Maternal Mortality the Florida Experience: Data and Results

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Conflict of Interest Statement

• I have no conflict of interest to report.
Objectives

• Understand the maternal mortality review process in Florida
• Know the definitions that surround maternal mortality review processes
• Know the three most common causes of maternal mortality in Florida by race
• Identify initial steps being proposed to address obstetric hemorrhage in Florida
Where does the DATA come from?

PREGNANCY-ASSOCIATED MORTALITY REVIEW (PAMR)
PAMR Mission Statement

In 1996, by the Florida Department of Health

- MISSION (2008): To increase awareness of the issues surrounding pregnancy-related death and to promote change among individuals, communities, and health care systems in order to reduce the number of deaths.
Why bother

Death

Uncommon

Surrogate measure of overall societal health
PAMR Goals

• Identify all maternal deaths
• Perform thorough medical record abstraction
• Perform a multidisciplinary review
• Recommend improvements to care
• The development of effective messages
• Disseminate the findings and recommendations
• Translation of findings and recommendations into quality improvement
Maternal Death

Database Linkage

PAMR

Notification
Database Linkage

• The response on the death certificate is “yes” to the question, “If female, was she pregnant with in the past year?”

• The ICD code: “cause of death” indicates a death classified as being due to:

  “Pregnancy, Childbirth and the Puerperium.”
  • O00-O99 Pregnancy, childbirth and the puerperium
  • O00-007 Pregnancy with abortive outcome
  • O10-099 Other complications of pregnancy, childbirth and the puerperium
Database Linkage (Cont.)

• There is a matching birth or fetal death record within 365 days prior to the woman’s death.

• There is a matching Healthy Start Prenatal Screen (Florida’s universal prenatal screening tool used to assess the risk and subsequently to identify those women most at risk of adverse health outcomes.)
# Current FL-PAMR Committee Members

<table>
<thead>
<tr>
<th><strong>MCH Title V Director (DOH)</strong></th>
<th><strong>DOH Abstractors</strong></th>
<th><strong>Physicians</strong></th>
<th><strong>Pathologist</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Donna Barber</strong>, R.N., M.P.H.; Children’s Medical Services, Department of Health (DOH)</td>
<td><strong>DOH Statistics</strong></td>
<td><strong>Isaac Delke</strong>, M.D.; University of Florida, (ACOG)</td>
<td><strong>Margaret Neal</strong>, M.D.; Pathology Associates</td>
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<tr>
<td><strong>Cheryl Clark</strong>, Dr.P.H., R.H.I.A. Manager, MCH Practice and Analysis (DOH)</td>
<td><strong>Miriam Gurniak</strong>, C.N.M.; TMH Family Practice Residency Program</td>
<td><strong>Anthony Gregg</strong>, M.D., Chief, Maternal Fetal Medicine, University of Florida; Chair Maternal Mortality Committee Florida District XII ACOG</td>
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<tr>
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<td><strong>Karen Harris</strong>, M.D., M.P.H, Vice Chair Florida District XII ACOG</td>
<td><strong>Robert Yelverton</strong>, M.D.; Chair Florida District XII ACOG</td>
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<tr>
<td><strong>Leticia Hernandez</strong>, PhD, MCH Practice &amp; Analysis (DOH)</td>
<td><strong>Jane Murphy</strong>, Executive Director, Healthy Start Coalition of Hillsborough County</td>
<td><strong>Regional Representation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Betsy Wood</strong>, B.S.N., M.P.H.; Division Community Health Promotions, Director (DOH)</td>
<td></td>
<td><strong>Physicians</strong></td>
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<td><strong>Obstetricians</strong></td>
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<td><strong>Karen Harris</strong>, M.D., M.P.H, Vice Chair Florida District XII ACOG</td>
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Co-Chairs (2)
- Clinical Chair - ACOG Dist XII Mat Mort Com Chair/Rep
- Administrative Chair – DOH Title V MCH Director

DOH Reps (4)
- PAMR Coordinator
- Epidemiologist
- PAMR Data Manager
- Lead PAMR Abstractor

