

FLORIDA OBSTETRIC HEMORRHAGE INITIATIVE (OHI) TOOL KIT

A QUALITY IMPROVEMENT INITIATIVE FOR OBSTETRIC HEMORRHAGE MANAGEMENT

Version 12/2014

Florida Perinatal Quality Collaborative At The Lawton and Rhea Chiles Center for Healthy Mothers and Babies



Partnering to Improve Health Care Quality for Mothers and Babies











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This toolkit has been adapted and modeled from the California <u>Improving Healthcare Response to Obstetric</u> <u>Hemorrhage Toolkit</u>:

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Dedication:

The Florida OHI Toolkit is dedicated to the individual members of the OHI Advisory Team and the OHI partners who have provided their leadership, resources, expert feedback and time to customize the toolkit for Florida hospitals. These efforts made it possible to launch the Florida initiative in a very short period of time with the most recently available information.

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INTRODUCTION

This document is a working draft that reflects a review of clinical, scientific and patient safety recommendations. The information presented here should not be used as a standard of care. Rather, it is a collection of resources that may be adapted by local institutions in order to develop standardized protocols for obstetric hemorrhage. We acknowledge the California Maternal Quality Care Collaborative (CMQCC) and the comprehensive work that they have completed in this area. With permission, we have reprinted, revised and updated portions of the California toolkit to reflect contemporary practices.

Scope of the Problem

Postpartum hemorrhage (PPH) is a leading cause of pregnancy-related mortality in Florida and the remainder of the United States.[1] While deaths due to PPH have declined in developed countries because hospitals have easier access to blood products, the incidence of PPH has doubled in the recent decade. [2] Early identifications and intervention are key components in the management and the ability to prevent postpartum hemorrhage as well as to decrease related severe morbidity.

The overall goals of the Obstetric Hemorrhage Initiative Tool Kit are:

- 1. To decrease short- and long-term morbidity and mortality related to obstetric hemorrhage in women who give birth in Florida
- 2. To guide and support maternity care providers and hospitals in implementing a multidisciplinary team for obstetric hemorrhage prevention and management.

This toolkit will provide obstetric care providers, hospital personnel and the collaborating services with the resources to locally develop their own obstetric hemorrhage policies and protocols.

Every US birthing facility should implement a policy to address Obstetric Hemorrhage events that is specific to the resources and needs of the individual institution. The policy will need to address the multidisciplinary care required for these patients because the root causes of severe maternal morbidity and mortality are often multifactorial involving standards of care, communication, collaboration, and coordination of care. Administration, nursing, obstetrics providers, blood bank staff, and anesthesiology are all critical partners in the multidisciplinary team approach necessary to quality improvement. Development and implementation of a standardized emergency response package (protocols) involving these critical partners is a key component of the Obstetric Hemorrhage policy. The policy should also include protocols and resources to support patients, families and staff. Ideally, there should be a reporting mechanism to identify systems improvement opportunities that may prevent the next case of serious morbidity/mortality. For this reason, some of the expected implementation components of the OHI initiative are related to policy and there will be measures to determine currency in this area.

Another important element is having multi-disciplinary teams in place who know their skill sets and roles in responding to and preventing obstetric hemorrhage. These teams need to train together and practice together in order to maintain and gain new competencies. Because each hospital and care team has differing resource sets, it is important to develop individualized protocols for each facility. A quality improvement team composed of a core set of team members from the involved disciplines must review



current policies and data, determine the priorities for improvement, and develop a work plan to address their needs.

This tool kit is intended to improve:

- 1. Readiness to address hemorrhage by implementing standardized protocols (general and massive).
- 2. Recognition of OB hemorrhage by performing ongoing objective quantification of actual blood loss during and after all births.
- 3. Response to hemorrhage by performing regular on-site multi-professional hemorrhage drills.
- 4. Reporting of OB hemorrhage by standardizing definitions and consistency in coding and reporting.

How to Use This Tool Kit

This tool kit is intended to provide guidance and core concepts for the quality improvement team that will include practice components and administrative components. Hospitals have an obligation to patients, providers and others to assure patient safety and competent care, providers have an obligation to patients and the hospital to practice in a competent, high quality manner. These obligations must be closely tied together and supportive of the multi-disciplinary team including the immediate obstetric care team and the extended team to include blood bank, anesthesia, rapid response teams and others. It is everyone's responsibility to maintain vigilance in having several components in place related to the recognition of potential for hemorrhage, readiness to respond, and report on the outcomes for future improvements. This guide offers the concepts and tools which may be adopted or adapted for local use.

This document is divided into three sections with recommendations for the providers, the hospital and appendices with supplemental information and resources. The toolkit is arranged in a way that makes it easy to access needed sections; however, it is recommended that all staff read the entire toolkit in order to understand both hospital and provider aspects of obstetric hemorrhage management.

The provider section addresses standard definitions, methods for risk assessment, and methods for management. This section is intended for use by the team of care providers (physicians, nurses, advanced practice nurses, lab staff, pharmacy staff, etc.) and covers topics including intervention techniques and special circumstances.

The hospital section includes requirements for preparedness, documentation and training. This section emphasizes the importance of a team of diverse staff, well-stocked carts and available equipment, and ways to document that policy and protocol are followed. This provides an opportunity for facilities to implement change and improve the care provided to women.

Disclaimer

This toolkit is considered a resource. Readers are advised to adapt the guidelines and resources based on their local facility's level of care and patient populations served and are also advised to not rely solely on the guidelines presented here. This toolkit is a working draft. As more recent evidence-based strategies become available, hospitals and providers should update their guidelines and protocols accordingly; the FPQC will also send out updates as well as revise these materials.





FOR THE PROVIDER

Physicians, Nurses, Midwives, Advanced Practice Nurses, Anesthesia, Blood Bank staff, Rapid Response Team members



POSTPARTUM HEMORRHAGE

DEFINITION

There is no single agreed upon definition of postpartum hemorrhage. Using definitions that rely on thresholds such as 500 mL after vaginal delivery and 1000 mL after cesarean section carry with them inaccuracies in the estimation of absolute blood loss. Volume replacement with crystalloid together with the movement of extravascular fluid to the intravascular space during the postpartum period results in concerns over setting an arbitrary threshold drop in hematocrit (e.g. 10%).

Waiting for patient symptoms (e.g. dizziness) or end organ dysfunction (e.g. oliguria) may indicate a blood loss of 10% of the total volume. Therefore, this definition is far too stringent.[19] Clinicians often underestimate blood loss when visual cues and "on the spot" assessments are made. Because of these concerns, it is recommended that clinicians use clinical "triggers," or multi-component thresholds, in an effort to identify maternal hemorrhage status and guide the need for clinical interventions.

Proposed "triggers" include an absolute threshold for **blood loss** (e.g. 500 ml after vaginal delivery), **vital signs** (e.g. >15% increase in maternal heart rate or absolute value >110), **blood pressure** ($\leq 85/45$), as well as **oxygen saturation** (e.g. <95%).

PROPOSED "TRIGGERS" FOR BLOOD LOSS, VITAL SIGNS AND OXYGEN SATURATION			
Categorical Trigger	Vaginal Delivery	Cesarean Delivery	
	500	1,000	
Vital Sign Trigger			
00			
Pulse	>15% increase OR >110 bpm	>15% increase OR >110 bpm	

Table 1: Triggers

RECOGNITION OF RISK

Risk assessment should be performed prenatally, on admission to labor and delivery, immediately prior to birth, and postpartum.

When hemorrhage in the postpartum period is divided into *primary* (≤ 24 hours after delivery) and *secondary* (>24 hours-12 weeks postpartum) causes the identification of risk factors may be easier to recognize. Primary postpartum hemorrhage causes include uterine atony, retained placenta (this includes placenta



accrete/percreta/increta), coagulation abnormalities, lacerations and extensions of the uterine incision, cervical, vaginal, perineal lacerations, and uterine inversion. Secondary causes include sub involution of the placental site, retained products of conception, infection, and inherited coagulation defects (e.g. von Willebrand's disease).

Risk assessment is important in the establishment of any obstetric hemorrhage protocol. Because pregnancy and the postpartum period encompass nearly a one year time span it is important that risk assessment be performed on multiple occasions. It is suggested that this be performed at the initial prenatal visit in order to ascertain a history of obstetric hemorrhage in a prior pregnancy (approximately 10% recurrence risk) as well as a predisposition for bleeding such as occurs in cases of inherited coagulation defects. Next, risk assessment performed near the end of the second trimester or early in the third trimester assists in gaining awareness of obstetrical hemorrhage and nearly 1/3 of pregnancies in the United States are delivered by cesarean section). Finally, risk assessment applied at the time of hospitalization for delivery allows care providers that might be mobilized in the case of obstetric hemorrhage to be alerted, medications that might be necessary to be on hand, and blood products to be made readily available.

When risk assessment tools allow for stratification of risk, measures taken in anticipation of hemorrhage might vary. For example in low risk cases blood might be available in the blood bank and in high risk cases this might be on hand in the delivery room or operating room. In high risk cases, additional surgical personnel should be on alert, whereas in medium risk cases medications should be readily available.

During the intrapartum period, induction or augmentation of labor, protracted labor or an arrest disorder (arrest of dilation or descent), or chorioamnionitis indicate a medium risk of obstetric hemorrhage. Assessment of low, medium and high risk factors during the antepartum and intrapartum periods should include the items listed in the sample risk assessment table on the next page (Table 2).



Table 2: A Sample Risk Assessment Tool Obstetric Hemorrhage Risk Factor Evaluation				
	Low	Medium	High	
Antepartum	 No previous uterine incision Singleton pregnancy ≤ 4 previous vaginal births No known bleeding disorder No history of PPH 	 Prior cesarean birth(s) Prior uterine surgery Multiple gestation >4 previous vaginal births Hypertension-associated conditions History of previous PPH Large uterine fibroids Estimated fetal weight > 4 kg Morbid obesity (BMI > 35 kgm²) Polyhydramnios 	 Placenta previa Low-lying placenta Suspected placenta accreta Hematocrit <30 Platelets <100,000 Active bleeding at admission Known coagulopathy Abruptio placenta 	
Intrapartum		 Induction or augmentation of labor Protracted labor or arrest disorder Chorioamnionitis 		

Adapted from the California Toolkit to Transform Maternity Care[4],[14],[15]

ACTIVE MANAGEMENT OF THE THIRD STAGE OF LABOR (AMTSL)

The data underpinning the concept of AMTSL are continuously evolving. The Cochrane database review that formed the basis of the CMQCC recommendations was replaced in 2011.[3] The World Health Organization released new guidelines in 2012 for prevention and management of postpartum hemorrhage based on a thorough analysis of the developing literature on AMTSL which significantly changed the earlier recommendations.[6] The studies reviewed used differing combinations of AMTSL components which also varied in dosing, timing and technique. The current research most strongly supported the use of uterotonics in the third stage for reduction in severe blood loss, blood transfusion and the use of additional uterotonics.[6] The recommendation for immediate cord clamping has been discontinued and the recommendations for controlled cord traction and sustained uterine massage are weak as the techniques require a skilled provider and the benefits are limited.[6][4]

The studies used in these recommendations compared various incarnations of AMTSL with expectant management. Physiologic management of third stage of labor, which requires a different skill set, may be a viable alternative for low risk women who have received no interventions that increase PPH risk and who have been properly counseled on all the risks, benefits and the alternative of AMTSL.[4]



Further research is still needed to assess the ideal time, dose and route of uterotonic administration in the third stage of labor. We recommend a range of dosage from 10 to 60 units of oxytocin in 1 liter of IV fluid, or the prepackaged dosage of the facility's choice, titrated to the fundal tone and administered at the delivery of the baby. If there is no IV in place, 10 units of oxytocin administered IM is the recommended dosage [62-66].

