Florida's Pregnancy-Associated Mortality Review
2008 Update

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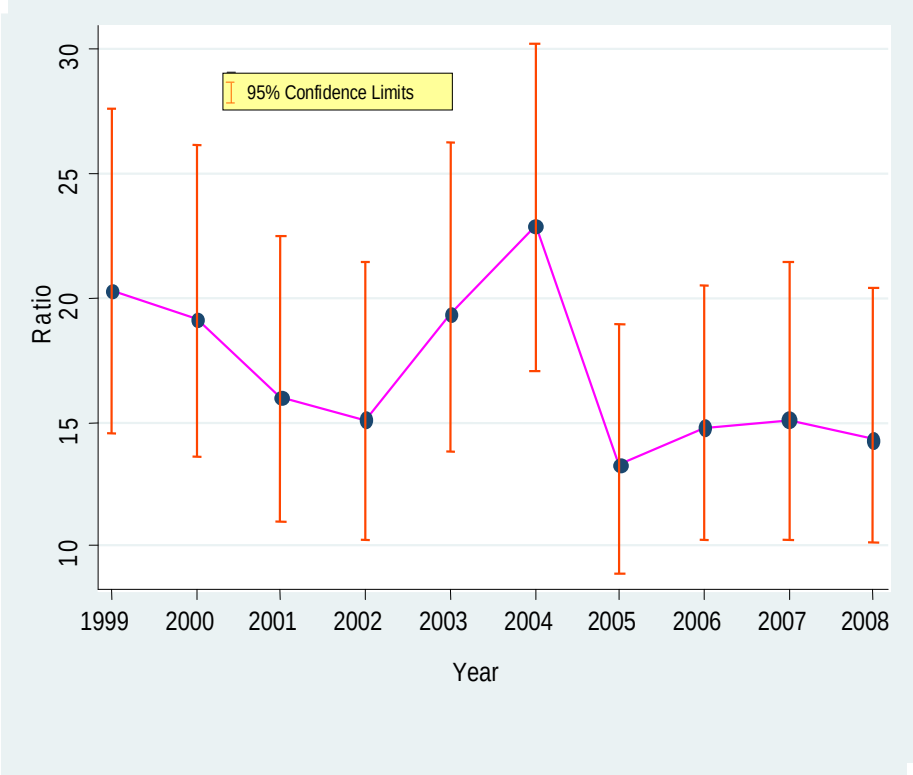
Pregnancy-Related Mortality Findings, Florida 2008

In 2009, the Pregnancy-Associated Mortality Review (PAMR) committee reviewed 41 pregnancy-associated deaths and identified 33 (80%) deaths as pregnancy-related. Between 1999 and 2008, the pregnancy-related mortality ratio fluctuated from 20.3 deaths per 100,000 live births in 1999 to a high of 22.9 in 2004 and a low of 13.3 in 2005. In 2007 and 2008, the ratios were 15.1 and 14.3 deaths per 100,000 live births, respectively (Figure 1). The slight downward trend from 1999 to 2008 is not statistically significant.

