



CMQCC

California Maternal
Quality Care Collaborative

Measuring Term Baby Outcomes: PC-06: Unexpected Newborn Complications

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Unexpected Newborn Complications

(term neonatal composite outcome measure)

This measure simply asks: of babies without preexisting conditions (no preemies, multiple gestations, birth defects or other fetal conditions) and who are normally grown and were not exposed to maternal drug use, **How many had severe or moderate neonatal complications?**

Unexpected Newborn Complications

(term neonatal composite outcome measure)

- First developed and and initial testing in 2010
 - California Maternal Quality Care Collaborative (Obstetrics) in conjunction with the California Perinatal Quality Collaborative (Neonatology)
- Extensively field-tested over the next 7 years
 - Used in state QI projects in California, Washington, Oregon and Florida, and NPIC (totaling over 750,000 annual births)
- NQF endorsed in 2012 and re-endorsed in 2016
- Chosen by TJC as PC-06 in early 2018
 - Reporting starting with January 2019 births

What is the Most Important Pregnancy Outcome for Mothers and their Families?

“A Good ‘Take-Home’ Baby...”

Avoiding Cesarean or Episiotomy
or moderate Maternal Morbidities
are clearly secondary

If Baby Outcomes Are So Important, Why Were We Not Measuring Them?

Some of the historical issues...

- Which babies?
- What outcomes?
- Low rates of poor outcomes
- Which of the poor outcomes are related to care?

Which Babies?

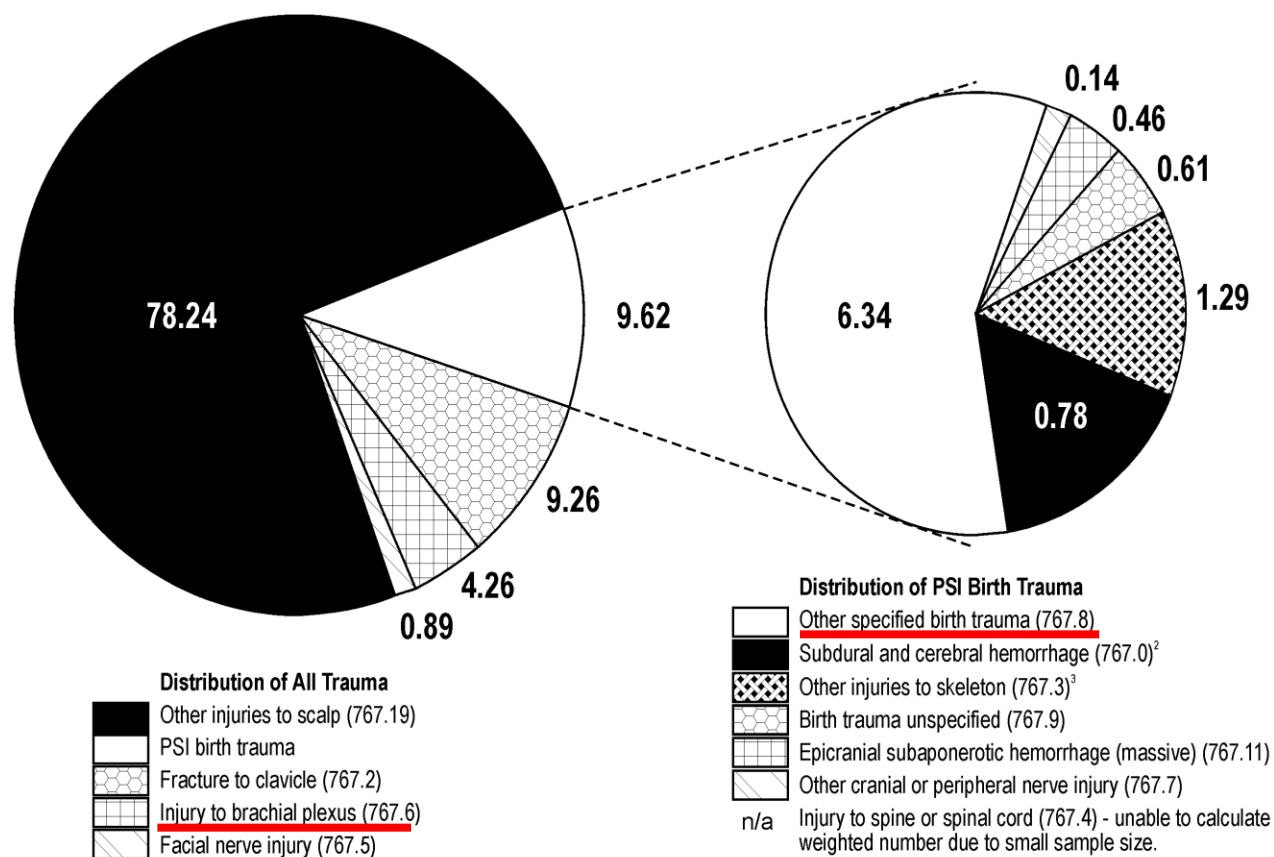
- All Babies versus Term Babies?
 - Preterm infants have a wide range of outcomes related to gestational age, birth weight--Not a homogeneous group
 - Rates of prematurity and congenital malformations vary greatly among hospitals
 - Important principle: Some populations (e.g. premies and malformations) are not **expected** to have perfect outcomes

