



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

TO: Chief Executive Officer

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DATE: April 2009

RE: Prevention of Maternal Deaths through Improved Management of Hemorrhage

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

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

1. Ensure that your hospital has current protocols to promptly respond to maternal hemorrhage, including rapid emergency access to blood and blood products.
2. Recognize and respond promptly to hemorrhage. Do not delay transfusion and fluid replacement while awaiting laboratory results or evidence of hemodynamic instability.

The number of maternal deaths among New York State (NYS) residents is higher than the national average (20.5 deaths/100,000 live births for NYS in 2004 vs. 13.1/100,000 live births for the U.S. in the same year) and is more than four times the Healthy People 2010 goal of 4.3/100,000. Marked racial disparities exist, with African-American mothers over three times more likely to die of pregnancy-related causes than white women; however, elevated maternal death rates in NYS affect all groups.

Hemorrhage is a Leading Cause of Maternal Mortality in New York City

The three leading causes of maternal death nationwide are embolism, hemorrhage and pregnancy-related hypertension. A review of maternal deaths from 2001 – 2005 in New York City (NYC) by the NYC Department of Health and Mental Hygiene (DOHMH) showed that hemorrhage remained a leading cause of pregnancy-related death, accounting for approximately one-third of deaths. Almost all women who died of hemorrhage-related causes were hospitalized at the time of death.

Hemorrhage is a Generally Preventable Cause of Maternal Mortality

Because most maternal deaths from hemorrhage occur in a hospital, we can potentially prevent many of them by improving our early recognition of and response to hemorrhage. Hemodynamic compensatory mechanisms, tachycardia and hypotension may not be evident in a pregnant woman until severe decompensation has occurred. 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 mortality.

Recommendations 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 are also at high risk. A coagulation 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 preeclampsia HELLP syndrome (Hemolysis, Elevated Liver 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 regarding blood loss during pregnancy, labor and delivery, and in the early postpartum period.** There are many causes of maternal hemorrhage, the most common of which is postpartum 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 abnormalities such as bicornate uterus. A retained placenta, placental fragments or retention of blood or blood clots in the uterus can result in over-distention of the uterus and uterine atony.

Certain medications, such as magnesium sulfate, terbutaline and halogenated anesthetics also predispose a woman to uterine atony.

- 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 = 250mL– which is also one (1) unit Packed Red Blood Cells).
 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, in addition to a team leader:
 - 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 who is familiar with severe hemorrhage to help with assessment of 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 immediately, as well as to help interpret complicated laboratory values such a 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. Tamponade within the uterus using a compression device may also be considered as a means of controlling hemorrhage.
 - Infused fluid should be warmed to avoid hypothermia.
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 is oriented to the procedures.

Resources available:

The American College of Obstetricians and Gynecologists (ACOG) District II and the New York State Department of Health are working together on the **Safe Motherhood Initiative (SMI)**, which conducts on-site hospital based reviews of maternal deaths and develops prevention recommendations for physicians and hospitals. To learn more about the SMI, please visit www.acogny.org

For more information, please contact:

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Updated: April 2009