

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



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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'



2017 Arizona Perinatal Health Overview

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



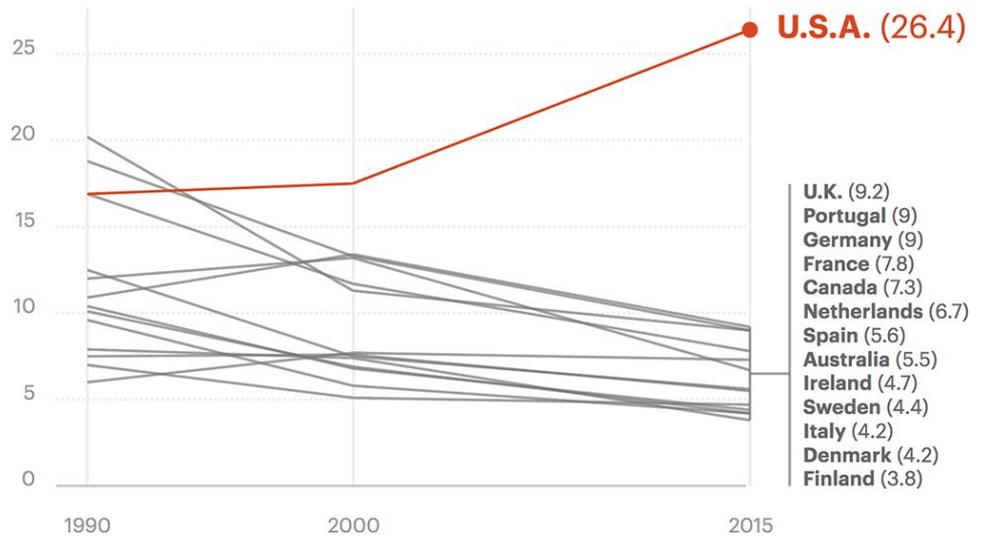
Maternal Mortality

Death of a woman 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 100,00 Live Births (1990-2015)



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Martin N, Montagne R. Focus On Infants During Childbirth Leaves U.S. Moms In Danger. NPR. <https://www.npr.org/2017/05/12/527806002/focus-on-infants-during-childbirth-leaves-u-s-moms-in-danger>. Published May 12, 2017. Accessed October 20, 2018.

Maternal Deaths in the United States

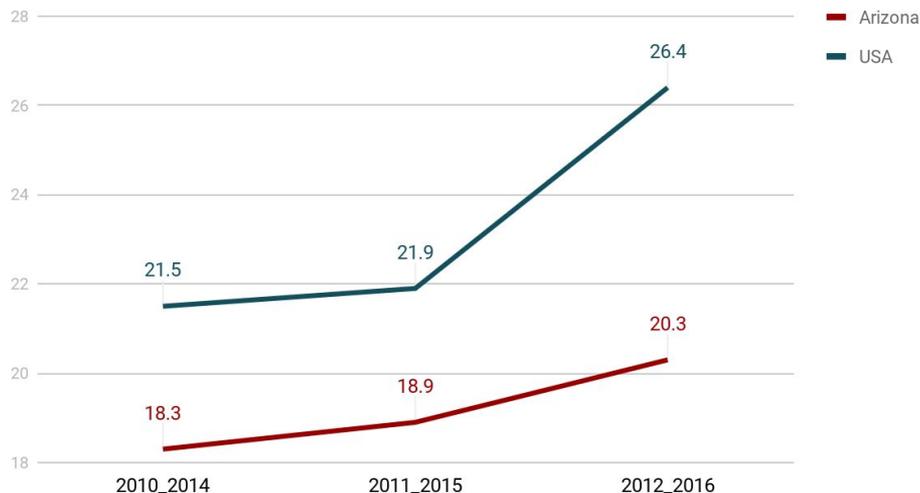
Hemorrhages account for a least a quarter of maternal deaths worldwide

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%)

Maternal Mortality Rate per 100,000 Live Births



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Reproductive Health. Centers for Disease Control and Prevention.

<https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm>. Published August 7, 2018.

Accessed October 20, 2018.

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

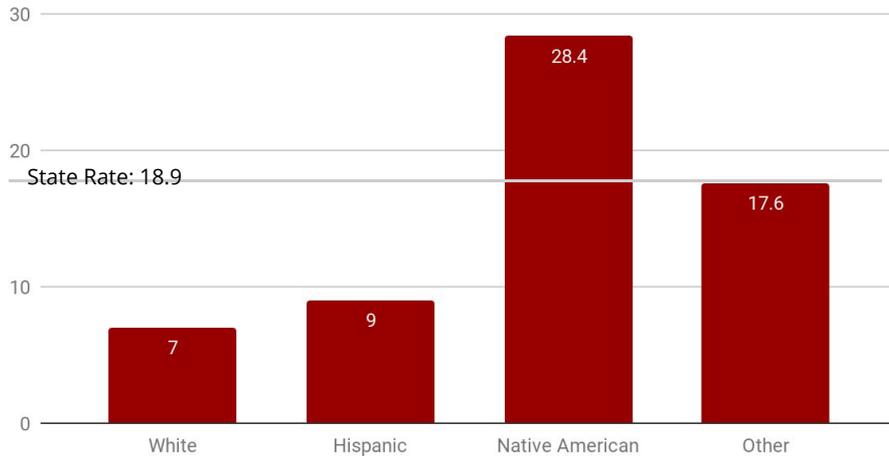
*“12. Evaluate the incidence and causes of **maternal fatalities** associated with pregnancy in this state. For the purposes of this paragraph, "maternal fatalities associated with pregnancy" means the death of a woman while she is pregnant or within one year after the end of her pregnancy.”*

