Maternal Mortality and Severe Morbidity in Arizona

“Attached to every statistic there is a person, family, child, or community.”

Dr. George Askew, MD, FAAP
New York City Deputy Commissioner of Health
Presentation Objectives

1. Provide an overview of the maternal morbidity continuum
2. Review social and health drivers of severe maternal morbidity (SMM) and mortality
3. Provide a national overview of SMM and mortality
4. Present recent SMM and mortality data in Arizona
5. Review findings from the ‘Arizona Hospital Maternal Safety Readiness Survey’
Total Births: 83,784

Statistics for women who had a live birth:
- Approximately 55% of births were paid by AHCCCS
- Approximately 26% had c-section deliveries
- About 17% had 2+ previous live births
- More than 15% were 35+ years of age
- About 12% gave birth <18 months apart
- More than half (53%) were overweight or obese
- About 8% had no prenatal care
- About 5% had early non-medically indicated deliveries
Spectrum of Maternal Morbidity

- Uncomplicated Deliveries
- Severe Maternal Morbidity
- Maternal Morbidity
- Maternal Deaths

Increasing Severity

Maternal Mortality

Death of a women while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. - CDC Definition

National rise in maternal deaths over the past decade.

There are significant racial disparities with Black women being three times as likely than White women to experience maternal death in the United States.

Maternal Mortality Rate per 100,000 Live Births (1990-2015)

Maternal Deaths in the United States

Hemorrhages account for at least a quarter of maternal deaths worldwide.

Older women with pre-existing conditions are at higher risk for morbidity and mortality.

Top leading causes of maternal deaths in the US:
- Cardiovascular disease (15.2%)
- Other medical-non cardiovascular conditions (14.7%)
- Infection/sepsis (12.8%)
- Hemorrhages (11.5%)

AZ Maternal Mortality Review Program

Established by the Arizona Senate Bill 1121 on April 2011

Authorized the Child Fatality Review Program to create a subcommittee to review all identified pregnancy related deaths.

Multidisciplinary team reviews cases to identify preventative factors and produce recommendations for systems level changes.

Report released on June 1, 2017

“12. Evaluate the incidence and causes of maternal fatalities associated with pregnancy in this state. For the purposes of this paragraph, "maternal fatalities associated with pregnancy" means the death of a woman while she is pregnant or within one year after the end of her pregnancy.”

- ARS 36-3501

Arizona Maternal Mortality Rate (per 1,000 live births) by Race/Ethnicity (2012-2015)

- State Rate: 18.9

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Maternal Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9</td>
</tr>
<tr>
<td>Native American</td>
<td>28.4</td>
</tr>
<tr>
<td>Other</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Percentage of Births by Race/Ethnicity (2012-2015)

- White: 45.4%
- Hispanic: 39.4%
- Native American: 6.0%
- Other: 9.2%
- Other: 9.2%

Preventability of a death is determined based upon the idea that under reasonable conditions something could have been done by an individual, or by the community as a whole, to prevent the death.

*All deaths that do not fit in the other categories
Severe Maternal Morbidity (SMM)

For every death there are multiple women experiencing complications

Global burden of SMM is unknown but is on the rise

Most common causes are hemorrhages and hypertensive disorders

Most preventable factors are provider-related

Contributors for Global SMM:

- Substandard maternal health care
- Inconsistent monitoring and surveillance
- Suboptimal use of evidence-based strategies for prevention and treatment

SMM in High Income Countries

Lack of a standardized definition to monitor and compare

SMM cases are typically identified by analyzing ICD diagnoses and procedure codes

SMM case reviews (medical records) are utilized by some high income countries (Gold Standard)

WHO Recommendations:

Identify system failures

Identify intervention priorities

Routine surveillance of SMM
SMM in High Income Countries

Estimates of the Prevalence of SMM in High-Income Countries (per 1,000 live births)

- Australia: 6
- New Zealand: 6.2
- Netherlands: 7.1
- Italy: 8.5
- USA 1: 5.8
- USA 2: 7.3
- USA 3: 7.3
- USA 4: 9.2
- France: 13.9

SMM in the United States

SMM results from unexpected outcomes of labor and delivery that lead to significant short- or long-term consequences to a woman’s health.

Occurs more frequently than maternal mortality

Estimated 50-100 women experiencing SMM to every maternal death

Rates have been increasing nationally since 2008

Surveillance provides an opportunity for public health improvement
Severe Maternal Morbidity in the United States

Est. Delivery Costs with/out SMM adjusting for other factors, NYC 2008-2012

*SMM may result in:

- Longer hospital stay
- Major surgery
- Other major medical interventions

$9,357

$15,714

Adjusted for maternal age, race/ethnicity, payer, method of delivery, plurality and comorbidity, and clustered by hospital.

