Update on Maternal Mortality

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Objectives
1. Discuss epidemiology and trends in maternal mortality in the United States
2. Describe causes of mortality and risk factors

Today’s Talk

The Problem
Definitions/Data: Maternal mortality in the United States
Maternal Mortality Review Committees (MMRCs)
  Goals, function, process
  Example: Cardiomyopathy
Data to Action
  State Initiatives: Past/Planned
  National Agenda

Maternal Mortality Rate, United States 1999-2014

[Graph showing trends in maternal mortality rate from 1999 to 2014]
edc.gov/nchs/nvss/deaths.htm
DATA & DEFINITIONS

**Leading Causes of Death**

- Heart disease and stroke cause most deaths overall.
- Obstetric emergencies, like hemorrhage and amniotic fluid embolism, cause most deaths at delivery.
- In the week after delivery, hemorrhage, hypertension and infection are most common.
- Cardiomyopathy causes most deaths 1 week to 1 year after delivery.
Timing of Maternal Deaths

Source: CDC Vital Signs—May, 2019

Maternal mortality is the tip of the iceberg . . . . .

Severe Maternal Morbidity Among Delivery and Postpartum Hospitalizations in the United States


- Nationwide Inpatient Sample database
- Aim to capture indicators of organ system failure (25)
- Use mortality hospitalizations to identify morbidity not previously considered
- Length of stay >90th percentile for diagnosis-identified cases by mode of delivery
  - >2 days vaginal
  - >3 days repeat cesarean
  - >4 days primary cesarean
- Include postpartum admissions

Vital Statistics: The Basis for Identification

- Based on death certificates sent from the states
- Coded by ICD-10 coding rules
- Cause of death ("O" codes)
- Not all maternal deaths have a clinically meaningful code
- Checkbox indicating recent or current pregnancy status
  - Checkbox introduced in 2003; adopted in Ohio in 2007
- Linkage analysis
  - Death certificates linked to birth/fetal death certificates

Sources of Data

<table>
<thead>
<tr>
<th>Data Source</th>
<th>CDC - National Center for Health Statistics (NCHS)</th>
<th>CDC - Pregnancy Mortality Surveillance System (PMSS)</th>
<th>Maternal Mortality Review System (MMRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Frame</td>
<td>During pregnancy - 42 days</td>
<td>During pregnancy - 365 days</td>
<td>During pregnancy - 365 days</td>
</tr>
<tr>
<td>Disease of Maternal Death</td>
<td>ICD 10 codes</td>
<td>Medical epidemiology (MME)</td>
<td>Maternal mortality (MMR)</td>
</tr>
<tr>
<td>Cases</td>
<td>Maternal death</td>
<td>Pregnancy-associated death</td>
<td>Pregnancy-related death</td>
</tr>
<tr>
<td>Measures</td>
<td>Mortality Rate</td>
<td>Maternal Mortality Rate</td>
<td>Maternal Mortality Rate</td>
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</table>

The Review Process

A Maternal Mortality Review (MMR)...
...has 3 components that the surveillance data systems (NCHS and PMSS) don’t have:

1. Robust DATA system dedicated to maternal mortality with multi-level data from multiple sources including non-traditional sources
2. A multidisciplinary committee of EXPERTS to review each case, define its preventability, and formulate prevention measures (Focus on prevention)
3. PH STAFF (usually a state department of public health team) to gather and manage the data, establish and guide the committee, communicate with stakeholders, and conduct and disseminate research and surveillance. (AKA, put it all together)

Source: CDC, 2019
Maternal Mortality Review IS NOT...

- A mechanism for assigning blame or responsibility for any death
- A research study
- Peer review
- An institutional review
- A substitute for existing mortality and morbidity inquiries


History of Maternal Death Reviews

1930
- New York Academy of Medicine
- Philadelphia County Medical Society

1968: 44 states + Washington, DC
2012: – 18 states + Philadelphia
2018: 33 states and 3 cities

The Process of Review

- Authorities and Protections
- Have the right people at the table
  - Ob/gyn, MFM, midwifery
  - Anesthesia
  - Forensic pathology
  - State and local health departments
  - Legal system and risk management
  - CFR, hospital administration, social work
- Identify cases
- Obtain pertinent records
- Prepare case summaries (de-identified)
CASE REVIEW PROCESS: 6 Key Questions
- Identify cause(s) of death and contributing factors
- Determine relationship to pregnancy
- Focus on case issues with opportunity for improvement: could the outcome be altered? Was it preventable?
- Identify contributing factors
- Make recommendations and action steps: Consider not the individual case but systems improvements
- What is the level of impact from these actions?

