Reducing Maternal Morbidity and Mortality: Lessons from CMQCC and The Joint Commission

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Objectives:
- List the current leading causes of maternal mortality in the US and in California.
- Identify key strategies to reduce maternal mortality and morbidity
- List the NQF Maternity Measures
- Understand the key issues and resources for the 4 Joint Commission OB measures

Presenter Disclosure(s):
- None

California Maternal Quality Care Collaborative
CMQCC:
- Data-driven Quality Improvement
- Develop and Refine Quality Measures
- Develop a State-wide Effort for Collaborative Quality Improvement
- Examine Approaches to Reduce Disparities in Outcomes
CMQCC: Stakeholders

- California DPH-MCAH
- CPQCC (Perinatal Quality Collaborative)
- OSHPD (State Agency for Outcome Data)
- Center for Health Statistics (Birth Certificates)
- California Dept of Health Services (MediCal)
- ACOG, District IX (California)
- AWHONN (maternity and neonatal nurses)
- American College of Nurse Midwives (ACNM)
- March of Dimes (MOD)
- Regional Perinatal Programs of California (RPPC)
- Other Public, Payer, Hospital Groups
- Clinician Leaders

Twin Drivers for Improving OB Care:

- Mortality/Morbidity Reviews
  - Dramatic case studies can catch the practitioner's attention
  - Can highlight important issues that have general relevance for safety

- National Quality Measures
  - Key for many other specialties
  - Late to come for OB
  - Drive “everyday practice”
  - Doc's want to wish them away
Transforming Maternity Care

Maternal Mortality Ratios in Selected Countries over the Past 30 Years

- Literature review and over 100 in-depth interviews and focus groups
- Focus on disparity (esp African American women) and on variation among the states
- Scathing indictment of US healthcare system for maternity care

Maternal Mortality Rate, California Residents; 1970-2006

- Maternal Deaths per 100,000 Live Births
- ICD-10
- ICD-9
- ICD-8

Not-Pregnancy-Related Deaths
Death of a woman within one year postpartum unrelated to pregnancy or its management.

Pregnancy-Related Deaths
Death of a woman within one year postpartum related to pregnancy or aggravated by the pregnancy or its management.

Pregnancy-Related Mortality in the United States

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Deaths</th>
<th>Maternal Mortality Rate (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Races</td>
<td>White</td>
</tr>
<tr>
<td>1998</td>
<td>474</td>
<td>12.0</td>
</tr>
<tr>
<td>1999</td>
<td>524</td>
<td>13.2</td>
</tr>
<tr>
<td>2000</td>
<td>589</td>
<td>14.5</td>
</tr>
<tr>
<td>2001</td>
<td>592</td>
<td>14.7</td>
</tr>
<tr>
<td>2002</td>
<td>566</td>
<td>14.3</td>
</tr>
<tr>
<td>2003</td>
<td>609</td>
<td>16.8</td>
</tr>
<tr>
<td>2004</td>
<td>623</td>
<td>15.2</td>
</tr>
<tr>
<td>2005</td>
<td>636</td>
<td>15.4</td>
</tr>
</tbody>
</table>


UK Maternal Mortality Ratios for international comparison

<table>
<thead>
<tr>
<th>Years</th>
<th>No.</th>
<th>Rate</th>
<th>Maternities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994-96</td>
<td>158</td>
<td>7.2</td>
<td>2,197,640</td>
</tr>
<tr>
<td>1997-99</td>
<td>128</td>
<td>6.0</td>
<td>2,123,614</td>
</tr>
<tr>
<td>2000-02</td>
<td>136</td>
<td>6.8</td>
<td>1,997,472</td>
</tr>
<tr>
<td>2003-05</td>
<td>149</td>
<td>7.0</td>
<td>2,114,004</td>
</tr>
</tbody>
</table>

THE CALIFORNIA PREGNANCY-ASSOCIATED MORTALITY REVIEW
Report from 2002-2003 Maternal Death Reviews

