Severe Maternal Morbidity: Trends and Disparities

Advisory Committee on Infant and Maternal Mortality

March 20, 2023

Ashley Hirai, PhD
Senior Scientist, Office of Epidemiology and Research
Maternal and Child Health Bureau (MCHB)

Vision: Healthy Communities, Healthy People
Maternal Mortality and Morbidity

Maternal Deaths

Severe Maternal Morbidity

Maternal Health Complications
Evidence-Based or Informed Strategies

- Insurance outreach and enrollment
- Hospital QI

National Performance Measures

- Well Woman Visit
- Low-Risk Cesarean

National Outcome Measures

- Severe Maternal Morbidity
- Maternal Mortality

Severe Maternal Morbidity (SMM) Surveillance

- HRSA collaborates with the Agency for Health Care Research and Quality (AHRQ; data purveyor) and the Centers for Disease Control and Prevention (CDC; measure developer) to pre-populate Title V Block Grant National Outcome Measure for SMM (NOM-2) from the Healthcare Cost and Utilization Project (HCUP) – State Inpatient Databases
Outline

• Definition
• Trends
• Types
• Disparities
• Measurement Issues
SMM Definition

• “Unexpected outcomes of labor and delivery that result in significant short or long-term consequences to a woman’s health” – CDC
  o 21 indicators (16 diagnosis and 5 procedures) from hospital discharge record codes
  o Recent analyses exclude blood transfusion only cases due to poor predictive value
    ▪ HCUP Fast Stats https://datatools.ahrq.gov/hcup-fast-stats
    ▪ Alliance for Innovation on Maternal Health https://saferbirth.org/aim-data/resources/

• Recent AHRQ, CDC, HRSA Publications
  o Associations Between State-Level Severe Maternal Morbidity and Other Perinatal Indicators. JAMA Netw Open. 2022;5(7):e2224621.
  o Assessment of Incidence and Factors Associated With Severe Maternal Morbidity After Delivery Discharge Among Women in the US. JAMA Netw Open. 2021 Feb 1;4(2):e2036148.

• Forthcoming Publications
  o AHRQ analysis of COVID-related SMM increases
  o CDC analysis of SMM indicators accounting for in-hospital deaths
SMM Trends, 2010-2020

Severe Maternal Morbidity per 10,000 delivery hospitalizations

ICD-9-CM

ICD-10-CM/PCS

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, National Inpatient Sample
## SMM Indicator Grouping

<table>
<thead>
<tr>
<th>Indicator Grouping</th>
<th>Indicators</th>
<th>2019 Rate per 10,000</th>
<th>2020 Rate per 10,000</th>
<th>Absolute Change</th>
<th>Relative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>Disseminated intravascular coagulation Shock Hysterectomy</td>
<td>36.5</td>
<td>36.9</td>
<td>0.4</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal</td>
<td>Acute Renal Failure</td>
<td>15.7</td>
<td>19.2</td>
<td>3.5</td>
<td>22%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Adult respiratory distress syndrome Temporary tracheostomy Ventilation</td>
<td>11.6</td>
<td>15.7</td>
<td>4.1</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>Sepsis</td>
<td>11.2</td>
<td>12.5</td>
<td>1.3</td>
<td>12%</td>
</tr>
<tr>
<td>Other Obstetric</td>
<td>Amniotic fluid embolism Eclampsia Severe anesthesia complications Air and thrombotic embolism</td>
<td>11.1</td>
<td>11.8</td>
<td>0.7</td>
<td>6%</td>
</tr>
<tr>
<td>Cardiac</td>
<td>Acute myocardial infarction Aneurysm Cardiac arrest/ventricular fibrillation Conversion of cardiac rhythm Heart failure/ arrest during surgery Pulmonary edema / Acute heart failure</td>
<td>9.0</td>
<td>9.3</td>
<td>0.3</td>
<td>3%</td>
</tr>
<tr>
<td>Other Medical</td>
<td>Puerperal cerebrovascular disorders Sickle cell disease with crisis</td>
<td>4.6</td>
<td>5.0</td>
<td>0.4</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases
SMM by Race and Ethnicity

From 42 states with adequate reporting of race and ethnicity

**Source:** Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases
Severe Maternal Morbidity (SMM) by Expected Payer

<table>
<thead>
<tr>
<th>Payer</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid or Medicare</td>
<td>90.9</td>
<td>102.1</td>
</tr>
<tr>
<td>Private insurance</td>
<td>71.5</td>
<td>76.8</td>
</tr>
<tr>
<td>Self-pay/no charge, other public</td>
<td>72.3</td>
<td>88.7</td>
</tr>
</tbody>
</table>

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, National Inpatient Sample
SMM by Rural/Urban Residence

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, National Inpatient Sample
SMM Trends by Hospital Location and Teaching Status

**Source:** Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, National Inpatient Sample

**ICD-9-CM**

- Metropolitan teaching hospitals
- Metropolitan non-teaching hospitals
- Non-Metropolitan hospitals

**ICD-10-CM/PCS**

- Metropolitan teaching hospitals
- Metropolitan non-teaching hospitals
- Non-Metropolitan hospitals
# State-level SMM Correlations with Perinatal Indicators


<table>
<thead>
<tr>
<th></th>
<th>Pre-pregnancy Hypertension</th>
<th>Pre-pregnancy Diabetes</th>
<th>Pre-pregnancy Obesity</th>
<th>Low-Risk Cesarean</th>
<th>Preterm Birth</th>
<th>Infant Mortality</th>
<th>Maternal Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMM</td>
<td>0.39</td>
<td>0.28</td>
<td>0.36</td>
<td>0.07</td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy Hypertension</td>
<td>0.56</td>
<td>0.48</td>
<td>0.51</td>
<td>0.68</td>
<td>0.65</td>
<td>0.65</td>
<td>0.42</td>
</tr>
<tr>
<td>Pre-pregnancy Diabetes</td>
<td>0.57</td>
<td>0.57</td>
<td>0.51</td>
<td>0.68</td>
<td>0.65</td>
<td>0.65</td>
<td>0.42</td>
</tr>
<tr>
<td>Pre-pregnancy Obesity</td>
<td>0.15</td>
<td>0.56</td>
<td>0.66</td>
<td>0.31</td>
<td>0.82</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>Low-Risk Cesarean</td>
<td>0.49</td>
<td>0.56</td>
<td>0.66</td>
<td>0.31</td>
<td>0.82</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>Preterm Birth</td>
<td>0.49</td>
<td>0.56</td>
<td>0.66</td>
<td>0.31</td>
<td>0.82</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>Infant Mortality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Mortality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- SMM only correlated with pre-pregnancy hypertension and low-risk cesarean
- Stronger and more consistent correlations for all other perinatal indicators
SMM and Maternal Mortality

SMM shows little geographic patterning with the highest rates in certain states on both coasts.

Maternal mortality is highest in the southeast.

Correlation: -0.25
Recent analysis of IBM MarketScan data showed ~15% of de novo SMM occurred in the postpartum period.

Contact Information

Ashley Hirai, PhD
Senior Scientist, Office of Epidemiology and Research
Maternal and Child Health Bureau (MCHB)
Health Resources and Services Administration (HRSA)
Email: ahirai@hrsa.gov
Phone: 240.472.2783
Web: mchb.hrsa.gov
Connect with HRSA

Learn more about our agency at:
www.HRSA.gov

Sign up for the HRSA eNews

FOLLOW US: