



## Sentinel Event Alert

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### Preventing Maternal Death

The goal of all labor and delivery units is a safe birth for both newborn and mother. A previous *Alert*<sup>(1)</sup> reviewed the causes of death and injury among newborns with normal birth weight and suggested risk reduction strategies. This Alert addresses the equally tragic loss of mothers. Unfortunately, current trends and evidence suggest that maternal mortality rates may be increasing in the U.S., despite the rarity of the incidence of maternal death – deaths that occur within 42 days of birth or termination of pregnancy. Since 1996, a total of 84 cases of maternal death have been reported to The Joint Commission's sentinel event database, with the largest numbers of events reported in 2004, 2005 and 2006. According to the National Center for Health Statistics of the Centers for Disease Control and Prevention, in 2006, the national maternal mortality rate was 13.3 deaths per 100,000 live births. (2) "Although the current maternal mortality rate may reflect increased identification of women who died during or shortly after pregnancy (3), there clearly has been no decrease in maternal mortality in recent years, and we are not moving toward the U.S. government's Healthy People 2010 target of no more than 3.3 maternal deaths per 100,000 live births (4)," says William M. Callaghan, M.D., M.P.H., senior scientist, Division of Reproductive Health, Centers for Disease Control and Prevention.

### Leading causes and prevention of maternal death

According to a study by the CDC of pregnancy-related mortality in the U.S. between 1991 and 1997, (5) the leading causes of maternal death are: hemorrhage, hypertensive disorder, pulmonary embolism, amniotic fluid embolism, infection, and pre-existing chronic conditions (such as cardiovascular disease). The study – conducted with state health departments and the American College of Obstetricians and Gynecologists – also indicated a four-fold increased risk of pregnancy-related death for black women, and increased risks for older women and women with no prenatal care. Whether due to better management, increased awareness or quality improvement, the numbers of deaths related to hemorrhage are declining, while deaths attributable to other medical conditions – including cardiovascular, pulmonary and neurologic problems – have significantly increased. (4)

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Alert.**

Individual state health departments and researchers nationally are examining the possible role of pre-existing medical conditions in contributing to maternal death. Pre-pregnancy obesity, with its related health implications, is an example. "Obesity is a growing epidemic in this country which impacts all age groups, including women of child-bearing age. Obesity can lead to hypertensive disorders, diabetes, and other medical conditions, and thus can directly and indirectly present significant health risks for pregnant women," says Janet Hardy, Ph.D., M.Sc., M.P.H., perinatal epidemiologist and assistant professor, Departments of Medicine, Obstetrics/Gynecology and Pediatrics, University of Massachusetts Medical School. "Heightened practitioner awareness and screening of pre-pregnant and pregnant women with pre-existing conditions and associated risk factors should be optimized. Improving access to prenatal care environments where specialized services and support are available for these women should be considered." It is only by taking a thorough medical and social history that underlying factors can be revealed.

Attempts to identify preventable deaths and understand how to prevent them has yielded varying results; several studies (6,7,8) determined that from 28 to 50 percent of maternal deaths were preventable. In 2008, Hospital Corporation of America (HCA) looked at individual causes of maternal deaths among 1.5 million births within 124 hospitals in the previous six years. (6) The study concluded that the majority of maternal deaths are not preventable and that while some deaths can be prevented by better individual care, precise figures indicating the frequency of preventable deaths should be examined carefully and with caution. According to the HCA study, the most common preventable errors are:

- Failure to adequately control blood pressure in hypertensive women
- Failure to adequately diagnose and treat pulmonary edema in women with pre-eclampsia
- Failure to pay attention to vital signs following Cesarean section
- Hemorrhage following Cesarean section

"The data showed the individual causes of death to be very heterogeneous and that the only cause of maternal death amendable to nationwide systematic prevention efforts is pulmonary embolism," says Steven L. Clark, M.D., medical

director of women and newborn services, HCA. “Pregnancy is a known major risk factor for venous thrombosis and pulmonary embolism. HCA now advocates for the universal use of pneumatic compression devices for all pregnant women undergoing Cesarean section.” Many hospital systems in California have also adopted VTE prophylaxis measures, as well as comprehensive programs for addressing and responding to hemorrhage, according to Elliott Main, M.D., chairman and chief of obstetrics, Sutter Health’s California Pacific Medical Center, and the principal investigator for California Maternal Quality Care Collaborative (CMQCC). However, unlike nearly all other adult patients undergoing major surgery, pregnant women undergoing Cesarean delivery have traditionally not received prophylactic measures for the prevention of venous thromboembolism afforded similar surgical patients who lack this risk factor.

