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

Volume Estimate	Percent	Type
500 ml or >	10-15%	compensated
1000-1500 ml	15-25%	mild
1500-2000 ml	25-35%	moderate
2000-3000 ml	35-50%	severe

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

IDENTIFICATION AND EVALUATION

- 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

MANAGEMENT
Non-surgical

IDENTIFY CAUSE OF BLEEDING

Examine **:**

Uterus to r/o atony
Uterus to r/o rupture
Vagina to r/o 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 O_2 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 SAO_2 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 undelivered
- 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