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.

OBG Management

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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.

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 appropriate 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.

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.obg-management.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. 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.

References
## Obstetric Hemorrhage Care Summary: Table Chart Format

### Assessments | Meds/Procedures | Blood Bank
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**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&C 2 U
- 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 Methylene 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
- Methylene 0.2mg IM (if not hypertensive)
  - May repeat if good response to first dose, BUT otherwise move on to 2nd level uterotonics (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 q5-10 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 Mivacurium 1000 mcg

### PR

### 2nd IV Access (at least 18gauge)
- Bimanual massage
- Vaginal Birth: (typical order)
  - Move to OR
  - Repair any tears
  - D&C; t/t retained placenta
  - Place intrauterine balloon
  - Selective Embolization (Interventional Radiology)
- Cesarean Birth: (still in-op)
  - (ttypical 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

### Transfus Aggressively
- Massive Hemorrhage Pack
  - Near 1:1 PRBC:FFP
  - 1 PLT pheresis pack per 6 units PRBCs

### Unresponsive Coagulopathy:
- After 10 units PRBCs and full coagulation factor replacement: may consider rFactor VIIa

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