Figure 1. Pregnancy-Related Mortality Ratios, Florida 1999-2008

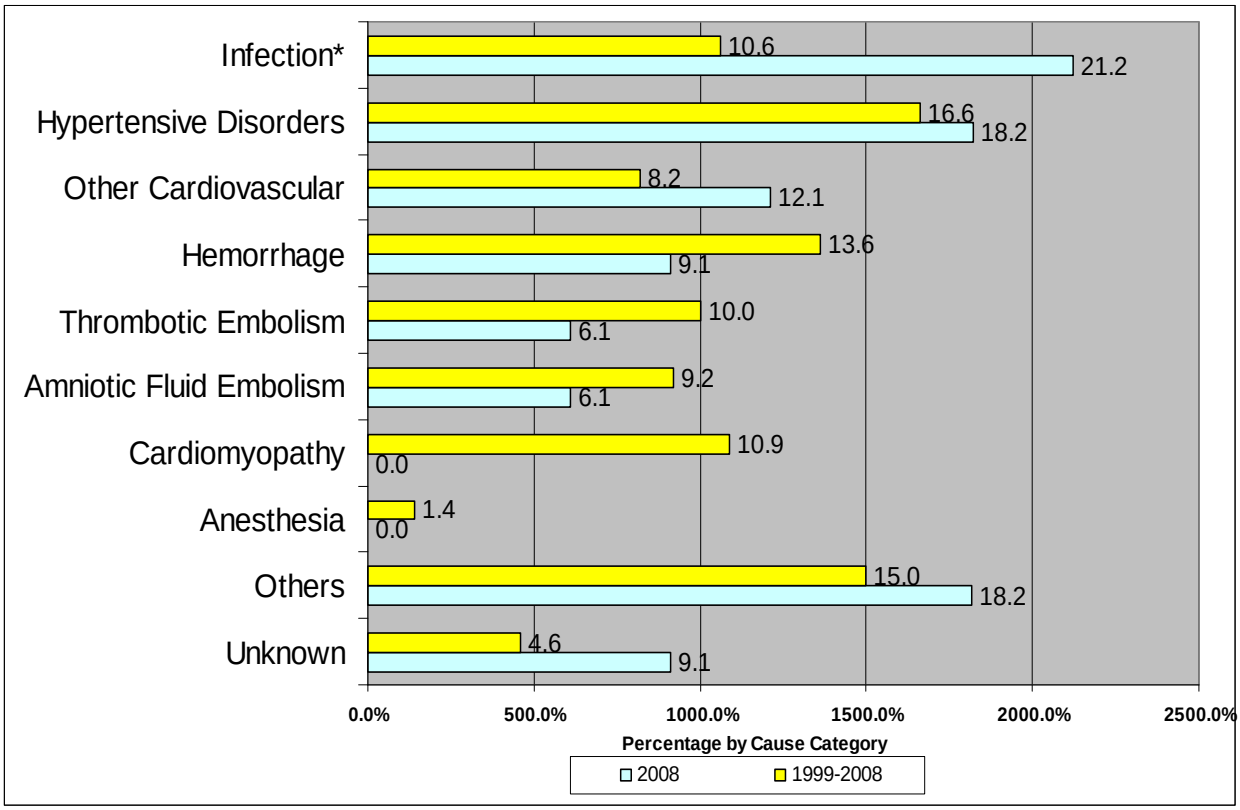


Cause of Death

The leading causes of pregnancy-related death in 2008 were infection (21%), hypertension (18%), and other cardiovascular (12%) (Figure 2 and Table 1). Other remaining causes ranked third among the categories accounting for 18.2% of deaths. These other causes include: collagen vascular diseases (3%), metabolic (3%), pulmonary problems (6%), and intracerebral hemorrhage (6%). Figure 2 and Table 1 show how the percentages of deaths for infection

(21.2% vs.10.6%), and other cardiovascular (12.1% vs. 8.2%) were higher in 2008 than in the ten-year period of 1999-2008, while there was a decrease in deaths for hemorrhage (9.1% vs. 13.6%), thrombotic embolism (6.1% vs. 10.0%), and amniotic fluid embolism (6.1% vs. 9.2%). There were no deaths due to cardiomyopathy or anesthesia in 2008. Limited statistical testing has been performed in this interim PAMR report because this reporting period contains only one year of data with a relatively small number of deaths. Therefore, differences highlighted in this report may not be statistically significant.

Figure 2: Distribution of Pregnancy-Related Causes of Deaths
Florida
1999-2008 (n=368), 2008(n=33)



* Infection: 7 cases – 5 generalized septicemia/septic-shock, septic abortion (AB), 1 postpartum pelvic infection, and 1 unknown/not otherwise specified (NOS).

Table 1: Distribution of Causes of Pregnancy-Related Death, Florida 1999-2008 and 2008

Causes	1999-2008 N (%)	2008 N (%)
Hypertensive disorders	61 (16.6)	6 (18.2)
Hemorrhage	50 (13.6)	3 (9.1)
Cardiomyopathy	40 (10.9)	0 (0.0)
Infection	39 (10.6)	7 (21.2)**
Thrombotic embolism	37 (10.0)	2 (6.1)
Amniotic fluid embolism	34 (9.2)	2 (6.1)
Other Cardiovascular	30 (8.2)	4 (12.1)
Anesthesia	5 (1.4)	0 (0.0)
Others*	55 (15.0)	6 (18.2)
Unknown	17 (4.6)	3 (9.1)
Total	368	33

* Others (list): 8 (Hematopoietic (sickle cell, thalassemia, ITP), 4 (Collagen vascular diseases), 1 (Metabolic pregnancy-related), 4 (Metabolic other pregnancy-related), 1 (Immune deficiency problems), 1(Injury), 4 (Cancer), 6 (Pulmonary problems), 1 (Multiple organ/system failure, NOS), 14 (Intracerebral hemorrhage - not associated with PIH), 6 (Gastrointestinal disorders), 5 (Other conditions not specified above).

