Editorial

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Planning reduces the risk of maternal death. This tool helps.

Developing—and practicing—standardized clinical responses to massive obstetric hemorrhage reduce the risk of this major cause of maternal death

What do you think of the California guideline for OB hemorrhage? What are its strengths? Weak spots? How does it compare to your hospital's plan?

Tell us at obg@dowdenhealth.com. We'll publish a selection of readers' observations in an upcoming issue.

Obstetric hemorrhage is a major cause of maternal death worldwide. Clinical research conducted in major trauma units shows that mortality can be reduced by:

- developing and practicing standardized processes for responding to massive hemorrhage
- defining, beforehand, the transfusion approach to massive hemorrhage—the so-called **massive transfusion protocol**, or MTP.

Take a look at California's OB hemorrhage guideline

Leaders in obstetrics in California have developed and released a guideline for managing massive obstetric hemorrhage and improving outcomes that involves four ascending stages of response[1]:

Stage 0. Assess women for risk factors for hemorrhage. Actively manage the third stage of labor by administering oxytocin and performing fundal massage.

Stage 1. Activate the hemorrhage protocol when blood loss exceeds what would be considered a normal volume. Immediately:

- assemble appropriate personnel (head nurse, anesthesiologist, additional obstetricians if available)
- establish large-bore intravenous access
- increase the rate of oxytocin infusion
- perform fundal massage
- administer methergine (if the mother is not hypertensive)
- prepare to transfuse 2 units of packed red blood cells (RBCs).

Stage 2. If bleeding continues, assemble the OB rapid response team. Also:

- assess coagulation status
- administer additional uterotonic agents, such as misoprostol and carboprost tromethamine (Hemabate)
- move to an operating room
- consider dilation and curettage
- place an intrauterine balloon
- consider interventional radiology and uterine artery embolization
- consider laparotomy and either uterine compression stitches or hysterectomy.

Stage 3. If bleeding persists and exceeds a predetermined volume:

- activate the MTP
- mobilize additional gyn surgical resources and an additional anesthesiologist
- repeat all laboratory tests
- perform laparotomy and consider hysterectomy.

(Note: This guideline for managing OB hemorrhage is summarized in the California Maternal Quality Care Collaborative's **TABLE**, which is reproduced on page 10b.)

A massive transfusion protocol is invaluable

Evidence from trauma centers demonstrates that an MTP reduces the risk of death and morbidity from major hemorrhage.[2–5] MTPs vary by center, but their common feature is rapid delivery of multiple units of blood, fresh frozen plasma (FFP), and platelets to the operating room (OR) where the mother has been brought.

It's not an exaggeration to say that, in the past, a clinician managing a massive bleed had to beg the blood bank to release adequate blood products. In the new MTP approach, the blood bank sends a standardized amount of products to the OR immediately after the MTP is triggered.

The MTP at Brigham and Women's Hospital. Our MTP calls for 2 units of RBCs and 2 units of FFP to be delivered by pneumatic tube within a few minutes. Additional products—4 more units of RBCs and 2 more units each of FFP and platelets—are delivered shortly thereafter.

There are alternatives: For example, an MTP can call for 6 units of RBCs, 4 units of FFP, and 6 units of platelets to be sent to the OR.

MTPs also emphasize the standardized transfusion ratio of units of RBCs to FFP of roughly 1:1, or 2:1 until coagulation status can be adequately assessed. Some MTPs also define the ratio of units of RBCs to platelets that should be utilized—for example, 5:1.

Common coagulation targets of MTPs are:

- hematocrit, ≥21%
- international normalized ratio (INR), ≤1.5
- platelets, ≥50K/μL
- fibrinogen, ≥100 mg/dL.

Trauma centers have more experience with MTPs, but major obstetric units have also discovered that they help clinicians and patients.[6]

RiaSTAP to the rescue for small OB units?

Many smaller obstetric hospitals do not have adequate blood products immediately available to deal with massive OB hemorrhage. In many cases of OB hemorrhage, all endogenous fibrinogen is consumed, and a key to saving the life of the mother is to replace fibrinogen rapidly.

Recently, the FDA approved a lyophilized fibrinogen concentrate (RiaSTAP) for congenital hypofibrinogenemia. Although RiaSTAP is expensive, it is stable and could be stocked by the blood bank of a small hospital for (off-label) use in massive hemorrhage.

Unlike cryoprecipitate, a commonly used source of fibrinogen that can take 30 minutes or longer to thaw, RiaSTAP can be quickly reconstituted with sterile water.

RiaSTAP might be apppropriate when it would take longer than 30 minutes to thaw cryoprecipitate and fibrinogen infusion is needed sooner. Combining RiaSTAP with FFP would provide most of the critical proteins in the coagulation cascade.

Saving lives worldwide with a balloon catheter

The intrauterine balloon is now widely recognized as a simple intervention that can often resolve massive OB bleeding.[7,8] Two FDA-approved intrauterine balloons are available:

- the Bakri Postpartum Balloon (Cook Medical)
- the BT-Cath (Utah Medical Products).

The Bakri Postpartum Balloon has been widely utilized; clinicians should be familiar with its use. I discussed this device in my February 2009 Editorial (available at www.obgmanagement.com).

The balloon of the BT-Cath has a graded shape that conforms to the lower uterine segment. This feature may reduce the frequency with which the balloon protrudes through the cervix and into the vagina.

In some case series, the intrauterine balloon resulted in resolution of more than 80% of cases of OB hemorrhage.[9–11] It is likely that the worldwide use of an intrauterine balloon could significantly reduce maternal mortality caused by hemorrhage.

Practice, practice, practice!

Firemen practice their response to fire scenarios. Pilots practice their response to various midair catastrophic events. Cardiovascular code teams practice their response to standard cardiac and respiratory arrest scenarios. OBs, OB anesthesiologists, and nurses would be wise to practice their team response to massive obstetric hemorrhage. A standardized plan, including an MTP, will reduce the associated morbidity and mortality.

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Obstetric Hemorrhage Care Summary: Table Chart Format

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

DRAFT

California Maternal Quality Care Collaborative (CMQCC): Hemorrhage Taskforce (2009) visit: www.CMQCC.org for details

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