Maternal Mortality and Morbidity Review
New Mexico Legislative Health and Human Services Committee
October 25, 2016
Maternal Mortality in the U.S.

**Figure 2. Maternal mortality rate,* by year — United States, 1900-1997**

*Per 100,000 live births.

Source: CDC
PRMR Trends in the U.S., 1987-2012

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

Source: CDC.gov

Source: Moaddab et al., 2016. Obstet Gynecol

<table>
<thead>
<tr>
<th>State</th>
<th>Total</th>
<th>Hispanic</th>
<th>NH White</th>
<th>NH Black</th>
<th>Native American</th>
<th>Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 – Massachusetts</td>
<td>5.6</td>
<td>6.9</td>
<td>3.9</td>
<td>17.0</td>
<td>0</td>
<td>4.9</td>
</tr>
<tr>
<td>#17 – Illinois</td>
<td>12.4</td>
<td>7.4</td>
<td>9.5</td>
<td>29.9</td>
<td>0</td>
<td>10.3</td>
</tr>
<tr>
<td>#41 – New Mexico</td>
<td>23.0</td>
<td>25.5</td>
<td>14.9</td>
<td>83.0</td>
<td>23.7</td>
<td>0</td>
</tr>
<tr>
<td>#51 – Washington DC</td>
<td>38.8</td>
<td>7.4</td>
<td>0</td>
<td>70.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>U.S. Overall</td>
<td>17.2</td>
<td>11.3</td>
<td>14.1</td>
<td>40.2</td>
<td>25.1</td>
<td>10.6</td>
</tr>
</tbody>
</table>

Maternal Mortality Ratio = Maternal Deaths/100,000 Live Births

Source: Moaddab et al., 2016. Obstet Gynecol

- Non-cardiovascular diseases: 15.3%
- Cardiovascular diseases: 14.7%
- Sepsis: 12.7%
- Hemorrhage: 11.3%
- Cardiomyopathy: 10.8%
- Pulmonary embolism: 9.0%
- Hypertensive Disorders: 7.6%
- Cerebrovascular accidents: 6.5%
- Amniotic fluid embolism: 5.7%
- Anesthesia complications: 0.2%

Source: CDC.gov

Rate per 10,000 delivery hospitalizations

Source: Creanga et al. 2014
Racial/Ethnic Disparities in SMM

Rate per 10,000 delivery hospitalizations

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Rate (per 10,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH White</td>
<td>114</td>
</tr>
<tr>
<td>NH Black</td>
<td>284</td>
</tr>
<tr>
<td>Hispanic</td>
<td>145</td>
</tr>
<tr>
<td>Asian</td>
<td>132</td>
</tr>
<tr>
<td>Amer. Indian</td>
<td>225</td>
</tr>
<tr>
<td>All</td>
<td>151</td>
</tr>
</tbody>
</table>

Source: Creanga et al. 2014
Maternal Mortality and Morbidity Review: Lessons from Illinois
10 perinatal centers supervise all obstetric hospitals in Illinois since 1976

- 6 in Chicago metro area (UIC, Rush, Northwestern, U of Chicago, Loyola, Stroger)
- Rockford
- Peoria
- Springfield
- St. Louis
Surveillance for maternal mortality in Illinois began in 1982 under IL Admin Code 77 sec 57

- Maternal death was defined “a death caused by direct or indirect complications of pregnancy occurring during the prenatal period or within 90 days after delivery or termination of the pregnancy”

- Pregnancy checkbox added to death certificate in 1989
Perinatal Centers began reviewing maternal deaths to collect information beyond the death certificate (1992)

Maternal Death Review section of IL code amended (2002)
  Maternal death redefined as “the death of any woman of any cause while pregnant or within 1 year of termination of the pregnancy irrespective of the duration of the pregnancy at the time of the termination or the nature of its termination.”
Hospitals required to report any maternal death to IDPH within 24 hours

- Maternal deaths are also identified using:
  - death certificate check box, vital records linkages, and review of obituaries and news reports

IDPH collects records from hospital, coroner or medical examiner, and other health care providers

- Must comply with request within 30 days
Medical records and the content of mortality review determinations are privileged and protected from legal discovery under the Medical Studies Act (735 ILCS 5/8-2101, www.ilga.gov/legislation)

Model legislation can be found at AMCHP MMR Resource Portal (http://www.amchp.org/programsandtopics/womens-health/Focus%20Areas/MMR)
Standardized abstract and review forms

- Determination of death:
  - Directly, indirectly or associated to pregnancy
- Potential preventability of death (Geller model)
  - “any action or inaction on the part of the health care provider, system, or patient that may have caused or contributed to progression to more severe morbidity or death”
Assessing Preventability

- Assess patient, provider, and systems factors which resulted in progression along the continuum of morbidity
  - From point of entry of care to discharge
Categories of Preventability

- Assessment/Entry to Care
- Refer to Expert
- Diagnosis
- Treatment
- Management hierarchy
- Education
- Communication
- Policies and procedures
- Documentation
- Discharge
Maternal Mortality Review Committee

- Statewide Maternal Mortality Review Committee (MMRC) formed in 2000 to:
  - Improve maternal care in state
  - Reduce preventable maternal deaths

- Review a subset of maternal deaths to determine whether death was related to pregnancy and potentially preventable
Meets 4 times/year

Reviews cases based on:
- Specific topics (hemorrhage, hypertensive disorders)
- At request of perinatal center
- Mostly pregnancy-related in-hospital deaths
- De-identified to patient, provider, and hospital