Survey of Prior Attempts to Measure Term Baby Outcomes

- Rate of Term Baby NICU admissions (or Term baby NICU LOS)
 - NICUs vary in their admission criteria, even internally by shift or census
 - Observation versus Confirmed Diagnoses
 - NICU Admission is not an external code
- AHRQ PSI 17: Birth Trauma Rate (injury to the infant)

AHRQ PSI 17: Birth Trauma

Figure 1. Distribution of all neonatal birth trauma and birth trauma considered to be a Patient Safety Indicator by AHRQ, 2004-2005¹.



Rates (per 1,000)

All Trauma: 25.9

PSI 17: 2.45

CS v. Vag (OR)

All Trauma: 0.55

PSI 17: 1.71

¹Denominator is total singleton live births with neonatal birth trauma in 2004-2005. However, percentages total 102.27 because some neonates had more than one type of neonatal birth trauma.

²Excluding infants weighing <2500g or EGA earlier than 37 weeks when using AHRQ guidelines for PSA#17

³Excluding infants with diagnosis Osteogenesis Imperfecta when using AHRQ guidelines.

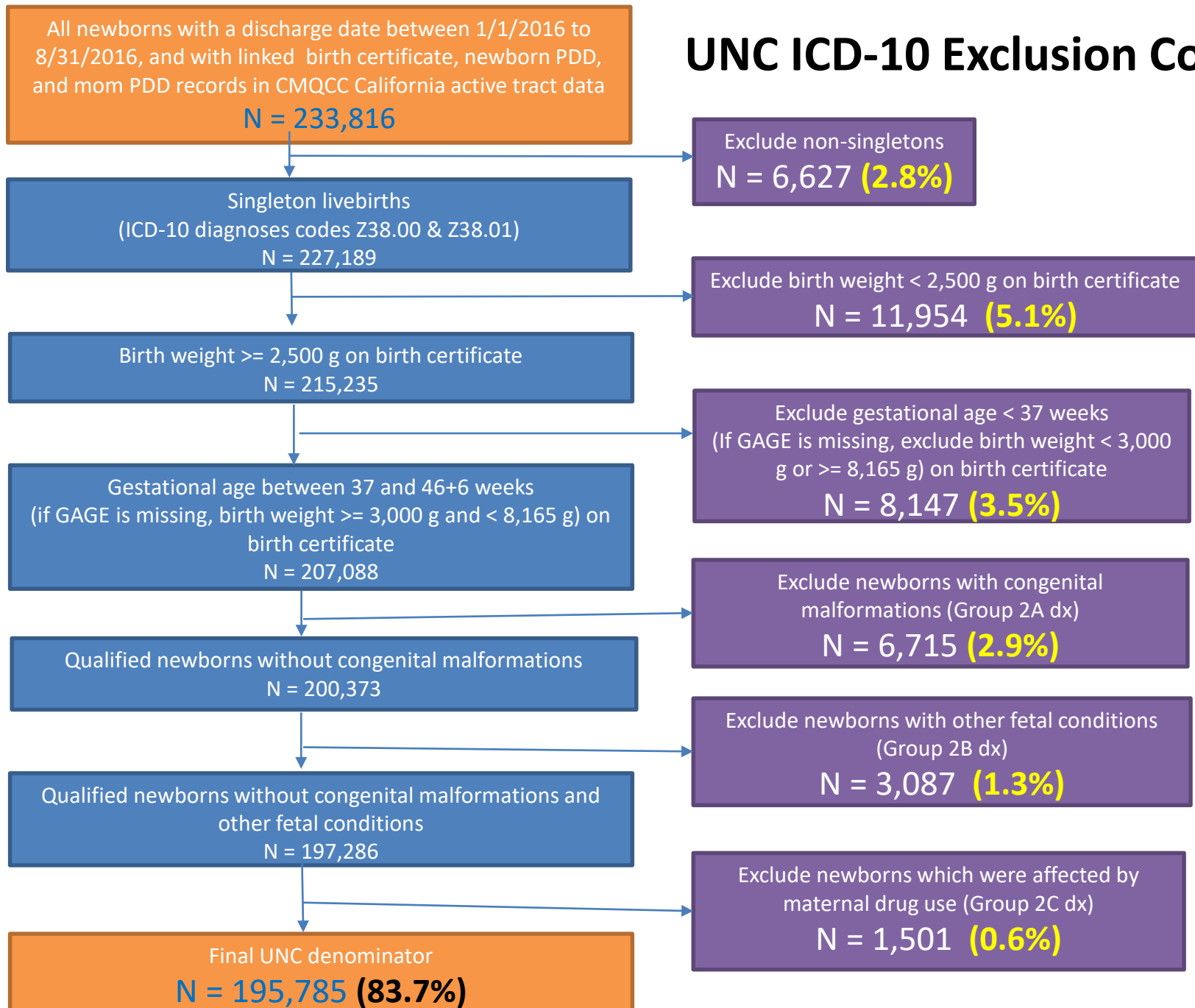
AHRQ PSI 17: Birth Trauma

- Critique:
 - Small subset of all birth traumas
 - Very low rate: 2 per thousand births
 - Dominated by non-specific codes
 - Easy to “show improvement” by adjusting coding practices for “other birth trauma”
 - Narrow view of birth outcomes...
 - Not NQF endorsed
- But it is easy to calculate!

UNC Denominator: Inclusions / Exclusions

- Include: Singleton live births (ICD10)
- BWt $\geq 2.5\text{kg}$ and GA ≥ 37 weeks
 - for PC-06, using ICD-10 codes for preterm and SGA
- Exclusions (ICD-10)-“Pre-existing Conditions”:
 - Congenital malformations (most Q codes)
 - Congenital disorders (from E and G codes)