- ARS 36-3501

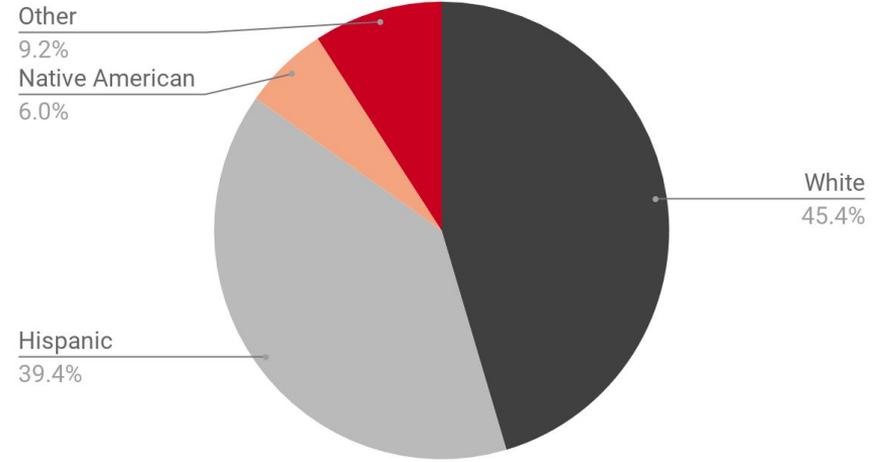


Arizona Maternal Mortality and Percent of Births by Racial Group in Arizona, 2012-2015

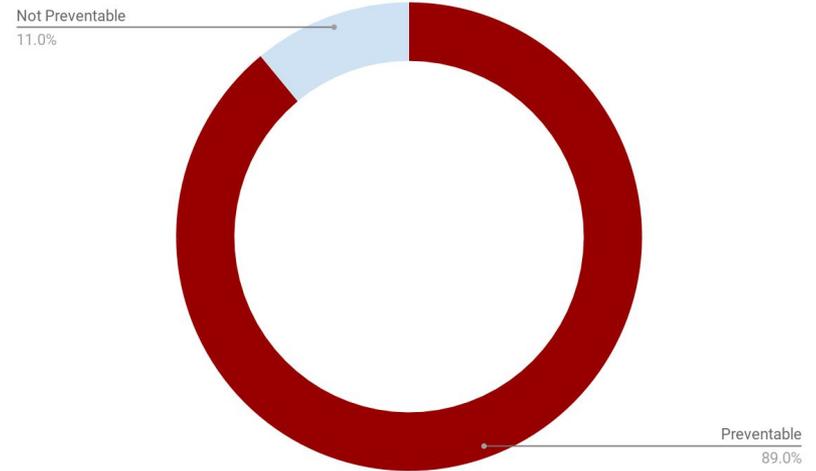
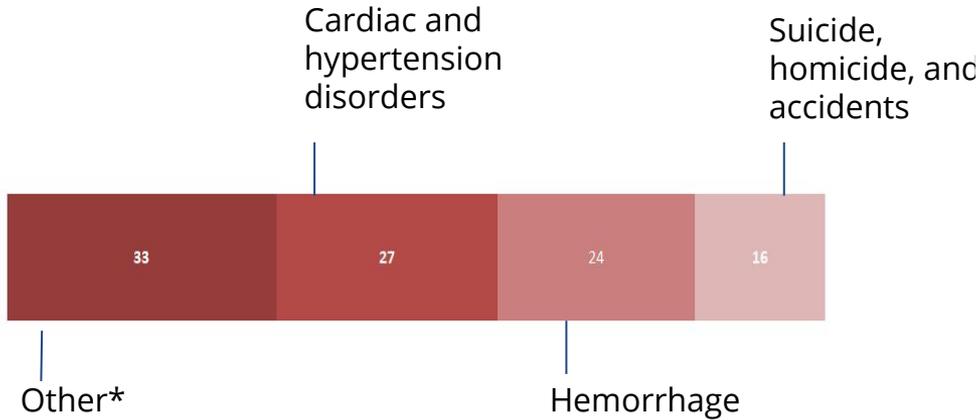
Arizona Maternal Mortality Rate (per 1,000 live births) by Race/Ethnicity (2012-2015)



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



Top Causes of Death for Pregnancy-Related Deaths and Preventability in Arizona, 2012-2015