Main also serves as chair of the California Pregnancy-Related and Pregnancy Associated Mortality Review Committee which identifies causes for the increase and improvement opportunities that can be addressed by CMQCC. As California has over 550,000 annual births, its findings can serve as a model for the entire United States. “Too often we under-respond to abnormal vital signs and operate in a state of denial and delay,” Dr. Main says. “It is important to identify triggers and establish protocols that certain findings trigger a response. In California, hemorrhage and complications of pre-eclampsia have been the drivers of maternal mortality and both have significant prevention opportunities.”

“Maternal deaths are the tip of the iceberg for they are a signal that there are likely bigger problems beneath – some of which are preventable,” says Dr. Callaghan. “It is important to consider the women who get very, very sick and do not die, because for every woman who dies, there are 50 who are very ill, suffering significant complications of pregnancy, labor and delivery.” For 1991 through 2003, the severe morbidity rate in the U.S. for severe complications and conditions associated with pregnancy was 50 times more common than maternal death. Understanding these experiences could affect how care is delivered as well as health policy. (9)

### Existing Joint Commission requirements

National Patient Safety Goal 16 (recognize and respond to changes in a patient’s condition) is most applicable to the care of women during labor and birth. During an extensive review of the National Patient Safety Goals during 2009, Goal 16 was deemed better suited as a standard and was moved to the 2010 standards for hospitals and critical access hospitals. The Provision of Care, Treatment and Services standard, PC.02.01.19, requires the hospital to:

- Have a process for recognizing and responding as soon as a patient’s condition appears to be worsening.
- Develop written criteria describing early warning signs of a change or deterioration in a patient’s condition and when to seek further assistance.
- Based on the hospital’s early warning criteria, have staff seek additional assistance when they have concerns about a patient’s condition.
- Inform the patient and family how to seek assistance when they have concerns about a patient’s condition.

### Joint Commission suggested actions

Each case of maternal death needs to be identified, reviewed, and reported in order to develop effective strategies for preventing pregnancy-related mortality and severe morbidity. To this end, The Joint Commission encourages participation by hospital physicians, including obstetrician-gynecologists, in state-level maternal mortality review and collaboration with such review committees in sharing data and records needed for review. The following suggested actions can help hospitals and providers prevent maternal death:

1. Educate physicians and other clinicians who care for women with underlying medical conditions about the additional risks that could be imposed if pregnancy were added; how to discuss these risks with patients; the use of appropriate and acceptable contraception; and pre-conceptual care and counseling. Communicate identified pregnancy risks to all members of the health care delivery team.
2. Identify specific triggers for responding to changes in the mother’s vital signs and clinical condition and develop and use protocols and drills for responding to changes, such as hemorrhage and pre-eclampsia. Use the drills to train staff in the protocols, to refine local protocols, and to identify and fix systems problems that would prevent optimal care.
3. Educate emergency room personnel about the possibility that a woman, whatever her presenting symptoms, may be pregnant or may have recently been pregnant. Many maternal deaths occur before the woman is hospitalized or after she delivers and is discharged. These deaths may occur in another hospital, away from the woman’s usual prenatal or obstetric care givers. Knowledge of pregnancy may affect the diagnosis or appropriate treatment.

Additional suggested actions for hospitals and providers to take for patients identified as high-risk (for example, those with

pre-existing medical conditions such as hypertension, diabetes, morbid obesity):

4. Refer high-risk patients to the care of experienced prenatal care providers with access to a broad range of specialized services.
5. Make pneumatic compression devices available for patients undergoing Cesarean section who are at high risk for pulmonary embolism.
6. Evaluate patients who are at high risk for thromboembolism for low molecular weight heparin for postpartum care.

