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Total number of audited charts with:

Numerator: _______ risk assessment documented in chart

Denominator: ______ total number of charts audited