ACOG Reps (6)
- ACOG District XII chair
- ACOG Dist XII Maternal Mortality Committee Chair/Rep
- Specialty of OB/GYN (2) – (not including ACOG representatives)
- Specialty of Maternal Fetal Medicine (2)
- Emergency Medicine representative
- Specialty of Pathology
- Florida Association of Medical Examiners representative
- Florida AWHONN representative
- American CNM representative

Med Specialties (3)
- Emergency Medicine representative

Nursing Reps (2)
- Specialty of Pathology

Emeritus (3)
- Florida Association of Medical Examiners representative

Other (2)
- American CNM representative

Healthy Start Executive Director

22
PAMR Goals

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What do we mean when we say “maternal mortality”? 

DEFINING 
MATERNAL MORTALITY
Pregnancy-Associated Death: Death of a woman from any cause, while she is pregnant or within one year of termination of pregnancy, regardless of the duration and site of pregnancy.

Pregnancy Related Death: Death of a woman during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

Pregnancy-Related Mortality Ratio: Estimate of the number of pregnancy-related deaths for every 100,000 live births.
US MATERNAL MORTALITY

*Note: Number of pregnancy-related deaths per 100,000 live births per year.*
2006-2008 US Data

Pregnancy Related Mortality Ratio

- White: 11.3
- Black: 34.8
- Other: 14.5

US: 15.2

- Cardiovascular diseases: 14.6%
- Cardiomyopathy: 12.4%
- Non-cardiovascular diseases: 11.9%
- Hemorrhage: 11.5%
- Infection/sepsis: 11.1%
- Hypertensive disorders of pregnancy: 10.5%
- Thrombotic pulmonary embolism: 10.3%
- Amniotic fluid embolism: 5.9%
- Cerebrovascular accidents: 5.7%
- Anesthesia complications: 0.6%
Obesity Trends* Among U.S. Adults
BRFSS, 1990, 2000, 2010

(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)

Maternal Death
- Class III obesity (RR=7.0)
- No prenatal care (RR=4.6)
- Cesarean delivery (RR=4.5)

Behavioral Risk Factor Surveillance System
FLORIDA MATERNAL MORTALITY
1999-2011
Pregnancy-Related Mortality Ratios (PRMR) Florida 1999-2010

Year

Ratio
0 10 20 30 40 50 60

PRMR Non-Hispanic White
Non-Hispanic Black Hispanic

26.5
13.3
2006-2008 US Data
1999-2010 Florida

Pregnancy Related Mortality Ratio

White: 11.3
Black: 34.8
Other: 14.5

Fl: ~230,000 births/yr

18 FL
15.2 US
Causes of Pregnancy-Related Death in
Florida Jan 1999 – Jan 2012

Pregnancy-Related Deaths Florida 1999-2010: Opportunities to make pregnancy safer
### Pregnancy-Related Deaths Florida 1999-2010: Opportunities to make pregnancy safer

<table>
<thead>
<tr>
<th></th>
<th>PAD</th>
<th>PRD</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 2006-2008</td>
<td>5,001</td>
<td>1,953</td>
<td>39.1</td>
</tr>
<tr>
<td>FL 1999-2010</td>
<td>1,780</td>
<td>470</td>
<td>24.7</td>
</tr>
</tbody>
</table>

- **Before Discharge**
  - Antepartum: 113 (24%)
  - After Discharge: 160 (34%)

- **After Discharge**
  - Before Discharge: 197 (42%)

*76% occurred postpartum*
Pregnancy-Related Deaths Florida 1999-2010

Hemorrhage

- Other (35%) - 25
- Ectopic (32%) - 23
- Retained Placenta (10%) - 7
- Accreta (11%) - 8
- Atony (11%) - 8

Other causes (35%)

- Abortion (6%) - 4
- Undelivered (4%)

Live Birth (52%)

Stillbirth (6%)

Before Delivery (42%)

- 1-7 days (24%)
- <1 day (28%)
- 8-42 days (6%)

Ectopic (32%)

8%
Pregnancy-Related Deaths Florida 1999-2010

Hypertensive Disease
(N=72)

