Pregnancy-Associated Mortality Review

Pregnancy-Related Deaths Due to Venous Thromboembolism, 2007-2016

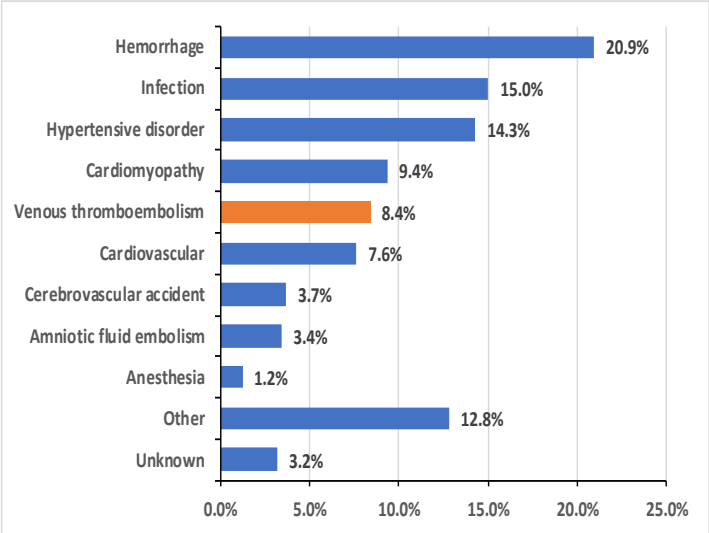
Florida Department of Health, Division of Community Health Promotion

Venous thromboembolism (VTE) accounted 9.2% of all pregnancy-related deaths (PRDs) in the United States for the period 2011-2013.[1] This brief presents an overview of PRDs due to VTE in Florida from 2007 to 2016 and provides evidence-based recommendations intended to reduce the risk of maternal death caused by this condition.

Florida's Pregnancy-Associated Mortality Review (PAMR) is an ongoing system of surveillance that collects and analyzes information related to maternal deaths to develop guidelines for prevention and interventions through evidence-based actions intended to lower risks for PRDs.[2]

From 2007-2016, the Florida PAMR Committee classified 406 cases as PRDs. Figure 1 shows the distribution of these PRDs by cause of death—8.4% of all PRDs during this period were due to VTE (the fifth leading cause).

Figure 1. Distribution of Pregnancy-Related Deaths (PRDs) by Cause, Florida, 2007 - 2016 (n=406)

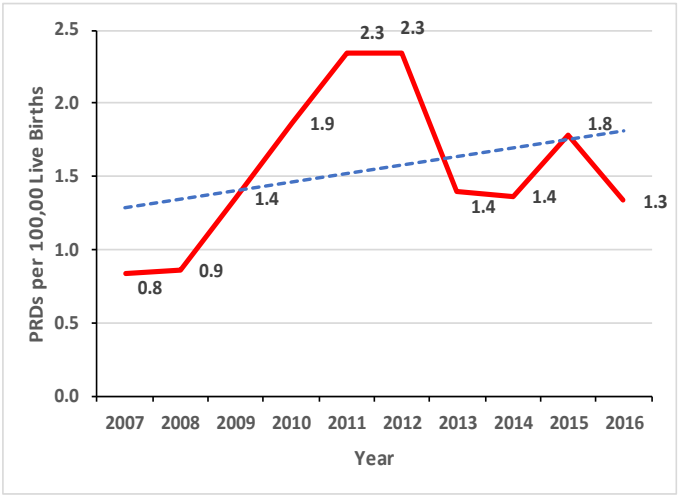


Between 2007 and 2016, the VTE-specific pregnancy-related mortality ratio (PRMR) rose from 0.8 deaths per 100,000 live births during 2007 to 2.3 in 2011 (see Figure 2). The trend analysis between 2007 and 2011 shows a statistically significant annual increase of 31.9 percent. However, the decrease in the PRMR for VTE from 2.3 per 100,000 live births in 2012 to 1.3 in 2016 (-10.6 percent annually) is not statistically significant.