This project was supported by federal Title V block grant funds received from the California Department of Public Health;
Center for Family Health;
Maternal, Child and Adolescent Health Division

Maternal Mortality Rates by Race/Ethnicity,
California Residents; 1999-2006

Causes of Maternal Mortality:
Medical Diagnoses
Pregnancy-Related Mortality in the United States

80% of deaths fall into these 6 categories

Clinical Causes of Death
Pregnancy-related Deaths

<table>
<thead>
<tr>
<th>Clinical Cause</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Disease</td>
<td>20</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>13</td>
</tr>
<tr>
<td>Other CV Disease</td>
<td>7</td>
</tr>
<tr>
<td>Preeclampsia/Eclampsia</td>
<td>16</td>
</tr>
<tr>
<td>Aortococcal Fluid Embolism</td>
<td>14</td>
</tr>
<tr>
<td>Obstetric Hemorrhage</td>
<td>10</td>
</tr>
<tr>
<td>Sepsis</td>
<td>8</td>
</tr>
<tr>
<td>DVT/PE</td>
<td>8</td>
</tr>
<tr>
<td>Intracranial hemorrhage</td>
<td>6</td>
</tr>
<tr>
<td>Anesthesia complications</td>
<td>3</td>
</tr>
<tr>
<td>Acute Fatty Liver</td>
<td>2</td>
</tr>
<tr>
<td>Suicide (pregnancy-related)</td>
<td>2</td>
</tr>
<tr>
<td>Cancer (dtx delayed by pregnancy)</td>
<td>2</td>
</tr>
<tr>
<td>Drug abuse complications</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>98</td>
</tr>
</tbody>
</table>

What can we prevent?
(And how do we judge that?)
CDC Determination of Preventable Maternal Mortalities by Cause

Table 2: Distribution of Causes of Pregnancy-Related Deaths and Percent of Preventable Deaths by Cause, North Carolina, 1995–1999

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>% of All Pregnancy-Related Deaths</th>
<th>% Preventable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiomyopathy</td>
<td>9</td>
<td>50</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Maternal infection</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Maternal sepsis</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Maternal edema</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Pulmonary emboli</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Pulmonary emboli</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Cardiomyopathy/other cardiovascular</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Amniotic fluid embolus</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>30</td>
</tr>
</tbody>
</table>


CA-PAMR Pregnancy-Related Deaths, Chance to Alter Outcome by Grouped Cause of Death; 2002-2003 (N=98)

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Strong/Good (N)</th>
<th>Strong/Good (%)</th>
<th>Some (N)</th>
<th>Some (%)</th>
<th>None (N)</th>
<th>None (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric hemorrhage</td>
<td>7</td>
<td>70</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Sepsis/infection</td>
<td>5</td>
<td>63</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Preeclampsia/eclamps</td>
<td>9</td>
<td>60</td>
<td>6</td>
<td>0</td>
<td>15</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Deep vein thrombosis/ pulmonary emboli</td>
<td>3</td>
<td>37</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Cardiomyopathy and other cardiovascular</td>
<td>6</td>
<td>29</td>
<td>12</td>
<td>2</td>
<td>14</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Amniotic fluid Embolism</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>2</td>
<td>14</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>All other causes of death</td>
<td>7</td>
<td>32</td>
<td>8</td>
<td>7</td>
<td>22</td>
<td></td>
<td>44</td>
</tr>
</tbody>
</table>


Key Findings

1. By all measurement approaches, Maternal Mortality in California has increased
2. Cardiovascular disease has emerged as the #1 category for pregnancy related deaths
3. Deaths from hemorrhage, preeclampsia, infection, and thromboembolism were judged to have good to strong chances to alter outcome
4. Obesity, advanced maternal age, cesarean section and African-American race were recognized contributing factors
5. >95% of cases had “opportunities for improvement” for the facilities and the professionals involved
CA-PAMR Opportunities for Quality Improvement Themes

