APEC Guidelines
Postpartum Hemorrhage

While many dangers associated with childbirth have been reduced through medical advances, death from hemorrhage continues to be a leading cause of maternal morbidity. According to the Pregnancy Mortality Surveillance System of the Centers for Disease Control and Prevention, in 2011-2012 hemorrhage was a direct cause of 11.3% of 3,404 of pregnancy-related deaths in the United States. (CDC 2016) In addition, pregnancy-related hemorrhage is associated with serious morbidities including adult respiratory distress syndrome, coagulopathy, shock, and renal injury. ACOG recommends obstetric units and providers have facilities, personnel, and equipment in place to manage hemorrhage properly.(ACOG 2006 reaffirmed 2013)

Postpartum hemorrhage is defined as the loss of greater than 500 mL of blood after vaginal birth or the loss of greater than 1,000 mL of blood following cesarean birth. Postpartum hemorrhage is also classified as early, occurring within the first 24 hours of delivery, and delayed hemorrhage occurring between 24 hours and 6-12 weeks postpartum. Early postpartum hemorrhage occurs in 4-6% of pregnancies with uterine atony as the cause in 80% of the cases.(ACOG 2006 reaffirmed 2013) Other causes of early postpartum hemorrhage include: retained placenta; defects in coagulation; and uterine inversion. Causes of delayed postpartum hemorrhage include: subinvolution of the placental site; retained products of conception; infection; and inherited coagulation defects.

All pregnant women should be assessed prenatally for risk factors associated with obstetric hemorrhage. Risk factors include placental previa/accreta, a history of bleeding disorders, those who decline blood products, prior cesarean birth or uterine surgery, multiple gestation, > 4 vaginal births, chorioamnionitis, history of prior postpartum hemorrhage, and large uterine fibroids. Patients with accreta should:

- Receive counseling about their risks prenatally including the possibility of hysterectomy and blood transfusion.
- Have their delivery scheduled to insure access to adequate personnel and equipment.
- Have a preoperative anesthesia assessment.
- Have blood products and clotting factors readily available if needed.

All pregnant women should have prenatal lab work to verify their blood type and antibody status and to assess for anemia. Medical treatment for anemia includes prenatal vitamins containing 60

mg of elemental iron and 1 mg folate with the addition of two additional iron tablets (300 mg ferrous sulfate yielding 60 mg of elemental iron). If oral iron fails, initiate IV Iron Sucrose to reach desired Hgb/Hct.

Management of postpartum hemorrhage varies depending on the etiology, available treatment options, and the patient's desire for future fertility. (ACOG 2006 reaffirmed 2013) A multidisciplinary approach to care should be used including obstetrician-gynecologists, nurses, anesthesiology, blood bank, and laboratory. The goal is to balance conservative management techniques with the need to control the bleeding and achieve hemostasis. Routine oxytocin administration following the delivery of the placenta and easy access to established protocols for hemorrhage management in delivery rooms and operating suites are evidence-based management systems that should be utilized. The California Maternal Care Collaborative has published an Obstetric Hemorrhage 2.0 Toolkit to assist providers and hospitals develop and establish protocols for patient care. The toolkit can be found at www.CMQCC.org.

Initial Evaluation of Excessive Bleeding

Accurate estimation of blood loss at the time of vaginal or operative delivery remains problematic. Therefore, awareness of the potential for excess blood loss remains critical because earlier recognition of early blood loss allows for earlier treatment.

All patients should receive IV oxytocin following placental delivery to control bleeding and minimize the risk of hemorrhage. (Tita, Szychowski et al. 2012) The initial oxytocin regimen should consist of 10-40 units of oxytocin in 500-1000 mL of Lactated Ringers (LR) or Normal Saline (NS) infused over 2-6 hours. Direct IV bolus of oxytocin should not be given. For patients without IV access, 10 units may be given IM. See Table 1 for medical management. If excessive bleeding occurs or continues after administration of oxytocin alternative uterotonics should be used, see Table 1. If bleeding persists, the following steps should occur rapidly and simultaneously : (Cunningham, Leveno et al. 2010)

- Empty the bladder and perform a bimanual pelvic exam. If the uterus is soft and poorly contracted ("boggy"), initiate bimanual uterine compression by messaging the posterior aspect of the uterus with a hand on the abdomen and massage the anterior uterine wall with the other hand through the vagina.
- Call for help!