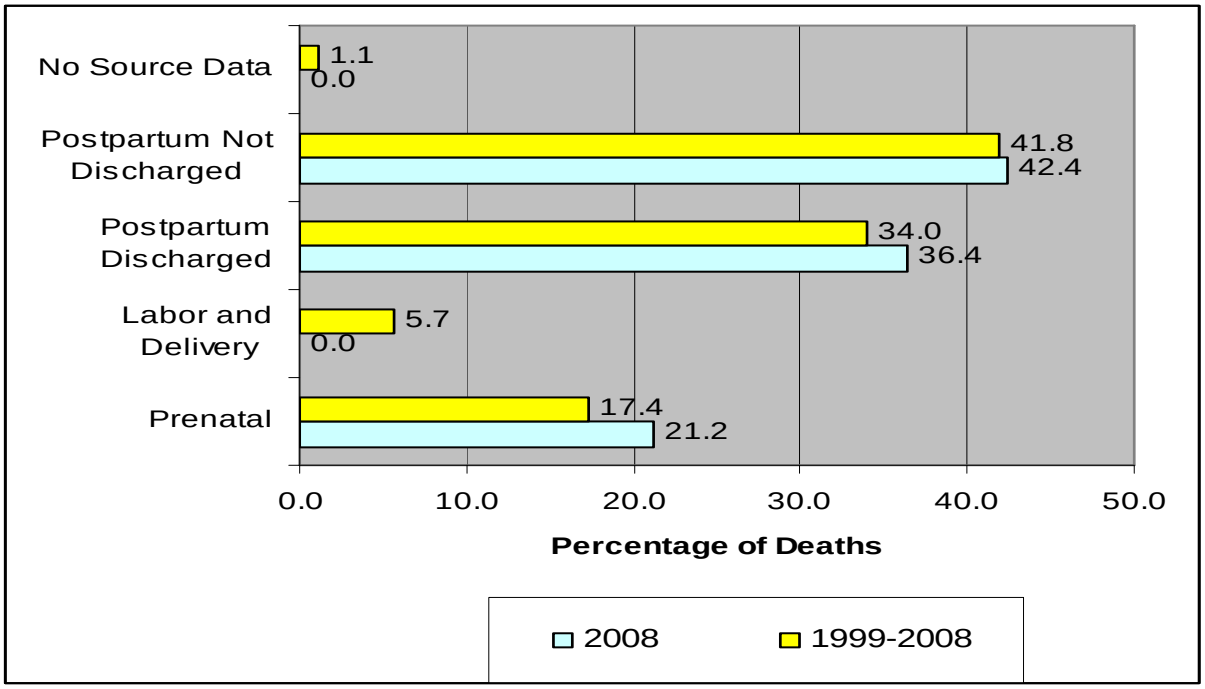
** 7 cases – 5 generalized septicemia/septic-shock, septic abortion (AB), 1 postpartum pelvic infection, and 1 unknown/not otherwise specified

Timing of Death

Figure 3 presents pregnancy-related death by timing of death: prenatal, labor and delivery, or postpartum. In 2008, approximately 78.8% of the deaths occurred during the postpartum period (the period following birth up to one year). Forty-two percent of all deaths occurred postpartum prior to discharge from the delivery hospital and 36.4% occurred postpartum after hospital discharge. Figure 3 presents the data for the ten-year period of 1999-2008 compared with single year data from 2008.

Among women who were discharged from the hospital after delivery, the most common causes of death occurring during the first six weeks were hypertension (29%), infection (21%), other cardiovascular (21%), thrombotic embolism (14%), and other causes (14%). For those women who were not discharged, the most common causes of death were infection (33%), hemorrhage (17%), hypertension (17%), other causes (17%), amniotic fluid embolism (8%), and unknown (8%).