- Timely diagnosis and standardized, evidence-based management of specific clinical conditions
- Recognition and response to clinical triggers (i.e., warning signs) in clinical status
- Coordination of care issues
- Optimal resuscitation of pregnant women, and earlier consideration of cesarean birth during resuscitation
- Access to care, including timely referrals to, and the availability of medical consultants or subspecialist care
- Maximizing the health of women before and during pregnancy and postpartum

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mort.</th>
<th>ICU</th>
<th>Serious Morbid</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE and AFE</td>
<td>10%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Infection</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>15%</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td>Preeclampsia / CVA</td>
<td>20%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Cardiac Disease</td>
<td>20%</td>
<td>15%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Transforming Maternity Care

Joint Commission Sentinel Alert: Improvement Opportunities

- Better control of BP in hypertensive women
- Better diagnosis and treatment pulmonary edema in women with preeclampsia
- Better recognition and treatment of hemorrhage especially following Cesarean birth
- Closer attention to vital signs, use of “triggers”
- Greater use of pneumatic compression devices and low molecular weight heparin in high risk patients undergoing a Cesarean birth
- Education of ED staff to complications of pregnancy and the postpartum period

The Joint Commission Sentinel Alert #44, January 26, 2010

CMQCC Hemorrhage Toolkit

- Guidelines, protocols, checklists, sample policies, support materials
- Series of “Best Practice” discussions on all OB hemorrhage topics, from Accreta to Jehovah’s Witness to Uterotonic agents
- www.CMQCC.org

CMQCC California Hemorrhage Guidelines

These are open access tools being utilized across CA and the world.
**CMQCC Hemorrhage Toolkit: Keys**

- Hemorrhage risk assessment on admission and late labor
- Careful assessment of total blood loss at delivery
- Every unit needs a hemorrhage equipment cart, and a med kit for emergency use
- Collaborative relationship with the Blood Bank for rapid release of blood and development of a massive transfusion protocol
- Drills and debriefs—prototype for OB emergencies and team development

**CMQCC California OB Hemorrhage Project**

- Hemorrhage Taskforce (2008-2009)
  - QI Toolkit/Best Practices/Web Resources
- CHW QI Project (2009)
- 1st CMQCC Statewide Collaborative (2009-2010)
  - 30 hospitals (110,000 annual births)
  - Large/small, urban/rural
- New CMQCC Collaboratives (2011)
  - Statewide: 20+ hospitals (still open)
  - LA County: 11 hospitals
  - Systems: Kaiser North and South; Sutter

**Cook “Bakri” Intrauterine Balloon**

- There are now several balloons, but the most available in the US is the Cook “Bakri” Balloon
  - Specifically designed for this purpose
  - Double lumen (for drainage from above)
  - Silicone (non-latex)
  - Uterine contour shape
  - Good filling capacity (saline)
  - Inexpensive
  - Easy to use
Lessons from Combat in Iraq

- Lowest losses ever from hemorrhage
- Key: increased FFP:RBC ratio

Iraq Theatre Experience

- Retrospective review of all soldiers with massive transfusion (>10u RBC in 24 hr) Nov 2003-Sept 2005, N=246
- Composition closer to whole blood more effective than 1980's ratios:
  - Not a RCT!
  - Biased against greatest EBL
  - But results are striking...

"Whole blood" is good for OB hemorrhage

- After 2u PRBCs, start FFP
- Massive transfusion protocol: 1:1 ratio FFP/RBC
  - 6 RBC + 4 FFP + 1Plt pack (Stanford+)
  - 4 RBC + 4 FFP, plts and cryo on request (CPMC)—think ahead!
  - Keep up!