The Case

1. Was the Death Pregnancy-Related?
   - Definition: Death of a woman while pregnant or within one year of termination of pregnancy, regardless of duration and site of pregnancy, from any cause related to or aggravated by her pregnancy or its management
   - Alternative Question: Would she have died if she hadn’t been or recently been pregnant?
2. What was the Cause of Death?

- Death certificates
  - Immediate
  - Underlying
  - Contributing
- Recommended
  - Underlying cause as categorized by the CDC-PMSS codes
    - Clinically meaningful
    - Consistent with most other MMRCs

3. Was the Death Preventable?

- Definition: A death is considered preventable if the committee determines the there was at least some chance of the death being averted by one or more reasonable changes to contributing factors
- Range of interpretations
  - What does reasonable mean? Feasible?
- Alternatively ask: Was there an Opportunity to Alter the Outcome?

3. Was the Death Preventable?

- WHO: Who could have prevented the occurrence?
  - Consider the level of contact with outside agency (example: health care or law enforcement)
  - Is it a one time contact or an on-going relationship?
- WHAT: Is there a program or an intervention that we can implement that would affect the chain of events that lead to this death?
  - How clear is the connection between the inciting/contributing factor and the cause of death? Is it direct causation or an observed association?
- WHEN: Timeline of events
  - How far downstream is the consequence? How far upstream is the causation
  - When is the proposed intervention point?
    - Preventable during pregnancy
    - Preventable during 1-2 years before pregnancy (i.e., mental health, addiction, diabetes treatment, management of comorbidities)
    - Preventable over a decade or a lifetime (i.e., prevention of ACES, PTSD, addiction, obesity, and such)

CONTRIBUTING FACTORS ➔ ACTIONABLE RECOMMENDATIONS

<table>
<thead>
<tr>
<th>CONTRIBUTING FACTOR LEVEL</th>
<th>CONTRIBUTION FACTOR DESC (ACCOUNTANCY)</th>
<th>DESCRIPTION OF ISSUES</th>
<th>RECOMMENDATIONS OF THE COMMITTEE</th>
</tr>
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<tbody>
<tr>
<td>PATIENT/FAMILY</td>
<td>History of intimate partner violence (IPV)</td>
<td>Obstetric provider should screen for depression, IPV, housing stability and nutritional needs, and provide referrals to supportive community resources</td>
<td></td>
</tr>
</tbody>
</table>
| PROVIDER                  | Quality of care - Failure to perform risk assessment for cardiac tee and IPV; delayed diagnosis of cardiomyopathy/CHF, lack of 
management strategies for IPV risk | Obstetric providers should refer patients who reported cardiovascular condition or significant family history to cardiologist during PNC and postpartum |
| FACILITY                  | Palliative/procedures - interpretive services | Obstetric providers are expected to be antisnoring training, programs should implement and adherence to guidelines for snoring and sleep apnea |
| SYSTEM                    | Unable housing - transient housing       | State office of community health should implement systems wide policy that promotes housing for pregnant women |
|                           | Access/financial - Late entry prenatal care | Women should expand Medicaid coverage to women of reproductive age |
| COMMUNITY                 | Social participation - Single mother / Malnutrition | Community and faith based leaders should expand resources/capacity for IPV victims during pregnancy and postpartum |
Data to action

