Strategies to Reduce Maternal Morbidity and Mortality and Associated Disparities

Sindhu K. Srinivas, MD, MSCE
Associate Professor
Director of Obstetrical Services at the Hospital of the University of Pennsylvania
Vice-chair for Quality and Safety for the Department of Obstetrics & Gynecology
Vice Chair, Health Policy Committee and Member of the Board of Directors for the Society for Maternal Fetal Medicine

Disclosures

No related conflicts of interest

Objectives

- Describe the clinical and societal burden of maternal morbidity/mortality and associated racial/ethnic disparities
- Apply evidence-based and expert opinion based strategies for the reduction of maternal morbidity and mortality
- Stimulate discussion and develop recommendations for concrete ways that we can eliminate maternal morbidity and mortality and associated disparities
This is Everyone’s Problem

Definitions

- **Disparity**: A great difference
- **Equity**: The quality of being fair and impartial

How Bad is the Problem?

- Maternal mortality ratios have risen or plateaued
- Even more prominent are morbidity events
- Black and Hispanic women are disproportionately affected
Maternal Morbidity and Mortality: Preeclampsia

**About 8 Preeclampsia Related Mortalities/2007 in CA**

- Near Misses: 380/year (ICU admissions)
- Serious Morbidity: 3400/year (prolonged postpartum length of stay)

Morbidity events are largely preventable

- Delay in Recognition
- Delay in Response
- Lack of Readiness

Severe maternal morbidity and disparities

- For every maternal death, approximately 50-100 women experience severe obstetric morbidity
- Rates are rising: nearly doubled over last decade
- Racial/ethnic disparities exist
  - 2-3 fold higher risk among black women

Source: 2017 California Rapid Cycle Maternal-Infant Database for CA births; CMQCC

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Obstetric disparities in care

<table>
<thead>
<tr>
<th>Associations Between Race/Ethnicity and Types of Obstetric Care</th>
<th>Non-Hispanic white</th>
<th>Non-Hispanic black</th>
<th>Hispanic</th>
<th>Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor induction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>16300 (52.1)</td>
<td>8867 (28.3)</td>
<td>8123 (25.3)</td>
<td>1360 (29.7)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.00 (ref)</td>
<td>0.88 (0.84-0.92)</td>
<td>0.87 (0.84-0.90)</td>
<td>0.74 (0.69-0.80)</td>
</tr>
<tr>
<td>30 min between complete dilation and initiation of pushing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>9111 (11.4)</td>
<td>685 (8.5)</td>
<td>854 (8.5)</td>
<td>576 (14.7)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.00 (ref)</td>
<td>0.86 (0.76-0.96)</td>
<td>0.82 (0.75-0.92)</td>
<td>1.13 (1.05-1.21)</td>
</tr>
<tr>
<td>Vaginal delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>33632 (48.6)</td>
<td>16475 (22.9)</td>
<td>10234 (14.4)</td>
<td>3962 (6.6)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.00 (ref)</td>
<td>0.89 (0.83-0.95)</td>
<td>1.06 (1.01-1.12)</td>
<td>0.96 (0.80-1.20)</td>
</tr>
</tbody>
</table>

| Eclampsia                                                   |                     |                    |          |       |
| N (%)                                                      | 4988 (15.4)         | 787 (9.1)          | 595 (6.6) | 106 (23.9) |
| Adjusted OR (95% CI)                                        | 1.00 (ref)          | 0.82 (0.76-0.89)   | 0.83 (0.78-0.90) | 1.98 (1.26-1.94) |


Disparities in maternal morbidity

<table>
<thead>
<tr>
<th>Associations Between Race/Ethnicity and Adverse Maternal Outcomes</th>
<th>Non-Hispanic white</th>
<th>Non-Hispanic black</th>
<th>Hispanic</th>
<th>Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postpartum hemorrhage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>805 (1.6)</td>
<td>702 (3.0)</td>
<td>827 (3.1)</td>
<td>130 (2.2)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.00 (ref)</td>
<td>1.12 (1.07-1.18)</td>
<td>1.16 (1.07-1.25)</td>
<td>1.34 (1.24-1.45)</td>
</tr>
<tr>
<td>Peripartum infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>2119 (4.1)</td>
<td>1169 (4.9)</td>
<td>1744 (6.4)</td>
<td>374 (8.2)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.00 (ref)</td>
<td>1.29 (1.14-1.46)</td>
<td>1.45 (1.32-1.60)</td>
<td>1.82 (1.43-2.31)</td>
</tr>
<tr>
<td>Severe perineal laceration at SVD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (%)</td>
<td>785 (2.5)</td>
<td>174 (1.2)</td>
<td>256 (1.5)</td>
<td>189 (5.6)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.00 (ref)</td>
<td>0.76 (0.62-0.90)</td>
<td>0.86 (0.70-1.09)</td>
<td>2.06 (1.72-2.47)</td>
</tr>
</tbody>
</table>