We recommend that women receive oxytocin and fundal massage. Gentle, controlled cord traction by a skilled care provider is an optional component of active management of the third stage. Research is continuing on the value of some of the other previously recommended components of AMTSL.

QUANTIFICATION OF BLOOD LOSS (QBL)

There is no controversy that after childbirth blood loss and clinical parameters associated with intravascular volume depletion should be closely monitored. However, there is controversy as to whether or not efforts should be made to quantify blood loss compared to utilization of clinical estimates.[6][4] QBL has been reported to improve communication among physicians and nurses resulting in improved treatment decisions.[61]

Inaccuracy of Visual Estimation

While it is common practice in obstetrics to estimate blood loss using visual cues, it is inaccurate. Research has shown that errors include underestimation and overestimation [75-76]. Estimation has been shown to be underestimated by as much as 50% [71]. Other research has shown that training can initially improve the accuracy of visual estimation but within 9 months of training completion the skills had deteriorated [72-73]. Several factors were explored including specialty area and years of experience and were found to be unrelated to the accuracy of estimation [73][75][77]. More recent data has shown that quantification of blood loss using measures is significantly more accurate than estimation [77].

QBL Methods

While quantification remains inexact, it is more accurate than a "guesstimate." See <u>Appendix J: Tips for</u> <u>Quantification of Blood Loss</u>.

1. Weighing of blood soaked items

Quantification by weighing pads and sponges after use and subtracting dry weight of the materials; using charts with the dry weights and weight of blood to calculate the blood loss [1 gm = 1 ml] is strongly recommended.[78]

 Utilization of graduated collection containers, including calibrated under-buttocks drapes. Use of this method requires accounting for other fluids such as urine and amniotic fluid in doing the calculation.[78]



Transitioning from EBL to QBL

Because there has been long standing practice of estimating loss primarily from experience that does not include formal training, there is sometimes resistance to the practice (see <u>Appendix I: Testimonials</u>). This practice of estimating can present patient safety concerns. Training on the methods of quantification and communicating the quantities is vital to success (See <u>Appendix H: Frequently Encountered Clinical</u> <u>Concerns and Responses to QBL</u>). Just as clinicians rely on strong data in other aspects of clinical care, it is critical that blood loss quantification play an integral role in obstetrics—it is a matter of patient safety.

Clear communication is important in order to translate the message into quick action; therefore it must be interpreted clearly. If the message is not clear the team response may be ineffective or incorrect. The use of terms such as scant, small, minimal, moderate, heavy, or excessive bleeding are subjective and not defined, therefore they vary from clinician to clinician. Use of specific terms and measures provides a consistent way to share information. A clear communication provides a more accurate sense of how the patient is fairing and provides greater opportunity for an early team response before the cascade of hemorrhage and its sequelae can begin.[61]

Subjective Statement	Objective Statement
"She's bleeding a lot"	"She has a 1200 ml QBL"
"She saturated 2 pads in 1 hour"	"She has a Stage 2 PPH"

Tips for Documentation of QBL [78]

- QBL is part of ongoing postpartum recovery documentation
- Maintain real time, vigilant surveillance of blood loss
- QBL is entered at each peripad or chux change but items may be grouped together
- Ensure that blood loss is totaled and communicated to other team members at regular intervals
- Document QBL at birth then ongoing QBL until the patient is stable (approximately 2 to 4 hours)
- Adjust electronic medical records to perform the math, if possible.
- 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

Blood Loss Staging

Birthing facilities should develop and maintain protocols addressing levels of clinical involvement in care. Obstetric hemorrhage protocols should guide all staff and clinicians involved in a hemorrhage event through stages of management.

Several stages of obstetric hemorrhage have been defined (see Examples of OB Hemorrhage Care Guidelines included in <u>Appendix C: FPQC Hemorrhage Care Guidelines</u> or <u>CMQCC Sample Care Guidelines</u> for details). Generally, estimated blood loss, vital sign changes, interventions being utilized, and clinical picture establish the transition of patients from stage 0 obstetric hemorrhage (least serious) to stage 3 (the most serious). Please see the blood loss staging table below (Table 3).



				CLINICAL
STAGE	BLOOD LOSS	VITAL SIGNS	INTERVENTION	PICTURE
Stage 0	<500 mL (VB)	Stable	Oxytocin utilized	Normal LOC
-	<1000 mL (C/S)			
Stage 1	>500 mL (VB)	>15% change HR	Additional measures, as	Increased
-	>1000 mL (C/S)	or	outlined in Care	bleeding
		$HR \ge 110 bps or$	Guidelines (e.g.	
		$BP \le 85/45 \text{ mm}$	administer additional	
		HG	uterotonic agents)	
		O2 sat <95%		
Stage 2	500 – 1500 mL (VB)	Continued vital	Blood products	Continued
	1000 - 1500 mL (C/S)	sign instability	considered or initiated	bleeding
Stage 3	>1500 mL	Vital signs	>2 units PRBC's	Suspicion for
Ū		unstable	transfused	DIC

Table 3: Blood Loss Staging

VB = vaginal birth, C/S = cesarean section, PRBC's = packed red blood cells

Cumulative Blood Loss

Cumulative blood loss is to be recorded in the patient's chart during labor and delivery, and a handoff report provided to postpartum staff. Cumulative blood loss should be recorded until the patient is physiologically stable (approximately 2 - 24 hours).

Recommendation

Because it is clear from randomized controlled trials that visual estimates of blood loss routinely underestimate the degree of hemorrhage and that training courses used for purposes of quantifying blood loss after vaginal and Cesarean delivery result in more accurate accounts of blood loss, the FPQC recommends hospitals and providers undergo training and routinely quantify blood loss during the immediate postpartum period for purposes of diagnosing primary postpartum hemorrhage.



INTERVENTIONS

Instituting the most appropriate interventions for postpartum hemorrhage will require an initial assessment of possible causes. The obstetric etiologies of postpartum hemorrhage may focus on four areas: Tone, Trauma, Tissue, and Thrombin. Following vaginal delivery, hemorrhage may be due to one of the following: 1) uterine atony 2) retained placenta/products of conception 3) lacerations. Etiologies of hemorrhage identified at the time of cesarean section include: 1) uterine atony, 2) adherent placenta, 3) placenta accreta/increta/percreta, 4) extension of the hysterotomy, and 5) uterine rupture. Care providers should carefully assess for the most likely cause of the hemorrhage and initial management should be aimed at addressing the primary etiology. For example, address uterine atony initially with medications and consider manual extraction of the placenta or curettage using a banjo/bovine curette in cases of retained placenta/products of conception. Surgical approaches are most appropriate in the primary management of lacerations, and extensions of the hysterotomy.

MEDICATIONS

Utilization of oxytocin to facilitate the third stage of labor has been recommended worldwide in an effort to reduce the risk of postpartum hemorrhage. When postpartum hemorrhage due to uterine atony is encountered during the third stage of labor, medical interventions are appropriate. See table 4 below for suggested uterotonic medications for postpartum hemorrhage. Although misoprostol (Cytotec) is included in this table there is emerging controversy surrounding its utility in the face of risks to the patient especially when high doses are utilized. Utilization of these agents may also be of benefit when postpartum hemorrhage occurs in cases other than uterine atony. If there are no results with one agent, move to the next.



UTEROTONIC AGENTS for POSTPARTUM HEMORRHAGE						
Drug	Dose	Route	Frequency	Side Effects	Contraindications	Storage
Pitocin ® (Oxytocin) 10 units/ml	10-40 units per 1000 ml, rate titrated to uterine tone	IV infusion	Continuous	Usually none Nausea, vomiting, hyponatremia ("water intoxication") with prolonged IV admin. ↓ BP and ↑HR with high dose, esp. IV push	Hypersensitivity to drug	Room temp
Methergine ® (Methylergoni vine) 0.2mg/ml	0.2mg	IM (<u>not</u> given IV)	-Q 2-4 hours -If no response after first dose, it is unlikely that additional does will be of benefit	Nausea, vomiting, severe hypertension, esp. with rapid administration or in patients with HTN or preeclampsia	Hypertension, PIH, Heart disease. Hypersensitivity to drug - CAUTION if multiple does of ephedrine have been used, may exaggerate hypertensive response w/possible cerebral hemorrhage	Refrigerate Protect from light
Hemabate ® (15-methyl PG F2a) 250mcg/ml	250mcg	IM or intra- myometri al (<u>not</u> given IV)	-Q 15-90 min. Not to exceed 8 doses/24hrs. If no response after several 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
Cytotec ®* (Misoprostol) 100 or 200 mcg tablets	800- 1000mcg	Per recom (PR)	One time	Nausea, vomiting, diarrhea, shivering, fever (transient), Headache	Rare known allergy to prostaglandin Hypersensitivity to drug	Room temp

Table 4: Uterotonic Medications

Adapted from the California Toolkit to Transform Maternity Care.[4]

*Note that studies and related commentary surrounding the use of Cytotec ® in the management of obstetric hemorrhage point to little or no advantage over the agents noted above the heavy black line. We suggest the agents above the line be used primarily, and Cytotec ® be used in low resource settings.[16]-[18][19]



BLOOD PRODUCT REPLACEMENT

The comments in this section regarding blood product replacement draw from the California Toolkit to Transform Maternity Care: Improving Health Care Response to Obstetric Hemorrhage.[4]

Massive Transfusion Protocol

We recommend that every obstetrical unit have a massive transfusion protocol that is coordinated with the blood bank and anesthesia. This protocol will often be implemented at around 4 units of blood products transfused.

Packed Red Blood Cells

Attempts should be made to maintain the patient's hematocrit between 21 and 24%. One should anticipate a rise in hematocrit after a single unit by about 3% in an average sized adult.[20] The number of units of packed red blood cells to transfuse should be determined by the stage of obstetric hemorrhage and the patient's response to therapy. When blood transfusion is considered and appropriately crossmatched blood is unavailable from the blood bank, consideration should be given to the use of uncrossed matched O negative blood while the blood bank continues to make efforts to complete a patient specific type and crossmatch.

Fresh Frozen Plasma

Fresh frozen plasma consists of the acellular portion of blood. The volume of a unit of fresh frozen plasma is approximately 250 mL. Fresh frozen plasma must be ABO – compatible. Once thawed it should be transfused immediately or maintained at 6°C for up to 24 hours.[20] In the absence of a patient specific crossmatch one can request AB negative fresh frozen plasma. This plasma is devoid of antibody against red blood cells expressing A or B antigens. Current recommendations are to keep a high ratio of packed red blood cells to fresh frozen plasma (e.g. 6:4 or 4:4). Fresh frozen plasma is generally initiated during stage III obstetric hemorrhage.