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

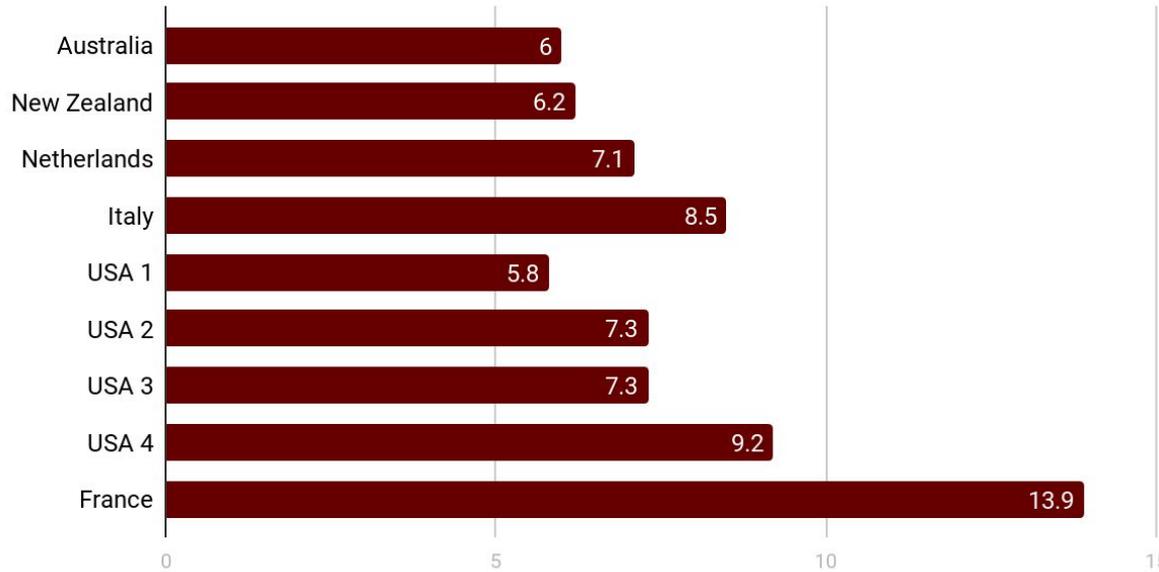
Identify intervention priorities

Routine surveillance of SMM



SMM in High Income Countries

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



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.**

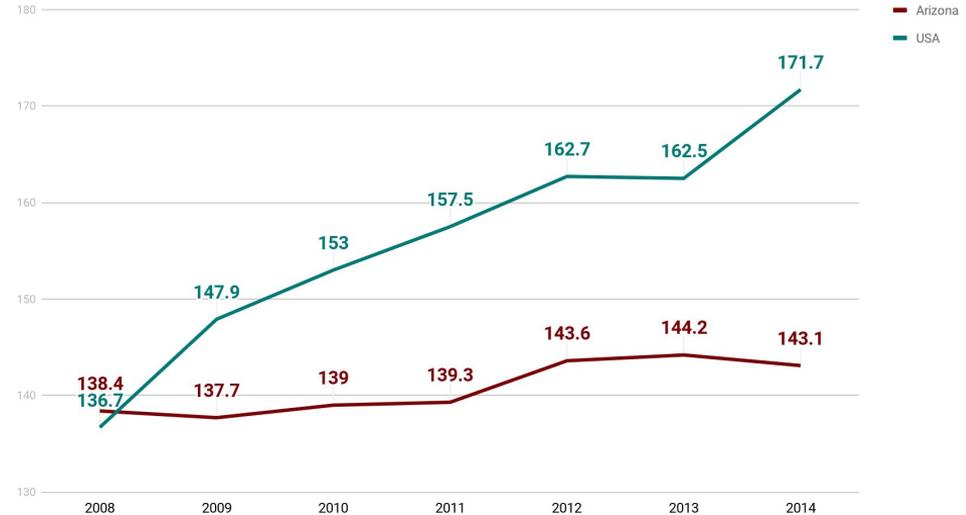
Occurs more frequently than maternal mortality

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 per 10,000 Delivery Hospitalizations



Severe Maternal Morbidity in the United States

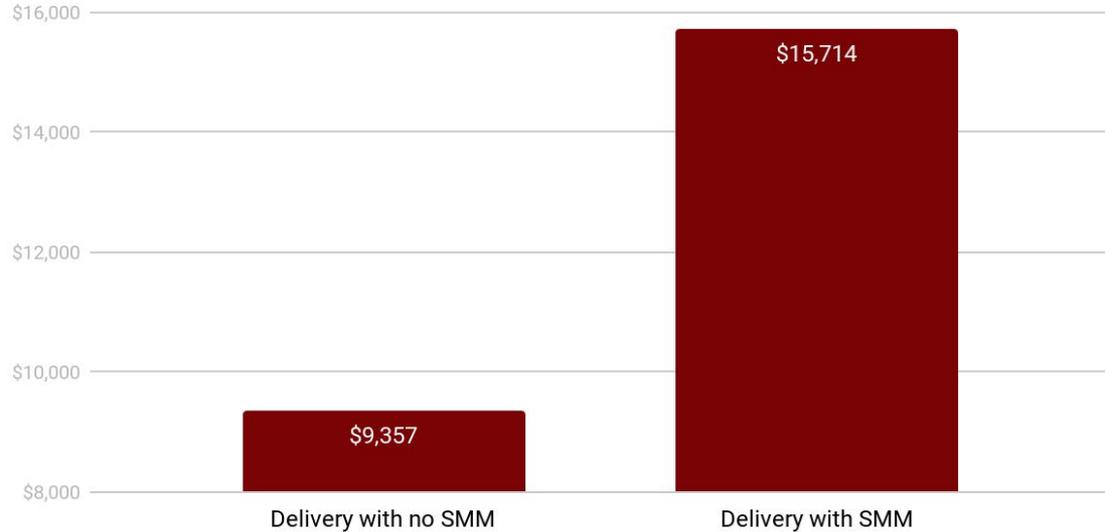
Est. Delivery Costs with/out SMM adjusting for other factors, NYC
2008-2012

SMM may result in:

