MATERNAL HEMORRHAGE
Prevention of Maternal Death

- High Rate of Maternal Death due to hemorrhage
- Most women who died of hemorrhage (97%) were hospitalized at the time of their death
- To reduce the risk of death the ACOG/DOH recommends:
  - Effective guidelines for maternal hemorrhage
  - Prompt recognition and response to hemorrhage

**DO NOT DELAY TRANSFUSION WHILE AWAITING LAB RESULTS OR HEMODYNAMIC INSTABILITY**
Prevention of Maternal Death

Recommendations

- Effective guidelines to respond, including emergency transfusion, with coordination among obstetricians, nurses, anesthesia and Blood Bank.
- Be vigilant to blood loss, if clinical judgment indicates transfusion, *do not delay awaiting lab results*, slow blood loss can be life threatening.
Prevention of Maternal Death
Recommendations

- Use fluid resuscitation and transfusion based on estimated blood loss and expectation of continued bleeding.
- Work with Labor and Delivery on Maternal Hemorrhage Drills.
- Conduct Continuing Medical Education for the entire medical team.
Informed Consent

- Identify patients who express concerns about receiving blood products for any reason (i.e. Jehovah Witness)
- Ensure that the patient has adequate opportunity to speak to an obstetrician and an anesthesiologist regarding her concerns and the risks/benefits
- Ensure that the “Consent/Refusal to Blood Products” form is signed
Refusal of Blood Products

- All L&D personnel must be notified when there is a patient on the floor who refuses blood products
- Identify a health care proxy who can make decisions for the patient if she is unable
- Consider cell saver back up
Risk Assessment for Hemorrhage
Low Risk

- First or early second trimester D&C without history of bleeding (scheduled)
- Cerclage
- Vaginal Birth
  - No previous uterine incision
  - No history of bleeding problems
  - No history of PP hemorrhage
  - Four or less previous vaginal births
  - Singleton pregnancy
Low Risk

- Send “Hold” specimen to the Blood Bank
- If patient’s status changes, notify blood bank to perform type and screen and/or type and cross match
- Examples include need for c/section, PP hemorrhage, chorioamnionitis, prolonged labor and exposure to oxytocin
Moderate Risk

- VBAC
- Cesarean sections
- Multiple gestations or macrosomia
- History of prior post partum hemorrhage
- Uterine fibroids
- Mid to late second trimester D&Es or induced vaginal births
- Other increased risks as designated by physician
Moderate Risk

- Type and screen to Blood Bank
- CBC with platelets
- Additional labs as per OB
- Consider cell saver for Jehovah Witness or any other patient who refuses blood products
High Risk

- Placenta previa
- Suspected placenta accreta
- Hematocrit less than 26
- Vaginal bleeding on admission
- Coagulation defects
- Other high risks as designated by the physician
High Risk

- Type and screen and cross match for 4 units
- CBC, PT, PTT, Fibrinogen
- Second large bore IV
- Anesthesia to prepare Hot Line
- Cell saver team on stand-by
  1-800-235-5728

(****especially for Jehovah’s Witness****)
MATERNAL BLOOD VOLUME

- Non pregnant female: 3600 ml
- Pregnant female (near term): 5400 ml
# DEGREES OF BLOOD LOSS

<table>
<thead>
<tr>
<th>Volume Estimate</th>
<th>Percent</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 ml or &gt;</td>
<td>10-15%</td>
<td>compensated</td>
</tr>
<tr>
<td>1000-1500 ml</td>
<td>15-25%</td>
<td>mild</td>
</tr>
<tr>
<td>1500-2000 ml</td>
<td>25-35%</td>
<td>moderate</td>
</tr>
<tr>
<td>2000-3000 ml</td>
<td>35-50%</td>
<td>severe</td>
</tr>
</tbody>
</table>
Caveats for the Pregnant Patient

- If the Obstetric Staff is considering transfusing a pregnant patient, anesthesia should be notified.
- Blood loss is almost always underestimated (especially after vaginal birth).
- Pregnant patients can lose up to 40% of their blood volume (compared to 25% in non-pregnant patients) before showing signs of hemodynamic instability.
- Don’t wait for hypotension to start replacing volume.
Causes of PP Hemorrhage

- Uterine Atony
- Lacerations to the cervix and genital tract
- Retained placenta and other placental abnormalities
- Coagulation disorders
Risk Factors for Uterine Atony

- Multiple gestation
- Macrosomia
- Polyhydramnios
- High Parity
- Prolonged labor especially if augmented with oxytocin
- Precipitous labor
- Chorioamnionitis
- Use of tocolytic agents
- Abnormal placentation
Trauma to the Genital Tract

- Large episiotomy, including extensions
- Lacerations of perineum, vagina or cervix
- Ruptured uterus
Placental Abnormalities

- Retained placenta
- Abnormal placentation
  - Accreta
  - Percreta
  - Increta
  - Previa
Coagulation Abnormalities