Factors that affect Maternal Mortality and Morbidity

- Mental health status
- Overweight and obesity
- Older women in pregnancy
- Parity
- Pre and interconception health status
- Pre-existing chronic conditions
- Prenatal care utilization
- Substance use disorder
- Delay in timely diagnosis and treatment
- Lack of care coordination
- Rising rate of cesarean sections (C-sections)
- Insufficient training for OB providers on management of chronic conditions
- System Level Factors
- Inconsistent implementation of national hospital protocols for perinatal health
- Lack of continuum of care between maternal and primary care
- Limited access to primary care for chronic conditions
- Lack of emphasis on maternal health
- Lack of accurate and standardized data
- Failure to follow evidence-based guidelines
- Socioeconomic and racial factors
- Shortage of maternity care providers (maternity care deserts)
- Lack of equipment to address complications at birth

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Health and Wellness for all Arizonans
Maternal mortality vs. health expenditure over time, 2000 to 2015

Health financing is reported as the annual per capita health expenditure and is adjusted for inflation and price level differences between countries (measured in 2010 international dollars).

OurWorldInData.org/the-link-between-life-expectancy-and-health-spending-us-focus • CC BY-SA
Access to Maternity Care in the U.S. Counties, 2016

- Hospitals offering obstetric (OB) care: zero level 1, <2 level 2
- OB Providers (OB/GYN, CNM) per 10,000: zero level 1, <60 level 2
- Proportion of women 18-64 without health insurance*: any level 1, 10% or greater level 2, less than 10%

Notes: OB/GYN = obstetrician/gynecologists; CNM = certified nurse midwives
*U.S. average is approximately 10%.
Protective Factors of Maternal Mortality and SMM found in High Income Countries

Better adequacy of prenatal care utilization

Women are attended by a skilled health worker during childbirth

Availability of postpartum care

Improved access to and quality of reproductive, maternal, and newborn health care services

Universal health coverage for comprehensive reproductive, maternal, and newborn health care

Strong health systems to collect high quality data in order to respond to the needs and priorities of women

Employ a culture of accountability in order to improve quality of care and equity
SMM in Arizona

Hospital Discharge Database, 2016-2018
Identifying SMM Cases

**SMM Overall:** includes women with a delivery hospitalization and a diagnosis or a procedure code for a qualifying medical indicator for SMM.

**SMM without transfusions:** includes women with a delivery hospitalization and a diagnosis or a procedure code for a qualifying medical indicator for SMM **but excludes women that only have a blood transfusion procedure code and no other qualifying medical indicators for SMM.**
Identifying SMM Cases

All hospital discharge entries from HDD participating hospitals

6,895,635 entries were analyzed for 2016-2018 (Quarters 1 and 2)

179,005 delivery inpatient hospitalizations

Excludes:
- Ectopic or molar pregnancy and pregnancy with abortive outcome
- Abortion procedures

Indicators used to identify SMM cases

Diagnosis based indicators (16):
- Acute myocardial infarction
- Acute Renal Failure diagnosis
- Adult Respiratory Distress Syndrome diagnosis
- Amniotic fluid embolism
- Aneurysm
- Cardiac arrest/ventricular fibrillation
- Disseminated Intravascular Coagulation
- Eclampsia
- Heart failure/arrest during procedure or surgery
- Puerperal Cerebrovascular Disorder
- Acute Heart Failure / Pulmonary edema
- Severe anesthesia complications
- Sepsis
- Shock
- Sickle Cell Disease with Crisis
- Air and thrombotic embolism

Procedures based indicators (5):
- Blood transfusion
- Conversion of cardiac rhythm
- Hysterectomy
- Temporary tracheostomy
- Ventilation

Follows methodology suggested by the ACOG Alliance for Innovation in Maternal Health (AIM)
Maternal characteristics of women with SMM compared to all women giving birth

Compared to all women that gave birth between 2016-2018, a higher proportion of women with SMM are:

- AHCCCS clients
- Younger than 19 years or older than 35 years old
- from a Community of Color

Race/Ethnicity categories are based on the AIM Data Collection Guidelines

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Medical and Procedure Indicators for SMM

Most common indicators for SMM

- DIC: 70
- Eclampsia: 69
- Hysterectomy: 54
- Puleedema: 33
- Renal Failure: 35
- Sepsis: 56
- Transfusions: 642 (2016), 569 (2017), 242 (2018Q1_Q2)

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SMM in Arizona

More than 1,000 cases every year, 35 for each maternal death in Arizona

Clear disparities among racial/ethnic groups

Combined Arizona SMM Rate 2016-2018Q2

- SMM without transfusions 65.79
- SMM overall 138.28
Arizona Perinatal Trust (APT): Levels of Perinatal Care

IN-HOSPITAL BIRTHING CENTERS – IHBC (Indian Health Services Only)
Provide hospital services for uncomplicated obstetrical patients (excluding cesarean delivery) and basic and transitional newborn care. Such centers should not electively deliver infants less than 37 weeks gestation.

