Maternal Healthcare Crisis: Maternal Mortality

Elizabeth Howell MD, MPP
Professor & Vice Chair of Research Obstetrics, Gynecology, and Reproductive Science
Director, Blavatnik Family Women’s Health Research Institute
Icahn School of Medicine at Mount Sinai
Presenter Disclosures

Elizabeth Howell, MD, MPP

I have no personal financial relationships with commercial interests relevant to this presentation
Objectives

- Trends in Maternal mortality
- Risk factors and comorbidities
- Causes of death
- Racial and ethnic disparities
Childbirth

• Four million births annually in US
• Childbirth #1 reason for hospital admission for commercial payers and Medicaid programs
• Childbirth accounts for quarter of all hospital discharges with annual cost of over $100 billion
• US spends more on healthcare than any other country

Maternal Healthcare Crisis

Hospitals know how to protect mothers. They just aren’t doing it.

Alison Young, USA TODAY
4:54 p.m. EDT July 27, 2018

Opinion

If Americans Love Moms, Why Do We Let Them Die?

By Nicholas Kristof

New York Times

July 29, 2017
US Maternal Mortality Rises while it Declines Elsewhere

Maternal Mortality Rankings for US and New York State

- 2015: US ranked 46th in the world in maternal mortality
- 2016: NY ranked 30th with a rate of 20.9 deaths per 100,000 live births

Maternal Mortality Definitions

- **Maternal mortality**: the death of a woman during pregnancy or within 42 days of termination of pregnancy.
- **A pregnancy-related death**: the death of a woman during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.
- **A pregnancy-associated but Not related death**: the death of a woman during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy.

New York State Maternal Mortality Review Initiative

• Comprehensive population-based review of all maternal deaths in New York State

• Started in 2010 and examines:
  – Pregnancy-Related Deaths
  – Pregnancy-Associated but Not Related Deaths

• Informs interventions to reduce risk of maternal deaths
Trends in Maternal Mortality in New York State


*Causes of death from death records A34, O00-O95, O98-O99.*
Demographic Risk Factors for Maternal Mortality

- Race
- Low socioeconomic status
- Lack of prenatal care
- Advanced maternal age
- Lower educational attainment

Clinical Risk Factors for Maternal Mortality

- Chronic health conditions – diabetes, hypertension, cardiac disease
- Obesity
- Cesarean delivery
  - Increased risk of venous thrombotic event, hemorrhage, infection
  - Increased risk abnormal placentation

# Maternal Demographic Characteristics for Pregnancy-Related Deaths in New York State

<table>
<thead>
<tr>
<th>Pregnancy-Related Deaths</th>
<th>MMR 2006-2008 (N=125)</th>
<th>MMR 2012-2014 (N=89)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid Insurance</td>
<td>45%</td>
<td>64%</td>
</tr>
<tr>
<td>High School Education or Less</td>
<td>28%</td>
<td>52%</td>
</tr>
<tr>
<td>English as Primary Language</td>
<td>63%</td>
<td>64%</td>
</tr>
<tr>
<td>Single Marital Status</td>
<td>48%</td>
<td>53%</td>
</tr>
<tr>
<td>First time mothers</td>
<td>30%</td>
<td>29%</td>
</tr>
<tr>
<td>Inadequate or No Prenatal care</td>
<td>18%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review

*2014 not complete
Pregnancy-Related Deaths by Health Insurance, New York State 2012–2014*

Pregnancy-Related Deaths

- Medicaid: 64%
- Private: 18%
- Other: 18%

Live Births

- Medicaid: 45%
- Private: 49%
- Other: 7%

Data source: NYS Maternal Mortality Review NYS Vital Statistics
## Maternal Clinical Characteristics for Pregnancy-Related Deaths in New York State

<table>
<thead>
<tr>
<th>Pregnancy-Related Deaths</th>
<th>MMR 2006-2008 (N=125)</th>
<th>MMR 2012-2014 (N=89)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-pregnancy Overweight or Obese</td>
<td>45%</td>
<td>60%</td>
</tr>
<tr>
<td>Cesarean Delivery</td>
<td>63%</td>
<td>66%</td>
</tr>
<tr>
<td>Delivered at Level 3 or Regional Perinatal Center</td>
<td>76%</td>
<td>64%</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review

*2014 not complete
Trends in Risk Factors

- Advancing maternal age
- Increasing rates of obesity
  - e.g. 30% of maternal deaths in 2006-2008 were obese vs. 51% of deaths in 2012-2014 (NYS)
- Rising rates of chronic conditions
  - Hypertension, diabetes increasing
  - Percentage of maternal deaths with 2 or more risk factors increased (NYS)