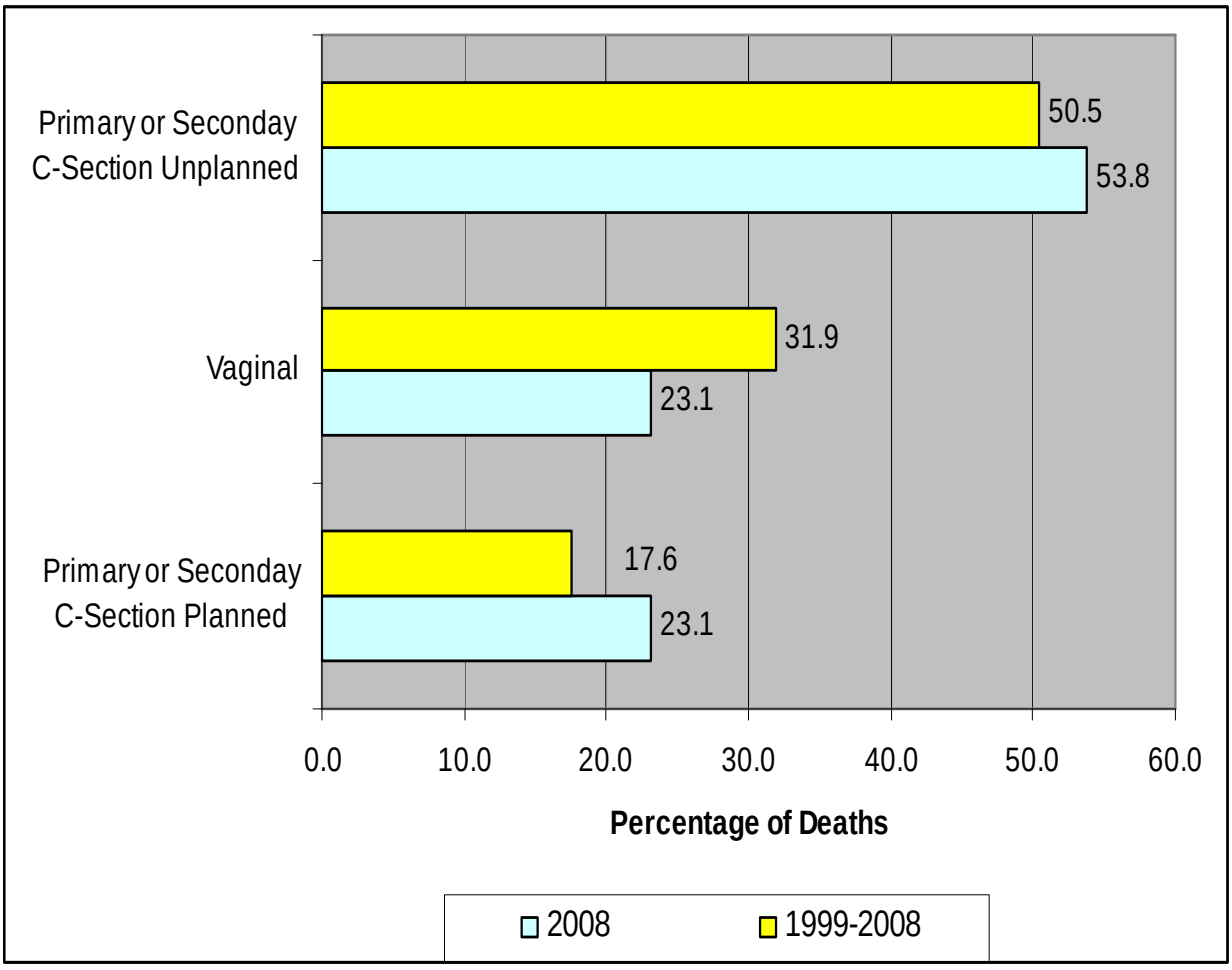
Figure 3: Percent Pregnancy-Related Mortality by Timing of Death
Florida 1999-2008 (n=368) and 2008 (n=33)



Type of Delivery

Figure 4 shows the percentage of women in 2008 who died during labor and delivery or postpartum by type of delivery. In 2008, the percentage of planned and unplanned cesareans increased slightly when compared with the ten years period 1999-2008 (53.8 vs. 50.5). In 2008, 20 (77%) of deaths were in women who had cesarean (C-Section) deliveries of which 6 were planned and 14 were unplanned. The percentage of women who died after a vaginal delivery decreased when compared with the whole 1999-2008 period (23.1% vs. 31.9%). This is likely due to the increasing rate of C-Sections among all births over this time period.

