PAMR

Pregnancy-Associated Mortality Review

Florida Department of Health, Division of Community Health Promotion

Pregnancy-Related Deaths Due to Hemorrhage, 2003-2015

Worldwide and in the United States,[1] hemorrhage is a leading cause of pregnancy-related deaths (PRDs) before, during, or after delivery. This brief presents an overview of PRDs due to hemorrhage in Florida from 2003 to 2015, and provides evidence-based recommendations intended to reduce the risk of maternal deaths due to hemorrhage.

Florida's Pregnancy-Associated Mortality Review (PAMR) is an ongoing system of surveillance that collects and analyzes information related to maternal deaths in order to promote care and system improvements through evidence-based actions intended to lower risks for PRDs.[2] From 2003-2015, the Florida PAMR Committee classified 541 cases as PRDs. Figure 1 shows the distribution of these 541 PRDs by cause of death. In this period (2003-2015), the top two leading causes of PRDs were hemorrhage (19.8%) and hypertensive disorders (14.8%).

Of the 541 PRDs, 107 (19.8%) were due to hemorrhage. Between 2003 and 2015, the pregnancy-related mortality ratio due to hemorrhage (HPRMR) rose from a rolling three-year average of 2.7 hemorrhage deaths per 100,000 live births during the 2003-2005 period to 5.3 deaths during the 2013-2015 period (see Figure 2). However, the upward trend for single-year data was not statistically significant for the same period.

Differences in HPRMRs were found for maternal characteristics of age, race and Hispanic ethnicity, marital status, delivery type, prenatal care, and body mass index (BMI). Women 35 years and older had a higher HPRMR of 10.2 compared with the HPRMR of women 24 years or younger at 1.7 PRDs per 100,000 live births. Non-Hispanic Black women had a higher HPRMR of 7.5 compared with non-Hispanic White or Hispanic and Non-Hispanic other races at 2.6 and 2.8 PRDs per 100,000 live births.

Figure 1. Distribution of Pregnancy-Related Causes of Deaths, Florida, 2003-2015 (n=541)

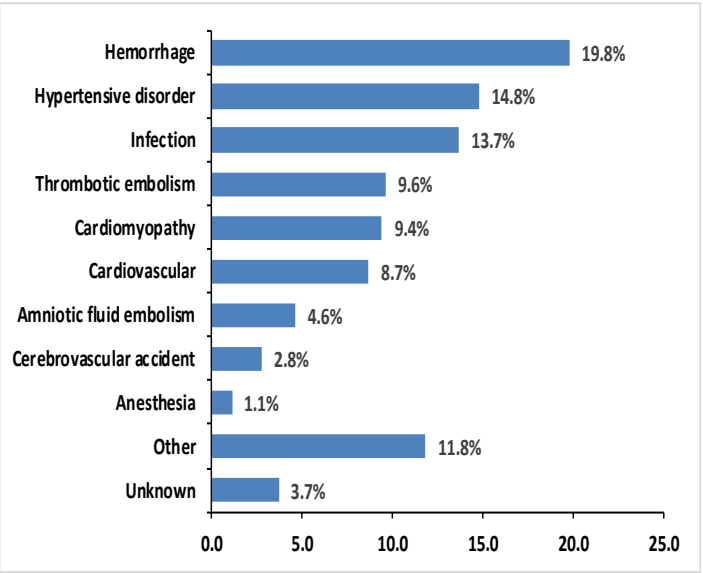
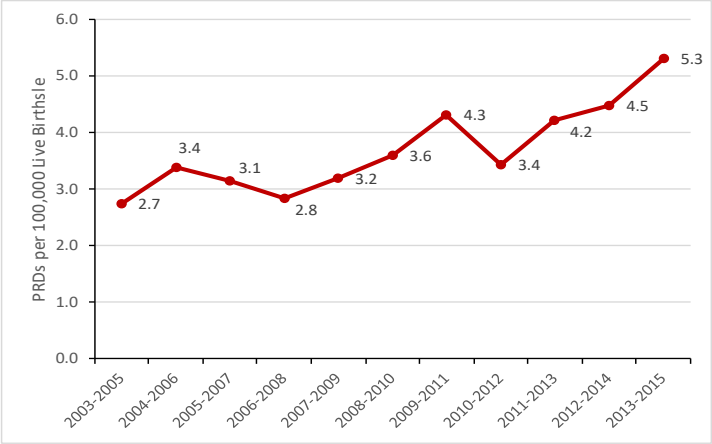