Differences in PRMRs for VTE were found for the maternal characteristics of race/ethnicity, delivery type, prenatal care, and body mass index (BMI). Non-Hispanic black women had a higher PRMR for VTE of 3.9 PRDs per 100,000 live births compared with women of non-Hispanic white or Hispanic and non-Hispanic other races women at 1.1 and 0.6, respectively.

Women who had a cesarean delivery had a PRMR for VTE higher than women who had vaginal deliveries (2.2 per 100,000 live births versus 0.3 for each group, respectively).

Figure 2. Pregnancy-Related Mortality Ratios (PRMR) for Venous Thromboembolism (VTE) per 100,000 Live Births, Florida, 2007- 2016



Women who had late or no prenatal care had a higher PRMR of death compared with women who began prenatal care in the first trimester (2.2 per 100,000 live births versus 0.3, respectively). Obese women (BMI ≥ 30) had higher PRMRs of 4.2 per 100,000 live birth compared with 0.5 for women with normal BMIs (20-24.9). See Table 1.

Overall characteristics of women at increased risk of PRD due to VTE were:

- Non-Hispanic black
- Cesarean delivery
- Late or no prenatal care
- Obese (BMI ≥ 30)

Table 2 displays the presence of risk factors by type of delivery. The most frequently reported risk factors among women who died before delivery were obesity and history of infections (42% each) followed by parity (a count of previous live births) of three or more (30%). Almost half of the women who died prenatally due to VTE had three or more risk factors identified in their case histories.

The most reported risk factors for women who died from VTE after a cesarean delivery were obesity (61%), chronic conditions, and a previous stillbirth (56% each). The majority of the women (56%) in this group had at least four or more risk factors identified in their case histories.

Prepared by Leticia Hernandez, PhD, MS . For more information about Florida PAMR, contact Angela Thompson, R.N., B.S.N; PAMR Coordinator at (850) 558-9686 or Angela.Thompson@flhealth.gov

Table 1. Pregnancy-Related Mortality due to Venous Thromboembolism (VTE): Pregnancy-Related Mortality Ratios (PRMRs) per 100,000 Live Births and Unadjusted Relative Risk Ratios (RRs), Florida, 2007-2016 (n=34)

Characteristics	Deaths	PRMR	RR (95%CI)
Age			
<25	12	1.7	1.2 (0.6-2.5)
25-34	17	1.5	Ref.
35 +	6	1.7	1.2 (0.5-3.1)
Race			
Non-Hispanic White	11	1.1	Ref.
Non-Hispanic Black	19	3.9	3.5 (1.7-7.4)*
Hispanic/Other races	4	0.6	0.6 (0.2-1.8)
Mode of Delivery[1]			
Vaginal	4	0.3	Ref.
Cesarean	18	2.2	7.5 (2.5-22.0)*
Prenatal Care Initiation			
First Trimester	10	0.3	Ref.
Second-Third or None	12	2.2	4.4 (1.9-10.3)*
Body Mass Index Categories			
Underweight (BMI <20)	1	1.0	2.0 (0.2-17.5)
Normal (BMI 20-24.9)	5	0.5	Ref.
Overweight (BMI 25-29.9)	9	1.7	3.4 (1.1-10.2)*
Obese (BMI 30 or +)	19	4.2	8.4 (3.1-22.5)*

1/ Excluded nine prenatal deaths. *Statistically significant p<0.05.

The most frequently reported risk factors for women who died from VTE after a vaginal delivery were history of preterm labor/delivery (75%), obesity, chronic conditions, and/or a history of infection (50% each). Most women who died from VTE after a vaginal delivery (75%) had three or more risk factors.

