



STATE OF NEW YORK DEPARTMENT OF HEALTH

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Health Advisory: Prevention of Maternal Deaths Through Improved Management of Hemorrhage

TO: Chief Executive Officer

FROM: Antonia Novello, MD, MPH, Dr.PH
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RE: Prevention of Maternal Deaths through Improved Management of Hemorrhage

IMPORTANT: Please share with all relevant staff, including all obstetrics, critical care, emergency medicine, laboratory, blood bank, anesthesiology, QI, nursing and hospital administration staff, and others as appropriate.

There is a high rate of maternal death from hemorrhage in New York State. To reduce risk of maternal death:

1. Ensure that your hospital has effective protocols to respond to maternal hemorrhage, including rapid emergency access to blood.
2. Promptly recognize and respond to hemorrhage. Do not delay transfusion while awaiting laboratory results or evidence of hemodynamic instability.

The number of maternal deaths among NYS residents is higher than the national average (15.9 deaths/100,000 live births for NYS in 2000 vs. 9.8/100,000 live births for the U.S. as a whole in the same year) and is four times the Healthy People 2010 goal of 3.3 deaths. Marked racial disparities exist, with African American mothers over three times more likely to die of maternal causes than white women; however, elevated maternal death rates in NYS affect all groups.

Maternal hemorrhage is the most common cause of maternal mortality in NY

The three leading causes of maternal death nationwide are eclampsia/pre-eclampsia, obstetric embolism, and hemorrhage. Review of deaths in New York City by the NYC Department of Health and Mental Hygiene (DOHMH) showed that hemorrhage was the leading cause of pregnancy-related death, accounting for one third of deaths. Sixty percent of hemorrhage-

related deaths occurred in the later stages of pregnancy. Most women (97%) who died of hemorrhage-related causes were hospitalized at the time of death. These deaths include all socioeconomic classes and occurred at hospitals throughout New York City. In addition to the hemorrhage-related deaths, there are an even higher number of “near misses” – women who develop severe hemorrhage but do not die.

Hemorrhage is a highly preventable cause of maternal mortality.

Most women dying of maternal hemorrhage die in a hospital setting. Health care providers can prevent maternal deaths by improving recognition and response to hemorrhage. Pregnant women have hemodynamic compensatory mechanisms that may blunt the typical responses to blood loss, such as tachycardia and hypotension, until severe decompensation has occurred. Initial laboratory parameters may not reflect current hemodynamic status. The causes of death due to hemorrhage are multi-factorial, and prevention requires a multidisciplinary response. Underestimation of blood loss and reliance on symptoms and hemodynamic changes may delay fluid resuscitation and transfusion. Hospital systems that support a rapid and coordinated response to extreme blood loss can limit maternal morbidity and improve maternal survival.

Recommendation for Providers to Reduce the Risk of Maternal Death:

- 1. Antepartum assessment is essential to identify women at special risk of hemorrhagic complications of pregnancy and childbirth.** Women who have a history of postpartum hemorrhage, placenta previa, grand multiparity or several previous cesarean births are at especially high risk of hemorrhage. Women with a history of bleeding diathesis or other hematological disease are also at high risk. A disorder that is stable in a non-pregnant woman can cause serious illness during pregnancy. Complications arising during pregnancy that predispose a woman to hemorrhage include pregnancy-induced hypertension HELLP syndrome (hemolysis, elevated enzymes, low platelets), and multiple gestation. Consultation with specialists should be sought during pregnancy, and the woman should be advised to deliver at a hospital with sufficient medical and nursing expertise and experience to manage her care. Prolonged use of oxytocic agents during labor and chorioamnionitis are intrapartum risk factors for hemorrhage. In all of these situations, hospital staff must be particularly vigilant when caring for such women.
- 2. Ensure that your hospital has effective protocols to respond to maternal hemorrhage, including rapid emergency blood transfusion, with coordination among physicians, nurses, anesthesiologists, and the blood bank.** Blood bank protocols should ensure that the hospital has compatible un-cross-matched blood available for obstetric emergencies, and they should eliminate barriers to rapid blood access when needed.
- 3. Be vigilant to blood loss during pregnancy, labor, and delivery, and in the early postpartum period.** There are many causes of maternal hemorrhage, with a major cause of postpartum hemorrhage being uterine atony. Nursing staff in the Labor, Delivery, Recovery and Postpartum areas must be trained in assessing and managing maternal hemorrhage. Staff must be especially vigilant for uterine atony in women with multiple gestation, polyhydramnios, macrosomic fetus, or some types of uterine abnormality such as bicornate uterus. A retained placenta, placental fragments or retention of blood or blood clots in the uterus can result in overdistention of the uterus and uterine atony. Certain medications, such as magnesium sulfate and terbutaline, also predispose a woman to maternal hemorrhage.
 - When problems are identified, the nurse assigned must notify the physician immediately.