Longer hospital stay

Major surgery

Other major medical interventions



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



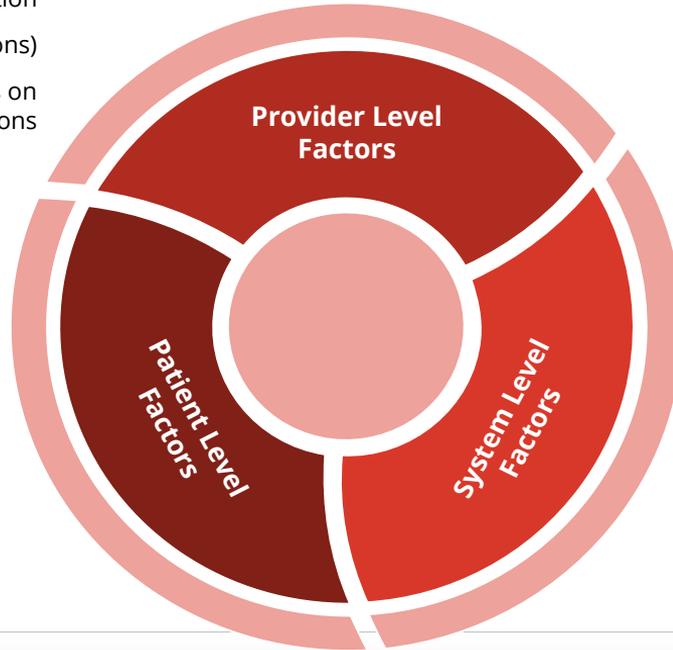
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New York City Department of Health and Mental Hygiene (2016). Severe Maternal Morbidity in New York City, 2008–2012. New York, NY.

Factors that affect Maternal Mortality and Morbidity

- 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
- 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



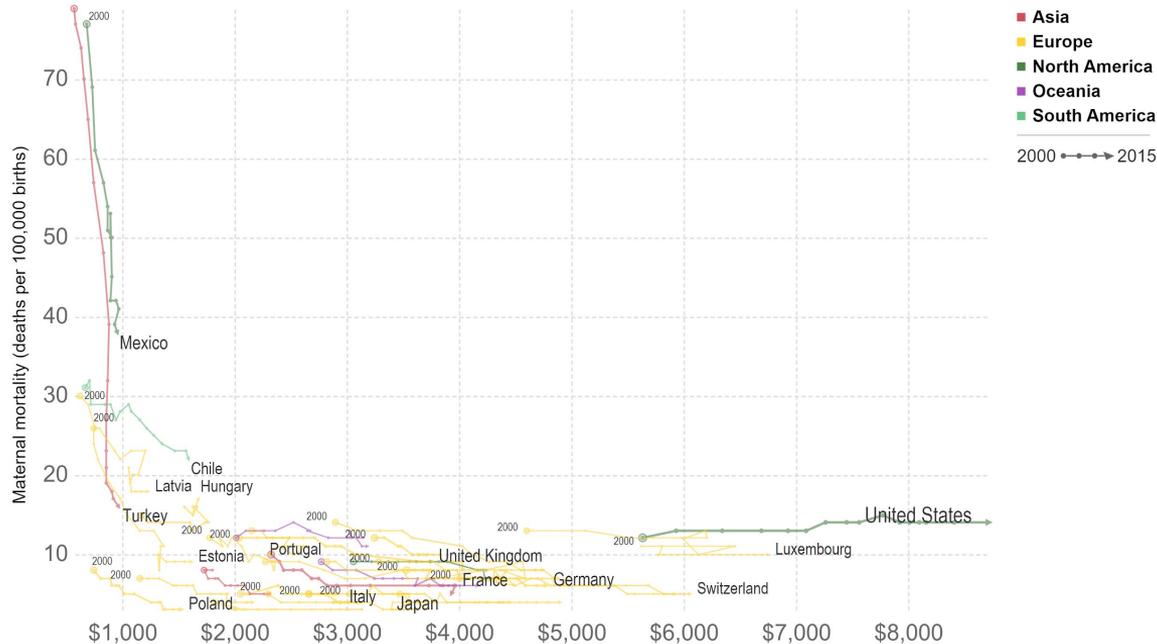
- Inconsistent implementation of national hospital protocols for perinatal health
- Lack of continuum of care between maternal and primary care
- Limited access to primary care for chronic conditions
- Lack of emphasis on maternal health
- Lack of accurate and standardized data
- Failure to follow evidence-based guidelines
- Socioeconomic and racial factors
- Shortage of maternity care providers (maternity care deserts)
- Lack of equipment to address complications at birth



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).



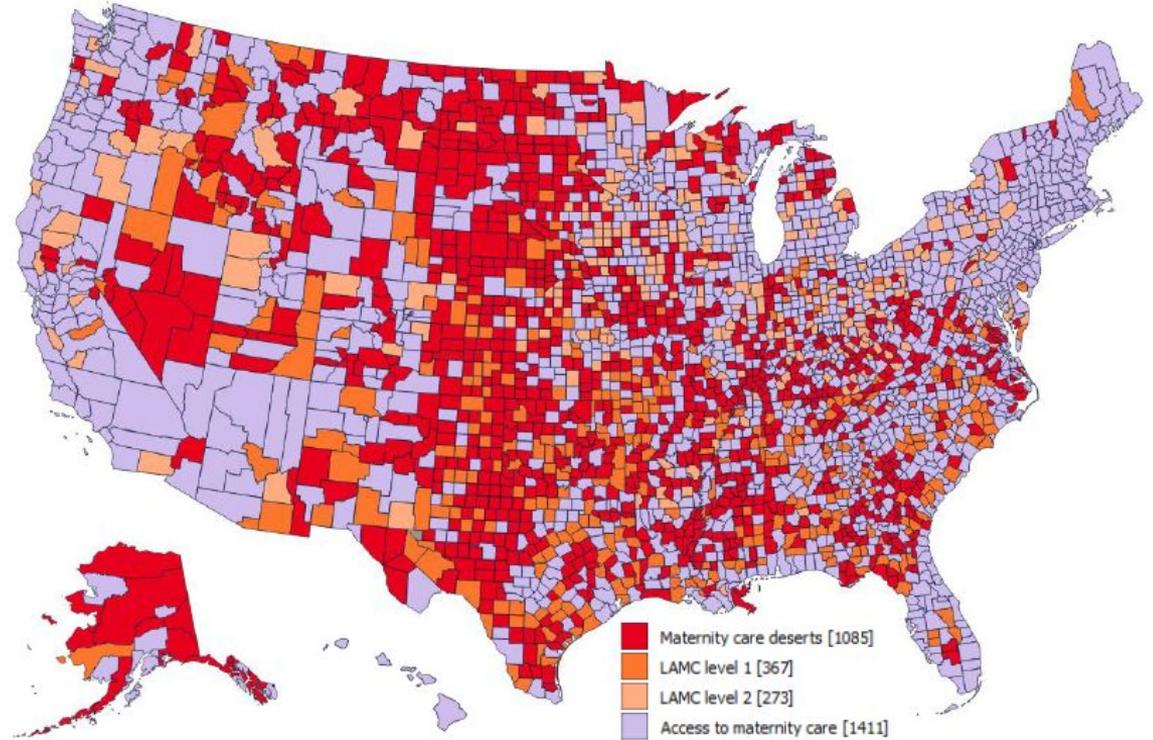
Source: Health Expenditure and Financing - OECDstat (2017), Gapminder (2010) and World Bank (2015)
 OurWorldInData.org/the-link-between-life-expectancy-and-health-spending-us-focus • CC BY-SA