## Top Six Causes of Pregnancy-Related Deaths
### New York State Maternal Mortality Review Cohort

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>2006-2008 N=125</th>
<th>2012-2014* N=89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>23%</td>
<td>16%</td>
</tr>
<tr>
<td>Hypertensive disorders</td>
<td>23%</td>
<td>7%</td>
</tr>
<tr>
<td>Embolism (not cerebral)</td>
<td>17%</td>
<td>25%</td>
</tr>
<tr>
<td>Cardiovascular conditions</td>
<td>10%</td>
<td>7%</td>
</tr>
<tr>
<td>Infection</td>
<td>3%</td>
<td>17%</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>2%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review
*2014 not complete
Causes of Pregnancy-Related Deaths
United States 2011-2013

## Timing of Pregnancy-Related Deaths
### New York State

<table>
<thead>
<tr>
<th>Timing</th>
<th>2006-2008 (N=125)</th>
<th>2012-2014* (N=89)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antepartum</td>
<td>12%</td>
<td>13%</td>
</tr>
<tr>
<td>During labor or delivery</td>
<td>9%</td>
<td>3%</td>
</tr>
<tr>
<td>Within a day of delivery</td>
<td>32%</td>
<td>30%</td>
</tr>
<tr>
<td>First week after delivery</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>1-6 weeks postpartum</td>
<td>20%</td>
<td>18%</td>
</tr>
<tr>
<td>43 days to 1 year</td>
<td>6%</td>
<td>15%</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review
*2014 not complete
Timing of Pregnancy-Related Deaths

CDC Data

Figure 1. Distribution of Pregnancy-Related Deaths by Timing of Death in Relation to Pregnancy

- **38%** While pregnant
- **45%** Within 42 days
- **18%** 43 days to 1 year

Nothing Protects Black Women From Dying in Pregnancy and Childbirth

Not education. Not income. Not even being an expert on racial disparities in health care.

by Nina Martin, ProPublica, and Renee Montagne, NPR, Dec. 7, 2017, 8 a.m. EST

LOST MOTHERS

How Hospitals Are Failing Black Mothers

A ProPublica analysis shows that women who deliver at hospitals that disproportionately serve black mothers are at a higher risk of harm.

by Annie Waldman, Dec. 27, 2017, 8 a.m. EST

Erica Garner
Andrew Burton/Getty Images

A GROWING EPIDEMIC: BLACK WOMEN FACE MAJOR DISPARITY IN MATERNAL MORTALITY

by Janell Hazelwood
March 2, 2018
Disparities in Maternal Mortality

- Minorities represent half of US births and racial/ethnic minorities suffer higher maternal mortality rates
- Black women 3 to 4 times more likely to die than white women – largest disparity among population perinatal health measures
- Native Americans, some Asians, some Latinas also have elevated rates

CDC Pregnancy Mortality Surveillance System at: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html
Definition of Disparities

• “Health equity and health disparities are intertwined. Health equity means social justice in health (i.e. no one is denied the possibility to be healthy for belonging to a group that has historically been economically/socially disadvantaged). Health disparities are the metric we use to measure progress toward achieving health equity.” (Dr. Paula Braveman)

Pregnancy-Related Mortality Ratios by Race/Ethnicity, New York State, 2012-2014*

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Mortality Rate per 100,000 live births 2012-2014*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black, non-Hispanic</td>
<td>39</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>8</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9</td>
</tr>
<tr>
<td>Other, non-Hispanic</td>
<td>8</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review; Mortality Rate is death per 100,000 live births in 2012-2014; *2014 not complete
Pregnancy-Related Mortality Ratios by Race-Ethnicity in US, 2011-2013

- Non-Hispanic Black: 44
- Non-Hispanic White: 14
- Hispanic: 13
- Other Race-Ethnicities: 11

Trends in Maternal Mortality by Race, NYS

Maternal Deaths per 100,000 Live Birth

National maternal mortality trends derived from CDC Wonder Database available at https://wonder.cdc.gov/
NYS trends derived from NYS Vital Statistics
CDC US Pregnancy-related Mortality by Race

Creanga. J of Women’s Hlth; 2014
### Top Six Causes of Pregnancy-Related Deaths by Race/Ethnicity, New York State 2012-2014*

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Total (N=89)</th>
<th>White, Non-Hispanic (N=27)</th>
<th>Black, Non-Hispanic (N=39)</th>
<th>Hispanic (N=15)</th>
<th>Other (N=8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embolism</td>
<td>22 (25%)</td>
<td>6</td>
<td>10</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>14 (16%)</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Infection</td>
<td>15 (17%)</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>10 (11%)</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hypertensive disorders</td>
<td>6 (7%)</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cardiovascular problems</td>
<td>6 (7%)</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review*2014 not complete
Leading Causes of Pregnancy-Related Deaths by Race, CDC Data