 - Fetal-placental Conditions, Infections, IUGR, Hydrops, Rh sensitization (from A and P codes)
 - Maternal Drug Use and withdrawal symptoms (from P codes)

UNC ICD-10 Exclusion Codes



Complications are Categorized from the Viewpoint of the Family:



Frame 1 (Severe): “Would I be fearful of my baby’s survival or long term outcome if my baby had...”

Frame 2 (Moderate): “Would I be upset if my baby had....”

Note that the concept of preventability is not used.

The Devil is always in the Details...

- Use administrative data to minimize data burden
 - Allows for 100% survey--no sampling!
- Provide safeguards for over-coding and under-coding
- Separate out Severe from Moderate complications
 - Critical for Face Validity
- Identify diagnosis categories (“buckets”)
 - To understand the areas for improvement and facilitate QI projects

UNC: Coding Strategies

- After examining coding practices for hospitals around the state, “special needs” appeared:
- **Over-coding** Protection:
 - Sepsis vs. “R/O Sepsis”—Added a requirement for a prolonged newborn LOS: LOS >4 days
- **Under-coding** Protection:
 - Diagnoses are not always recorded (e.g. a systematic exclusion of hypoxia codes) however procedure codes are almost always coded as they tie to billing.
 - Utilize both diagnosis and procedure codes for a “complication bucket” whenever appropriate (e.g nitric oxide, EEG, ventilator, ECMO)

UNC: Coding Strategies-2

■ Over-coding Protection:

- A number of moderate complication diagnoses required a longer LOS than usual to indicate that it was consequential—Added a requirement for a prolonged newborn LOS: LOS >4 days for a Cesarean and >2 days for a vaginal birth
- Examples: clavicle fracture,