Potential preventability of death
Maternal Mortality Review Committee

- Multidisciplinary expert panel
  - Obstetrician/Gynecologist
  - Maternal Fetal Medicine specialist
  - Advance practice nurse/certified nurse midwife
  - Cardiologist who specializes in pregnancy
  - Anesthesiologist
  - Coroner
  - Pathologist
  - Lawyer
  - Perinatal network administrator
  - Health educator
  - Maternal and child health epidemiologist
752 Maternal deaths in database as of 6/20/14

*Data for 2012-2014 is not complete due to time required to obtain records.
<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Examples</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vascular</td>
<td>AFE, PE, cerebrovascular events, chronic HT</td>
<td>77</td>
<td>30.0%</td>
</tr>
<tr>
<td>Cardiac</td>
<td>Cardiomyopathy, heart disease, dysrhythmias</td>
<td>46</td>
<td>17.9%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>Uterine rupture, atony, lacerations</td>
<td>38</td>
<td>14.8%</td>
</tr>
<tr>
<td>Pre-eclampsia/</td>
<td>Pre-eclampsia/ Eclampsia</td>
<td>18</td>
<td>7.0%</td>
</tr>
<tr>
<td>Eclampsia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection</td>
<td>Puerperal, due to spontaneous AB</td>
<td>16</td>
<td>6.3%</td>
</tr>
<tr>
<td>Cancer</td>
<td>Breast, leukemia, lymphoma, melanoma</td>
<td>13</td>
<td>5.1%</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>Pneumonia, asthma</td>
<td>13</td>
<td>5.1%</td>
</tr>
<tr>
<td>Other</td>
<td>Psychiatric, anesthesia, hematologic, hepatic</td>
<td>35</td>
<td>14.3%</td>
</tr>
</tbody>
</table>
Preventability* of Pregnancy-Related Deaths in IL

*Preventability as determined by perinatal center review
Compared 76 cases reviewed by both MMRC and Perinatal Centers

MMRC disagreed with PC review on:
- Cause of death (55.3%)
- Potential preventability (48.7%)

MMRC found more cases potentially preventable compared with PCs (70% vs. 41%)
- Provider & system factors vs. patient factors
Maternal Deaths in IL, 2002-2014

- Homicide: 89 deaths (12%)
- Suicide: 49 deaths (6%)
- Substance Abuse: 45 deaths (6%)

All Other Causes: 569 deaths (76%)

Violence: 183 deaths (24%)
MMRC-V formed to examine maternal deaths due to homicide, suicide, and substance abuse

- Many deemed pregnancy-associated but not related
- MM Review form re-aligned with relevant information
- Expands capacity for state-level maternal mortality review
Convened stakeholder meetings to:

- Develop review process and data collection form to include social determinants of health

Identified appropriate committee members

- Added intimate partner violence advocates, psychologists, trauma specialists, and maternal substance abuse expert

Data sharing agreements with Violent Death Reporting System and other IDPH data systems
Translating Findings from Maternal Mortality Reviews
Mandated education for all obstetric providers
- Written pre-test
- Didactic lecture
- Skill stations (blood loss estimation)
- Simulation drill
- Debriefing
- Hospitals developed obstetric hemorrhage policy and rapid response teams
- Post-test 6 months after completion
All providers across Illinois showed improvement in knowledge at post-tests

Improvement in hospital preparedness
- Decrease in time to stat labs and blood products
- Increase in OB personnel & OB hemorrhage drills
- Increase in policies on hemorrhage

Provider behavior changed
- Increase in use of appropriate interventions
- Decrease in number of ICU admission for PPH
Reduce the rate of severe morbidities in women with severe preeclampsia, eclampsia, or preeclampsia superimposed on pre-existing hypertension by 20%
Maternal Hypertension Initiative

- Readiness
  - Every unit must have protocols, drills, rapid access to medications, and system plan for escalation

- Recognition & Prevention
  - Standard protocol for assessment of all pregnant and postpartum women
  - Standard patient education on warning signs
Response

- Facility-wide standard protocols with checklists and escalation policies for management and treatment of every case of severe hypertension/ preeclampsia

Reporting/Systems Learning

- Post event debriefs
- Multidisciplinary review for systems issues of all cases admitted to ICU
IL Perinatal Quality Collaborative

- Birth Certificate Accuracy Initiative
  - Accuracy went from 87% in 2014 to 97% in 12/2015

- Reducing Early Elective Deliveries
  - EED went from 2.32% in 2013 to 1.81% in 12/2014
Facility-level review recommended by CDC and ACOG
  - Identify opportunities for improvement and successes

SMM defined as ICU admission and/or transfusion $\geq 4$ units
  - From conception to 6 weeks postpartum
  - 50:1 ratio of SMM to maternal mortality
Implementing Severe Maternal Morbidity Review

- Convened stakeholders for monthly planning meetings
  - Title V director
  - IDPH Office of Women’s Health and Family Services
  - Perinatal network administrators and nurse educators
  - Implementation Scientists
Key Steps for Review of Deaths and Morbidities

- Legislation
  - Mandate reporting of maternal deaths
  - Protect records and committee from legal discovery
- Infrastructure
  - Personnel for collection of medical records and data abstraction
- External Multidisciplinary team
  - Explore system and community factors
The Maternal Mortality Review Universe: Today

- Active MMR Committees (~27 states/1 city)
- Newly starting up/planning a MMR Committees (~11 states/DC)
- Unknown/No Reviews (~12 states)
- Legislative support this past session (~5 states)

Thank You