Two Stages: Resuscitation and Treatment

- Resuscitation, transfuse per clinical signs
- DIC treatment, transfuse per lab parameters

Supportive measures are critical

- Warm patient (Bair Hugger®, fluid warmer)
- Correct metabolic acidosis
Baseline mean: 158 units/1000 births
Follow-up mean: 50 units/1000 births

Baseline: 1.2 women w/ massive transfusion per month (0.27%)
Follow-up: 0.4 women w/ massive transfusion per month (0.09%)

Preeclampsia
- Leading cause of death is stroke
- Treat both Systolic and Diastolic Hypertension
- Protocols for use of BP drugs on L&D
- Educational program for Emergency Departments for 3rd trimester and postpartum OB emergencies, especially hypertensive complications
- ACOG is revising guidelines
- CMQCC has convened a taskforce to develop “tools” for a toolkit
DVT/PE Prevention

- ACOG (September 2011) now recommends placement of pneumatic compression devices before all cesarean deliveries.
- Women with additional risk factors (e.g., obesity, BMI > 30) should also receive heparin/Lovenox beginning 12 hours post procedure.
- Many California hospitals already have protocols for universal SCD’s at Cesarean delivery.

National Quality Measures

- Episiotomy rate
- Cesarean rate for low-risk first births
- Elective delivery prior to 39 weeks
- Prophylactic antibiotics for Cesarean birth
- DVT prophylaxis for women having a Cesarean birth

NQF OB Quality Measures
(National, November 2008)

- Exclusive breastfeeding at hospital discharge
- Birth trauma rate (limited ICD9 codes)
- Rate of antenatal steroids for under 34 week births
- Infants under 1500g not delivered at Level III center

Leapfrog Group Measures
- Released May 2009

California MediCal Quality Measure Set (proposed)
- Released Oct. 2009
Specifications Manual for Joint Commission National Quality Core Measures (2012A)

- 5 Perinatal Care Core Measures (specs revised 09-11)
  - PC-01: Elective Delivery
  - PC-02: Cesarean Section
  - PC-03: Antenatal Steroids
  - PC-04: Health Care-Associated Bloodstream Infections in Newborns
  - PC-05: Exclusive Breast Milk Feeding
- Discharges 01-01-12 thru 6-30-12

Elective Delivery <39 wk (PC-01)
The Joint Commission

- Uncomplicated pregnancies before 39 weeks who had an elective delivery (either CS or induction)
- Numerator: Inductions + CS without labor/ROM
- Denominator: Women delivering at 37 and 38 weeks gestation
- Exclusions: A list of medical and obstetric complications
- Risk Adjustment: none

Key Resource for Implementation

- www.CMQCC.org/
- www.marchofdimes.com/

Formally supported by: ACOG (California and several other Districts), AHWONN, ACNM
Adverse Neonatal Outcomes According to Completed Week of Gestation at Delivery: Odds Ratios

Tita AT, et al, NEJM 2009;360:111

Clinician and/or Patient Desire to Schedule a Non-medically Indicated (Elective) Induction or Cesarean Section

- Clinician, Staff & Patient Education
- Elective Delivery Hospital Policy
- Physician Leadership
  A. Enforce policy
  B. Approve exceptions

Reduce Demand
Induction / Cesarean Scheduling Process
Case NOT Scheduled if Criteria Not Met

Public Awareness Campaign
QI Data Collection & Trend Charts

Elective Delivery, GA 37-38 Weeks, 11 Jun—11 Aug
Hospitals

18 hospital system in Northern California, working on ED<39 since Jan 2011
Shakespeare BREAK

*Macbeth*, Act 5, Scene 8

Setting: towards the end of the play, Macduff is confronting Macbeth, each with swords drawn. Macbeth recalls the prophesies of the three witches in Act 1 who forecast that he is “invulnerable”.

**MACBETH**

“Let fall thy blade on vulnerable crests; I bear a charmed life, which must not yield

To one of woman born”.

Shakespeare (cont)

- **MACDUFF**
  “Despair thy charm, And let the angel whom thou still hast served, Tell thee, Macduff was from his mother’s womb, *Untimely ripp’d*

- “Untimely ripped from his mother’s womb” is certainly an image that stays with you.
- But for today’s purpose...Even Shakespeare knew that you shouldn’t do a Cesarean delivery before 39 weeks!