- DIC (may result from excessive blood loss)
- Thrombocytopenia
- abruption
- ITP
- TTP
- Pre-eclampsia including HELLP Syndrome
- Anticardiolipin/Antiphospholipid Syndrome
Assessment:

- Mental Status
- Vital Signs including BP, Pulse and O$_2$ saturation
- Intake: Blood Products and Fluids
- Output: Urine and Blood Loss
- Hemoglobin and Hematocrit
- Assess uterine tone and vaginal bleeding
Identify Team Leaders (MD/ RN) Call Code Noelle

- MFM on-call
- Anesthesia Attending
- Blood Bank Director
- Antepartum Back-up (if MFM is primary OB)
- L&D Nurse Manager
- ADN
IDENTIFY CAUSE OF BLEEDING

Examine:

- Uterus to rule out atony
- Uterus to rule out rupture
- Vagina to rule out laceration
MANAGEMENT
Non-surgical

- **Management**
  - **Atony:** Firm Bimanual Compression

- **Order**
  - Oxytocin infusion
  - 15-methyl prostaglandin F2alpha IM
  - Second line:
    - (methergine (if BP normal), PGE1, PGE2)
MANAGEMENT: Non-surgical Hypovolemic Shock

Management:
- Secure 2 large bore IVs, consider a central venous catheter
- Insert indwelling foley catheter

Order:
- LR at desired infusion rate
- Second line NS with Y-Type infusion set
- Two units of PRBCs for stat infusion
- Cross match 4 additional units of PRBCs
- Thaw 4 units of FFP
- Supplemental O₂ at 8-10 L Non re-breather mask
MANAGEMENT: Non-surgical Nursing

- **Registered Nurses:**
  - Administer O2 at 8-10 L face mask
  - Cardiorespiratory, BP and SAO₂ monitors
  - Secure 2 Large bore IVs
  - Pick up orders as written
  - Administer warmed IV Fluids
  - Administer Blood Products
  - Insert indwelling foley catheter
  - Trendelenberg position
  - Administer medications
MANAGEMENT: Non-surgical Nursing

- Nursing Station Clerks:
  - Enter Lab and Blood Bank Orders
  - Page all members of Maternal Hemorrhage team
  - Await addition instructions for:
    - Cell Saver Team
    - Gyn-Oncology Surgeon
MANAGEMENT: Non-surgical Nursing

- Clinical Assistants:
  - Assists RN/MD as needed
  - Prep OR; including gyn long, hysterectomy and/or gyn surgery trays
  - Pick up blood products from Blood Bank
  - Obtain Blood/Fluid Warmer
  - Obtain Cell Saver Equipment from OR
MANAGEMENT: Surgical

OR Personnel

- OB Attending
- MFM Back up
- OB Resident(s)
- Anesthesia Attending
- Anesthesia Resident(s)
- 2 Circulating RNs
- 1 Scrub Tech/RN
- Gyn-Onc Surgeon (prn)
- Interventional Radiology (prn)
- Cell Saver Personnel (prn)
MANAGEMENT: Surgical

OR Equipment

- Trays
  - Gyn Long Tray
  - Hysterectomy Tray
  - Gyn Surgery Tray

- Cell Saver Equipment

- Preparation of fibrin glue
  (1-30 ml syringe with 2 vials Topical Thrombin + 0.5 ml of 10% CaCl, 1-30 ml syringe with 30 ml of cryoprecipitate, both attached to 18 g angiocaths)
MANAGEMENT: Surgical

ANESTHESIA

- Team Coordinator
- Airway management
- Hemodynamic Monitoring
- Fluids
- Blood Products
- Output
MANAGEMENT: Surgical

OBSTETRICIAN/SURGEON

- Control Source of Hemorrhage
- Perform indicated Procedure:
  - REPAIR LACERATION
  - BILATERAL UTERINE ARTERY LIGATION
  - BILATERAL HYPOGASTRIC ARTERY LIGATION
  - HYSTERECTOMY
- Utilize additional resources if surgery continues and emergency transfusion is occurring (Gyn-Onc Surgeon)
- Consider Interventional Radiology
MANAGEMENT: Surgical

NURSING

- Assist anesthesia as needed
- Assist with surgery (scrub/circulate)
- Assess for the need for further additional surgical expertise

*Ongoing surgery with emergency transfusion continuing*

- Obtain NICU as needed if infant un delivered
- Obtain/administer medications as needed
Post-op Disposition

- Anesthesiologist and obstetrician will determine post op disposition of the patient and call appropriate consults (i.e. SICU attending)
- All intubated patients must go to the SICU
- Other patients at anesthesiologist’s discretion
- Nursing to give report to SICU
Summary

- Maternal hemorrhage remains the number one cause of maternal death in NYS.
- Identification of high risk patients can prevent severe complications.
- Early intervention for the low risk patient who starts to bleed is also crucial.
- Proper communication between nursing, OB, anesthesia and neonatology will provide best outcome for mother and baby.