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Access to Maternity Care in the U.S. Counties, 2016



Definitions	Maternity care deserts	Limited access to maternity care (LAMC)	
		Level 1	Level 2
Hospitals offering obstetric (OB) care	zero	<2 Hospitals	<2 Hospitals
OB Providers (OB/GYN, CNM) per 10,000	zero	<60	<60
Proportion of women 18-64 without health insurance*	any	10% or greater	Less than 10%

Notes: OB/GYN = obstetrician/gynecologists; CNM = certified nurse midwives
 *U.S. average is approximately 10%.



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March of Dimes. Nowhere to Go: Maternity Care Deserts across the U.S. March of Dimes; 2018.

Protective Factors of Maternal Mortality and SMM found in High Income Countries

Better adequacy of prenatal care utilization

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

Women are attended by a skilled health worker during childbirth

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

Availability of postpartum care

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

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

Delivery hospitalizations

Indicators used to identify SMM cases

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

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



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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

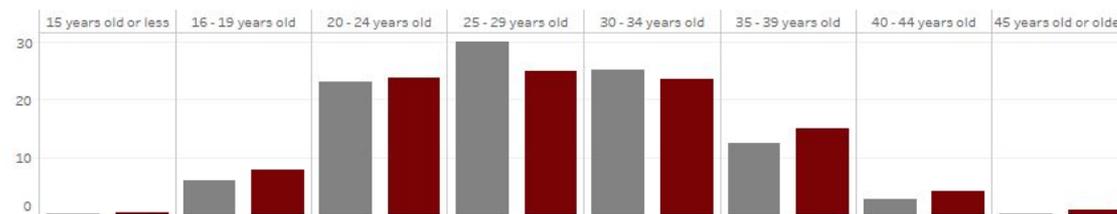
Compared to all women that gave birth between 2016-2018, a higher proportion of women with SMM are:

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

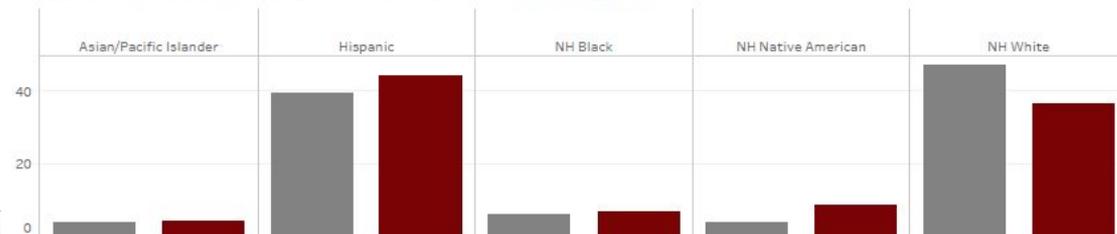
Payer Distribution for all deliveries vs. SMM Cases