4. **Use fluid resuscitation and transfusion based on the estimation of current blood loss and the expectation of continued bleeding, regardless of apparent maternal hemodynamic stability.** Accurately estimate blood loss (one cup = 250cc or one large clot – which is also one (1) unit Packed Red Blood Cells). If your clinical judgment indicates the need for transfusion, do not delay while awaiting laboratory results. Be alert to the possibility of low, continuous blood loss, which can be life threatening, especially in postpartum patients.
5. **Work with the Labor and Delivery Staff to conduct “Hemorrhage Drills” to ensure the most efficient response to hemorrhage emergency.**
 - All hospitals should have protocols and procedures in place to deal with maternal hemorrhage.
 - Staff should handle maternal hemorrhage emergencies with the same level of urgency and preparation as a cardiac code.
 - During a hemorrhage “code”, all times and events must be recorded.
 - There should be at least two (2) large-bore IVs in place for fluids, blood, and medications and a foley catheter to monitor output.
 - A maternal hemorrhage team should be assembled, including operating room staff in case surgery is needed.
 - Hospitals should run drills at different times of the day to ensure that appropriate hemorrhage team members are available at all times. As with a “hemorrhage code”, one (1) person should be designated as a scribe to document times and interventions.
 - The hemorrhage team should include:
 - a) A surgeon with experience and expertise in controlling massive hemorrhage to advise about the need for additional surgery and to provide surgical assistance. The surgeon could be an ob/gyn, a maternal-fetal medicine specialist, a gyn oncologist, a pelvic reconstructive surgeon, a vascular surgeon or a general surgeon. The exact specialization is not as critical as the expertise and experience.
 - b) A critical care specialist or an anesthesiologist to help with assessment or organ perfusion and cardiovascular function.
 - c) A hematologist or clinical pathologist available on site to advise on appropriate blood products, and to coordinate and mobilize appropriate personnel to provide these products ASAP, as well as to help interpret complicated laboratory values such as hypocalcemia, hypokalemia, thrombocytopenia, abnormal liver function tests, renal function tests, etc., and to help determine if correction of clotting abnormalities has been achieved.
 - A portable ultrasound machine should be readily available in case it is needed to assess for retained placental fragments.
 - Consider alternative treatments such as surgery and embolization. Balloon tamponade within the uterus using a large Foley or Sengstaken-Blakemore tube may also be considered as a means of controlling hemorrhage.
6. **Do not forget the needs of the family during response to a maternal emergency.** Social work or other support staff should be called in immediately as appropriate to provide family support while medical and nursing staff are attending to the maternal medical emergency.
7. **Provide continuing medical education on hemorrhage for your entire medical team.** Ensure all hospital staff, including physicians, nurses, laboratory personnel and others are aware of the procedures related to dealing with maternal hemorrhage. Incorporate this education into your hospital’s mandatory annual educational programs and ensure all new staff are oriented to the procedures.

Resources available:

ACOG District II and the New York State Department of Health are working together on the **Safe Motherhood Initiative**, which conducts in-depth reviews of individual maternal deaths and develops prevention recommendations for changes in practice at the hospital where the death occurred and statewide. ACOG-NY in collaboration with the Department will be developing a professional education program on the topic of maternal hemorrhage.

For more information, please contact Donna Williams at ACOG (dwilliams@ny.acog.org or (518) 436-3461), Mary Applegate, MD MPH at the Department of Health (msa04@health.state.ny.us or (518) 474-1911), or your Regional Perinatal Center.