Disparities in rates of Preeclampsia

Figure 1: 2-Year Rolling Averages of Pre-eclampsia Rates by Race

K Breathett · 2013 Circulation
Racial Disparities in Comorbidities, Complications, and Maternal and Fetal Outcomes in Women With Preeclampsia/eclampsia

- In-hospital mortality for AA women higher than that for white women (OR 2.85, 95% CI: 1.38-5.53) with preeclampsia
- When compared to white women with preeclampsia, AA women had an increased odds of IUFD (adjusted OR 2.45, 95% CI: 2.14-2.82)

Contributors to health and health care disparities

- Health system factors
  - Health services organization, financing, delivery
  - Health care organizational culture, QI
- Patient-level factors
  - Beliefs and preferences
  - Race/ethnicity, culture, family
  - Education and resources
  - Biology
- Clinical encounter
  - Provider communication
  - Cultural competence
- Provider factors
  - Knowledge and attitudes
  - Competing demands
  - Implicit/explicit biases
- Structural factors
  - Poverty/wealth
  - Unemployment
  - Stability of housing
  - Food security
  - Racism

Adapted from Kilbourne et al, AJPH 2006

What steps can we take to decrease morbidity and mortality and associated disparities?
Mortality Review Committees

- State based
- Health System based

Deaths From Unintentional Injury, Homicide, and Suicide During or Within 1 Year of Pregnancy in Philadelphia

- Approximately half (49%; 42 of 85) of pregnancy-associated deaths were from unintentional injuries (n = 31), homicide (n = 8), or suicide (n = 3)
- Drug overdose was the leading cause
- Substance use was noted during or around events leading to death in 46% of non overdose deaths
- A history of serious mental illness was noted in 39% (32 of 82) of non suicide deaths.
- History of intimate partner violence (IPV) was documented in 19% (15 of 77) of non homicide deaths.
- Regardless of cause of death, approximately half of all decedents had an unscheduled hospital visit documented within a month of death.

Innovative care delivery models

- Safe Start - Community Health Worker model for at risk pregnant mothers (Funded through Merck for Mothers)
  - Medical or mental health comorbidity
  - Utilization criteria
- Partnership between a Medicaid provider, behavioral health organization, community organization and health system
- Patients partnered with an advocate during pregnancy through three months postpartum
- 185 women enrolled; 154 Controls
Safe Start Data

- If you are enrolled in Safe Start, you are **68% less likely to** receive inadequate prenatal care

- Birth control use (82% vs 71%)*

N = 434  [208 Safe Start enrollees, 226 Controls]

Safe Start

- Higher Postpartum visit show rate: 60% vs. 45%*

- Breastfeeding initiation rates: 83%

- NAS babies: 1% versus 10%

Prenatal/Antenatal

**BE AWARE**

- For any given duration of hypertension, blacks are more likely to have end organ damage

  - Consider prenatal evaluation for sequelae of long standing disease

  - Consider screening to identify additional risks
Example: ECHO algorithm-Hospital of the University of Pennsylvania

If any of the following criteria obtain maternal ECHO

- If EKG abnormal with LVH
- Evidence of end organ disease from CHTN or diabetes
- Longstanding disease (more than 10 years)
- Difficult to control-multiple medications
- Two or more comorbidities

Example: Screening for Obstructive Sleep Apnea

- Screen all women with a BMI ≥ 35 at the 1st or 2nd prenatal visit with STOP questionnaire
- Questions:
  - Snoring
  - Tired
  - Observed
  - High Blood pressure
- Women are considered screen positive if they answer “yes” to at least 2 of the 4 questions
- If positive, referral to sleep medicine

Prenatal/Antepartum

- Attentiveness to overall care (not just during pregnancy)
  - Establishing primary care provider and/or specialist
  - Encouraging close follow-up after delivery
  - Mental health
  - Social determinants
- Education of individual patients regarding their morbidity long term based on pregnancy related conditions
  - Culturally and linguistically appropriate (appropriate reading level) health care and educational materials
  - Awareness of bias
**Prenatal/Antepartum Summary**

- Attentiveness to populations at risk
- High clinical suspicion
- Think about social determinants and their impact
- Innovative partnerships and programs that bring resources together

**Intrapartum**

- Council on Patient Safety bundles
  - Severe HTN
  - VTE
  - Obstetric Hemorrhage
  - Mental Health-Depression and Anxiety

- Maternal levels of care
  - Patients should be cared for at the right place at the right time

**Postpartum in the Hospital -Breastfeeding**

- African-American women have the lowest prevalence of breastfeeding

- An estimated 54.4 percent of African-American women breastfed after giving birth compared to 74.3 percent of white women and 80.4 percent of Hispanic/Latino women.
Not Breastfeeding