Figure 2. Pregnancy-Related Mortality Ratios per 100,000 Live Births due to Hemorrhage (HPRMR), Three Year Rolling Average, Florida, 2003-2015



Women classified as not married had higher HPRMR of 4.6 than married women with 3.0 deaths per 100,000 live births. Women who delivered by cesarean had a higher HPRMR of 4.3 compared with the HPRMR of 1.0 PRDs per 100,000 live births for women who had a vaginal delivery. Women who had late or no prenatal care had a higher HPRMR of 5.7 compared with women who had prenatal care during the first trimester of pregnancy at 1.4 PRDs per 100,000 live births. Obese (BMI ≥ 30) women had higher HPRMR of 5.8 compared with 3.2 PRDs per 100,000 live births for women with a normal BMI (20-24.9) (see Table 1).

Collectively, uterine atony, uterine laceration, and placental disorders (placenta previa/accreta/increta/percreta), accounted for two thirds of the deaths in women with an intrauterine pregnancy at 20 weeks or more. Ectopic pregnancy accounted for 30.8% of all PRDs due to hemorrhage (see Table 2).

Overall characteristics of women at increased risk of PRD due to hemorrhage were (see Table 1):

- 35 years or older
- Non-Hispanic Black
- Not married
- A cesarean delivery
- Late or no prenatal care
- Obese (BMI ≥ 30)

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Table 1. Pregnancy-Related Mortality due to Hemorrhage: Rates per 100,000 Live Births (HPRMRs) and Unadjusted Relative Ratios (RRs), Florida, 2003-2015 (n=107)

Characteristics	Deaths	HPRMR*	RR (95%CI)
Age			
<25	17	1.7	Ref.
25-34	46	3.1	1.8 (1.0-3.1)*
35 +	44	10.2	5.8 (3.3-10.2)*
Race			
Non-Hispanic White	34	2.6	Ref.
Non-Hispanic Black	47	7.5	2.9 (1.9-4.5)*
Hispanic/Other races	26	2.8	1.1 (0.6-1.8)
Marital Status			
Not married	61	4.6	1.5 (1.1-2.3)*
Married	46	3.0	Ref.
Mode of Delivery			
Vaginal	19	1.0	Ref.
Cesarean[1]	45	4.3	4.1 (2.4-7.0)*
Prenatal Care Initiation[2]			
First Trimester	29	1.4	Ref.
Second-Third or None	31	5.7	4.1 (2.5-6.8)*
Body Mass Index Categories[3]			
Underweight (BMI <20)	4	4.2	1.3 (0.5-3.7)
Normal (BMI 20-24.9)	30	3.2	Ref.
Overweight (BMI 25-29.9)	24	5.3	1.6 (1.0-2.8)
Obese (BMI 30 or +)	30	5.8	1.8 (1.1-3.0)*

1/ Excluded two emergency cesarean deliveries. 2/ Excluded women who died during first or second trimester. 3/ Included years 2004-2012. * Statistically significant p<0.05

Florida PAMR Committee Hemorrhage Recommendations for Actions:

In 2014, the Florida PAMR Committee initiated the assessment of preventability of PRDs. During the 2013-2015 period, 51.2% of all PRDs had a strong chance to alter the outcome. Deaths from hemorrhage were determined the most preventable of maternal deaths with 74.3% of strong chance to alter the outcome. The PAMR Committee identified the following recommendations to reduce the risk of hemorrhage PRDs.