Figure 5. Leading Underlying Causes of Pregnancy-Related Deaths, by Race-Ethnicity

<table>
<thead>
<tr>
<th>Condition</th>
<th>non-Hispanic Black</th>
<th>non-Hispanic White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td>10.5</td>
<td>14.4</td>
</tr>
<tr>
<td>Cardiovascular and Coronary Conditions</td>
<td>12.8</td>
<td>15.5</td>
</tr>
<tr>
<td>Infection</td>
<td>8.1</td>
<td>13.4</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>10.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Embolism</td>
<td>5.2</td>
<td>9.3</td>
</tr>
<tr>
<td>Preeclampsia and Eclampsia</td>
<td>5.2</td>
<td>11.6</td>
</tr>
<tr>
<td>Mental Health Conditions</td>
<td>1.2</td>
<td>11.3</td>
</tr>
</tbody>
</table>

Top Six Causes of Pregnancy-Associated but Not Related Deaths by Race/Ethnicity, NYS, 2012-2014*

<table>
<thead>
<tr>
<th></th>
<th>Total (N=147)</th>
<th>White, non-Hispanic (N=70)</th>
<th>Black, non-Hispanic (N=40)</th>
<th>Hispanic (N=23)</th>
<th>Other (N=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury</td>
<td>77 (52%)</td>
<td>40</td>
<td>15</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Cancer</td>
<td>14 (10%)</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Infection</td>
<td>7 (5%)</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cardiac arrhythmia</td>
<td>8 (5%)</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>6 (4%)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>8 (5%)</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review; *2014 not complete
## Pregnancy-Associated Deaths Classified as Injury, by Race/Ethnicity, New York State 2012-2014*

<table>
<thead>
<tr>
<th>Injury</th>
<th>Total (N=77)</th>
<th>White, non-Hispanic (N=40)</th>
<th>Black, non-Hispanic (N=15)</th>
<th>Hispanic (N=11)</th>
<th>Other (N=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance Abuse</td>
<td>23 (30%)</td>
<td>19</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suicide</td>
<td>13 (17%)</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>MVA</td>
<td>17 (22%)</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Homicide</td>
<td>15 (15%)</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Undetermined injury</td>
<td>9 (12%)</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Data source: NYS Maternal Mortality Review; *2014 not complete
Maternal Death is Tip of the Iceberg

- For every maternal death, 100 women suffer severe maternal complications related to pregnancy and childbirth
- Significant racial/ethnic disparities exist
- Over one-half maternal deaths/severe events preventable
- Improving quality important lever to improve outcomes and reduce disparities

How Did We Get Here?
Figure 1: Pathways to Racial and Ethnic Disparities in Severe Maternal Morbidity & Mortality

Preconception Care

Postpartum Care

Delivery & Hospital Care

Antenatal Care

Outcomes
Severe Maternal Morbidity & Mortality

Health status: comorbidities (e.g. HTN, DM, obesity, depression); Pregnancy complications

Race/Ethnicity

System Factors
- Access to high quality care, transportation, structural racism, policy

Provider Factors
- Knowledge, experience, implicit bias, cultural competence, communication

Community/Neighborhood
- Community, social network
- Neighborhood: crime, poverty, built environment, housing

Patient Factors
- Socio-demographics: age, education, poverty, insurance, marital status, employment, language, literacy
- Knowledge, beliefs, health behaviors
- Psychosocial: stress, self-efficacy, social support

Socio-demographics: age, education, poverty, insurance, marital status, employment, language, literacy

Every health system

- Establish systems to accurately document self-identified race, ethnicity, and primary language.
- Provide system-wide staff education and training on how to ask demographic intake questions.
- Ensure that patients understand why race, ethnicity, and language data are being collected.
- Ensure that race, ethnicity, and language data are accessible in the electronic medical record.
- Evaluate non-English language proficiency (e.g., Spanish proficiency) for providers who communicate with patients in languages other than English.
- Educate all staff (e.g., inpatient, outpatient, community-based) on interpreter services available within the healthcare system.

- Provide staff-wide education on:
  - Peripartum racial and ethnic disparities and their root causes.
  - Best practices for shared decision making.
- Engage diverse patient, family, and community advocates who can represent important community partnerships on quality and safety leadership teams.

THANK YOU

Follow us on Twitter: @MountSinaiWHRI