Platelets

Prophylactic preoperative transfusion is rarely required when the platelet count is >100,000/uL. Major invasive procedures (excludes vaginal delivery) generally require platelet counts of at least 40,000 – 50,000/uL. The threshold used for regional anesthesia is typically around 80,000/uL.[20] In the face of massive obstetric hemorrhage, attempts should be made to keep the platelet count between 50 and 100,000/uL. A plateletphoresis unit is derived from the equivalent of six units of whole blood wherein the platelets are pooled. A single donor unit given to an average sized patient can be expected to raise the platelet count by 40,000 - 50,000/uL. Once in stage III obstetric hemorrhage, one unit of platelets should be provided for every four or six units of packed red blood cells.

Cryoprecipitate and Fibrinogen

Cryoprecipitate is an acellular blood compound that contains at least 80 IU of factor VIII: C and 150 mg of fibrinogen. Additionally, cryoprecipitate contains factor VIII: vW F, factor XIII (participates in fibrin cross-linking), and fibronectin. These blood complements are in relatively low volumes of plasma (5 – 20 mL) when a unit of cryoprecipitate is ordered. Cryoprecipitate is typically pooled and derived from 6 to 10 donors. The volume of cryoprecipitate is indicated on the label.[20] A 10 unit pooled bag of cryoprecipitate is expected to increase the fibrinogen level in an average sized patient by 75 mg/dL. Another useful



approximation is to treat hypo-fibrinogenemia with one unit of cryoprecipitate for each 7 to 10 kg of body weight.[20]

BLOOD PRODUCTS			
Product	Considerations	Advantages	
Packed Red Blood Cells (PRBC)	Approx. 35-40 min. is needed for crossmatch – assuming no sample is in the lab and assuming no antibodies present If antibody positive, may take 1-24 hrs for crossmatch Tranfuse O Negative blood if you cannot wait for crossmatching	Best first-line product for blood loss 1 unit = 250 mL volume, typically increases Hct by 3%	
Fresh Frozen Plasma (FFP)	Approx. 35-45 min to thaw for release	Highly desired if >2 units PRBCs given, or for prolonged PT, aPTT>1.5x control 1 unit = 250 mL volume and typically increases Fibrogen by 10mg/dL	
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 40-50k transient increase in platelets	
Cryoprecipitate (CRYO)	Approx. 35-45 min to thaw for release	Priority for women with Fibinogen levels <80 10 unit pack typically raises Fibinogen 80- 100mg/dL Caution: 10 units come from 10 different donors, so infection risk is proportionate	

Table 5: Blood Products

Additional information regarding the use of blood products can be found in the Acute Adverse Effects table in the <u>Appendix C</u> of this document.



SURGERY AND DEVICES

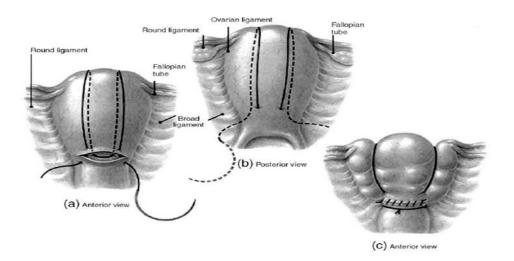
The identified etiologies of the hemorrhage and the response to noninvasive interventions are the guide to appropriate surgical intervention.

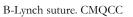
<u>Curettage</u>

Utilization of a banjo/bovine curettage should be considered first after a vaginal birth, especially when obstetric hemorrhage is a result of retained products of conception. The patient should be transferred to the operating room for the curettage and volume resuscitation. Risk factors for retained products of conception include abnormal placenta implantation, multiple gestation, eccentric/velementous insertion of the umbilical cord.

Strategically Placed Sutures

B–Lynch sutures are placed in response to uterine atony that is refractory to medical therapy. These sutures are most commonly placed at the time of cesarean section or after vaginal delivery when medical management of uterine atony fails. (See figure below)





O'Leary stitches can be placed below an inferior lateral extension of a hysterotomy. These extensions are identified most commonly after labors complicated by arrest disorders. Using a non-cutting needle, branches of the uterine artery in the broad ligament are ligated by passing the needle through a clear space in the broad ligament then through the interior. Importantly, this suture must be placed inferior to the most distal portion of the extension. Every effort should be made to ensure the ureter is not ligated upon placement of this suture.

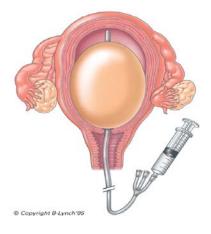
Uterine artery ligation has been described but in most circumstances requires an experienced surgeon in order to avoid worsening hemorrhage due to venous disruption in the retroperitoneal space and or improper ligation of the posterior branch of the uterine artery. In many centers uterine artery ligation is performed with the assistance of a vascular surgeon or GYN oncologist.



Balloons and Embolization

Uterine artery balloon tip catheters have been employed preoperatively in cases at high risk for obstetric hemorrhage due to placenta accreta/increta/percreta (planned hysterectomy). Their utility has been challenged. Consensus suggests that these catheters should be placed with the guidance of experienced interventional radiologist. Furthermore, these catheters should not be inflated prophylactically but rather in the event of significant obstetric hemorrhage during planned hysterectomy.

The **intrauterine balloon** (see image below) has been used in the management of obstetric hemorrhage following delivery of a low-lying placenta, in cases of a poorly contracting lower uterine segment, uterine atony, the management of placenta accreta/increta/percreta, surgical implantation, and disseminated intravascular coagulation, and as a temporary measure for patients being considered for uterine artery embolization or hysterectomy.



Bakri Balloon. CMQCC

Uterine Artery Embolization

Arterial blood supply to the uterus is derived from four primary sources which include the right and left uterine arteries (branches of the hypogastric arteries) as well as right and left utero-ovarian arteries. When hysterectomy is performed successfully, adequate ligation of all four sources is required. This can be hindered by the many anastamoses, which occur throughout the adnexae and along the lateral/outer portion of the uterus. Aberrant vasculature is identified in cases of placenta previa, and especially cases of placenta accreta. Thus, in cases of serious hemorrhage, isolation of the utero-ovarian arteries may be routine, but as the operator descends into the pelvis there is routinely a requirement for more than two ligatures to achieve adequate hemostasis.

Reduction of blood flow through the uterine arteries can be achieved by mechanical methods other than placement of suture ligatures. Procedures provided by and interventional radiology (IR) team can be helpful in accomplishing this goal. Placement of hypogastric balloon tip catheters when at-risk patients are identified preoperatively can be helpful. An important aspect is to inflate the balloon tip catheters only when needed because prophylactic inflation may result in unrecognized sources of bleeding and in inability to visualize specific vessels needing attention once the balloon tip catheters are deflated.

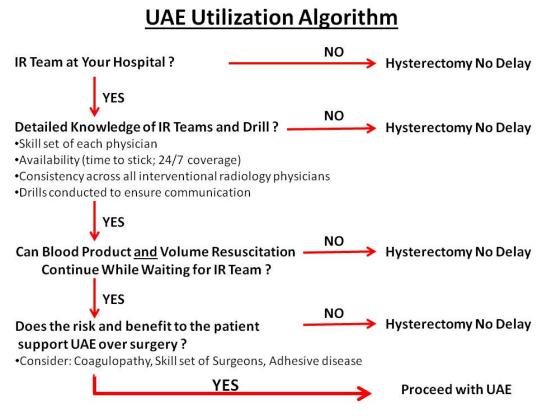
During an ongoing hemorrhage, obstetric providers will be faced with considering hysterectomy to definitively manage hemorrhage. The option of calling an IR team may provide an opportunity to



selectively embolize the uterine arteries, additional branches of the hypogastric artery, and ovarian arteries using gel foam, coils, or "glue" alone or in combination, thus allowing uterine preservation. It is also noted that in some cases UAE following hysterectomy is an appropriate adjunct to mitigate further blood loss. The material chosen for uterine artery embolization (UAE) will depend on the patient's condition, anatomy and acceptable affect. There are several major questions to consider when balancing whether or not to proceed with hysterectomy or UAE. These include:

- 1) Is an IR team available within the hospital system?
- 2) Do obstetric providers have a detailed knowledge of the IR team and Drill together?
- 3) Can blood product and volume resuscitation proceed while waiting for the IR team to arrive?
- 4) Does the risk and benefit support UAE over hysterectomy?

There are no agreed upon professional guidelines on the use of UAE for the treatment of obstetrical hemorrhage. Several reviews on this topic are available.[67][68] Overall, the literature supports UAE as a safe and effective measure to manage both primary and secondary postpartum hemorrhage.[69][70] Critical for any obstetric unit proposing to offer UAE as an adjunct or primary approach to address obstetric hemorrhage is a detailed knowledge of the IR team and whether the skill needed in cases of obstetric hemorrhage can be provided consistently. When this is not the case, hysterectomy should NOT be delayed while considering UAE. Furthermore, drills between the obstetric care providers and the IR team that emphasize communication and patient transfer are crucial to the success of UAE in managing obstetric hemorrhage. It is easy to see from the figure that for UAE to supersede hysterectomy many criteria must be met. However, once an effective practice culture is established, transarterial pelvic interventions provide a useful service in both mitigating the need for hysterectomy and controlling pelvic hemorrhage.





Hysterectomy

Although listed in this sequence of approaches, peripartum hysterectomy should not be delayed in the management of obstetric hemorrhage in cases where medical management fails, bleeding has continued and more conservative nonmedical approaches are either inappropriate to consider or have failed. For those inexperienced with peripartum hysterectomy for obstetric hemorrhage, it is appropriate to mobilize additional personnel that can facilitate this procedure with minimal operative morbidity. Delay in performing a peripartum hysterectomy in response to obstetric hemorrhage can lead to maternal morbidity or mortality.





SPECIAL CIRCUMSTANCES

THE JEHOVAH'S WITNESS PATIENT

The article below is reprinted with permission from the <u>California Maternal Quality Care Collaborative</u> <u>Toolkit to Transform Maternity Care: Improving Health Care Response to Obstetric Hemorrhage.</u>[4]

Obstetric Care for Women Who Decline Transfusions (Jehovah's Witnesses and Others)

Elliott Main, MD, Department of Obstetrics and Gynecology, California Pacific Medical Center, Sutter Health

Background and Literature Review

Given the known rate of obstetric hemorrhage, it is very unsettling to many obstetricians and anesthesiologists to have a patient decline a potentially life-saving treatment. Fortunately, discussions regarding limits to intervention generally occur in advance of emergencies in pregnant women whose belief systems preclude blood transfusion.