Figure 4: Percent Pregnancy-Related Mortality by Type of Delivery
Florida 1999-2008 (n=301), 2008 (n=26)

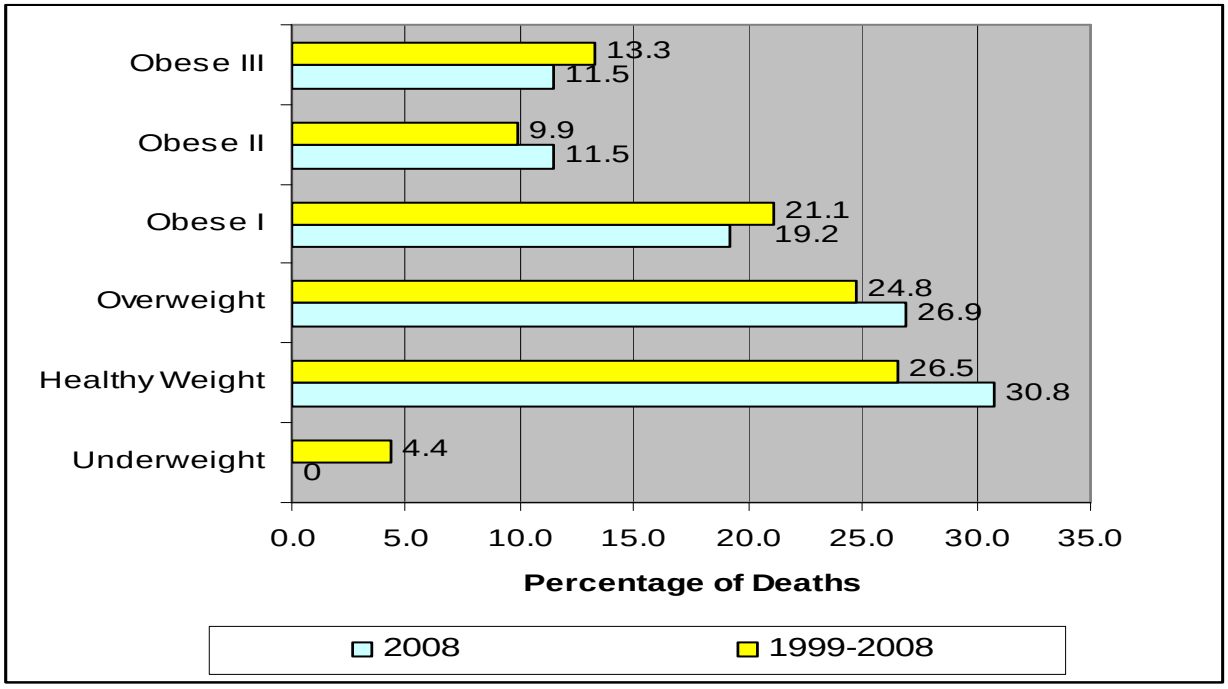


Weight

In 2008, the majority (69%) of women experiencing a pregnancy-related death fell into the overweight and obese I, II, or III categories (Figure 5). Almost half (42%) were classified as obese. This compares to 20.0% of all women having a live birth who were classified as being obese in 2008 (CHARTS, FDOH). Figure 5 presents data for 2008 and the period of 1999-2008 for comparison.

Figure 5: Percent of Pregnancy-Related Mortality by BMI

Florida 1999-2008 (n= 294) and 2008 (n= 26)



A physician/nurse subcommittee reviews all of the identified pregnancy-associated death certificates on a quarterly basis and classifies each death into one of the following categories: pregnancy-related, possibly pregnancy-related, and not pregnancy-related. A total of 15 cases are chosen each quarter for record abstraction and team review. Preference is given to those deaths categorized as pregnancy-related, followed by a random selection of possibly pregnancy-related and not pregnancy-related until a total of 15 cases has been reached. Table 2 displays the characteristics of those deaths that were not chosen for review by PAMR.