■ Under-coding Protection:

- Some cases had very few codes but very long LOS...suspicious for a morbidity
- Screened these cases first for neonatal jaundice, phototherapy, and a series of codes for social problems (e.g. homelessness, child welfare custody, residential institution)
- If none of these codes, these cases were considered moderate morbidity

Examples of “Severe UNC”

- Neurologic/Birth Injury
 - ICH, HIE, Asphyxia, Erb’s Paralysis, EEG
- Shock/Resuscitation
 - Arterial Line, CPR
- Respiratory
 - Pulm Hem, Vent, Chest tube, Nitric Oxide
- Infection
 - Septic shock, Sepsis with identified bacteria

Examples of “Moderate UNC”

- Neurologic/Birth Injury (with LOS requirement)
 - Fx. Clavicle, “affect. by” forceps, CT or MRI
- Respiratory
 - CPAP, RDS, Pneumothorax
 - with LOS: TTP, Mec Aspiration
- Infection
 - Sepsis with identified bacteria but short LOS

Do Hospitals Caring for Higher Risk Mothers Have Higher Rates of UNC?

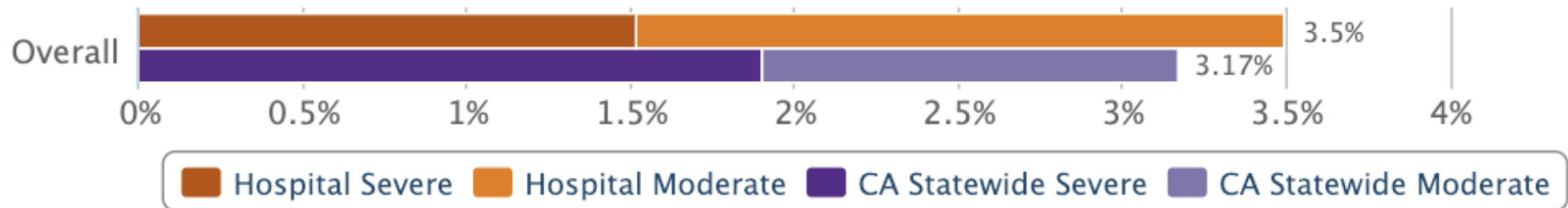
NICU Level (N)	Severe UNC	Total UNC
Level III-IV (117)	1.7%	3.0%
Level II (58)	2.4%	3.4%
Level I (74)	2.4%	3.0%
Critical Access (14)	2.5%	3.4%
University (6)	2.3%	4.6%

Mean rates among California hospitals for full-year 2017

UNC Analysis: What is Driving My Rate?