The goals of the interaction with the woman who is declining transfusion are the following: 1) to find common ground to manage the birth as safely as possible; 2) to build trust or if not possible, to transfer to a program amenable with the plans; and 3) to develop a well thought out delivery plan to minimize blood loss and maximize decisive decisions. A large study in New York of 391 live births among Jehovah's Witness found 2 maternal deaths from hemorrhage (512 maternal deaths per 100,000 births).[21]

With regard to goal #3, there is a broad movement in the United States to develop skills and promote the concepts of "Bloodless Surgery." While this may sound a bit utopian, there are case series of open-heart surgeries and liver transplants without transfusions. The principles of this approach are listed below:[22]

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
- 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

Not all blood products are "off the table." There is a wide range of acceptable blood interventions within the Jehovah's Witness community—50% will actually take some form of blood transfusions. Therefore it is imperative to begin discussions prenatally to educate and review all possible options to be available at the time of delivery. [23][24]

RECOMMENDATIONS

Prenatal Care

- 1. Comprehensive discussion with a checklist specifying acceptable interventions[25]
- 2. Aggressively prevent anemia (goal: maintain HCT: 36-40%)
 - Iron—PO or IV (sucrose) (+Folate and B12)
 - rh-Erythropoeitin 600 units/kg SQ 1-3x per week (each dose contains 2.5ml of albumin so is not always acceptable)
- 3. Line-up Consultants (consider MFM, Hematology, Anesthesiology)

Labor and Delivery

- 1. Early anesthesia consultation
- 2. Reassessment of hemorrhage risk and discussion of options (e.g. Surgery, Interventional Radiology)
- 3. Review specific techniques (e.g. Options Checklist and Fibrin/Thrombin glues, rFactor VIIa but remember that rFVIIa needs factors to work)[26]
- 4. Review references—Have a Plan![27]
- 5. Be decisive

Postpartum

- 1. Maintain volume with crystaloids and blood substitutes
- 2. Aggressively treat anemia
 - Iron—IV (sucrose)
 - Rh-Erythropoeitin 600 units/kg SQ weekly (3x week); RCT's show benefit in Critical Care units



PLACENTA ACCRETA AND PERCRETA

The article below is used with permission from the <u>California Maternal Quality Care Collaborative Toolkit</u> to Transform Maternity Care: Improving Health Care Response to Obstetric Hemorrhage[4]

Note: Consideration should be given to intraoperative consultation, and referral made to appropriate tertiary facilities.

Placenta Accreta and Percreta: Incidence, Risks, Diagnosis, Counseling and Preparation for Delivery

Richard Lee, MD, Los Angeles County and University of Southern California Medical Center

Background and Literature Review

The rising incidence of placenta accreta is due to the rapidly rising numbers of primary and repeat cesarean births. The most recent data in California shows that 31% of all births are by cesarean section.[28] One study at The University of Chicago showed that between 1982 and 2002 (before the greatest rise in cesarean births) the overall incidence of placenta accreta was 1 in every 533 deliveries.[29]

There are four types of placenta previa: 1) a complete previa occurs when the placenta completely covers the internal os; 2) a partial previa occurs when the placenta partially covers the internal os; 3) a marginal previa occurs when the placenta is located next to the internal os; 4) a low lying placenta occurs when the placental margin is within two centimeters of the internal os, but not next to the internal os.

A placenta accreta occurs when there is abnormally firm attachment of placental villi to the uterine wall with the absence of the normal intervening deciduas basalis and Nitabuch's layer. There are three variants of this condition: 1) *accreta:* the placenta is attached to the myometrium; 2) *increta:* the placenta extends into the myometrium; and 3) *percreta:* the placenta extends through the entire myometrial layer and uterine serosa.

Risk

The risk of placenta accreta is highest in patients with both prior cesarean birth and placenta previa (placenta previa also increases with prior cesarean births). Silver, et al. reported proportionally increased risk of placenta accreta with higher numbers of prior cesareans in women with or without placenta previa.[30]

Diagnosis

A diagnosis of accreta can be confirmed with tissue histology; however, medical imaging can be an effective diagnostic tool. Ultrasound can detect the presence of accrete (80% sensitivity) and absence of accreta (95% specificity).[31]-[34] Warshak et al. reported that in cases with suspicious or inconclusive ultrasonography results, MRI accurately predicted placenta accreta with 88% sensitivity and 100% specificity.[33] While MRI's specificity is enhanced when gadolinium is used, its effects on the fetus remain uncertain; many researchers believe benefits of its use outweigh risks associated with mis- or undiagnosed placenta accreta.[33] A recent Stanford study suggests that high-resolution sonography and MRI give similar results but are complimentary when one modality is inconclusive.[34] Second trimester Maternal Serum Alpha-Fetoprotein (MSAFP) may also be helpful. In two recent studies of patients with placenta previa, MSAFP was elevated in 45% of those with accreta, and not in those without accreta.[35]



Counseling

Providers caring for patients with prenatally suspected placenta accreta should counsel patients extensively about potential risks and complications well in advance of their estimated due date. Patients with accreta are at increased risk for hemorrhage, blood transfusion, bladder/ureteral damage, infection, need for intubation, prolonged hospitalization, ICU admission, need for reoperation, thromboembolic events and death.[30][34]-[36] Discussions should involve relative likelihood for hysterectomy and subsequent infertility.

Delivery Timing

In patients with strong suspicion for placenta accreta, it is strongly advised to perform the delivery before labor begins or hemorrhaging occurs.[35] Therefore, consideration should be given to performing the cesarean birth electively and prematurely, either after corticosteroids for fetal lung maturation or after documentation of fetal lung maturity. The committee could not reach consensus on the recommended gestational age for elective delivery; some tertiary referral centers recommended 32-34 weeks and others 35-36 weeks. All agreed that patients with repeated bleeding episodes or deeper invasion (e.g. placenta percreta) should be delivered early.

Delivery Preparations

Advance planning with anesthesia, blood bank, nursing (OB and OR) and advanced surgeons is an essential first step. Advanced surgeons are gynecology oncologists or experienced pelvic surgeons familiar with the operative management of complex pelvic surgeries. A Massive Transfusion Pack with 4-6 units PRBCs, FFP and Platelets should be available. At the time of cesarean, the hysterotomy should be made away from the location of the placenta. In all but those with focal accretas, a hysterotomy - without disturbance of the placenta-is strongly advised.[35] Blood salvage equipment should also be considered where available.[37] The results of conservative surgery have been recently reviewed with many complications noted (e.g. infection, delayed hemorrhage, reoperation requiring hysterectomy, disseminated intravascular coagulation) and should only be considered in the most select situations.[38] Consultation with experienced surgeons (e.g. gynecologic oncologist) or referral to appropriate facilities is required when a provider lacks appropriate support services or surgical experience with managing placenta accreta. The use of prophylactic intravascular balloon catheters for cesarean hysterectomy for placenta accreta is controversial as a recent large case control study (UC Irvine/Long Beach Memorial) showed no benefit.[39] If a focal placenta accreta is found (typically in the lower uterine segment at the delivery of a placenta previa) management options are broader and include over-sewing, fulguration and placement of an intrauterine compression balloon (with drainage through the cervix/vagina) for 24 hours.



PATIENTS WITH COAGULATION DEFECTS

The article below is used with permission from the <u>California Maternal Quality Care Collaborative Toolkit</u> to Transform Maternity Care: Improving Health Care Response to Obstetric Hemorrhage.[4]

Inherited Coagulation Disorders in Pregnancy

David Lagrew, MD, Saddleback Memorial Medical Center

Background and Literature Review

The coagulation process is a complex biochemical chain reaction involving several pathways and proteins. Genetic abnormalities in any of these proteins can lead to serious coagulation problems. Although relatively rare in pregnancy, such abnormalities can lead to maternal hemorrhage events during antepartum, birth or postpartum and can have deleterious effects on the mother's and baby's health. Identifying patients with inherited coagulation disorders and carefully planning their care is crucial for optimal outcomes. Although postpartum hemorrhage can occur in these patients, coagulation defects are sufficiently rare that routine screening in patients with postpartum hemorrhage will not identify a large number of these patients.[40][41] Though incidence is low, this is an important group of individuals to identify and prepare for.[42]-[46]

The most commonly identified coagulation disorders are von Willebrand's 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). Basic knowledge of these disorders will help to better understand the management recommendations below. von Willebrand Disease (vWD) is the most common hereditary coagulation abnormality described in humans with a prevalence of 1% in the general population.[42][47][48] It occurs less frequently as an acquired disorder (acquired von Willebrand Syndrome) manifested by the presence of auto-antibodies. Von Willebrand Disease is caused by a deficiency of the plasma protein that controls platelet adhesion (VIII:vWF) and decreased activity of the protein that stabilizes blood coagulation (VIII:C). The disorder can cause mucous membrane and skin bleeding symptoms, bleeding with vaginal birth, surgical events or other hemostatic challenges. Women of child-bearing age may be disproportionately symptomatic compared with other age groups.

Several types of vWD have been described.[49] Type 1 individuals make up 60-80% of all vWD cases and have a quantitative defect (heterozygous for the defective gene) but may not have clearly impaired clotting function. Decreased levels of vWF are detected in these patients (10-45% of normal, i.e., 10-45 IU). Most patients lead nearly normal lives without significant bleeding episodes. Patients may experience bleeding following surgery (including dental procedures), noticeable easy bruising or menorrhagia (heavy periods). Type 2 vWD patients (20-30% of all vWD cases) have a qualitative defect and the tendency to bleed varies between individuals. Individuals with Types I and II are usually mildly affected by the disorder and pass on the trait in an autosomal dominant fashion.

Type III vWD is the most severe form; it is autosomal recessive and severely affected individuals are homozygous for the defective gene. Patients have severe mucosal bleeding, no detectable vWF antigen, and may have sufficiently low factor VIII. They can have occasional hemarthoses (joint bleeding) as in cases of mild hemophilia. Most vWD diagnoses are in women with a positive family history or menorrhagia. Blood testing for vWF activity provides confirmation of diagnosis.



Hemophilia A (Factor VIII coagulant deficiency) is a blood clotting disorder caused by a mutation of the factor VIII gene, which leads to Factor VIII deficiency. Inheritance is X-linked recessive; hence, males are affected while females are carriers or very rarely display a mild phenotype. It is the most common hemophilia, occurring in 1 in 5000 males. Women can, on rare occasion, exhibit a homozygous state if both parents carry the disorder. More frequently, carriers show atypical performance of "Lyonization" of the X chromosome (random inactivation of the X chromosome). Usually women have 50% activity but if inactivation of the "normal" gene occurs in greater frequency, lower levels can be seen.[50] Of note, Factor VIII activity usually increases during pregnancy. [51]

Hemophilia B (Factor IX deficiency) is a blood clotting disorder caused by a mutation of the Factor IX gene, also carried on the X-chromosome. It is the least common form of hemophilia (sometimes called "Christmas Disease," after the first afflicted patient), occurring in about 1:30,000 males and very rarely in females. Diagnosis can be made by measuring levels of IX activity in the blood, which does not usually change during pregnancy.

Hemophilia C (Factor XI deficiency) is a rare condition in the general population (less than 1:100,000) but more common in Ashkenazi Jewish patients, and it can occur in both males and females.[52] Up to 8% of these individuals are carriers (autosomal recessive) of the gene, which is located on Chromosome 4. Treatment is usually not necessary because patients have approximately 20-60% factor XI activity; however, they should be closely followed since the postpartum hemorrhage rate is 20%.

Diagnosis in pregnancy of any of these coagulation disorders may be difficult due to the variability of clotting factor activity caused by hormonal changes of pregnancy.[53] When a patient with an inherited coagulation disorder delivers, one must be concerned about extrauterine bleeding and hematomas and the effect of the disorder on the fetus. Cesarean section is rarely recommended.[54] Autoimmune acquisition of these disorders has been described and therefore may occur despite the lack of familial history.

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:[49][50]
 - von Willebrand Disorder: Measurement of Ristocetin Co-Factor Activity and von Willebrand Antigen (VIII:Ag) activity
 - Hemophilia A: Measurement of Factor VIII activity (Factor VIII:C assay)
 - Hemophilia B: Measurement of Factor IX activity (If Factor VIII:C is normal)
 - Hemophilia C: Measurement of 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 partial thromboplastin.
- 3. Affected patients or carriers, or patients with suspected history should consult with a hematologist who has specific interest and knowledge of coagulation disorders.