Ohio: Maternal Deaths of Cardiac Origin

**Ohio Pregnancy-Related Deaths by CDC Maternal Mortality Cause of Death Category (2008-2014)**

- Non-Cardiovascular Conditions, 25, 31.8%
- Infection, 15, 19.9%
- Maternal Health Conditions, 7, 4.5%
- Maternal Anemia, 5, 0.6%
- Cerebral Aneurysm, 3, 0.4%
- Hypertension (Preeclampsia), 10, 6.5%
- Maternal Cause of Death, 4, 2.6%
- Maternal Complications of Pregnancy, 11, 13.4%
- Preterm labor and/or induction of labor, 12, 14.9%
- Hemorrhage, 10, 13.7%
- Injury, 14, 9.5%


- Ohio: 20.8
- U.S.: 17.9

**CDC Maternal Mortality COD Codes, Cardiomyopathy**

- 90.1 Postpartum/postpartum cardiomyopathy: 18
- 90.9 Other cardiomyopathy/405: 6
- Total: 24

**CDC Maternal Mortality COD Codes, Cardiovascular Conditions**

- 90.1 Coronary artery disease/myocardial infarction (MI)/atherosclerotic cardiovascular disease: 5
- 90.2 Pulmonary hypertension: 5
- 90.4 Vascular aneurysm/dissection: 6
- 90.5 Hypertensive cardiovascular disease: 6
- 90.7 Conduction defects/arrhythmias: 8
- 90.9 Other cardiovascular disease/407: 5
- Total: 39

Ohio Data Source: Ohio Department of Health Pregnancy-Related Mortality Review and Bureau of Vital Statistics

U.S. Data Source: Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System

Note: 2016 U.S. pregnancy-related mortality ratio data are not yet available.
ACTIONS TO IMPROVE DATE & REDUCE MATERNAL DEATHS

• Beta tested MMRDS (MMRIA precursor)
• Quality Improvement—Vital Statistics
  – Compared COD listed on DC to COD determined by PAMR, 2008-2011 cases to ascertain false positives
  – Participated in CDC checkbox pilot project
• Simulation Training for Obstetric Emergencies
  – Onsite trainings at 5 sites: 2014 (3), 2017 (2)
  – Train the Trainer sessions (4) for OB nurse educators: 2015 (2), 2017 (2)
  – Advanced Train the Trainer sessions: 2017 (2)
• Participating in the AIM Opioid Use Disorder in Pregnant Women Collaborative

At the Federal Level
Preventing Maternal Deaths Act (HR 1318/S1112): Signed into law by President Trump
  – Help or assist states create/expand MMRCs
  – Require DHHS to research ways to reduce disparities in maternal health outcomes
CDC Partnership
MMRIA: A Common Language

FUTURE DIRECTIONS
• Multi-year Ohio-specific report to be released
• Engage broad group of stakeholders
  – Comprehensive report
  – Facilitated town hall meeting
• Improve response to obstetric emergencies
  – Needs assessment survey
  – HTN in Pregnancy Pilot
  – Consider becoming an AIM state
• Build capacity at local level to prevent mortality and morbidity
• Improve quality and consistency of interconception care
• Build capacity for medical sub-specialists, including MFM, to provide services to HR women: telehealth
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<th>IF YOU ARE:</th>
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<td>Health Care Providers</td>
<td>States or Communities</td>
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<tr>
<td>• Help patients manage chronic</td>
<td>• Assess and coordinate delivery hospitals</td>
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<td>conditions.</td>
<td>for risk-appropriate care.</td>
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<td>• Communicate with patients</td>
<td>• Support review of the causes behind</td>
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<td>about warning signs.</td>
<td>every maternal death.</td>
</tr>
<tr>
<td>• Use tools to flag warning signs</td>
<td>Women and their Families</td>
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<tr>
<td>early so women can receive timely</td>
<td>• Know and communicate about symptoms of</td>
</tr>
<tr>
<td>treatment.</td>
<td>complications.</td>
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<tr>
<td>Hospital Systems</td>
<td>• Note pregnancy history any time</td>
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<tr>
<td>• Standardize coordination of</td>
<td>medical care is received in the year</td>
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<tr>
<td>care and response to emergencies.</td>
<td>after delivery.</td>
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<tr>
<td>• Improve delivery of quality</td>
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<tr>
<td>prenatal and postpartum care.</td>
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<td>• Train non-obstetric providers to</td>
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<td>consider recent pregnancy history.</td>
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