Total UNC: Example University Hospital
Full Year: 2017

Percentage of all Term Newborns without preexisting conditions



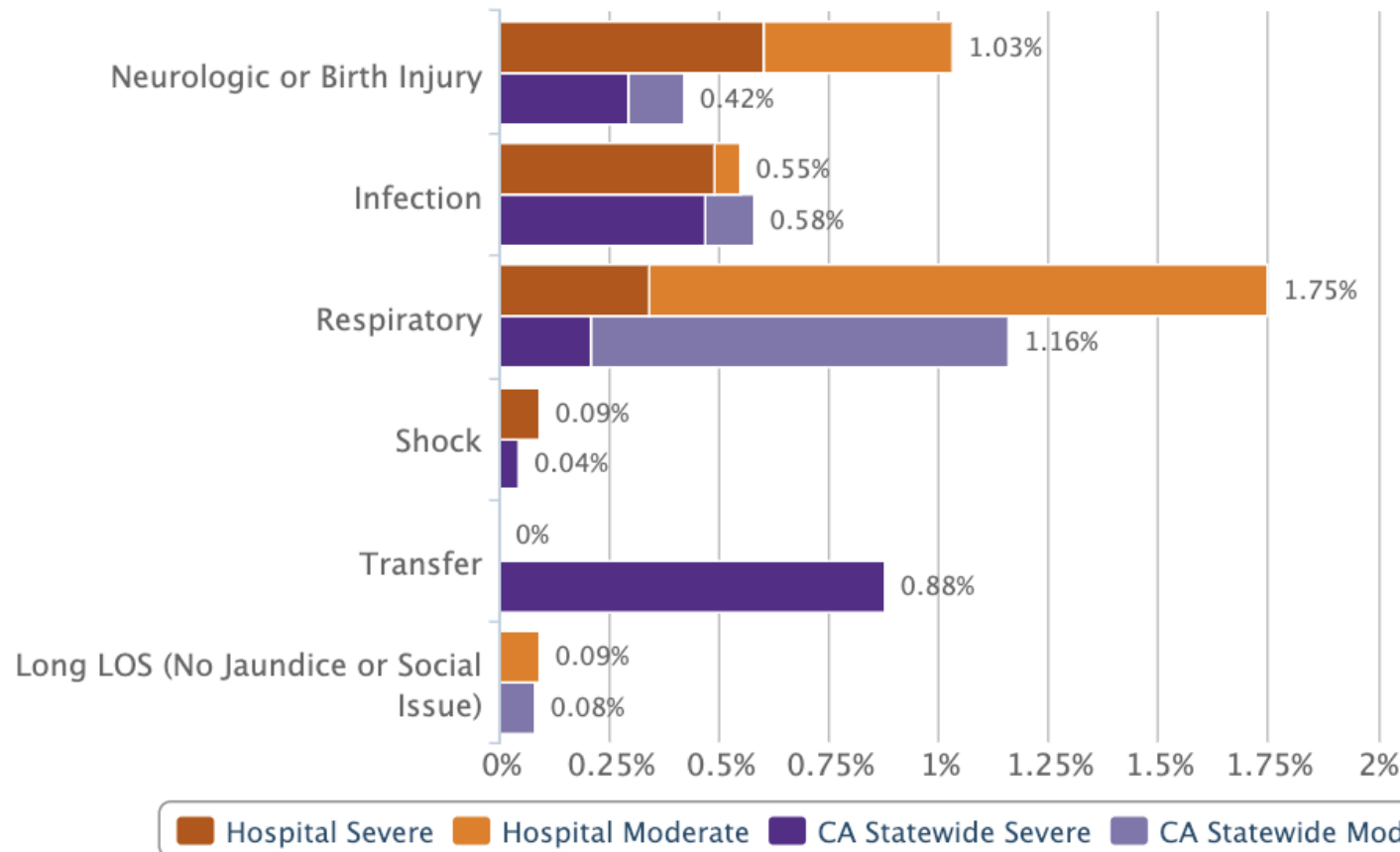
UNC: Additional NQF Validation Studies

- Face Validity:
 - In a comparison trial for neonatal morbidity by gestational age UNC tracked very closely to NPIC (major East Coast perinatal data set) analysis using NICU admissions and major complications
- Formal Reliability Testing
 - NQF requirement using RAND statistical tools for Reliability
 - Tests ability to discriminate among hospitals (variation and frequency)
 - Good is ≥ 0.8 , excellent is ≥ 0.9
 - Mean UNC Reliability among 220 California hospitals = 0.92
- Stability within a hospital over time
 - Tested for 3x 6-month baseline periods with minimal variation noted in >90% of California hospitals

UNC Analysis: What is Driving My Rate?

