



Pregnancy-Associated Mortality Review

Pregnancy-Related Deaths Due to Cardiovascular Diseases, 1999-2017

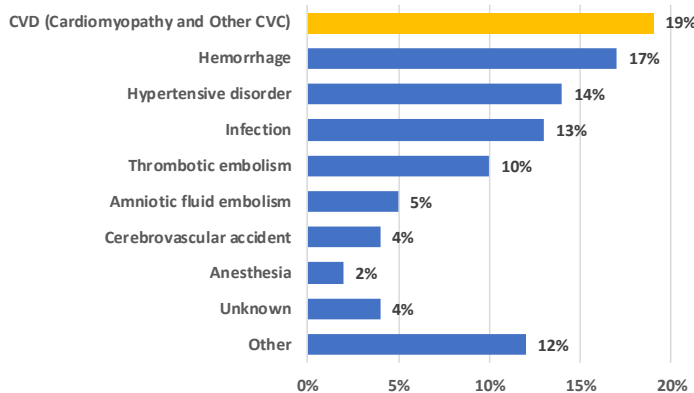
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In the United States, cardiovascular disease (CVD) is the leading cause of death in pregnancy and the postpartum period. CVD represents 26.5% of pregnancy-related deaths (PRD).¹ This brief presents an overview of PRDs due to CVD in Florida from 1999 to 2017 and provides evidence-based recommendations intended to reduce the risk of maternal death caused by these conditions.

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 1999 to 2017, there were 4,146,653 live births in Florida and the Florida PAMR Committee classified 752 cases as PRDs. Figure 1 shows the distribution of these PRDs by cause of death. During the same period, CVD was the leading cause of PRD with 19.2% classified as cardiomyopathy (10.4%) and other cardiovascular conditions (CVC) (8.8%).

Figure 1. Distribution of Pregnancy-Related Deaths (PRDs) by Cause, Florida, 1999-2017 (n=752)



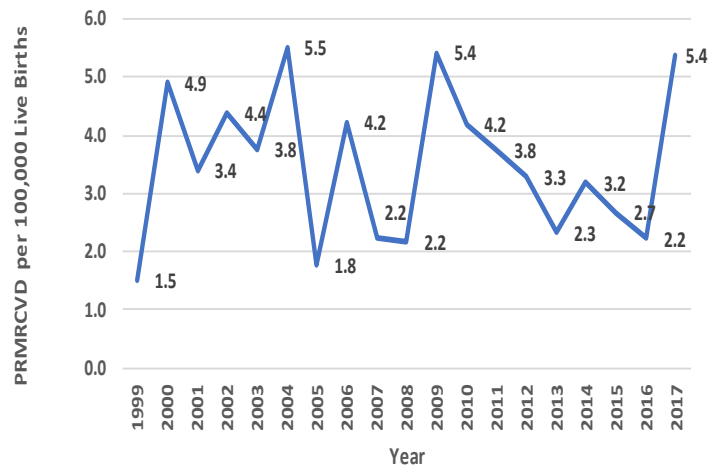
During 1999-2017, the 144 deaths due to CVD had an incident rate of 3.5 deaths per 100,000 live births, of them 78 (1.9) were due to cardiomyopathy and 66 (1.6) were deaths from other CVCs. During this period, the CVD-specific pregnancy-related mortality ratios (PRMR) fluctuated from 1.5 deaths per 100,000 live births in 1999 to 5.5 in 2004 and 5.4 in 2009 and 2017 (Figure 2). The trend between 1999 and 2017 was not statistically significant.

Differences in PRMRs for CVD were found for the maternal characteristics of race/ethnicity, mode of delivery, prenatal care, body mass index (BMI) and parity.

The ages of women who died from CVD ranged between 15 and 45 years with a median age of 30 years old. There were no statistically significant differences by age.

Forty-nine percent of women who died from CVD were non-Hispanic Black, 36.1% were non-Hispanic White, and 12.5% were Hispanic. Non-Hispanic Black women had higher PRMR of 7.9 per 100,000 live births compared with non-Hispanic White (2.7), or Hispanic (1.6).

Figure 2. Pregnancy-Related Mortality Ratios (PRMR) Due to Cardiovascular Disease (CVD) per 100,000 Live Births, Florida, 1999-2017 (n=144)



Studies show that CVD is associated with cesarean delivery.³ Sixty percent of women who died from CVD had a cesarean delivery. Women who delivered by cesarean had a higher PRMR of 4.6 per 100,000 live births compared with 1.6 for women who had a vaginal delivery.

Women who had late or no prenatal care had a higher PRMR due to CVD when compared with women who began prenatal care in the first trimester (5.7 versus 2.2 per 100,000 live births respectively).