- Add a second large-bore intravenous catheter site for blood transfusion.
- Prepare for potential blood transfusion. See Table 2 Blood Component Therapy.
- Inspect the cervix and vagina for lacerations.
- Explore the uterine cavity manually for retained placental fragments or lacerations.
- Insert Foley catheter to monitor urine output and assessment of renal function.
- Begin volume resuscitation.

Medical Management

Table 1. Medical Management of Postpartum Hemorrhage

Drug*	Dose/Route	Frequency	Comment
Oxytocin (Pitocin)	**IV:** 10-40 units in 1 liter normal saline or lactated Ringer's solution **IM:** 10 units	Continuous	Avoid undiluted rapid IV infusion, which causes hypotension.
Methylergonovine (Methergine)	**IM:** 0.2 mg	Every 2-4 hours	Avoid if patient is hypertensive.
15-methyl $PGF_2\alpha$ (Carboprost) (Hemabate)	**IM:** 0.25 mg	Every 15-90 min, 8 doses maximum	Avoid in asthmatic patients; relative contraindication if hepatic, renal, and cardiac disease. Diarrhea, fever, tachycardia can occur.
Dinoprotone (Prostin E_2)	**Suppository:** vaginal or rectal 20 mg	Every 2 hours	Avoid if patient is hypotensive. Fever is common. Stored frozen, it must be thawed to room temperature.
Misoprostol (Cytotec, PEG_1)	800-1,000 mcg rectally		Onset of action can be delayed so utility for acute bleeding is limited.

Abbreviations: IV, intravenously; IM, intramuscularly; PG, prostaglandin.
*All agents can cause nausea and vomiting.
Modified from Dildy GA, Clark SL. Postpartum hemorrhage. Contemp Ob/Gyn 1993;38(8):21-9.

Blood Transfusion

While there has been an emphasis on restrictive transfusion protocols with a Hgb of ≤7 mg/dL as the trigger for transfusion, these policies do NOT apply in the setting of massive hemorrhage with ongoing bleeding. In the setting of ongoing massive hemorrhage, there is no need to await a Hgb result. The decision to transfuse should be based on the patient's clinical status, vital signs, and bleeding status.

Blood product transfusion should be considered with significant ongoing blood loss, particularly if vital signs are unstable. The purpose of transfusion of blood products is to replace coagulation factors and red cells for oxygen-carrying capacity, not for volume replacement. (ACOG 2006 reaffirmed 2013)

Table 2. Blood Component Therapy (ACOG 2006 reaffirmed 2013)

Product	Volume (mL)	Contents	Effect (per unit)
Packed red cells	240	Red blood cells, white blood cells, plasma	↑ hct 3% points, ↑ hgb 1 g/dL
Platelets	50	Platelets, red blood cells, plasma	↑ platelet ct 5,000-10,000/mm³ per unit
Fresh frozen plasma	250	Fibrinogen, antithrombin III, factor V and VIII	↑ fibrinogen by 10 mg/dL
Cryoprecipitate	40	Fibrinogen, factors VIII and XIII, van Willebrand factor	↑ fibrinogen by 10 mg/dL

More recent data demonstrate that a ratio of 1-2 units PRBC : 1 unit FFP : 1 unit platelets produces more favorable outcomes than traditional approaches. Due to this, many hospitals have developed massive transfusion protocols (MTP) that provide products in this ratio once the protocol is activated. Even without a MTP, a ratio as outlined above should be used when transfusion is required in the setting of massive hemorrhage. Laboratory confirmation of need only results in delay of treatment with continued hemorrhage and less favorable outcomes.

Uterine Tamponade or Packing

When uterotonics fail to control hemorrhage due to uterine atony, uterine tamponade may be utilized. This is most easily achieved with a Bakri tamponade balloon or similar device placed under

ultrasound guidance and inflated to its maximum. If such a device is unavailable, uterine packing can be performed by layering the packing material back and forth from one cornu to the other using a sponge stick ending with the gauze extending through the cervical os. The balloon or pack should remain in place until the patient is fully resuscitated and then gradually removed over the course of hours to ensure bleeding does not resume. Oxytocin should be infused while the pack is in place.