UNC Category Analysis : Example University Hospital
Full Year: 2017

Percentage of all Term Newborns without preexisting conditions



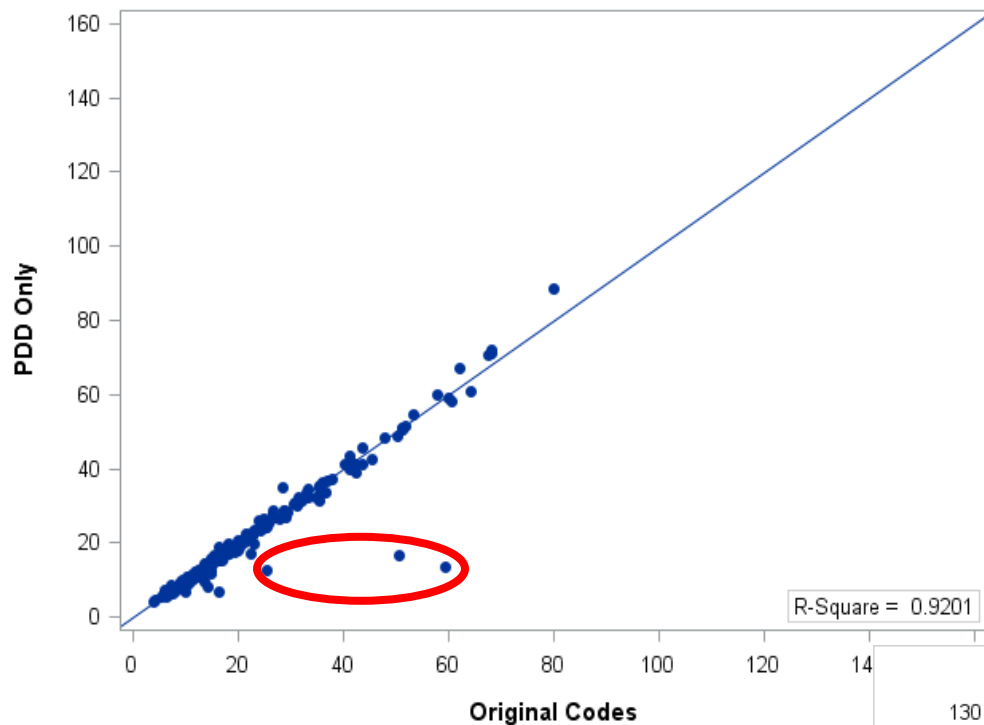
“Post-market Surveillance”

- After an expert panel picks ICD codes that “make sense”, it is critical to examine data from large numbers of hospitals to see how codes are assigned in the “real world”
- Example:
ICD9 Procedure Code 93.90: Non-invasive mechanical ventilation <24hrs (e.g. CPAP) is used by some hospitals for bag and mask resuscitation in the delivery room so bills can be created for a pediatrician in attendance...
- TWEAK: add a LOS modifier

2016-2017 Projects

- Translate to ICD-10 codes
 - Examine individual code frequencies
 - Review again with expert panel
 - ICD-9 v. ICD-10: within 0.1% point
- Eliminated Birth Certificate linkage, allow for PDD alone:
 - No Low Apgar--no change in rates
 - No BWt and GA--slight rise in Moderate UNC due to more 35-36 wk'ers
- Focus on Severe v. Moderate v. Total UNC

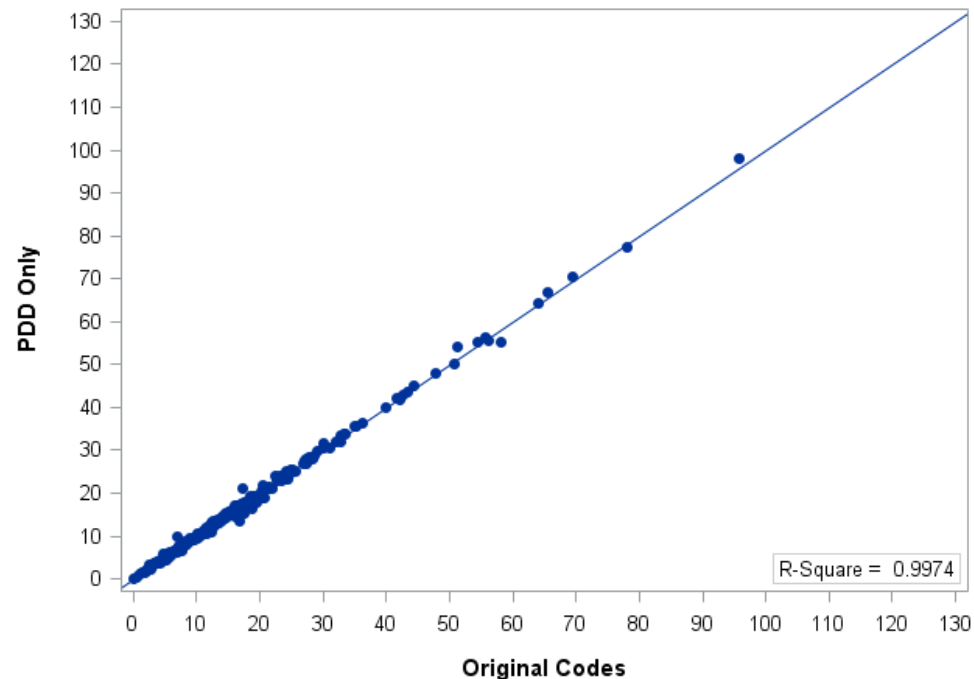
Hospital-specific Severe UNC Rate (per 1,000 births)



