Panel 5
Data Systems and Measurement: Formal Discussion

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Disclosures

Financial:
None

Clinical:

1) I supervise quality for 20 birthing facilities for Sutter Health including two for which the majority of births are by midwives

2) I provide outpatient consultations for several hundred Northern California maternity providers including midwives at free-standing birthing facilities.
Topics for Discussion

- Limitations of Vital Records
- Denominator and Numerator size issues
- Power limitations
- Comparison issues
- What is high risk? How to compare risks?
- California Maternal Data Center for Ongoing Assessment of Hospital Care
2003 US Standard Certificate of Live Birth

<table>
<thead>
<tr>
<th>PLACE WHERE BIRTH OCCURRED (Check one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Hospital</td>
</tr>
<tr>
<td>□ Freestanding birthing center</td>
</tr>
<tr>
<td>□ Home Birth: Planned to deliver at home? 9 Yes 9 No</td>
</tr>
<tr>
<td>□ Clinic/Doctor’s office</td>
</tr>
<tr>
<td>□ Other (Specify)</td>
</tr>
</tbody>
</table>

Does not capture planned home birth transferred to hospital.

*Intended place of birth is not asked for Hospital or Birthing Center births.*

*This is a critical issue as the “transferred” group has a high rate of serious morbidity (less morbidity for home births and more for in hospital births)*
2003 US Standard Certificate of Live Birth

Non-specific, does not necessarily capture transfer from home.

Not only does it “not necessarily” capture transfer from home the US Standard BC ON-screen Instructions indicate that it is meant to capture intra-facility transfers ONLY:

Was the mother transferred to this facility for maternal medical or fetal indications prior to delivery? Transfers include hospital to hospital, birthing facility to hospital Etc.

- Yes
- No
- Unknown

If the yes box is checked, the following appears:

Please enter the name of the facility the mother transferred from. If the name of the facility is not known, enter “unknown.”

Facility name: ________________________________
A Revised BC Still Has Potentials for Errors

• The “perfect” or “tweaked” BC form may look good “on paper” but...
• It still has to be completed correctly!

• Little attention to BC data quality (we are starting a large project in CA)
• “Minor” fields that are rarely used are least likely to be completed accurately
• New/added fields take a while to become accurately completed
Denominator Issues

• Perinatal mortality in these populations is typically 1-2 per thousand

• Power calculation: To identify a difference between 1 per thousand and 2 per thousand, the sample size recommended is 23,500 per arm

• The total number of home births in the US is 27,000 per year...

• Where can these numbers come from?
Numerator Issues

- Perinatal mortality in these populations is typically 1-2 per thousand
- IF sample size is 10,000, we may be looking at only 10-20 cases...
- Mis-attribution or non-reporting of even a few cases can lead to significant changes in the rates
- Would require an on-going, extensive focus on these data elements ($, time) without guarantee of accuracy
Birth Certificate Data

• Some BC data fields have high accuracy: birth date/time; birth weight, parity, plurality, maternal demographics, race/ethnicity, method of delivery

• Others are acceptable: gestational age (OB Estimate)

• Others are known to be poorly collected: pregnancy complications, L&D complications, neonatal complications, NICU admission

• But if present, they are likely correct (high positive predictive value)

• Makes it hard to risk-adjust for medical factors solely on the basis of the birth certificate
Prevalence (%) of adverse neonatal outcomes by place of delivery, using multiple hospital comparison groups

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Planned home (n=2,736)</th>
<th>Hospital comparison A (n=117,083)</th>
<th>Hospital comparison B (n=135,929)</th>
<th>Hospital comparison C (n=138,672)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal death</td>
<td>0.26</td>
<td>0.08*</td>
<td>0.29</td>
<td>0.34</td>
</tr>
<tr>
<td>5-minute Apgar&lt;4</td>
<td>0.33</td>
<td>0.29</td>
<td>0.55</td>
<td>0.67*</td>
</tr>
<tr>
<td>5-minute Apgar&lt;7</td>
<td>5.2</td>
<td>1.8†</td>
<td>2.4†</td>
<td>2.8†</td>
</tr>
<tr>
<td>NICU admission</td>
<td>0.7</td>
<td>3.3†</td>
<td>5.9†</td>
<td>7.1†</td>
</tr>
<tr>
<td>Assisted ventilation &gt;6 hours</td>
<td>0.40</td>
<td>0.30</td>
<td>0.67*</td>
<td>0.96†</td>
</tr>
</tbody>
</table>

Oregon BC data: 2008-2010.
Group C is all >35 weeks Hospital births
Group B is reduced by excluding facility transfers
(desired to exclude intended home births, but likely did not)
Group A is reduced further by applying Oregon eligibility criteria for home births
(eg >35 weeks, no preeclampsia, etc)

Data “Conundrums” Identified

• Single state data, even over several years, still provides inadequate denominators (and numerator instability)

• Different states can have very different home birth attendant certifications, guidelines and cultures/traditions (even within states!)