Table 2: 2008 PAMR Quarterly Data on Non-Selected Cases (n=98)

Classification at Selection
Pregnancy Related = 0
Possibly Pregnancy Related = 0
Not Related = 96
Unable to classify due to pending cause of death status= 2

PAMR Selection
ICD – 10 = 28
Prenatal Screen = 30
Pregnancy √ Box = 40
Birth/Fetal Death Certificate = 74

Age
< 16 = 0
16 – 19 = 13
20 – 24 = 17
25 – 29 = 25
30 – 34 = 25
35 – 39 = 14
> 39 = 4

Race / Ethnicity
White Non-Hispanic = 54
Black Non-Hispanic = 24
Hispanic = 12
Other (specify) = Haitian (4), Cherokee Indian (2), Seminole Indian (1), Central American (1)

Marital Status
Married = 30
Separated = 1
Divorced = 13
Widowed = 0
Never Married = 54

Place of Birth
Florida = 38
Other U.S. = 38
Outside U.S. = 22

Education Level
8th or less = 3
HS, no diploma = 23
HS diploma or GED = 41
College, no diploma = 13
College with degree = 18

Cause of Death:

Motor Vehicle Accidents = 30
Drug Overdoes (Accidental) = 22
Homicide = 11
Suicide = 7
AIDS = 6
Cancer:
- Colon = 2
- Brain = 1
- Acute Lymphoblastic Leukemia = 1
- Ovarian = 1
- Lymphoma = 1
- Breast = 1
- Lung = 1
- Melanoma = 1

Myocarditis = 1
Cardiomypathy (307 days out) = 1
Myocardial Fibrosis = 2
Meningitis = 2
Alcoholic Cirrhosis = 1
Chronic Renal Disease/hypertension = 1
Lobar Pneumonia (135 days out) = 1
Seizure Disorder (145 days out) = 1
Ruptured Cerebral artery aneurysm (294 days out) = 1

Medical Examiner Referred
Yes = 79
No = 19

Autopsy
Yes = 77
No = 21

Florida PAMR Recommendations for the 33 Pregnancy-Related Deaths in 2008

After reviewing pregnancy-related deaths, the PAMR committee identifies relevant issues related to the death and makes recommendations in an effort to prevent such future deaths. The following text summarizes these issues and recommendations into four prevention categories: Clinical Factors, System Factors, Individual and Community Factors, and Death Review Factors.

CLINICAL FACTORS: Relates to services provided by the entire health care system.

ISSUES – A lack of services evidenced by:

1. Incomplete assessment.
2. Inadequate documentation.
3. Lack of coordination and follow-up, particularly of high-risk women.
4. Deficient communication between staff and patients.
5. Lack of association between a change in mental status and deteriorating medical condition.

RECOMMENDATIONS

A. Interconception Education and Counseling:

- Preconception and interconception care is especially important for women with chronic illnesses.
- Important for providers to obtain thorough assessment, particularly for women with chronic illness.
- Important to provide preconception counseling at each primary care visit for women with chronic illness.
- Important for all providers to be providing family planning education and counseling to women of childbearing age, particularly if they have a chronic illnesses.
- High-risk, postpartum women need to follow-up with care coordinators during interconception period.
- Important to provide interconception counseling on risks of obesity in pregnancy.
- Need to provide genetic counseling for high-risk/obese women.
- Family planning counseling is critical for patients undergoing a repeat C-Section.
- Important to include father of baby in discussions regarding risk, particularly if cultural differences exist.

- Patients need education and counseling regarding risks of over-the-counter medications, particularly during pregnancy.
- Ascertain any particular customs, preferences, or cultural practices among women with regards to their health practices.

B. Prenatal:

- Health care staff – Important to have the skill to obtain a correct blood pressure (BP).
- Increase awareness of the signs and symptoms of preeclampsia.
- Need for all obstetrical (OB) providers to have education on management for term preeclampsia.
- Important to adhere to standards and criteria for outpatient surgical procedures.
- Important for providers to thoroughly assess women who have a history of hypercoagulability or embolic event and treat appropriately.
- Important to coordinate care in high-risk women seeing multiple providers.
- Important for emergency room and OB providers to coordinate care in managing patient with acute illness.
- Importance of coordination of care with patients who have multiple complications.
- Important for providers to be offering counseling for pregnant women with potential life-threatening consequences.