Cesarean Section (PC-02)
The Joint Commission

- Nulliparous women with a term, singleton baby in a vertex position delivered by cesarean section
  - Numerator: Patients with cesarean sections
  - Denominator: Nulliparous patients delivered of a live term singleton newborn in vertex presentation
  - Exclusions: none
  - Risk Adjustment: maternal age

Transforming Maternity Care
Cesarean Births Have Risen by Over 50% in the Last 10 years

Risks of Being a Prior Cesarean...
- 90% of all future births would be by CS
- Decisions around VBAC-TOL vs. Rpt CB
- Risk of Uterine Rupture
- Risk of Hemorrhage/Transfusions
- Epidemic of Placenta Previas
- Epidemic of Placenta Accretas
- Increase of Peripartum Hysterectomies

Top and Bottom two Quintiles (40%) of Age-adjusted Low-Risk Primary CS Rates: Northern CA
Top and Bottom two Quintiles (40%) of Age-Adjusted Low Risk Primary CS Rates: Southern CA

- **HIGH:** Hospitals with rates >17%
  - n=34/80 (43%)
- **LOW:** Hospitals with rates ≤ 16%
  - n=40/80 (50%)

Top and Bottom two Quintiles (40%) of Age-Adjusted Low-Risk Primary CS Rates: LA County

- **HIGH:** Hospitals with rates >17%
  - n=44/60 (73%)
- **LOW:** Hospitals with rates ≤ 16%
  - n=12/60 (20%)

Local Medical Culture at Work?

Resources Under Development

- Focus on Labor Management: prevent the development of an indication for a CS by changing labor practices
- CMQCC, OHSU, Milbank Fund
- Payer coordination: blended hospital payment for delivery—one payment for birth, no matter if vaginal or cesarean
- Bundled payment for birth: doctors and hospitals
### Antenatal Steroids (PC-03)
The Joint Commission

- Patients at risk of preterm delivery at 24-32 weeks gestation receiving antenatal steroids prior to delivering preterm newborns
  - Numerator: Patients with a full course of antenatal steroids completed prior to delivering preterm newborns
  - Denominator: Patients delivering preterm newborns with 24-32 weeks gestation completed
  - Exclusions: Patients with documented reason for not administering antenatal steroids

### Exclusive breast milk feeding (PC-05)
The Joint Commission

- Exclusive breast milk feeding during the newborn’s entire hospitalization
  - Numerator: Newborns that were fed breast milk only since birth
  - Denominator: Newborns discharged from the hospital
  - Exclusions:
    - Discharged from the hospital while in NICU
    - Documented maternal medical conditions for which breast milk feeding should be avoided (a short list of TJC defined infections and medications)
    - Note: does not exclude baby indications for supplementation such as hypoglycemia

### Key Resource for Implementation

**CPQCC Antenatal Corticosteroid Therapy (ANS) Toolkit**
Responsiveness to Executive Functioning

Principles of Data-Driven QI (1)

- Convert your Perinatal Committee from “Peer-review” to “Data-driven QI”
- Perinatal Committee should lead these projects with support and guidance from hospital QI
- Limit the number of projects, as limited bandwidth for everyone!
- Numerators and denominators are both important

Principles of Data-Driven QI (2)

- Examine the Numerators! Why did this case become a numerator?
  1. Documentation gap? (make it easy to collect!)
  2. Coding gap? (expand the team!)

  *Focus and settle these issues first…*

  3. Practice gap?
  Or Justified based on clinical situation
Self-Defense Manual
for Medical Professionals


Table of Contents:
“The best defense is a good offense.”

- Chapter One: Attack the Data
- Chapter Two: Attack the Messenger
- Chapter Three: Attack the Premise

When all else fails, there is always….
- Chapter Four: “My Patients are ALL High Risk”

Appendix: Counter Strategies

- Data: Clean carefully before presentation-
  - Be very certain about case attribution
  - Example: every obstetrician who covers midwives or FP’s will have higher CS rates
- Premise: Good to have backing of national organization(s)
- Risk Adjustment: simple strategies best-
  - Risk stratification v. logistic regression
  - Process measures do not need risk adjustment!
Thank You!

Questions?

Register at CMQCC.org and keep up-to-date with new resources:
www.cmqcc.org