Florida PAMR Committee VTE Recommendations for Actions:

In 2014, the Florida PAMR Committee initiated an annual assessment of the preventability of PRDs. Between 2013-2016, 54.9% of all PRDs had a strong chance to alter the outcomes. PRDs from VTE, cardiovascular, and hypertensive disorders ranked second and each had a 60.0% strong chance to alter the outcomes. Hemorrhage ranked first with 81.5% chance to alter the outcome.

The PAMR Committee identified the following recommendations to reduce the risk of VTE PRDs:

Clinical Factors - Providers should consider the use of prophylactic anticoagulants or mechanical measures post-op in overweight and obese patients.

It is important to promote the use of VTE prophylaxis for all patients undergoing cesarean delivery with pneumatic compression devices or low molecular weight heparin in high -risk patients.

See: http://www.floridahealth.gov/%5C/statistics-and-data/PAMR/index.html for more recommendations.

References:

1. Centers for Disease Control and Prevention (CDC). Reproductive Health. Retrieved from: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html
2. Burch, D., Noell, D., Washington, H., Delke, I. (2012). Pregnancy-Associated Mortality Review. The Florida Experience. Seminars in Perinatology. 36(1): 31-36.
3. Drife J. (2003). Thromboembolism. British Medical Bulleting. 67: 177-190.
4. Heyl, P., Sappenfield, W., Burch, D., Hernandez. L., Kavanaugh, V., Hill, W. (2013). Pregnancy-Related Deaths Due to Pulmonary Embolism: Findings from Two State-Base Mortality Reviews. Maternal and Child Health Journal 17(7): 1230-5.

System Factors - Facilities should consider using a thrombotic risk scoring system to identify high-risk patients for preventive treatment for deep vein thrombosis (DVT) and develop pharmacologic prophylaxis policies that include standards developed with pharmaceutical experts.

Individual and Community Factors - Women with morbid obesity should seek prenatal care for pharmacologic prophylaxis to prevent DVT.

Providers and health campaigns should stress the importance of chronic disease care and optimal weight before, during, and between pregnancies.

Recommendations from the literature:

All women should undergo an assessment of their risk for VTE, ideally before or during early pregnancy. VTE risks are high in the first trimester and death my occur before scheduling the prenatal visit. The assessment should be repeated if the woman is admitted to the hospital or develops other problems during pregnancy.[3]

Increasing provider awareness of associated risk factors presenting symptoms should foster improved patient education, screening, and treatment protocols leading to a decrease in maternal morbidity and mortality.[4]

Table 2. Presence of Risk Factors by Type of Delivery for Pregnancy-Related Deaths Due to Venous Thromboembolism (VTE), Florida 2007-2016 (n=34)

	Prenatal		Type of Delivery: Cesarean		Type of Delivery: Vaginal	
Obese	5	41.7%	11	61.1%	2	50.0%
Parity 3 or more	3	30.0%	5	27.8%	1	25.0%
Chronic Conditions	2	16.7%	10	55.6%	2	50.0%
Family History of Thrombotic Embolism	0	0.0%	0	0.0%	1	25.0%
Personal History of Thrombotic Embolism	3	25.0%	3	16.7%	1	25.0%
Previous Pregnancy Loss or Stillbirth	2	16.7%	10	55.6%	1	25.0%
History of Preterm Labor/Delivery	2	16.7%	6	33.3%	3	75.0%
Utero-Placental Problems	0	0.0%	5	27.8%	0	0.0%
History of Anemia	0	0.0%	5	27.8%	0	0.0%
History of Infection	5	41.7%	5	27.8%	2	50.0%
Number of Risk Factors per Case						
0	2	16.7%	0	0.0%	0	0.0%
1	3	25.0%	1	5.6%	1	25.0%
2	2	16.7%	5	27.8%	0	0.0%
3	4	33.3%	2	11.1%	1	25.0%
4	1	8.3%	3	16.7%	1	25.0%
5+	0	0.0%	7	38.9%	1	25.0%

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