PERINATAL CARE CENTERS – LEVEL I
Provide hospital services for low-risk obstetrical patients, including cesarean delivery and basic and transitional newborn care; such centers should not electively deliver infants less than 36 weeks gestation.

PERINATAL CARE CENTERS – LEVEL II
Provides hospital services for selected high risk obstetrical patients and newborns requiring selective continuing care; such centers should not electively deliver infants less than 32 weeks gestation.

PERINATAL CARE CENTERS – LEVEL III
Provide hospital services for high-risk obstetrical patients and newborns requiring selective continuing care; such centers should not electively deliver infants less than 28 weeks gestation.

PERINATAL CARE CENTERS – LEVEL III
Provide hospital services for all obstetrical and newborn patients including those patients requiring subspecialty and intensive care at all gestational ages.

FREESTANDING NEONATAL CARE CENTERS – LEVEL III
Provide hospital services for all newborns requiring subspecialty and intensive care at all gestational ages.
Variations by level of care
All Arizona facilities Reporting to HDD 2016-2018Q2

Rates per 10,000 delivery hospitalizations

SMM Rates by APT Facility Level

<table>
<thead>
<tr>
<th>Level</th>
<th>SMM Without Transfusions</th>
<th>SMM Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>APT Level I</td>
<td>36.73</td>
<td>161.83</td>
</tr>
<tr>
<td>APT Level II</td>
<td>41.50</td>
<td>96.47</td>
</tr>
<tr>
<td>APT Level IIIE</td>
<td>62.43</td>
<td>153.40</td>
</tr>
<tr>
<td>APT Level III</td>
<td>89.13</td>
<td>153.23</td>
</tr>
<tr>
<td>Non-APT</td>
<td>30.90</td>
<td>109.40</td>
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Variations by facility
All Arizona facilities Reporting to HDD 2016-2018Q2

Rates per 10,000 delivery hospitalizations
Findings from the ‘Arizona Hospital Maternal Safety Readiness Survey’
Arizona Hospital Maternal Safety Readiness Survey

**Purpose:** To assess quality improvement efforts in maternal care practices across Arizona’s birthing facilities. This data will be used to drive morbidity/mortality prevention efforts in Arizona. This work is in alignment with and will support the Arizona Health Improvement Plan Maternal and Child Health Workgroup and advance obstetric care and health outcomes of Women in Arizona.

**Design:** 27 questions modeled after the Alliance for Innovation in Maternal (AiM) Health Readiness Survey

**Recruitment:** Online and phone recruitment

**Data collection period:** October 7-18, 2018
### Survey Working Group

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency/Organization</th>
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<tbody>
<tr>
<td>Enid Quintana Torres</td>
<td>ADHS</td>
<td>Linda Meiner</td>
<td>Arizona Perinatal Trust</td>
</tr>
<tr>
<td>Martín Celaya</td>
<td>ADHS</td>
<td>Deb Christian</td>
<td>Arizona Perinatal Trust</td>
</tr>
<tr>
<td>Patricia Tarango</td>
<td>ADHS</td>
<td>Dean Coonrod</td>
<td>Arizona Perinatal Trust</td>
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<tr>
<td>Breann Westmore</td>
<td>March of Dimes</td>
<td>Robert BJ Johnson</td>
<td>Arizona Perinatal Trust</td>
</tr>
<tr>
<td>Kathy Walker</td>
<td>Banner Health</td>
<td>April Hamilton</td>
<td>Arizona Perinatal Trust</td>
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Survey Participants

80% participation rate

34/42 birthing facilities participated
Last QI project that OB departments participated on...