Clinical Factors **-** Providers should raise awareness on the importance of early recognition of the signs of hemorrhage and implement a standard treatment protocol as outlined in the Florida Perinatal Quality Collaborative's obstetric hemorrhage toolkit.

System Factors - Providers should promote the use of the "Checklist for Management of Pregnant Women who Decline Transfusions" from Florida's obstetric hemorrhage toolkit to plan for high risk deliveries.

Individual and Community Factors **-** Providers should raise community awareness about the need for women of reproductive age who are experiencing abdominal pain to seek prompt medical attention.

More recommendations can be found at: http://www.floridahealth.gov/%5C/statistics-and-data/PAMR/index.html

References:

1. Hogan M. et al. (2010). Maternal mortality for 181 countries, 1980-2008: A systematic analysis of progress towards Millennium Development Goal 5. Lancet 375: 1609-1623.
2. Burch, D., Noell, D., Washington, H., Del, I. (2012). Pregnancy-Associated Mortality Review. The Florida Experience. Seminars in Perinatology. 36(1): 31-36.
3. Florida Perinatal Quality Collaborative (2013). Florida Obstetric Hemorrhage Initiative Toolkit: A Quality Improvement Initiative for Obstetric Hemorrhage Management.

Obstetric Hemorrhage Initiative (OHI):

In 2013, under contract with the Florida Department of Health, the Florida Perinatal Quality Collaborative (FPQC), in partnership with the American Congress of Obstetricians and Gynecologists (District XII) and the OHI Advisory Group (consisting of maternal, public, and quality improvement health leaders), developed a toolbox for hospital implementation. The OHI was formed to address the issue of highly preventable morbidity and mortality related to postpartum hemorrhage. Participating hospitals assembled multi-disciplinary teams and implemented strategies that responded to every obstetric hemorrhage through a 2-year multi-hospital collaborative. The first phase was completed in June 2015. Phase two began in February 2016 and consists of hospitals leading their own internal initiative with FPQC providing online tools, resources, and assistance.

The goal of the collaborative is to achieve improvements in maternal outcomes related to hemorrhage by implementing best practice guidelines as developed by the OHI Advisory Group. These guidelines include risk assessment, application of massive transfusion policies, obstetric hemorrhage simulation drills and debriefing, and quantification of blood loss.[3]

Table 2. Pregnancy–Related Deaths Due to Hemorrhage by Causes, Florida, 2003-2015 (n=107)

Causes	Vaginal	Cesarean Delivery	N/D*	Total Deaths (%)
Total Intrauterine gestations at >20 weeks	**19**	**47**	**4**	**70**
Uterine atony/postpartum hemorrhage[1]	6	7	1	14 (20%)
Placenta previa	1	2		3 (4%)
Placenta accreta, increta, percreta[2]	2	12	1	15 (21.%)
Abruptio placentae[1]	0	3	2	5 (7%)
Retained placenta/postpartum hemorrhage[3]	4	1		5 (7%)
Other (uterine artery laceration, intra-abdominal & other sites of hemorrhage)	2	9		11 (16%)
Coagulopathies including disseminated intravascular coagulation	0	2		2 (3%)
Uterine bleeding, no otherwise speficied	2	6		8 (11%)
Uterine laceration/rupture spontaneous, forceps or therapeutic abortion	2	4		6 (9%)
Unknown	0	1		1 (1%)
Intrauterine gestations at <20 weeks	**4**	**N/A**		**4 (100%)**
Spontaneous abortion/hemorrhage[4]	2			2 (50%)
Dilation and evacuation/ bleeding from uterine perforation/laceration of uterine vessels	2			2 (50%)
Ruptured ectopic pregnancy		**N/A**		**33 (100%)**
Total Deaths Due to Hemorrhage	**23**	**47**	**4**	**107**

1/Three cases related to religious beliefs. 2/Four cases undelivered-diagnosis by autopsy. 3/ Two cases of home birth. 4/ Termination (abortion). * N/D Not delivered.

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