- Associated with more
  - Weight retention
  - Diabetes
  - Hypertension
  - Metabolic syndrome
  - Cardiovascular disease


Postpartum-In the Hospital

- Standardize in hospital management of HTN-consider developing an evidence based guideline
- Transition of care
- Timing of follow-up
- Education regarding the impact of pregnancy related complications on long term health
- PCP follow-up

Hypertension Recommendations

- Follow up within 7 days
- Aggressive coordination of care in the postpartum period with an emphasis on blood pressure control
- Antihypertensive choice: thiazide diuretics and calcium channel blockers
  - preferred antihypertensive agents
  - Greater BP control and cardiovascular event reduction in the general population
Answering the Challenge

Way to Health

TextBP: TEXT INTERFACES

PATIENT VIEW

PROVIDER VIEW
### TextBP: RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Office</th>
<th>Text</th>
<th>p-value</th>
<th>aOR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP obtained within 10 days n(%)</td>
<td>45 (43.7%)</td>
<td>95 (92.2%)</td>
<td>&lt;0.001</td>
<td>58.2 (16.2-208.1)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Of the 8 women who did not send in a text message:
- 1 left the hospital without her cuff
- 2 gave the wrong phone number
- 2 withdrew

### TextBP: RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Office</th>
<th>Text</th>
<th>p-value</th>
<th>aOR (95% CI)*</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication started within 2 weeks postpartum</td>
<td>30/104 (28.8%)</td>
<td>17/103 (16.5%)</td>
<td>0.41</td>
<td>1.0 (0.3-3.1)</td>
<td>0.95</td>
</tr>
<tr>
<td>% of women with SPE who attended Cardiology visit by 6 weeks</td>
<td>15/35 (42.9%)</td>
<td>19/40 (47.5%)</td>
<td>0.69</td>
<td>0.7 (0.1-4.8)</td>
<td>0.74</td>
</tr>
<tr>
<td>Additional ED or office visit for BP issues</td>
<td>2 (1.9%)</td>
<td>3 (2.9%)</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readmission</td>
<td>4 (3.9%)</td>
<td>0</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended PP visit</td>
<td>60 (58.2%)</td>
<td>71 (68.9%)</td>
<td>0.11</td>
<td>2.3 (1.85-5.07)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Adjusted for age, race, insurance, BMI, parity, disease severity, timing of diagnosis, mode of delivery, CHTN/DM, lasix course given

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### TextBP: RESULTS

- **Women who met the ACOG guidelines for hypertension management:**
  - Control: 0%
  - Heart Safe Motherhood: 82%

- **Women readmitted for hypertension within 7 days of discharge:**
  - Control: 4%
  - Heart Safe Motherhood: 0%
At scale at the Hospital of the University of Pennsylvania

1068 patients

- 965 (90%) texted at least one BP
- 811 (76%) texted in accordance with ACOG BP time points
- 90 (8%) were started on medications or had medication dose adjusted
- 9 (0.8%) readmissions for PP HTN

Next Steps

- Partnership with Health Systems
- Partnership with Payers

Contributors to health and health care disparities

Adapted from Kilbourne et al, AJPH 2006
Summary of Recommendations for the OB/GYN Specialist

- Utilize pregnancy as a window into screening for end organ disease (examples: ECHO algorithm, sleep apnea screening)
- Be aware of disparities in disease prevalence, disease severity, and pregnancy complications by race and actively incorporate that knowledge into your practice

Postpartum treatment of disease should follow evidence based guidelines where they exist
- Incorporate link to PCP and/or specialist as part of routine transition post pregnancy to help improve long term care
- Take care of whole person – role of mental health
- Use the postpartum visit to address health improvement for the subsequent pregnancy and across the lifespan

Healthcare system /Hospital Recommendations

- Develop standardized patient education materials
- Innovate in the area of access - Cab vouchers availability, language services
- Think out of the box: utilization of patient centered follow-up
  - Remote visits, home visits, community health workers
  - Technology can level the field
**Healthcare System/Hospital Recommendations**

- Incorporate recommended care bundles

**Disparities Bundle Themes**

- Care fragmentation
  - Importance throughout reproductive life
- Communication
  - Patient education (culturally competent) – Shared decision-making
- Systemic racism – Implicit bias
- Lack of measurement and benchmarking – Disparity dashboard
  - Inter-hospital differences

**Healthcare System/Hospital Recommendations**

- Develop clinical guidelines regarding treatment and follow-up for HTN postpartum, reduce variation
- Partner with lower resource hospitals to help improve healthcare quality
- Implementation of maternal levels of care to align resources and patient needs
- Establish maternal morbidity and mortality review committees – both in hospitals and across systems and across states
Thank you

References