- 4. Obtain perinatal consultation for planning and coordination of antepartum and intrapartum management.
- 5. Refer patients for genetic counseling regarding possible testing and evaluation of the fetus and newborn.
- 6. 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 hemotologist:
 - von Willebrand Disorder: Mild forms can be treated with desmopressin acetate (DDAVP) but more severe forms require vWF and VIII factor replacement.[46] 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.
 - Factor XI activity: Factor XI concentrates provide the best source for factor XI replacement.





FOR THE HOSPITAL

Physicians, Nurses, Midwives, Advanced Practice Nurses, Anesthesia, Blood Bank staff, Rapid Response Team Members



CRITICAL STAFF AND EQUIPMENT

Success of a maternal hemorrhage initiative is dependent on the right leadership and a multidisciplinary team. Nurse and physician leaders will assist in defining the problem, making the case for change, setting goals and identifying local resources.

It is important to identify the clinical services involved in a response to maternal hemorrhage. These may include but are not limited to obstetrics, anesthesia, surgery, pediatrics, blood bank, critical care medicine, and interventional radiology. The development of a massive transfusion protocol in collaboration with the blood bank is particularly important in these cases and improves response while decreasing cost.[7]

All level of providers should participate in development of policies, simulation drills, and debriefs, including nurses, physicians, midlevel providers and ancillary staff.

Additionally, consistent with State and Federal Guidelines as well as the Joint Commission Statement *Advancing Effective Communication, Cultural Competence, and Patient- and Family-Centered Care*, hospitals are expected to be able to meet the needs of Limited English Proficient (LEP) patients as well as those with other disabilities (e.g. hearing impaired and speech impaired).

CARTS, KITS, AND TRAYS

Postpartum hemorrhage (PPH) is a commonly encountered obstetrical emergency on labor and delivery units. Although medical management is often successful in treating PPH, if there is a lack of response, the obstetrician may have to proceed to surgical measures. For an efficient response to the emergency, the obstetrician should have rapid access to surgical instruments and tools designed to treat PPH. Equipment and instruments compiled on an obstetrical hemorrhage "cart" is designed to treat vaginal/cervical lacerations and perform uterine tamponade or uterine/ovarian artery ligation. In short, the cart would have all the instruments necessary to treat PPH before hysterectomy is considered. A list of recommended instruments is included in <u>Appendix E.</u> Each institution should engage their providers, obtain feedback on the components of the hemorrhage cart and adapt this list based on their own local resources.

SIMULATION DRILLS

Importance of Simulation

Simulation has been used to support training in high stress situations that would be unsafe to rehearse in clinical practice. It offers the opportunity for learning from error without causing harm to the patient, provides for competence acquisition, and the development of clinical reasoning skills.[8]-[10] In obstetrics, simulation has been demonstrated to improve short term response to obstetric emergencies and improved long term recollection.[9][11]-[13]

Medical simulation drills of obstetrical hemorrhage cases can assess system weaknesses and strengths, test policies and procedures for coping with hemorrhage and improve teamwork and communication skills of staff members. Drills that include all disciplines (obstetrics, anesthesia, pediatrics and nursing) can be especially effective in improving team training and communication.



In order to improve success, these simulations should include members of all of the clinical services that are required in the management of an obstetric hemorrhage, represent situations that are as similar to "real life" as possible and include a debriefing post event.

RECOMMENDATION

All hospitals adopt regularly scheduled simulation drills for practicing response to obstetric hemorrhage. Optimal implementation would require that these drills occur onsite with members of all relevant disciplines available. These drills should occur during different shifts. Unscheduled drills may also provide additional information about preparedness. Ideally these should take place on at least an annual basis.[13]

Sample simulations can be found in the CMQCC Toolkit.

DEBRIEFING

Debriefing is a process of information exchange and feedback conducted after an event and is designed to improve teamwork skills and outcomes.[58] Following an obstetric hemorrhage or any major obstetric event, conducting a debriefing will provide the team with the opportunity to decompress while identifying areas for improvement. Simulation participants benefit from the immediate feedback provided during debriefings, increasing learner engagement and enhancing retention of information.[59] Debriefing is a crucial element of the simulation process and results in a higher level of staff preparedness and confidence, contributing to optimal outcomes when emergencies arise.[60]

Led by a facilitator who outlines the debriefing process and assists as a resource to ensure the objectives are met, the participants debrief themselves.[57] The debriefing room should be comfortable, private and away from interruptions and provide the opportunity for all participants to be seen and heard.[57] Effective debriefs allow the participants to look upon the process as a learning opportunity and not a punitive one. The debrief begins with the facilitator providing a recap of the situation, background and key events that occurred. Through a thorough and accurate reconstruction of the events, analysis of why the event occurred, what worked, and what did not work, discussions ensue of lessons learned and what should be done differently in the future.[58]

The basis for a debrief, whether it is impromptu or planned, is to answer the following questions: What did we do well? What did not go so well? What can we improve upon in the future? A simple checklist can be created with the following questions to help aid the process for both the facilitator and the participants: [58]

- What did we do well?
- As a team, assess how the following played a role in the performance of the team:
 - o Team Leadership
 - Situational Awareness
 - o Mutual Support
 - o Communication
- Did we have the equipment and resources necessary?
- Lessons Learned?
- Goals for Improvement?



• What can we do differently?

Debriefing forms for hemorrhage drills and actual PPH emergencies should be developed in conjunction with the risk management office or other department involved with quality analysis such as root cause analyses. The forms should include information such as: the number and type of providers and staff participating; the procedures used; the equipment used; the materials used; the environment; the management and the problems identified through the process. A sample debrief form is available in <u>Appendix G.</u>

HEMORRHAGE DOCUMENTATION

As with other aspects of health care, obstetric hemorrhage prevention and management requires precise and thorough documentation. It is ideal if all departments utilize the same or similar documents for the same care and that communication between departments and levels of care is ongoing and comprehensive. The obstetrical hemorrhage risk assessment tool used in labor and delivery for admission should be similar, if not identical to that used in the physician and midwifery offices. The recovery room documents for cesarean section should contain the same assessment for hemorrhage information as that for the recovery of the vaginal delivery.



CONCLUSION

The Florida OHI toolkit is intended to provide guidance to hospitals and obstetric providers in the development of individualized policies and protocols related to obstetric hemorrhage. It is not to be construed as a standard of care; rather it is a collection of resources that may be adapted by local institutions in order to develop standardized protocols for obstetric hemorrhage. The toolkit will be updated as additional resources become available.

Other resources and references are also available online at the California Maternal Quality Care Collaborative website as cited in the references and appendices. Additionally, ACOG, CDC, HRSA, AWHONN, SMFM, and the American Blood Bank Association, in conjunction with other partners, are working to develop a bundle of care for future distribution.

If you have any questions related to the content or use of this toolkit, please contact the FPQC.

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APPENDICES



APPENDIX A: SAMPLE HEMORRHAGE POLICIES AND PROCEDURES

See: Example Hospital Hemorrhage Protocols

CMQCC Obstetric Hemorrhage Care Guidelines: Sample Policy and Procedure

From the California Maternal Quality Care Collaborative Toolkit to Transform Maternity Care

POLICY INDEX: O	Page 1 of X
POLICY TITLE: Obstetric Hemorrhage Care Guidelines	
DEPARTMENT AND USERS DISTRIBUTION:	
Maternal Child Health, Labor and Delivery, Emergency Department, Operating Roo	om,
Blood Bank, Intensive Care Unit, Post-Anesthesia Care Unit(s)	

Original Date of Issue:

Reviewed Date			
Revised Date			

PURPOSE

The purpose of this protocol is to provide guidelines for the optimal response of the multidisciplinary team in the event of obstetric hemorrhage. This protocol will also aid in recognizing patients at risk for hemorrhage and identifying stages of hemorrhage and primary treatment goals.

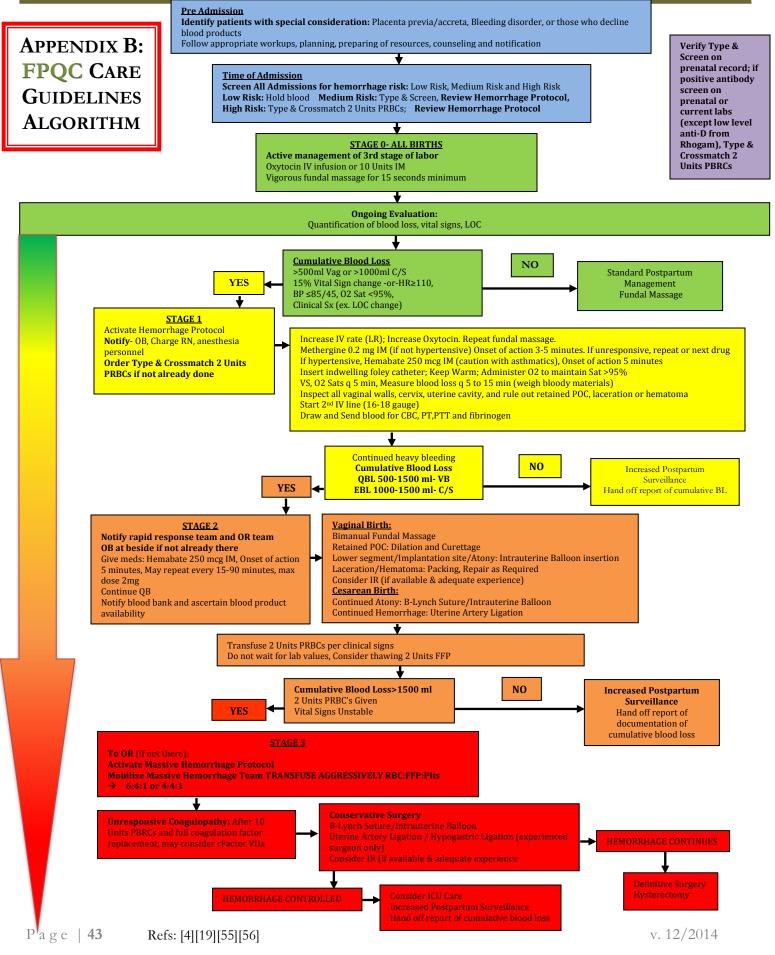
POLICY STATEMENTS

Optimal response to obstetric hemorrhage requires the coordination of effort of team members from multiple disciplines and departments.

- Obstetric unit, anesthesia department, blood bank, operating room, and other appropriate services work together to identify necessary system supports and processes for mounting an efficient and coordinated response to obstetric hemorrhage.
- Obstetric physicians, obstetric RNs, certified nurse midwives, anesthesiologists, and other appropriately qualified clinicians are authorized to mobilize the team to respond to an obstetric hemorrhage.
- The OB hemorrhage critical pack/cart are always kept stocked, not expired, and available for an emergency in all areas of the hospital where women are treated for OB hemorrhage. Note: the assignments for stocking and checking the cart need to be clearly delineated by each hospital. For example: medications will be kept together in an emergency packet in the pharmacy cart on the unit; the emergency medication packet will be maintained by pharmacy; the adult resuscitation cart or a separate resuscitation cart will be designed with an OB hemorrhage supply component.
- The Obstetric (OB) Hemorrhage general and massive policies and procedures will be updated at least every three years.