Obese women had a higher PRMR due to CVD of 7.1 per 100,000 live births compared with 2.0 for normal weight women (Table 1).

Women with parity of two or more had a higher PRMR due to CVD: 7.0 per 100,000 live births compared with women with parity zero (0.9) or parity one (3.1).

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

- Non-Hispanic Black
- Late or no prenatal care
- Obese (BMI ≥ 30)

CVD was associated with:

- Cesarean deliveries
- Parity 2 or more

Table 1. Pregnancy-Related Mortality due to Cardiovascular Disease (CVD): Pregnancy-Related Mortality Ratios (PRMRs) per 100,000 Live Births and Unadjusted Relative Risk Ratios² (RRs), Florida, 1999-2017 (n=144)

Characteristics	Deaths	PRMR	RR (95%CI)
Age			
<25	35	2.5	0.7 (0.4-1.0)
25-34	77	3.6	Ref.
35 +	32	5.1	1.4 (0.9-2.1)
Race			
Non-Hispanic White	52	2.7	Ref.
Non-Hispanic Black	71	7.9	2.9 (2.0-4.1)*
Hispanic	18	1.6	0.6 (0.3-1.0)*
Mode of Delivery¹	141		
Vaginal	44	1.6	Ref.
Cesarean	66	4.6	2.8 (1.9-4.1)*
Prenatal Care Initiation			
First Trimester	69	2.2	Ref.
Second-Third or None	43	5.7	2.5 (1.7-3.7)*
Body Mass Index Categories			
Underweight (BMI <20)	4	2.9	1.5 (0.5-4.1)
Normal (BMI 20-24.9)	28	2.0	Ref.
Overweight (BMI 25-29.9)	24	3.3	1.7 (1.0-2.9)
Obese (BMI 30 or +)	44	7.1	3.6 (2.2-5.7)*
Parity			
Zero (First viable pregnancy)	16	0.9	Ref.
One (Second viable pregnancy)	41	3.1	3.3 (1.8-5.8)*
Two or more (Third+ viable pregnancy)	78	7.0	7.4 (4.3-12.7)*

1. Excluded nine emergency cesarean deliveries. 2. Not taking other risk factors into account.
*Statistically significant p<0.05.

Of the 78 cardiomyopathy deaths during 1999-2017, 71 (91.0%) died during the postpartum period, 40 (57.9%) after 42 days postpartum. Of the other 66 cardiovascular deaths, 56 (84.8%) were due to cardiovascular problems, 8 (12.1%) were due to cardiac arrhythmia, and 2 (3.0%) were due to cardiac arrest. Among all cardiovascular deaths, 39 (27.1%) had a history of hypertension, 16 (11.1%) had diabetes and 15 (10.4%) had asthma.

Among the cardiovascular PRDs, 77.1% of deaths occurred after a live birth, 13.2% died before delivery, 5.6% after a stillbirth, and 4.2% after an abortion.

Florida PAMR Committee CVD Recommendations for Actions:

In 2014, the Florida PAMR Committee initiated an annual assessment of the preventability of PRDs. Forty-two percent of PRDs due to cardiovascular disease were deemed to be preventable while 31.3 % had factors that definitively contributed. Factors that contributed were personal decisions (11%), and providers knowledge/skills/assessment (9%). Of note, 38% of these PRDs were found to have significant comorbidities. The Florida PAMR Committee identified the following recommendations as opportunities to reduce the risk of PRDs due to CVDs.⁴

Clinical Factors - Recommendations for Clinicians:

- Increasing the awareness for all medical providers of signs of cardiac problems in pregnant and postpartum women is important.

- Medically high-risk women may require longer postpartum stay.
- Provide aggressive management and follow up of hypertension during pregnancy and postpartum.
- Patients presenting during pregnancy or postpartum with shortness of breath and dizziness require thorough assessment.
- Providers should refer patients for smoking cessation.
- Providers should consider more thorough workup in obese patients with cardiac issues.
- Women with known CVD should receive pre-and inter-conception counseling by an experienced maternal-fetal medicine specialist and/or cardiologist.⁵

System Factors

- Increase provider awareness of the importance of educating patients about how shortness of breath or severe headaches during pregnancy or postpartum may signify a complication requiring medical advice.
- Health providers should promote the use of the Florida Prenatal Risk Screening to obstetrical providers and medical residents.
- Improve access to family planning services postpartum to women with risk factors such as obesity, hypertension, and cardiac disease.

Individual and Community Factors

- Every woman of reproductive age with a chronic condition should understand the risk of pregnancy.
- It is important for health professionals to identify and address barriers for non-compliant patients.
- It is important for health professionals to teach patients about shortness of breath and severe headaches as warning signs of complications.
- It is important for patients to read and follow the doctor/pharmacist directions and only take medications as instructed.

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