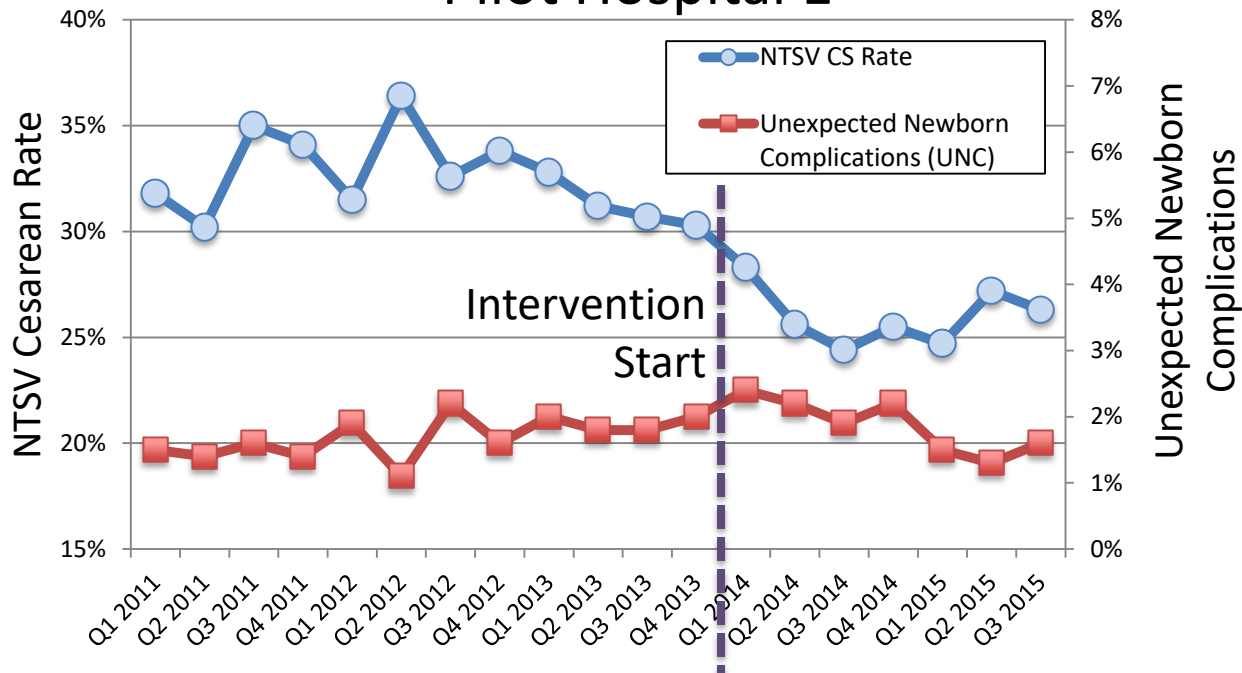
UNC
Original (with BC)
vs. PDD only
Hospital Level
Comparisons

On case review, these 3 hospitals had multiple cases of 5' Apgar charted as 0 when it was missing and 1' Apgar was ≥ 7

Hospital-specific Moderate UNC Rate (per 1,000 births)