Table 3. Tamponade Techniques for Postpartum Hemorrhage (ACOG 2006 reaffirmed 2013)

Uterine tamponade Technique	Comment
Packing	4 inch gauze; can soak with 5,000 units of thrombin in 5 mL of sterile saline
SOS Bakri tamponade balloon	Insert balloon; instill 300-500 mL of saline.

Surgical Management for Postpartum Hemorrhage(ACOG 2006 reaffirmed 2013)

Exploratory laparotomy is indicated when intractable atony is unresponsive to the above therapy. Midline vertical abdominal incision provides optimal exposure. Surgical techniques include:

- Uterine artery ligation-bilateral; also can ligate uteroovarian vessels.
- B-Lynch suture.
- Hypogastric artery ligation should generally not be performed as it is associated with increased complications and is less successful than previously thought. Its use should be reserved for providers with experience in its performance.
- Repair of uterine rupture.
- Hysterectomy.

Arterial Embolization

Arterial embolization can be considered in patients with stable vital signs with persistent but not excessive bleeding. Techniques include: Radiographic identification of bleeding vessels with embolization via, coils, glue, or balloons. Since this typically requires transport of the patient to a radiology suite, it should be reserved only for patients who have been adequately resuscitated and have stable vital signs.

Uterine Rupture

Uterine rupture can occur at the site of a prior surgical procedure involving the uterine wall, congenital malformation, or spontaneously. While not all areas of rupture are associated hemorrhage, surgical repair is required. Rupture of a previous cesarean delivery scar can be managed by revision of the edges of the prior incision followed by primary closure.(ACOG 2006 reaffirmed 2013) In the setting of large defect or massive hemorrhage, hysterectomy may be life-saving and its performance should not be delayed.

Inverted Uterus

Uterine inversion occurs when the uterine corpus descends to, and sometimes through, the uterine cervix. Uterine inversion is associated with immediate life-threating hemorrhage. The following steps should occur rapidly and simultaneously:

- Summon help from anesthesia, nursing, and other physicians.
- If the placenta has already delivered, replace the inverted uterus by pushing up on the fundus with the palm of the hand and fingers in the direction of the long axis of the vagina.
- Establish second large-bore IV access and initiate transfusion to treat hypovolemia.
- Medications may be needed to relax the uterus and restore normal anatomy. Such medications include terbutaline, magnesium sulfate, halogenated general anesthetics, or nitroglycerin.
- If uterine inversion occurs before placental separation, Do NOT deliver the placenta until infusion systems are operational, fluids are being given, a uterine-relaxing anesthetic has been administered, and the uterine fundus has been replaced.

If manual replacement is not successful, a laparotomy is required with the use of two possible procedures. The Huntington procedure involves progressive upward traction on the inverted corpus using Babcock or Allis forceps. The Haultain procedure involves incising the cervical ring posteriorly, allowing for digital repositioning of the inverted corpus with subsequent repair of the incision. (ACOG 2006 reaffirmed 2013)

Delayed Postpartum Hemorrhage

Delayed postpartum hemorrhage occurs in approximately 1% of pregnancies. Most common causes include:

- Von Willebrand's disease- reported to occur in 10-20% of adult women. Testing for bleeding disorders should be considered.
- Uterine atony- Ultrasound can help identify retained products of conception or large intrauterine clots that require extraction. Treatment includes uterotonic agents, antibiotics, and curettage. Use of ultrasound during curettage can help avoid uterine perforation if infection or subinvolution is suspected. Subinvolution of the placental site typically presents with significant blood 5-10 days post-delivery. It is often associated with endometritis. Because subinvolution is due to failed healing of the endometrium, curettage should be avoided unless the uterus is enlarged and filled with clots preventing contraction. Once bleeding is controlled in patients with subinvolution, a brief course of estrogen may be considered to hasten endometrial healing.

References

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