• Were the home births under-coded for maternal complications? Were the hospital births under-coded for maternal complications?

• Did the BC really capture the intended home births that ended in the hospital? (No, but Oregon changed this BC question as of 1/1/2012)
Dilemma

- Need very large numbers
- Need to be very very careful not to under-report numerators
- Need robust sources of medical conditions for risk-adjustment or risk stratification

_Birth Certificates are likely to provide only large numbers. Linked datasets would be better choice for medical conditions but still require great care for numerator identification!_
Comparisons

• If we can not randomize, how can we make the groups comparable?
• Control for medical and demographic factors
• Control for commitment to program
  – Commitment to home v. hospital v. birth center (or centering)
  – Commitment to end goal, e.g. value of vaginal birth
# IOM List of Risk Factors for PTB

<table>
<thead>
<tr>
<th>Medical Risk Factors</th>
<th>Demographic Risk Factors</th>
<th>Social Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Previous low birthweight or preterm delivery</td>
<td>• Race/ethnicity</td>
<td>• No or inadequate prenatal care usage</td>
</tr>
<tr>
<td>• Multiple 2nd trimester spontaneous abortion</td>
<td>• Single marital status</td>
<td>• Cigarette smoking</td>
</tr>
<tr>
<td>• Prior first trimester induced abortion</td>
<td>• Low socioeconomic status</td>
<td>• Use of marijuana and other illicit drugs</td>
</tr>
<tr>
<td>• Familial and intergenerational factors</td>
<td>• Seasonality of pregnancy and birth (birth rate by time of year)</td>
<td>• Meth</td>
</tr>
<tr>
<td>• History of infertility</td>
<td>• Maternal age</td>
<td>• Cocaine use</td>
</tr>
<tr>
<td>• Nulliparity</td>
<td>• Employment-related physical activity</td>
<td>• Alcohol consumption</td>
</tr>
<tr>
<td>• Placental abnormalities</td>
<td>• Occupational exposures</td>
<td>• Caffeine intake</td>
</tr>
<tr>
<td>• Cervical and uterine anomalies</td>
<td>• Environment exposures</td>
<td>• Maternal weight gain (both excessive or insufficient)</td>
</tr>
<tr>
<td>• Gestational bleeding</td>
<td></td>
<td>• Poor dietary intake</td>
</tr>
<tr>
<td>• Intrauterine growth restriction</td>
<td></td>
<td>• Sexual activity during late pregnancy</td>
</tr>
<tr>
<td>• In utero diethylstilbestrol exposure</td>
<td></td>
<td>• Leisure-time physical activities</td>
</tr>
<tr>
<td>• Multiple gestations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Short stature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Low pregnancy weight/low body mass index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Urogenital infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Preeclampsia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Early Onset</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCLUDE??</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

N/A: Not Applicable
Risk Dose Effect

• Many of the factors are not dichotomous

• Gradations should be considered:
  – Degree of hypertension (transient vs. mild or severe)
  – Gestational bleeding, when and how much
  – Obesity (BMI of 30 vs. BMI of 50+)
  – Anemia (Hct=26 vs. 34)
  – Maternal Age (30 vs 35 vs 45 years)
  – Gest DM (diet well controlled, vs poorly controlled with meds vs early Type II)

• Risk adjustment needs work—simplify and make more complicated!
Labor Outcomes

• Cesarean birth rates, labor length, labor pain, physiologic birth rates, successful birthing center/home births (fewer transports)

**Parity Dominates!**

• Nulliparous women have much higher rates of everything
• Much harder to find increased risk for birth location for low-risk multips (Para 1-3)
Risk Factor Analysis Decisions

- Focus on Racial/Social-factor high risk groups who are low risk medically
- What to do with the high risk medical categories, do they really belong in Centering? Define what additional care they will receive?
- Will you ask questions at the outset as to the women’s interest/commitment for a vaginal birth (if Cesarean rate or other labor metrics are outcome measures)?
Summary for Required Data Sources

• Vital Records
  – Continuing issues with attribution and accuracy
  – Not good source for co-morbidities/complications

• Patient Discharge Diagnosis (PDD) data sets
  – Better source for co-morbidities/complications
  – Easily linkable to vital records
  – BUT not collected for home births or most independent birthing centers

• Data QI projects in play in California
Summary for Voluntary Data Sources

• Registries
  – Not universal, non-standard
  – “Voluntary” raises questions about missing cases
  – Need quality assessment

• Research Data Sets
  – Expensive
  – Hard to get sufficiently large numbers
  – Often not standardized to other data sets (to roll into meta-analyses)
Understanding Small Risks

• Multiple studies have shown that families/patients have a hard time understanding small risks OR interpret them quite differently.