<table>
<thead>
<tr>
<th>OB Hemorrhage</th>
<th>OB Hypertension</th>
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<tbody>
<tr>
<td>Reduction Primary C-section</td>
<td>Maternal Early OB Warning System</td>
</tr>
<tr>
<td>Retained Sponges</td>
<td>Mental Health</td>
</tr>
<tr>
<td>Maternal Sepsis</td>
<td>Perinatal Opioid Exposure</td>
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<tr>
<td>Delayed Cord Clamping</td>
<td></td>
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<tr>
<td>Exclusive Breastfeeding</td>
<td></td>
</tr>
<tr>
<td>Reduction Inductions</td>
<td></td>
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</tbody>
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What worked well in previous OB QI efforts...

- Teamwork/Buy-in/Engagement
- Shared leadership
- Clear scientific rationale, expectations and implementation steps
- Drills
- Physician Champions
- Active participation from the QI Department
70% are currently participating or have recently participated in a QI effort with a QI organization (i.e. Leapfrog, CMQCC, APT)
75% have a multidisciplinary perinatal quality committee

97% have a process for “lessons learned” to be addressed with Staff (OB,CNM,RN)

60% have a process for “lessons learned” to be addressed with patient and family
41% of facilities review their emergency policies and protocols every 3 years.

96% of facilities report following the emergencies and protocols 75-100% of the time.
OB Department have a standardized process for OB emergencies related to:

- **100% OB Hemorrhage**
- **97% Severe Hypertension/Preeclampsia**
- **76% Maternal Sepsis**
- **68% Maternal Early Warning Signs**

69% of Emergency Departments have a standardized process for OB Emergencies.
85% of facilities conduct regular multidisciplinary on site drills for OB emergencies

47% of facilities report doing quarterly drills
Identified challenges in OB-related drills...

In **67%** of facilities OBs Anesthesia **are not** required to participate in drills

In **64%** of facilities Family Practitioners or Emergency Department Staff **are not** required to participate in drills

In **55%** of facilities MTF **are not** required to participate in drills

In **44%** of facilities OBs **nor** OB residents **are required** to participate in drills
Data measure types currently being tracked by OB Departments...

<table>
<thead>
<tr>
<th>Measure Type</th>
<th>Percent of respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process</strong> measure-frequency of performing a diagnostic test or treatment related to an outcome (i.e. rate of antibiotic prophylaxis at Cesarean birth, rate of obstetric hemorrhage risk assessment on L&amp;D admission)</td>
<td>29</td>
</tr>
<tr>
<td><strong>Structure</strong> measure-identify information about policies, equipment, and staff that are relevant to the QI project and are often noted once when the task is completed (i.e. annual policy review, staff training sessions)</td>
<td>37</td>
</tr>
<tr>
<td><strong>Outcome</strong> measures-examines the impact on patient's health and well-being (i.e. severe maternal morbidity and mortality rates)</td>
<td>24</td>
</tr>
</tbody>
</table>
Barriers to past implementation of QI efforts...

Burden of documentation in EHR systems

Facilities are short staffed

Infrequency of drill opportunities

The amount of effort required (staff training, coordination)

Lack of participation in efforts

Resistance to change from all levels

Limited provider/physician buy-in

“It can be very challenging to get the hospital staff and physicians to agree to the same plans and the support each other though implementation. It seems that someone is always resistant to the change.”
Overall challenges to data collection in facilities...

Other: limited reports from EHR systems

- Other (please specify): 3%
- Lack of Trained Staff: 11%
- Incorrect Coding: 14%
- Compatibility of EMR Systems: 18%
- Time Burden: 25%
- Inadequate Documentation: 27%
Greatest need to improve OB specific QI efforts...

- Involvement of staff and personnel in the process
- Motivation of providers and physicians
- Continued staff education
- Lack of specialized equipment

“Staff needs to feel empowered”

“Move towards collaborative teams”
91% of facilities have a high interest in working with a perinatal collaborative to improve quality of care
Obstetrical topics that facilities want to see addressed in a collaborative improvement effort....

Substance use during pregnancy

Chronic conditions management (obesity, hypertension, as such)

Breastfeeding support

Mental health

Reduction of peripartum racial/ethnic disparities

Standardized perinatal benchmarks across Arizona

"Would love to be able to participate in an AZ collaborative and submit data"

"Perhaps urban centers could collaborate with rural hospitals to help staff gain experience"

"We feel that we already have a perinatal collaborative with the Arizona Perinatal Trust"
In Summary...

Maternal Mortality continues to be on the rise in Arizona and across the nation

While the rate of maternal mortality increases more women become severely morbid during delivery

A variety of provider, patient, and systemic factors contribute to this emerging maternal and child health threat

Consistent surveillance of SMM and maternal mortality coupled with the identification and use of evidence based strategies at the facility level can aid states curve the rise in cases and prevent maternal deaths