OHI Tool Kit





APPENDIX C: CMQCC ACUTE ADVERSE EFFECTS OF TRANSFUSION

BLOOD PRODUCT REPLACEMENT: OBSTETRIC HEMORRHAGE, From Holli Mason, MD

	Acute Adverse Effects of Transfusion (Onset within minutes or hours)					
Type of Reaction						
Hemolysis-Immunologic (Acute Hemolytic transfusion reaction)	1:25,000	Red cell incompatibility, usually ABO	Fever, chills, renal failure, DIC, pain, hypotension, tachychardia, anxiety, hemoglobinemia, hemoglobinuria, cardiac arrest.			
Hemolysis-Physical or Chemical	Unknown	Overheating, freezing, addition of hemolytic drugs or solutions.	Asymptomatic hemoglobinuria, rarely DIC, renal failure, hypotension			
Febrile Nonhemolytic	0.5-1.5%	Recipient antibodies to donor leukocytes; or preformed cytokines in blood product	Fever, chills			
Anaphylaxis	1:20,000- 47,000	IGA deficient recipient with antibodies to IgA in donor plasma; antibodies to other plasma proteins, WBCs and platelets.	Respiratory obstruction and cardiovascular collapse, angioedema, anxiety, chills, agitation.			
Urticarial	1-3%	Antibody to donor plasma proteins	Pruritis and hives			
Transfusion Related Acute Lung Injury (TRALI, Noncardiogenic Pulmonary Edema)	Reported 0.001%, 0.02%, 0.34%	DONOR antibody to recipient leukocytes or patient antibody to donor specific HLA or granulocytes	Respiratory distress, pulmonary edema and hypoxemia with normal wedge pressures. "White out" on CXR			
Congestive Heart Failure	Unknown	Volume overload	Respiratory distress			
Septic Complication	1:1000- 7:1000	Bacterial contamination	Usually gram negative sepsis when the transfusion is red cells, gram positive cocci are most common in platelet transfusion			
Hypothermia	Unknown	Rapid infusion of cold blood	Chills without fever			
Hyperkalemia	Unknown	RAPID infusion of stored red cell	Cardiac dysfunction (usually problematic only in infants or those with compromised renal function)			
Hypocalcemia	Unknown	RAPID AND MASSIVE transfusion of stored blood Prophylactic administration of Calcium is not recommended.	Cardiac dysfunction (usually problematic only in patients with SEVERE hepatic insufficiency or neonatal massive exchange transfusion)			



Lyndon A, Lagrew D, Shields L, Melsop K, Bingham B, Main E (Eds). Improving Health Care Response to Obstetric Hemorrhage. (California Maternal Quality Care Collaborative Toolkit to Transform Maternity Care) Developed under contract #08-85012 with the California Department of Public Health; Maternal, Child and Adolescent Health Division; Published by the California Maternal Quality Care Collaborative, July 2010.



APPENDIX D: CMQCC JEHOVAH'S WITNESS BLOOD PRODUCT AND TECHNIQUE INFORMED CONSENT/DECLINE

My signature below indicates that I request no blood derivatives other than the ones which I have designated in this consent be administered to me during this hospitalization. My attending physician,_____M.D. 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______M.D. has also fully explained to me the potential risks associated by not authorizing blood and / or nonblood management during this 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 NO'	Г COMPONE	NTS OF HUMAN BLOOD
Hetastarch		
Balanced Salt Solutions		
MEDICATIONS WHICH CONTAIN A FRA	CTION OF H	UMAN BLOOD
Rhogam		
Erythropoeitin		
Human Immunoglobulin		
Tisseel		
TECHNIQUES FOR BLOOD CONSERVAT	ION / PROCE	ESSING

Hemodilution	
Cell Saver	
Autologous Banked Blood	
Cardiopulmonary Bypass	
Chest Drainage Autotransfusion	
Plasmapheresis	
Hemodialysis	
Other	





PLEASE CIRCLE WHICH ONE APPLIES

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

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

I fully understand the options available to me and hereby release the hospital, 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:



Tool: Jehovah's Witness Consent Form and Management Checklist from:

Lyndon A, Lagrew D, Shields L, Melsop K, Bingham B, Main E (Eds). Improving Health Care Response to Obstetric Hemorrhage. (California Maternal Quality Care Collaborative Toolkit to Transform Maternity Care) Developed under contract #08-85012 with the California Department of Public Health; Maternal, Child and Adolescent Health Division; Published by the California Maternal Quality Care Collaborative, July 2010.



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 (sucrose) with Folate and B12 as needed

rhErythropoeitin 600units/kg SQ 1-3x per weekly as needed

(most preparations have 2.5ml of albumin so may be refused by some

Jehovah's Witnesses)

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,

rFactor VIIa—but remember that rFVIIa needs factors to work)

- □ Review references—Have a Plan!!
- \Box Be decisive

Postpartum

- Maintain volume with Crystaloids and Blood substitutes
- Aggressively treat anemia
- □ Iron—IV (sucrose)
- RhErythropoeitin 600units/kg SQ weekly (3x week)

RCT's show benefit in Critical Care units

For more information, please review: www.CMQCC.org section on "OB Hemorrhage/Jehovah's Witness"



Tool: Specific Checklist for Managment of Pregnant Women who Decline Transfusions from:

Lyndon A, Lagrew D, Shields L, Melsop K, Bingham B, Main E (Eds). Improving Health Care Response to Obstetric Hemorrhage. (California Maternal Quality Care Collaborative Toolkit to Transform Maternity Care) Developed under contract #08-85012 with the California Department of Public Health; Maternal, Child and Adolescent Health Division; Published by the California Maternal Quality Care Collaborative, July 2010.





APPENDIX E: CMQCC CARTS, KITS AND TRAYS CHECKLISTS



Tool: OB Hemorrhage Carts, Kits, Trays-Recommended Instruments, Supplies

RECOMMENDATION

Labor and delivery units construct a sterile tray that provides rapid access to instruments used to surgically treat PPH. Hysterectomy trays are separately available.

OB Hemorrhage Cart: Recommended Instruments

- Set of vaginal retractors (long right angle); long weighted speculum
- Sponge forceps (minimum: 2)
- Sutures (for cervical laceration repair and B-Lynch)
- Vaginal Packs
- Uterine balloon
- Banjo curettes, several sizes
- Long needle holder
- Uterine forceps
- Bright task light on wheels; behind ultrasound machine
- Diagrams depicting various procedures (e.g. B-Lynch, uterine artery ligation, Balloon
- placement)

OB Hemorrhage Medication Kit: Available in L&D and Postpartum Floor PYXIS/refrigerator

- Pitocin 20 units per liter NS 1 bag
- Hemabate 250 mcg/ml 1 ampule
- Cytotec 200mg tablets 5 tabs
- Methergine 0.2 mg/ml 1 ampule

OB Hemorrhage Tray: Available on Postpartum Floor

- IV start kit
- 18 gauge angiocath
- 1 liter bag lactated Ringers
- IV tubing
- Sterile Speculum
- Urinary catheter kit with urimeter
- Flash light
- Lubricating Jelly
- Assorted sizes sterile gloves



Labor and Delivery Emergency Hysterectomy Tray: Available in L&D OR Suite

- 4 Towel Clips, Backhaus (perforating) 5 1/4"
- 4 Mosquito, Curved, 5"
- 2 Clamp, Mixter 9"
- 2 Clamp, tonsil
- 2 Clamp, Allis, Extra long 10"
- 2 Clamp, Allis 6"
- 2 Clamp, Babcock 8"
- 2 Clamp, Babcock 6 1/4"
- 2 Clamp, Lahey 6"
- 2 Clamp, Heaney-Rezak, Straight, 8"
- 8 Kelly, Curved 5 3/4"
- 2 Kelly, Straight 5 3/4"
- 8 Pean Curved, 6 1/4"
- 2 Forceps, Debakey, 9 1/2"
- 1 Forceps, Tissue with teeth 9 3/4"
- 1 Forceps, Russian 8"
- 1 Forceps, Smooth 8"
- 1 Forceps, Ferris Smith
- 2 Forceps with Teeth, 6 "
- 1 Forceps, Russian 6"
- 2 Forceps, Adson with Teeth
- 1 Forceps, Tissue, Smooth, 7"
- 2 Kocher, Straight, 8"

- 6 Forceps, Heaney, Curved, 8 1/4"
- NH, Mayo Hegar, 8"
- 4 Sponge Stick, 9 1/2"
- 1 Scissor, Jorgensen, Curved, 9"
- 1 Scissors, bandage 7"
- 1 Scissors, curved dissecting, Metzenbaum
- 1 Scissors, Mayo, curved
- 1 Scissors, sharp/blunt, Straight, 5 1/2'
- 1 Scissors, Curved Metzenbaum 12"
- 1 Scissors, Mayo Straight 11"
- 1 Scissors, Mayo Curved 11"
- 1 Knife Handle #3
- 1 Knife Handle #4
- 1 Knife Handle #3, Long
- 1 Retractor, Kelly, large
- 1 Retractor, Deaver, Large, 3" x 12"
- 1 Retractor, Deaver, Medium
- 2 Retractor, Med/large Richardson
- 1 Retractor, Balfour Blades
- 2 Retractor, Goulet, 7 1/2"
- 1 Suction, Yankauer Tip
- 1 Suction, Pool Tip



APPENDIX F: OBSTETRIC HEMORRHAGE AUDIT TOOL

Please audit 20 vaginal delivery and 10 Cesarean delivery charts each month.

MR#

Risk Assessment

(Numerator= # charts with risk assessment documented / Denominator= Total Number of audited charts)

Documented in chart \Box Yes \Box No

Active Management of Labor

(Numerator= # charts with both oxytocin and fundal massage documented / Denominator= Total Number of audited charts)

□ Oxytocin IV/IM □ Fundal Massage

Oxytocin administered at delivery of: □ baby OR □ placenta

Cumulative Blood Loss and Quantitative Measurement

(Numerator= Not measured; Estimated with Visual Cues Only; Measured using one or more of the three recommended formal measurements / Denominator= Total Number of audited charts [please audit 10 Vaginal and 10 Cesarean)

□Vaginal Delivery □Cesarean Section

□ Measurement NOT recorded in chart

□ EBL – Visual Estimation of Blood Loss (includes mixed methods)

□ QBL – Quantification of Blood Loss (only used quantification methods)

If QBL, Select all that apply:

□ Formally measured by % saturation with the use of pictures to determine blood volume

□ Formally measured by weighing

□ Formally measured by collection

Adapted the California Maternal Quality Care Collaborative Toolkit to Transform Maternity Care



APPENDIX G: FPQC OB HEMORRHAGE TEAM DE-BRIEFING FORM

Adapted the California Maternal Quality Care Collaborative Toolkit to Transform Maternity Care

Topic: The de-brief form provides an opportunity for maternity service teams to review then document sequence of events, successes and barriers to a swift and coordinated response to obstetric hemorrhage.

Goal: De-brief completed in 100% of all obstetric hemorrhages that progress to Stage 2 or 3. All de-briefs have at least Primary RN, and Primary MD who participates in the de-briefing session.