• For example, in prenatal diagnosis, some families are not willing to take a 1/10,000 risk for a Downs baby while others are quite happy with 1/50 levels of risk and avoid an invasive test.

• There is not an external, objective standard for which to make judgments in this context so personal philosophies/choices come into play.
My Editorial:
What is helping to drive the increase in home births?

Fear of an over-medicalized birth with too many interventions

High CS rates and low VBAC rates are clear-cut statistics
Median Hospital Cesarean Rates (2007) for California Perinatal Regions
(Source: All-California Rapid Cycle Maternal/Infant Database, CMQCC 2011)

- Median Cesarean Rate (%)
  - NTSV CS State Mean=28.1%
  - Total CS State Mean=31.3%

- HP2020 NTSV CS Target=23.9%
California Maternal Data Center: Vision

- Build a statewide data center to collect and **timely report** national quality measures with **minimal burden**
- Design sub-measures to support **clinical quality improvement projects**
- Support **data quality improvement**
- **Single source** for maternity data for many stakeholders—**reduce duplication**

CMQCC: Transforming Maternity Care
CMQCC Maternal Data Center: Data Flow

**PDD File (ICD9 codes)**

**Birth Certificate File (Clinical Data)**

Uploads electronic files

Automatic Linkage

CMQCC Data Center

Limited manual data entry for this measure

**REPORTS**

Benchmarks against other hospitals
Sub-measure reports

<39wk Elective Delivery
CHART REVIEW
Labor?/SROM? (~6% of cases for brief review)

Calculates all the Measures
## CMDC’s Clinical Quality Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>NQF</th>
<th>Joint Commission</th>
<th>Leapfrog</th>
<th>CMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective Deliveries 37 - 39 week rate</td>
<td>P</td>
<td>P (PC-01)</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>C-Section rate Low-risk 1st Birth (NTSV)</td>
<td>P</td>
<td>P (PC-02)</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Infants &lt; 1500 grams at appropriate level</td>
<td>P</td>
<td></td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Episiotomy rate</td>
<td>P</td>
<td></td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Healthy Term Newborn rate</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenatal Steroids</td>
<td>P</td>
<td>P (PC-03)</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Neonatal Blood Stream Infections</td>
<td>P</td>
<td>P (PC-04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusive Breast Milk</td>
<td>P</td>
<td>P (PC-05)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
- Current: 1Q 2013
# Transforming Maternity Care

## Springfield General

### Reports

**Period: Nov 2011 - Jan 2012 (3 months)**

**Clinical Quality Measures**

- **Elective Delivery Under 39 Weeks**: 20.0% *
- **Episiotomy Rate**: 14.4%

View all 5 clinical quality measures

**General Maternity Statistics**

- **Total Cesarean Section Rate**: 33.4%
- **Vaginal Births After Cesarean Section**: 11.0%

View all 3 general maternity statistics

**Data Quality Measures**

- **Missing / Inconsistent Delivery Method**: 3.0%
- **Missing / Inconsistent V27 (Outcome of Delivery)**: 41.2%

View all 9 data quality measures

**Prematurity Measures**

- **Late Preterm Birth Rate**: 6.2%
- **Twin Late Preterm Birth Rate**: 50.0%

View all 4 prematurity measures

### Data Entry

View detailed data entry status.

**Current Data Available**

All data is imported and reports are available from **01/01/2011** through **12/31/2012**

### Data Entry Next Steps

**IT staff**

- Submit March 2012 admin data

**Clinical/OI Staff**

- Complete data linkage for February
- Complete chart review for January
Reporting Center

- Each measure is displayed graphically and as a data table
- Each measure can be downloaded either as an image for use in presentations or as a data file to be used in reports

Select comparison group(s) for your hospital

Also Display
- State Average
- Region Average
- "System" Average

Download As
- JPEG (image)
- CSV (data file)

Click on rate to "Drill Down" to see the numerator cases

Download this measure
Variation of NTSV CS rates among CA hospitals
Is Maternity Care an Opportunity for Value Based Purchasing?