## References

- 1 The Joint Commission: "Preventing infant death and injury during delivery," *Sentinel Event Alert*, Issue 30, July 21, 2004, [http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea\\_30.htm](http://www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_30.htm) (Accessed September 25, 2009)
- 2 Heron MP, et al: Deaths: Final data for 2006. National Center for Health Statistics, *National Vital Statistics Reports*, 57(14), 2009, [http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57\\_14.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_14.pdf) (Accessed October 22, 2009)
- 3 SE Geller, et al: A descriptive model of preventability in maternal morbidity and mortality. *Journal of Perinatology*, 2006, (26(2):79-84)
- 4 Centers for Disease Control and Prevention (CDC): Pregnancy-Related Mortality Surveillance. Surveillance Summaries, *Morbidity and Mortality Weekly Report*, February 21, 2003, 2003:52 (No. SS-2), <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5202a1.htm> (Accessed July 10, 2009)
- 5 Berg CJ, et al: Pregnancy-Related Mortality in the United States, 1991-1997. *Obstetrics & Gynecology*, 2003, 101(2):289-296
- 6 Clark SL, et al: Maternal Death in the 21st century: Causes, prevention, and relationship to Caesarean delivery. *American Journal of Obstetrics & Gynecology*, 2008, 199(1):91-92
- 7 Berg CJ, et al: Preventability of Pregnancy-Related Deaths: Results of a State-wide Review. *Obstetrics & Gynecology*, 2005, 106(6):1228-34
- 8 Geller SE, et al: The continuum of maternal morbidity and mortality: Factors associate with severity. *American Journal of Obstetrics & Gynecology*, 2004, 191(3):939-944
- 9 Callaghan WM, et al: Identification of severe maternal morbidity during delivery hospitalizations, United States, 1991-2003. *American Journal of Obstetrics & Gynecology*, 2008, 199(2):133.e1-133.e8

## Additional resources

- Sakala C, Corry M: Evidence-based maternity care: What it is and what it can achieve. October 2008, The Childbirth Connection, The Reforming States Group, The Milbank Memorial Foundation, <http://www.milbank.org/reports/0809MaternityCare/0809MaternityCare.html> (Accessed July 10, 2009)
- California Maternal Quality Care Collaborative, [www.cmqcc.org/maternal\\_mortality](http://www.cmqcc.org/maternal_mortality) and [www.cmqcc.org/maternal\\_disparities](http://www.cmqcc.org/maternal_disparities) (Accessed July 10, 2009)
- Deneux-Tharoux C, et al: Underreporting of Pregnancy-Related Mortality in the U.S. and Europe. *Obstetrics & Gynecology*, 2005, 106(4):684-692
- Callaghan WM, Berg C: Pregnancy-Related Mortality Among Women Aged 35 Years and Older, United States, 1991-1997. *Obstetrics & Gynecology*, 2003, 102(5, Part 1):1015-1021
- Geller SE, et al: Reliability of preventability model in maternal death and morbidity. *American Journal of Obstetrics & Gynecology*, 2007, 196(1):e1-57.e6
- Pearlman MD: Patient Safety in Obstetrics and Gynecology: An Agenda for the Future. *Obstetrics & Gynecology*, 2006, 108(5):1266-71
- Pennsylvania Patient Safety Authority: Medication errors in labor and delivery: Reducing maternal and fetal harm. Pennsylvania Patient Safety Advisory, December 16, 2009, 6(Suppl 1):1-6, [http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2009/dec16\\_6\(suppl1\)/Pages/01.aspx](http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2009/dec16_6(suppl1)/Pages/01.aspx) (Accessed December 16, 2009)
- Berg C, Danel I, Atrash H, Zane S, Bartlett L (editors): Strategies to reduce pregnancy-related deaths: From identification and review to action. Centers for Disease Control and Prevention, 2001, [http://www.cdc.gov/reproductivehealth/ProductsPubs/PDFs/Strategies\\_taged.pdf](http://www.cdc.gov/reproductivehealth/ProductsPubs/PDFs/Strategies_taged.pdf) (Accessed July 10, 2009)
- Bacak SJ, Berg CJ, Desmarais J, Hutchins E, Locke E (editors): State maternal mortality review: Accomplishments of nine states. Centers for Disease Control and Prevention, 2006

## Patient Safety Advisory Group

The Patient Safety Advisory Group informs The Joint Commission on patient safety issues and, with other sources, advises on topics and content for Sentinel Event Alert. Members: James P. Bagian, M.D., P.E. (chair); Michael Cohen, R.Ph., M.S., Sc.D. (vice chair); Jane H. Barnsteiner, R.N., Ph.D., FAAN; Jim B. Battles, Ph.D.; William H. Beeson, M.D.; Patrick J. Brennan, M.D.; Martin H. Diamond, FACHE; Cindy Dougherty, R.N., CPHQ; Frank Federico, B.S., R.Ph.; Steven S. Fountain, M.D.; Suzanne Graham, R.N., Ph.D.; Jerril W. Green, M.D.; Ezra E.H. Griffith, M.D.; Peter Gross, M.D.; Carol Haraden, Ph.D.; Martin J. Hatlie, Esq.; Jennifer Jackson, B.S.N., J.D.; Henri R. Manasse, Jr., Ph.D., Sc.D.; Jane McCaffrey, MHA, DFASHRM; David Mechtenberg; Mark W. Milner, R.N., MBA, MHS; Jeanine Arden Ornt, J.D.; Grena Porto, R.N., M.S., ARM, CPHRM;

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