Instructions: Complete as soon as possible, but no later than 24 hours after any Stage 2 or 3 hemorrhages. During de-brief, obtain input from participants (all or as many as possible). *Attach additional pages with notes as needed.*

(Stage 2 or 3 hemorrhages are defined as bleeding that continues after administration of IV or IM Oxytocin, vigorous fundal massage, emptied bladder and Methergine 0.2 mg IM)

Were the following medications, procedures or blood prod Medications	ucts used? (Check if yes, check all that apply) Post-hemorrhage, the patient required	
□ High dose misoprostol (800-1000 mcg)	(Check if yes, check all that apply)	
Carboprost tromethamine (Hemobate)	□ Intubation □ Central Line	
Blood Volume/Options	Pressors Arterial Line	
Invasive hemodynamic monitoring	□ Admission to ICU □ Admission to higher acuity unit	
□ Blood warmer	(e.g., PACU)	
Rapid fluid infuser (level one machine)	Volume of blood lost: mls	
Blood cell salvage machine (cell saver)	Method of Blood Loss Measurement (Check all that	
Factor VIIa (non-standard treatment)	apply)	
Procedures	Visually Estimated Only	
Intrauterine balloons	Formal Estimate using Posters/Pictures	
B-Lynch suture	Formal Measure by weight	
Uterine artery ligation	Formal Measure by volume collection	
Uterine artery embolization	Blood Product Transfusion Ratios - Active	
Non-pneumatic Anti-shock Garments (NASG; non-	Hemorrhage Treatment and Resuscitation Period	
standard	(~the first 4-6 hours PP)	
treatment)	Units of PRBCs: Units of FFP:	
COMMENTS about medications, procedures, or blood		
products:	Units of Platelets: Units of Cryo:	

Who participated in the debrief? (check all that apply)

- Primary MD/DO/CNM
- □ Primary RN
- □ Other RNs
- Anesthesia

Thinking about how the obstetric hemorrhage was managed... Identify what went well (Check if yes, describe)

- □ Communication went well
- Teamwork went well
- □ Leadership went well
- Decision-making went well
- Assessing the situation went well
- □ Other
- Briefly describe:

Identify opportunities for improvement: "human factors" (Check if yes, describe)

- □ Communication needed improvement
- Teamwork needed improvement
- □ Leadership needed improvement
- Decision-making needed improvement
- Decision-making needed improvement
 Assessing needed improvement
- □ Other
- Briefly describe:

- □ Blood bank staff
- □ Pharmacy
- □ Lab team
- □ Rapid Response team

Identify opportunities for improvement: "nonhuman factors" (Check if yes, describe)

- Delay in blood products availability
- Equipment issues
- □ Medications issues

□ Inadequate support (in-unit or other areas of the hospital)

Delays in transporting the patient (within the

- hospital or to another facility)
- Other

Briefly describe:



APPENDIX H: FREQUENTLY ENCOUNTERED CLINICAL CONCERNS AND RESPONSES TO QBL

Adapted from Bingham, D. & Main, E. [74] and AWHONN Slides from Council on Patient Safety in Women's Health Care QBL Safety Action Series Presentation 8/28/14.

Issue	AWHONN Response
Providers believe that their patients are unique;	Distribute key peer-reviewed literature related to
thus, the research does not apply to their specific	the measurement of blood loss to every nurse and
group of patients.	physician.
Many physicians and nurses have only performed	The lack of experience indicates that there is a
EBL. They are not familiar with how to QBL.	need for more education tactics with QBL details.
The providers are concerned, on the basis of their	Track the number of births quantified and their
training and experience, that if they begin	relationship to early recognition of PPH. Report
quantifying blood loss they will have higher blood	facts and QBL trends to the physicians and nurses.
loss levels which might reflect negatively on their	
practices, putting their reputations in jeopardy.	
"QBL is only needed for cases where a	Measurement of cumulative blood loss is the goal.
hemorrhage is identified."	Often it is too late when we recognize that the
	woman has lost too much blood. Perform regular
	quantification in non- emergency situations to
	prepare the team for the actual PPH event.
"QBL is not exact and therefore it is not worth	The goal is not a "perfect, precise" number. There
doing."	may be some discrepancies from mixing with
	amniotic fluid, urine, irrigant, etc. and this can be
	measured to some degree. It is more accurate to
	do some measurements than to rely solely on
	visual estimates.
"There was fluid already in the canister, just	Since irrigation is usually done after the major
estimating, we forgot it and so it's just an	bleeding is controlled, it may be best to connect to
estimate."	another canister BEFORE irrigating to capture
	this fluid separately. With continued use,
	documenting the measures at birth and then
	ongoing becomes routine practice and there is less
	forgetting to document.
"With QBL, it is now my responsibility to get it	Shared responsibility and accountability is critical
right." "I used to be in charge and still want the	to quality patient outcomes. A shared team
responsibility."	awareness is needed. It is no one person's
$(ODI + 1 + 1 + C)^2 + 1 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + $	responsibility. It is a TEAM responsibility.
"QBL takes a lot of time doesn't it?"	Teams that do QBL report that it becomes routine
	and takes very little additional time. Have QBL
	nurse and physician experts showcase do-ability of
	QBL and describe how they successfully
It's soins to down OD	performed QBL.
It's going to slow down OR room turnover."	Have scales and dry item lists readily available in
	every OR. Develop quick methods for
	totaling/calculating in EMR. Think of the time
	that will be saved by avoiding a hemorrhage event.



APPENDIX I: TESTIMONIALS WHY DO QUANTIFICATION OF BLOOD LOSS IN OBSTETRICS?

"When I was practicing in Ohio, a quality improvement project was initiated for reduction of obstetric hemorrhage. I was skeptical about some of the components and somewhat taken aback to having anesthesiologists or nurses telling me what the blood loss amount was. I had been estimating blood loss for years without any problems and did not see the value for the added time and attention that it would take. That is, until the consistent measurements indicated that estimation was not as safe for my patients as measured quantification.

Over time, I learned from the literature that estimations were often as much as 50% inaccurate, usually underestimating the true loss. I have heard from nurses, that on day two the hematocrit is sometimes low and the patient symptomatic when estimations are used and quantifications ignored. This has made a believer out of me and now, I consistently want to have quantified measurement of blood loss for vaginal and caesarean deliveries. Quantification is not a perfect measurement but is more accurate than guessing . . .

We have the evidence that early recognition of significant blood loss and early intervention is safer for our patients. We need to get over the old thinking that we are not good at our jobs if there is blood loss and move to the evidence based model that says we are best at our work if we recognize and respond appropriately."

Judette Louis, MD, MPH Assistant Professor, College Of Medicine Obstetrics & Gynecology Assistant Professor, Morsani College of Medicine and College of Public Health

"When it comes to obstetric hemorrhage, denial and delay in recognition can equal maternal death. The uterus can bleed 500-800 cc/minute and within 5 minutes of unrecognized hemorrhage a patient can suffer loss of an entire blood volume along with valuable clotting factors. Signs of hypotension are often masked in healthy patients due to increases in cardiac output and vasoconstriction. Quantification of blood loss in the operating room and labor and delivery room is vital to providing early intervention in recognition and treatment of obstetric hemorrhage. As medical providers, we need to join together in accurately measuring blood loss as part of the multidisciplinary approach to obstetric hemorrhage. By putting the ego aside and letting go of estimates, we can move towards evidenced based quantification of blood loss to help providers overcome the denial and delay in treatment of maternal hemorrhage."

Jean Miles, MD

Regional Director Obstetrical Anesthesia Services, Memorial Healthcare System Director Obstetrical Anesthesia, Memorial Regional Hospital Sheridan Healthcorp Hollywood, FL

"When implementing any new initiative among nursing staff it is essential to understand the 'why' behind the purpose of implementing the new process/procedure. QBL allows us to have a more accurate clinical picture of blood loss so we can proactively manage our patients rather than reactively manage their symptoms after they are already occurring. Even the most experienced clinicians can have a difference of opinion when it comes to subjective assessment. QBL is the closest we can come to objectively assessing the blood loss post-delivery so we can improve clinical outcomes for our patients".

Marie Sakowski, MSN, RNC Nurse Manager, Perinatal, Labor and Delivery, Women's Health Pavilion, Florida Hospital Tampa

AWHONN recommends measuring blood loss for every woman who gives births in order to reduce denial that leads to delays in women receiving lifesaving treatments. Measuring blood loss makes an un-reliable subjective process much more reliable.

Debra Bingham, DrPH, RN AWHONN Vice President of Nursing Research, Education, and Practice



APPENDIX J: TIPS FOR QUANTIFICATION OF BLOOD LOSS

Every birth needs to have quantification of blood loss (QBL). Careful planning and training are important to successful implementation of QBL.

Because there is always concern about the mixing of other fluids into the blood loss, the following information is offered to assist in decision making. Average amounts of amniotic fluid have been estimated at 700 ml for normal, 300 ml for oligohydramnios, and 1400 ml for polyhydramnios.[61] It is important to make note of fluids contained in the collection container at the time of infant delivery and continue to measure until the patient is stable, usually 2 to 4 hours postpartum. If there is amniotic fluid collected in the drape or container, this fluid should not be included in the blood loss calculation. Since the majority of blood loss occurs after the delivery of placenta, an establishment of baseline measure of other fluids should occur before delivery of the placenta.[4] The use of a calibrated drape, which has an error rate of less than 15% is recommended for vaginal deliveries.[73] For Caesarean Sections, a two part collection method is recommended, changing to a second container after the infant is delivered or noting the collection amount at the time of delivery.

Methods of QBL:

<u>Weight</u>

- Use scales to weigh all blood-saturated items (e.g., laps, chux, cloth pads, peripads) and clots.
- Standardize products used for deliveries and determine their dry weights.
- Create a laminated list of dry weights of items used during birth that may become blood soaked. Attach to every scale.
- Converting Grams to Milliliters: Calculate the gram weight and convert to milliliters. Grams (a unit of mass) converted to Milliliters (a unit of volume): One gram = One milliliter

Direct Measurement

- Graduated suction canisters
- Under-buttocks and OR drapes with calibrated pouches.

Quantification Tips:

- Measure amount of fluids after birth of the infant. The majority of the bleeding is after the placenta is delivered.
- Keep track of any extra fluids added e.g. irrigants, urine, feces.
- Pre-determine the dry weights of items regularly used and have these weights readily available
- A practical way of measuring blood in laps is to weigh them in groups of 5.
- Adjust electronic medical records to document and perform the math if possible
- Need ready access to measuring devices such as scales, suction canisters, etc.

QBL at Cesarean Deliveries:

- Between delivery of infant and placenta, the OB suctions the drape of amniotic fluid; scrub staff directs circulator to change suction tubing to second canister. Circulator records volume in second canister before irrigation is used (or amount of irrigation to subtract).
- Bloody lap sponges passed off scrub table by staff, circulator weights bloody sponges, and numbers are recorded.
- Train staff to account for other large sources of blood loss, if indicated.



APPENDIX K: MEASUREMENT & DELIVERABLES GRID

OB Hemorrhage Multi-Hospital Collaborative

<u>Aim 1:</u> Reduce the number of massive hemorrhages and the number of major complications from massive hemorrhage, including transfusions and hysterectomies, for all birthing women in participating hospitals by 50% by December 31, 2014.