Age Distribution for all deliveries vs. SMM Cases

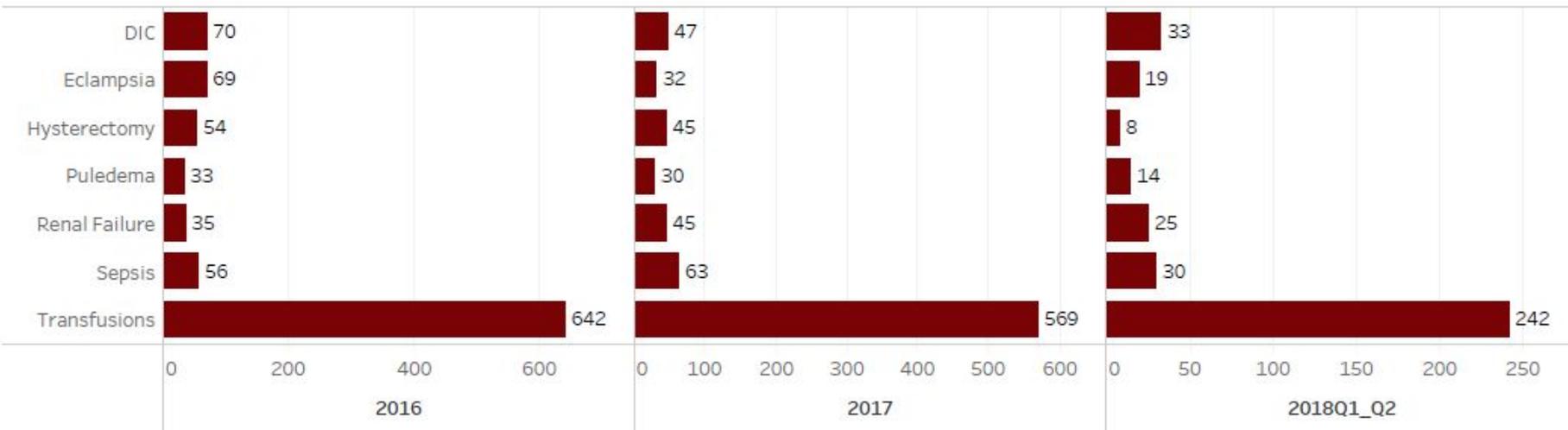


Race/Ethnicity Distribution for all deliveries vs. SMM Cases



Medical and Procedure Indicators for SMM

Most common indicators for SMM



SMM in Arizona

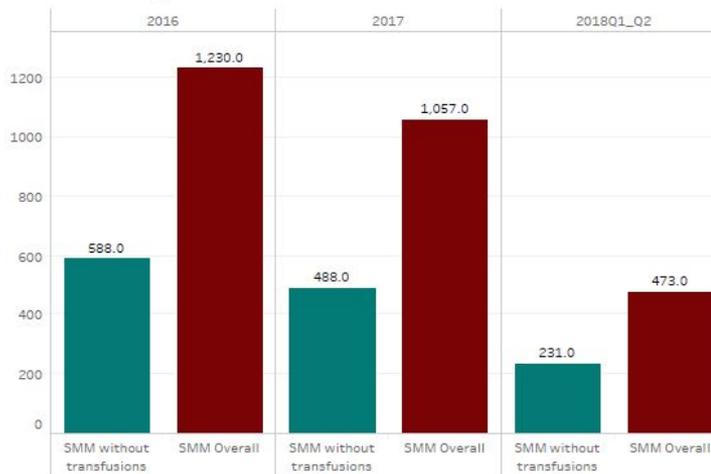
More than 1,000 cases every year, 35 for each maternal death in Arizona

Clear disparities among racial/ethnic groups

Combined Arizona SMM Rate 2016-2018Q2

- SMM without transfusions 65.79
- SMM overall 138.28

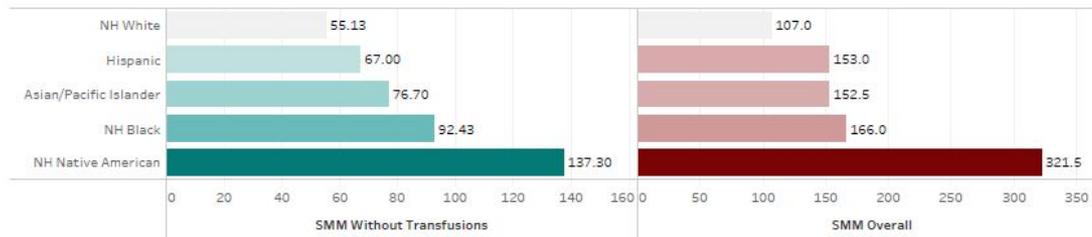
SMM Counts by Year



SMM Rates by Year



SMM Rates by Race/Ethnicity



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 IIE

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.