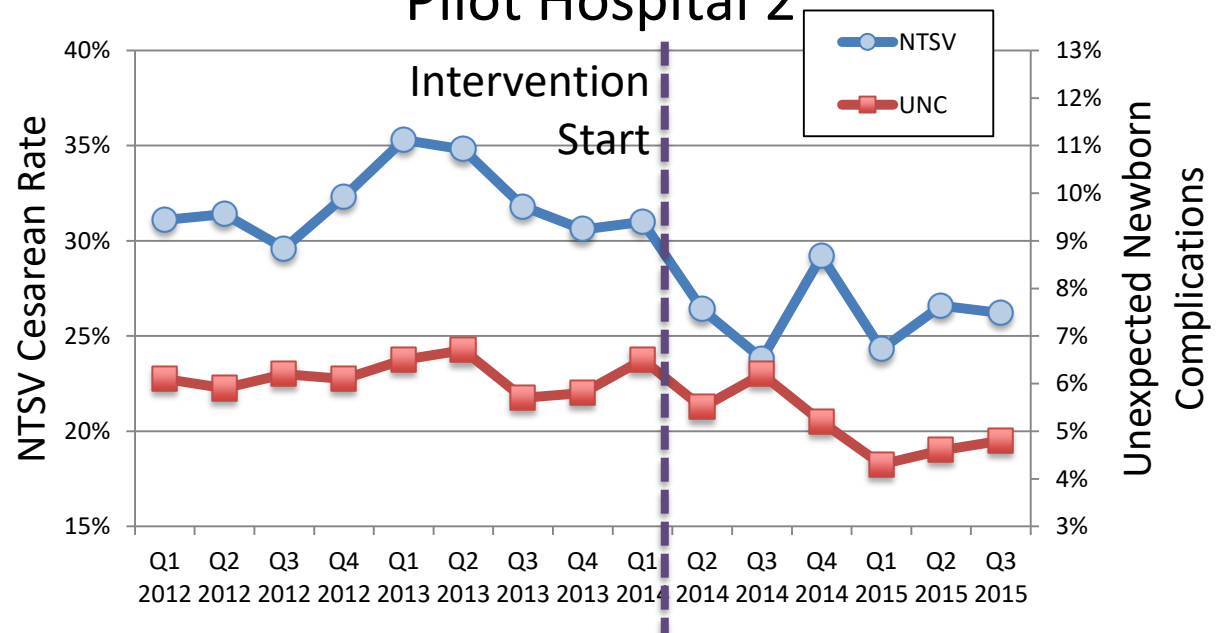
Pilot Hospital 1



Unexpected
Newborn
Complications (UNC)
as a
Balancing Measure
for Cesarean
reduction projects

In each pilot hospital, after successful intervention to reduce NTSV Cesarean births (decreased 15-22%), Unexpected Newborn Complications measure was either unchanged or reduced, reassuring the medical staff.

Pilot Hospital 2



Examples of UNC QI Projects

- Benchmarking for UNC categories leads to better understanding of where to work
- Revision of infection work-up protocols
- Education for forceps best practices
- Improved resuscitation protocols
- Second Stage Labor management protocols
- Identification of cases for in-depth review
- Most important use is as balancing measure for OB intervention studies



UNC Conclusions

- Reflects a patient/family viewpoint but also resonates with physicians
- More variation than expected
- More improvement opportunities than expected
- Sensitive to both obstetric practice and neonatal care



UNC Summary

- Validated term baby outcome measure
- Able to drill-down and examine reasons for higher levels / improvement opportunities
- Suitable for use as a balancing measure for primary or NTSV Cesarean rate QI projects

UNC FAQs

1. What proportion of a hospital's births are included?

80-85% will meet inclusion criteria, generating a sufficient volume

2. Do certain hospital types have significantly different rates (and hence inherently disadvantaged)?

While there is large variation among hospitals of the same type or category, the means and ranges between the categories are quite similar, indicating that risk adjustment is not required.

3. How much variation is there among hospitals?

Total UNC showed significant variation. In 2016, the 50th%tile was 27.4 per 1,000 while 25th%tile was 19.2 and the 75th%tile was 37.7. Similar variation was seen for Severe UNC.

4. What are the diagnosis categories that drive UNC?

In California, the most frequent category is Respiratory at 10.9 per 1,000 births, followed by Transfer to Another Hospital (8.0), Infection (6.2), Neurologic/Birth Injury (3.9) and Long LOS (0.9 per 1,000 births)

UNC FAQs (cont)

5. Why are hospital transfers included?

A. Transfer case are included as Severe because they usually represent serious neonatal issues, and the transfer results in major disruption and concern for the family.

B. Neonatal coding in the birth hospital is often quite limited so the underlying diagnosis(es) are usually unclear

C. Only transfers to higher levels of care should be included

6. What about infants transferred who later are found to have a congenital anomaly?

An unrecognized neonatal anomaly requiring transfer is often a perinatal quality care opportunity.

7. What happens if the long LOS is due to the mother?

Some mothers have prolonged PP LOS due to conditions like Preeclampsia, but if the baby is normal, most insurances require that the baby be discharged and either stay as rooming-in or go home with family.

Thank You



Questions?