- Cerebrovascular Hemorrhage (43%)
  - Eclampsia 15%
  - Preeclampsia 18%
  - GHTN 10%

- Live Birth 86%
  - Before delivery 8%
  - <1 day 18%
  - 1-7 days 40%
  - 8-42 days 31%
  - 43-183 days 3%

- Stillbirth 7%
- Un-delivered 7%
- Stillbirth 7%
- Un-delivered 7%

- Hypertensive Disease (N=72)

- Stillbirth 7%
- Un-delivered 7%
- Stillbirth 7%
- Un-delivered 7%
OBSTETRIC HEMORRHAGE INITIATIVE
Change Information Flow

PAMR
Infant, Maternal and Reproductive Health
Florida Department of Health
Division of Community Health Promotion
Bureau of Family Health Services

Problems
1) Anonymity
2) 42% preventable
17 weeks prior C-section one year earlier
- hemoperitoneum
35-36 weeks gestation
• Copyright July 2010, 166 pages
• Compendium of Best Practices: fifteen articles
• Care Guidelines: three summaries of best practices for obstetric hemorrhage
• Hospital-level Implementation Guide
• Appendices
• Slide set for
### Placenta Previa and Placenta Accreta by Number of Cesarean Deliveries

<table>
<thead>
<tr>
<th>Cesarean Delivery</th>
<th>Previa</th>
<th>Previa*: Accreta† N (%)</th>
<th>No Previa‡: Accreta† N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First§</td>
<td>398</td>
<td>13 (3.3%)</td>
<td>2 (0.03%)</td>
</tr>
<tr>
<td>Second</td>
<td>211</td>
<td>23 (11%)</td>
<td>26 (0.2%)</td>
</tr>
<tr>
<td>Third</td>
<td>72</td>
<td>29 (40%)</td>
<td>7 (0.1%)</td>
</tr>
<tr>
<td>Fourth</td>
<td>33</td>
<td>20 (61%)</td>
<td>11 (0.8%)</td>
</tr>
<tr>
<td>Fifth</td>
<td>6</td>
<td>4 (67%)</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>≥6</td>
<td>3</td>
<td>2 (67%)</td>
<td>4 (4.7%)</td>
</tr>
</tbody>
</table>

*Percentage of accreta in women with placenta previa
†Increased risk with increasing number of cesarean deliveries; P < .001
‡Percentage of accreta in women without placenta previa

### OB Hemorrhage Cart: Recommended Instruments

- [ ] Set of vaginal retractors (long right angle); long weighted speculum
- [ ] Sponge forceps (minimum: 2)
- [ ] Sutures (for cervical laceration repair and B-Lynch)
- [ ] Vaginal Packs
- [ ] Uterine balloon
- [ ] Banjo curettes, several sizes
- [ ] Long needle holder
- [ ] Uterine forceps
- [ ] Bright task light on wheels; behind ultrasound machine

Diagrams depicting various procedures (e.g. B-Lynch, uterine artery ligation, Balloon placement)
## Blood replacement products