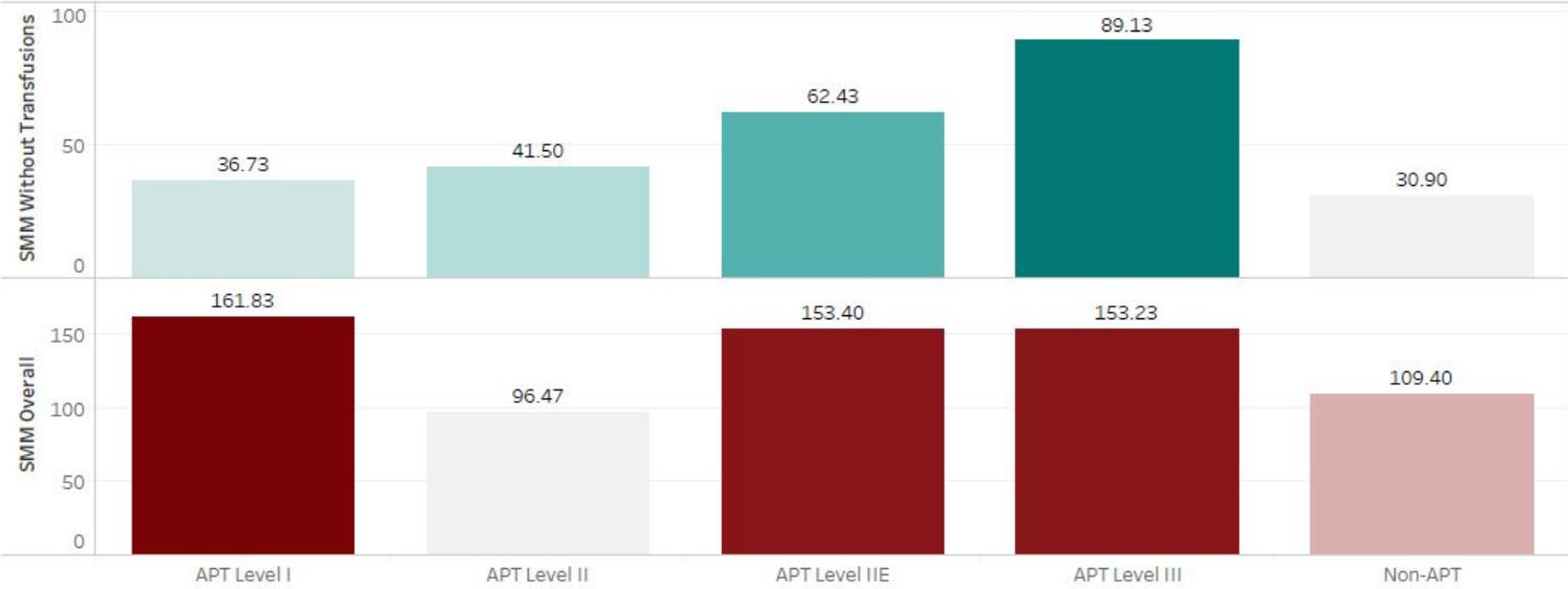


Variations by level of care

All Arizona facilities Reporting to HDD 2016-2018Q2

Rates per 10,000 delivery hospitalizations

SMM Rates by APT Facility Level



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Variations by facility

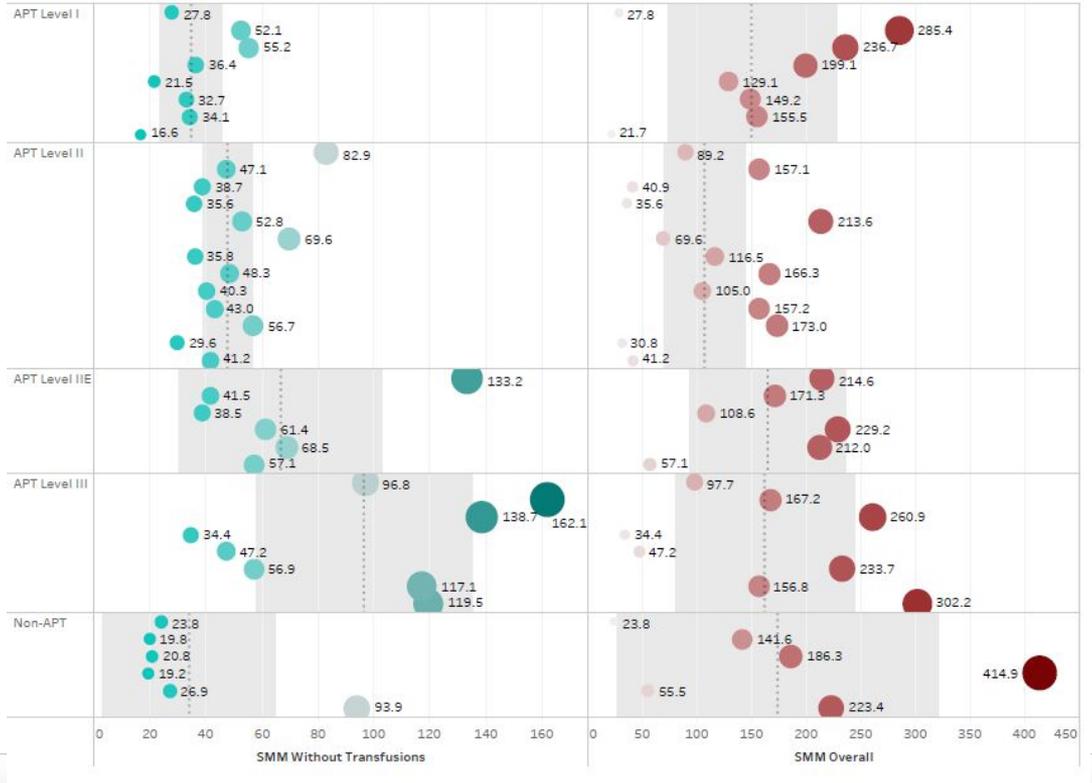
All Arizona facilities Reporting to HDD 2016-2018Q2

Rates per 10,000 delivery hospitalizations

Severe Maternal Morbidity Rates per Facility, 2016- 2018Q2

All Arizona Facilities reporting to Hospital Discharge Database

Rates per 10,000 delivery hospitalizations



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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



Name	Agency/Organization	Name	Agency/Organization
Enid Quintana Torres	ADHS	Linda Meiner	Arizona Perinatal Trust
Martín Celaya	ADHS	Deb Christian	Arizona Perinatal Trust
Patricia Tarango	ADHS	Dean Coonrod	Arizona Perinatal Trust
Breann Westmore	March of Dimes	Robert BJ Johnson	Arizona Perinatal Trust
Kathy Walker	Banner Health	April Hamilton	Arizona Perinatal Trust

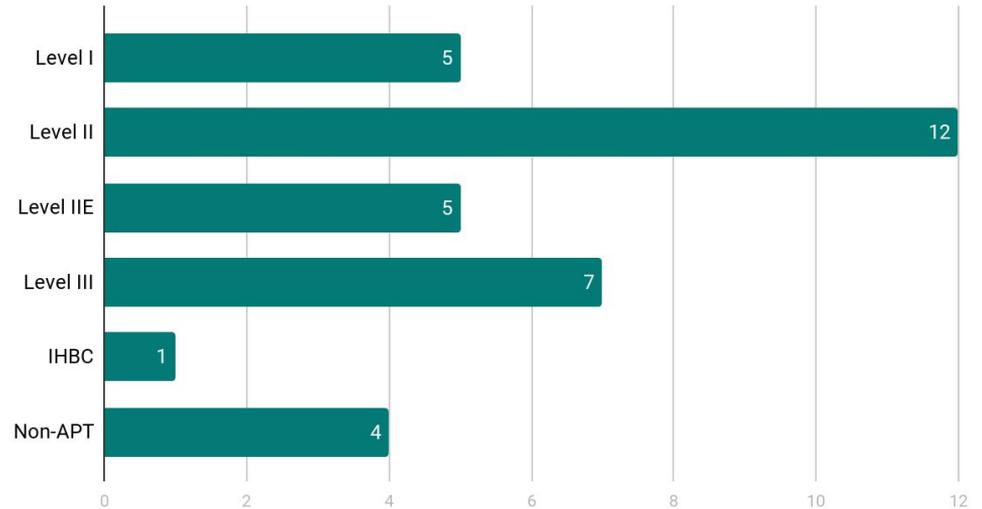


Survey Participants

80% participation rate

34/42 birthing facilities participated

Survey Participation by APT Level



Last QI project that OB departments participated on...