C. Labor and Delivery and Postpartum (before discharge):

- Inductions need to be done for appropriate medical reasons.
- Repeat C-Section should not be scheduled prior to 39 weeks.
- Increase provider awareness of appropriate management of hemorrhage.
- Raise the index of suspicion for postpartum hemorrhage in women with risk factors.
- Consider prophylaxis of emboli for all pregnant women undergoing Cesarean birth, both elective and non-elective.
- Increase awareness regarding the condition of sleep apnea and the potential effects upon the post-operative, obese patient.
- Important to provide a thorough assessment on high-risk individual and provide education to patient prior to discharge.

D. Postpartum (after discharge):

- More appropriate to do a non-contrast Computerized Axial Tomography (CAT) scan for suspected subarachnoid hemorrhage as opposed to a magnetic resonance imaging (MRI) scan.
- Maintain a high index of suspicion for subarachnoid hemorrhage with appropriate evaluation (CAT scan/Lumbar Puncture).
- Important to provide timely follow-up of high-risk women in the postpartum period.
- Important to provide care coordination for early discharge of a postpartum woman.
- Early discharge is not appropriate for patients with a lack of understanding of risk status and limited resources to comply with treatment regimen.
- Important for women undergoing Cesarean deliveries to receive follow-up care within the first 1-2 weeks post delivery.

SYSTEM FACTORS: A lack of policies and procedures may lend itself to deficient quality of care, which potentially can affect a woman's health outcome.

ISSUES

1. Lack of a universal treatment policy for prevention of thrombotic embolism, particularly for pregnant and postpartum women who are obese and /or have delivered by Cesarean.
2. Postpartum education was not inclusive for signs of thrombosis and cardiovascular events.
3. Decreased number of available beds due to limited staff.
4. Lack of available practice standards for management of term patients with preeclampsia.

RECOMMENDATIONS

- Review the process for obtaining tubal consent and/or receiving services to identify barriers such as paperwork, miscommunication, denial by anesthesiologist, etc.
- Important to assess the appropriate level of care on individual basis.
- Need to develop standards of care for screening and treatment of obese, pregnant women.
- Need of standard procedures for emergency department staff with regards to emergent Cesarean delivery.

- Systems should be in place for follow-up and care coordination of patients who are without health insurance coverage.
- Important for pregnant women who are developmentally delayed and with chronic illness to be referred for care coordination/guardianship.

DEATH REVIEW FACTORS: The PAMR process relies on information from death certificates and autopsy reports for the identification and evaluation of pregnancy-related deaths.

ISSUES

1. Lack of autopsy on unexplained or inconclusive deaths.
2. Death certificates not always completed accurately.
3. Missing prenatal records in hospital charts.

RECOMMENDATIONS

- Important to obtain final autopsy results prior to documenting a final cause of death on death certificate; otherwise, cause of death should be declared as pending.
- Autopsy recommended for women who die from unknown/unexplained cause of death.
- Important for direct communication between medical provider and Medical Examiner when requesting an autopsy be performed.
- Autopsy important for any sudden maternal death.
- Coordinate with outside pathologists to assure submission of amended death certificates in a timely manner.

INDIVIDUAL/COMMUNITY FACTORS: It has been established that a woman's health prior to her pregnancy can greatly affect the birth outcome as well as the woman's health status after birth. Some deaths may be associated with a woman's personal decision regarding her health and her care. It is important that healthcare providers enable women to make informed decisions.

ISSUES

1. Women presenting in pregnancy with pre-existing medical conditions such as hypertension, obesity, diabetes, and asthma.
2. Lack of documentation of patient education and counseling regarding a woman's risk factors.

RECOMMENDATIONS

- Women with chronic illness need preconception education and counseling with regards to risk of pregnancy.
- Patient education needed for family planning and safe termination of pregnancy.
- Need to provide education and counseling, especially for women with high-risk conditions.
- Need to raise public awareness regarding risk of certain sexual acts during pregnancy.
- Providers need to encourage patients to relay personal history.

REFERENCES

Florida Department of Health, *CHARTS,* http://www.floridacharts.com/charts/chart.aspx