<table>
<thead>
<tr>
<th>Product (mL)</th>
<th>Contents</th>
<th>Uses &amp; effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Whole blood</strong> (1u = 500cc)</td>
<td>All components</td>
<td>Rarely used, mostly for massive bleeding</td>
</tr>
<tr>
<td><strong>Packed red cells</strong> (1u=200-250cc)</td>
<td>Red cells only</td>
<td>One unit increases hematocrit by 3% points</td>
</tr>
<tr>
<td><strong>Fresh frozen plasma</strong> (1u=200-300cc)</td>
<td>All clotting factors, Fibrinogen; NO platelets</td>
<td>Best for replacing multiple clotting factors (as with DIC) 1u FFP increases Fibrinogen by 7-10 mg/dL Usual dose is 10 to 15 mL/kg</td>
</tr>
<tr>
<td><strong>Cryoprecipitate</strong> (1 bag=10-15cc)</td>
<td>Fibrinogen, factors V, VIII, XIII, VWF</td>
<td>10 bags of Cryoprecipitate raises plasma fibrinogen by 70 mg/dL in a 70 kg patient</td>
</tr>
<tr>
<td><strong>Platelets</strong> (1u=50cc)</td>
<td>Platelets</td>
<td>6u raises platelet count ~30,000/mcL in average size adult</td>
</tr>
<tr>
<td><strong>Human-recombinant Factor 7a</strong></td>
<td>Factor 7a</td>
<td>50-100 mcg/kg IV Q2hrs until hemostasis achieved (~ 10-40 min after infusion)</td>
</tr>
<tr>
<td>CLASS</td>
<td>Blood Loss % (cc)</td>
<td>Blood Pressure mmHg</td>
</tr>
<tr>
<td>-------</td>
<td>------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>I</td>
<td>10 – 15% (500 – 1000 cc)</td>
<td>Normal</td>
</tr>
<tr>
<td>II</td>
<td>15 – 25% (1000 – 1500 cc)</td>
<td>Slightly low &quot;Mild hypotension&quot;</td>
</tr>
<tr>
<td>III</td>
<td>25 – 35% (1500 – 2000 cc)</td>
<td>70 to 80 &quot;Moderate hypotension&quot;</td>
</tr>
<tr>
<td>IV</td>
<td>35 – 45% (2000 – 3000 cc)</td>
<td>50 to 70 &quot;Severe hypotension&quot;</td>
</tr>
</tbody>
</table>

*Women with Preeclampsia don’t have the normal blood volume expansion of pregnancy, making a blood loss of 500-1000 cc potentially life-threatening*

*Modified from Bonnar, J. Baillieres, Clin Obstet Gynaecol 2000; 14:1*
## Uterotonics for Atony

<table>
<thead>
<tr>
<th>Steps</th>
<th>Treatment</th>
<th>Type</th>
<th>Dose/Route/Frequency</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluid resuscitation</td>
<td>Crystalloids: RL or NS</td>
<td>IV bolus</td>
<td>~ 3cc crystalloid/cc EBL</td>
</tr>
<tr>
<td>2</td>
<td><strong>Uterotonics</strong></td>
<td>Oxytocin</td>
<td>IV Infusion: 10-40units/liter in RL or NS IM: 10units</td>
<td>Avoid rapid, undiluted, large dose IV bolus <em>May cause circulatory collapse</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Methergine</td>
<td>0.2mg IM Q2-4hr</td>
<td>Avoid if pt hypertensive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemabate</td>
<td>0.25mg IM Q15-90min, Max of 8 doses</td>
<td>Avoid if pt asthmatic; can cause diarrhea, fever, tachycardia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prostin E2</td>
<td>20mg suppository Q2h, vaginal or rectal</td>
<td>Avoid if pt hypotensive; fever is common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cytotec (PGE1)</td>
<td>800-1000mcg rectally x 1</td>
<td></td>
</tr>
</tbody>
</table>

*Modified from ACOG Technical Bulletin #76 – PPH; October 2006*
B Lynch Technique
*Described by Lynch, 1997*

- Insert needle below incision
- Come out above incision
- Go over top of uterus to back
- Go into uterus on that side and back out again through the back onto the other side.
- Take suture back over the top of the uterus to the front, and into uterus above incision
- Bring suture to outside of uterus below incision
- Pull suture down, tie across front
Maternal Mortality Committee
Mission Statement

A) Converting observations and lessons learned in the Florida Pregnancy Related Mortality Review (PAMR) into meaningful standards of quality and safety in the care of our patients in Florida.

B) Development of communication tools for transmitting findings and recommendations to the ACOG fellows in Florida at least in part by working closely with organizations such as the Florida Perinatal Quality Collaborative (FPQC).
Maternal Mortality Committee
Mission Statement (Cont)

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Summary

Maternal Mortality is relevant in Florida. Using data obtained through PAMR, this problem can be systematically addressed at a grassroots level. Through the FPQC-ACOG-PAMR partnership, the Obstetric Hemorrhage Initiative will be the first of several approaches aimed at reducing maternal mortality in Florida.