OB Hemorrhage

OB Hypertension

Reduction Primary
C-section

Maternal Early OB Warning
System

Retained Sponges

Mental Health

Maternal Sepsis

Perinatal Opioid Exposure

Delayed Cord Clamping

Exclusive Breastfeeding

Reduction Inductions

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

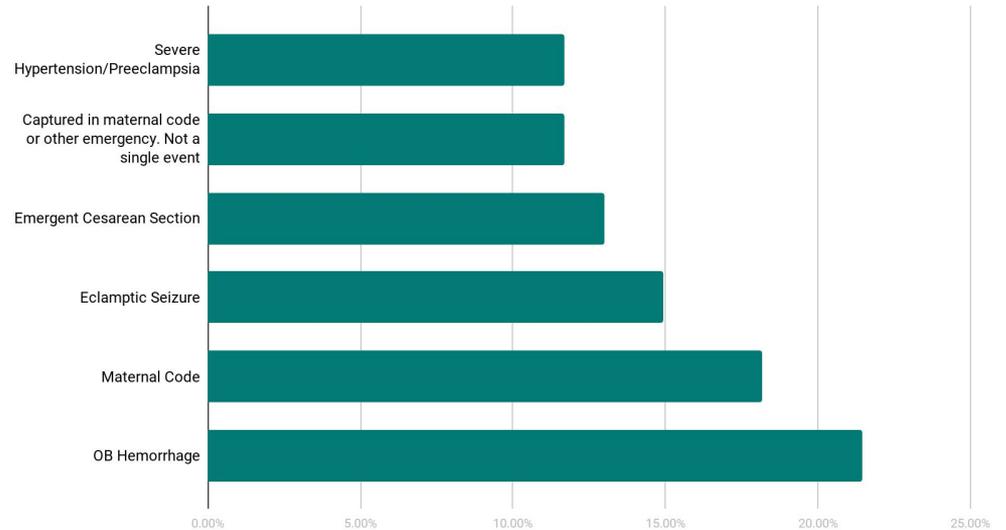
69% of
Emergency
Departments have
a standardized
process for OB
Emergencies



85% of facilities conduct regular multidisciplinary on site drills for OB emergencies

47% of facilities report doing quarterly drills

Drill Topics



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...

Measure Type	Percent of respondents (%)
Process 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&D admission)	29
Structure 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)	37
Outcome measures-examines the impact on patient's health and well-being (i.e. severe maternal morbidity and mortality rates)	24



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

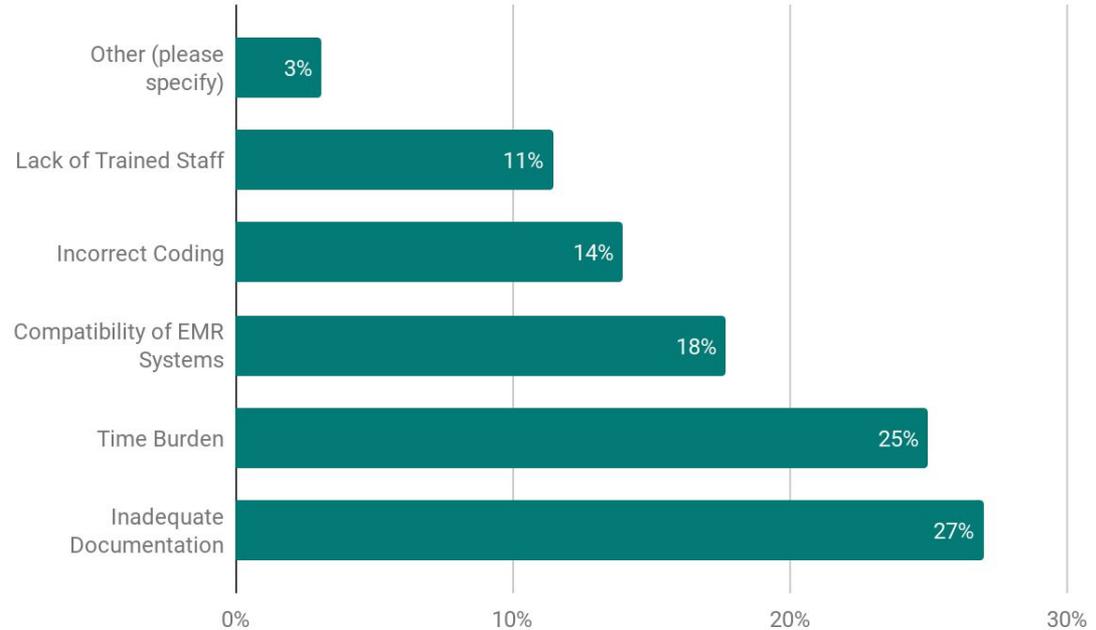
Limited provider/physician buy-in

"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



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