<u>Aim 2:</u> All collaborative participants develop and implement a multidisciplinary team response to every massive obstetric hemorrhage by December 31, 2014.

Purpose of the Measurement Grid: The measurement grid outlines the measures to be collected over the 18-24 month life of the OB Hemorrhage multi-hospital collaborative. The grid includes the specific parameters for each measure, what data to collect, and how to submit data on the deliverables. Hospital teams may determine their data collection methods.

Process Measures

Identify progress over time in changes to processes of care that affect outcome measures. Measuring the results of these process changes will show if the changes are leading to an improved, safer system.

Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
1. General Department Hemorrhage Policy and Procedure is reviewed and updated	 <u>General Department Policy</u> is reviewed and updated and includes (but is not limited to the following elements): Identify roles and multi-disciplinary team responders for stage 1, 2, and 3 hemorrhages Determine and implement the most 	Create or revise a written general hemorrhage policy and protocol	 At baseline and annually: Submission of general department hemorrhage policy and procedure Date of most recent review and update



	desirable method for maintaining accessibility to the needed OB hemorrhage supplies (Hemorrhage Kit/Cart)		
Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
2. Massive Transfusion Protocol and Procedure is reviewed and updated	<u>Massive Transfusion Protocol</u> is reviewed and updated and includes (but is not limited to) the following elements: Coordination of response with Blood Bank	Create or revise a written massive transfusion policy and protocol	 At baseline and annually: Submission of massive transfusion protocol Date of most recent review and update
3. Cognitive/ didactic education and Skills education conducted with/provided to >80% of existing RN and MD staff and an ongoing education plan is developed for 100% of incoming (new hire/new join) staff	<u>Cognitive/Didactic education</u> includes, but is not limited to, Grand Rounds, Flip Charts <u>Skills education</u> includes, but is not limited to: intrauterine balloons, B-Lynch suturing, quantitative measurement of blood loss	Track the number of existing MD's and non-MD clinical staff who receive didactic/cognitive and skills education Track the number of new hires who receive education on hemorrhage policies and procedures.	 Monthly # of existing MD and # of non-MD clinical staff who received cognitive/didactic education on hemorrhage policies and procedures each month Denominator: # of existing MD's and # of non-MD clinical staff in pool of possible responders Are 100% of new hires receiving cognitive/didactic and skills education on hemorrhage policies and procedures? Y/N
4. Create drills tailored to your hospital P&Ps and responder roles	Have 100% of staff run at least one multi- disciplinary (i.e., doctors and nurses) drill per YEAR to identify system and process improvement opportunities. After each drill complete a drilldebrief form.	Track the number of clinicians and staff involved in drills. Complete drill debrief forms. These forms will be used to track number of drills.	Monthly Submit drill debrief forms to edunn2@health.usf.edu # of MD and non-MD clinicians involved in drills/mo over total # clinicians





Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
5. Percent of women assessed for risk of obstetric hemorrhage on admission	Utilizing an evidence-based risk scoring tool, all women admitted for birth will be assessed for risk of obstetric hemorrhage and the score documented in clinical record so that the risk is considered in the patient care plan for labor and delivery.	Use audit tool to audit 20 randomly selected charts per month. 10 vaginal and 10 c- section. Note whether the risk score was included in the patient care plan for L&D.	 Monthly Numerator: # of women assessed for risk of OB hemorrhage at admission each month Denominator: 20
6. Percent of women receiving Active Management of the Third Stage of Labor	 In order to be considered Active Management, must include two 2 components: Oxytocin (IV or IM) at delivery of the baby Fundal Massage for 15 seconds minimum Optional: Gentle cord traction 	Use audit tool to audit 20 randomly selected charts per month. Note: Administration of oxytocin at delivery of: - Baby - Placenta	 Monthly Numerator: # of women who received active management of the third stage (both oxytocin and fundal massage) Denominator: 20
 7a. Quantitative measurement of blood loss is documented DURING <u>vaginal</u> deliveries 7b. Quantitative measurement of blood loss is documented 	 Quantification and documentation of blood loss is performed (during and after all births until immediate recovery status changes to routine postpartum care and woman is physiologically stable) using 1 or more of the 3 preferred methods: 1. Formally estimate blood loss by recording percent (%) saturation of blood soaked items with the use of visual cues such as pictures/posters to 	Use audit tool to audit 20 randomly selected charts per month. 10 vaginal and 10 c- section.	Monthly Numerators: Not measured Estimated with visual cues only Measured using % saturation Measured using weight Measured by collection
DURING <u>cesarean</u> deliveries	 determine blood volume equivalence of saturated/blood soaked pads, chux, etc. Formally measure blood loss by weighing blood soaked pads/chux, etc. Formally measure blood loss by collecting blood in graduated 		Denominator: 20



	measurement containers.		
Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
8. Documented hand off report assessing for cumulative blood loss, between labor and delivery and postpartum medical and nursing staff for all women with 1000 cc blood loss or greater.	Handoff report assessing cumulative blood loss between L&D and postpartum staff in 100% of cases involving blood loss of 1000 cc or greater These reports are to assure that continued vigilance is maintained for progression of blood loss and appropriate actions taken as needed.	Track # of reports.	Monthly Numerator: # of reports Denominator: # of hemorrhages that advanced beyond 1000 cc / Stage 2 or 3 hemorrhages
9. Frequency of debrief sessions involving MD and non-MD staff that took place for a hemorrhage that advanced beyond 1000 cc /beyond stage 2 or 3	Stage 2 or Stage 3 hemorrhages are defined as hemorrhages that continues requiring additional interventions, treatments, or procedures after the patient received IV or IM Oxytocin, vigorous fundal massage, and either IM Methergine or PR Misoprostol. Stage 2 and 3 interventions are outlined in the CMQCC OB hemorrhage checklist. <i>Recommendation:</i> Completion of debrief is encouraged to occur immediately after the patient is stabilized e.g. when she goes to the recovery area, but no later than 24 hours after event. RN who took care of patient leads debriefing and fills out form	Track all hemorrhages beyond 1000 cc / stage 2 or 3. Track the number of MDs and non-MD staff who participated in debriefings on debrief forms. See "Obstetric Hemorrhage Team DeBriefing Form" or any form that captures the elements contained on this form. Email scan of debriefing to the FPQC	Monthly Numerator : # of debrief forms submitted to FPQC Denominator : # of hemorrhages that advanced beyond 1000 cc / Stage 2 or 3 hemorrhages (hemorrhages that required interventions, treatments, procedures outlined in stage 2 or 3 of the CMQCC OB hemorrhage checklist) each month



Measure Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
10. Percent of women (who gave birth ≥20 0/7 weeks gestation)Blood Transfusion: data from internal source such as blood bank data, patient charts, medical records, Electronic Medical Record bit (EMR), etc.Transfused with any blood product during the birth admissionIf available: Blood loss data recorded in patient record or delivery log.Transfusion: with product for transfusions: 99.0	Data Collection Plan Track the number of women transfused with any blood product during the birth admission. Track the number of women who gave birth (≥20 0/7 weeks gestation) each month	Data Submission/Calculation Raseline Monthly Numerator: # of women (who gave birth ≥20 0/7 weeks gestation) who were transfused with any blood product during the birth admission each month. Denominator: Total # of births (≥20 0/7 weeks gestation) each month



OHI Toolkit

Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
11. Total units of each type of blood product (PRBCs, Platelets, Plasma/FFP, Cryo) transfused during birth admissions per total births	 Work with your blood bank to identify units transfused per month during birth admission of each type: PRBCs Platelets Plasma/FFP Cryo Accounting records can also be an accurate source for these data Cross check data obtained from blood bank and/or accounting with chart reviews 	Track the number of units of each type of blood product per birth admission. Debrief Form: For women who experience Stage 2 or 3 hemorrhage, identify units of PRBCs, Platelets, Plasma/FFP, Cryo (for each woman) on the Debrief Form Track the number of women who gave birth (≥20 0/7 weeks gestation) each month	Baseline Monthly Numerator: Total units of each type of blood product (PRBCs, Platelets, Plasma/FFP, Cryo) transfused during birth admissions each month. • # Units of PRBCs • # Units of platelets • # Units of plasma/FFP • # Units of Cryo Denominator: Total # of births (≥20 0/7 weeks gestation) each month
12. Percent of women (who gave birth ≥20 0/7 weeks gestation) who were transfused with ≥5 units PRBCs during the birth admission	See above	Track the number of women who were transfused with ≥5 units PRBCs during the birth admission.	Baseline Monthly Numerator: Number of women (who gave birth ≥20 0/7 weeks gestation) who were transfused with ≥5 units PRBCs each month. Denominator: Total Number of Births (≥20 0/7 weeks gestation) each month.





Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
13. Rate of peripartum hysterectomies in women (who gave birth ≥20 0/7 weeks gestation) per 1000 births (hysterectomy performed during birth admission) stratified by risk of Placenta Previa and/or Placenta Accreta/percreta	 Peripartum hysterectomies are stratified by: Women with Placenta Previa and/or Placenta Accreta/Percreta Women without Placenta Previa and/or Placenta Accreta/Percreta Women who had a hysterectomy and placenta previa and/or accreta/percreta are reported <u>separately</u> from women who had a hysterectomy and NO placenta previa/accreta/percreta. This measure includes both planned and emergent hysterectomies. 	Peripartum Hysterectomy: Data Collection from internal source such as EMR, medical records, or other method determined by each site ICD-9 Procedure Codes 68.3 Subtotal abdominal hysterectomy 68.39 Other and unspecified subtotal abdominal hysterectomy 68.4 Total abdominal hysterectomy 68.49 Other and unspecified total abdominal hysterectomy 68.49 Other and unspecified total abdominal hysterectomy 58150 Hysterectomy Total/Partial (Use Post- Partum or with Vaginal) 59160 D&C after delivery	Baseline Monthly Numerator: Number of peripartum hysterectomies (performed during birth admission) in women who gave birth ≥20 0/7 weeks gestation each month. • # hysterectomies with Placenta previa/accreta/percreta • # hysterectomies without previa/accreta/percreta • # hysterectomies without previa/accreta/percreta • Births (≥20 0/7 weeks gestation) each month. Annotation for each hysterectomy: • indication for hysterectomy • # of prior c-secs • # of days post-delivery



OHI Toolkit

Measure	Deliverable Specifics	Data Collection Plan	Data Submission/Calculation
14. Percent of women	Note: FFP, RBC or plt 10pack=1 unit	Track the number of	Baseline
(who gave birth ≥20 0/7 weeks gestation) who were transfused with >3 units of any blood product during the birth admission	 Blood Transfusion: data from internal source such as blood bank data, patient charts, medical records, Electronic Medical Record (EMR), etc. If available: Blood loss data recorded in patient record or delivery log. ICD-9 Procedure Code for transfusions: 99.0 CPT Code: 36430: Transfusion, blood or blood components Note that these codes do not typically identify transfusions accurately. We recommend obtaining data from the Blood Bank when possible. Cross check against patient charts as needed. 	<pre>women transfused with >3 units of any blood product during the birth admission. Track the number of women who gave birth (≥20 0/7 weeks gestation) each month</pre>	Monthly Numerator: # of women (who gave birth ≥20 0/7 weeks gestation) who were transfused with >3 units of any blood product during the birth admission each month. Denominator: Total # of births (≥20 0/7 weeks gestation) each month