

# AHRQ Neonatal Quality Indicators: The NQI and the Research Indicators

Sheryl Davies  
Stanford University  
Academy Health Annual Research  
Meeting, Child Health Interest Meeting  
26 June, 2010

# Acknowledgments

- Neonatal Module Development:

---

  - Kathryn McDonald, Stanford University
  - Patrick Romano, UC-Davis
  - Sheryl Davies, Stanford University
  - Jeffrey Geppert, Battelle Health and Life Sciences
  - Olga Saynina, Stanford University
  
- Support for Quality Indicators II (AHRQ Contract No. 290-04-0020):
  - Mamatha Pancholi, AHRQ Project Officer
  - Jeffrey Geppert, Project Director, Battelle Health and Life Sciences

# Acknowledgments

- Data used: State Inpatient Datasets, SID 2007 and Kids' Inpatient Dataset, KID 2003 Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.
- We gratefully acknowledge the data organizations in participating states that contributed data to HCUP that we used in this study: the Arizona Department of Health Services; California Office of Statewide Health and Development; Colorado Health and Hospital Association; CHIME, Inc. (Connecticut); Florida Agency for Health Care Administration; Georgia Hospital Association; Hawaii Health Information Corporation; Illinois Health Care Cost Containment Council; Iowa Hospital Association; Kansas Hospital Association; Maryland Health Services Cost Review Commission; Massachusetts Division of Health Care Finance and Policy; Missouri Hospital Industry Data Institute; New Jersey Department of Health and Senior Services; New York State Department of Health; Oregon Association of Hospitals and Health Systems; Pennsylvania Health Care Cost Containment Council; South Carolina State Budget and Control Board; Tennessee Hospital Association; Utah Department of Health; Washington State Department of Health; and Wisconsin Department of Health and Family Services.

# AHRQ Quality Indicators (QIs)

---

- A set of tools for **evaluating, monitoring,** and **comparing the quality** and **accessibility** of health care using ICD-9-CM coded **administrative data** from hospitals
  - Prevention Quality Indicators (PQI): Avoidable Hospitalizations & Conditions (area level)
  - Inpatient Quality Indicators (IQI): Mortality, Utilization & Volume
  - Patient Safety Indicators (PSI): Avoidable Complications
  - Pediatric Quality Indicators (PDI): Primarily based on PSI

# AHRQ Neonatal QI Development

## Identification of potential indicators

---

- Literature review
  - Identified previously developed quality measures
    - Grade III & IV intraventricular hemorrhage (IVH)
    - Retinopathy of prematurity (ROP)
    - Necrotizing enterocolitis (NEC)
    - Meconium aspiration syndromes (MAS)
    - Nosocomial blood stream infections (BSI)
    - Neonatal mortality



# AHRQ Neonatal QI Development

## Evaluating Potential Indicators

---

- CD-9-CM coding review
  - To ensure correspondence between clinical concept and coding practice
- Empirical analyses
  - To explore alternative definitions
  - To assess nationwide rates, hospital variation, relationships among indicators
  - To develop methods to account for differences in risk
- Dealing with Bias
  - Exclude patients at risk for:
    - Complications present on admission
    - Non-preventable complications
  - Stratification – risk groupings

# AHRQ Neonatal QI Development

## Evaluating Potential Indicators

---

### ○ Expert Panel Evaluation

- Based on Nominal Group Technique or Modified RAND Appropriateness Method
- Independent initial evaluation followed by conference call and then final evaluation
- Panelists assessed face validity, potential bias, gaming and overall usefulness

# Potential AHRQ Neonatal QIs – Brief Summary

Measure	Birthweight Limits		Inclusions		Exclusions	
	500-1499g	≥1500g	Inborns	Transfers (<2 d/o)	Principal Dx	Other
<b>IVH (Grade III &amp; IV)</b>	Yes	No	Yes	No	No	Pts. transferred out at <1 week
<b>ROP</b>	Yes	No	Yes	Yes	No	Pts. transferred out, or died at <1 week
<b>NEC</b>	Yes	No	Yes	Yes	Yes	None
<b>MAS</b>	No	Yes	Yes	No	No	None
<b>Nosocomial BSI</b>	Yes	If death, major surgery, ventilation, or transfer in/out	Yes	Yes	Yes	Length of stay <2 days
<b>Neonatal Mortality</b>	Yes	Yes	Yes	Yes	No	1. Transfers to another hospital 2. Dx of Tri 13, or 18, anencephaly, & polycystic renal dz.



# Potential Neonatal QIs: Ratings Process

- Recommendation requirements - Median score of  $\geq 7$  (9 point scale), without significant disagreement, on one of two questions
  - Useful for quality improvement?
  - Useful for comparative reporting?

Measure	Quality Improvement?	Comparative Reporting?
IVH	7*	6.5
ROP	4	3
NEC	6	6
MAS	3	3
Nosocomial BSI	8	8
Neonatal Mortality	6	7

\* Significant disagreement on ratings amongst panelists

# AHRQ Neonatal QIs: Research vs. Implemented QIs

---

## ● Highest Rated

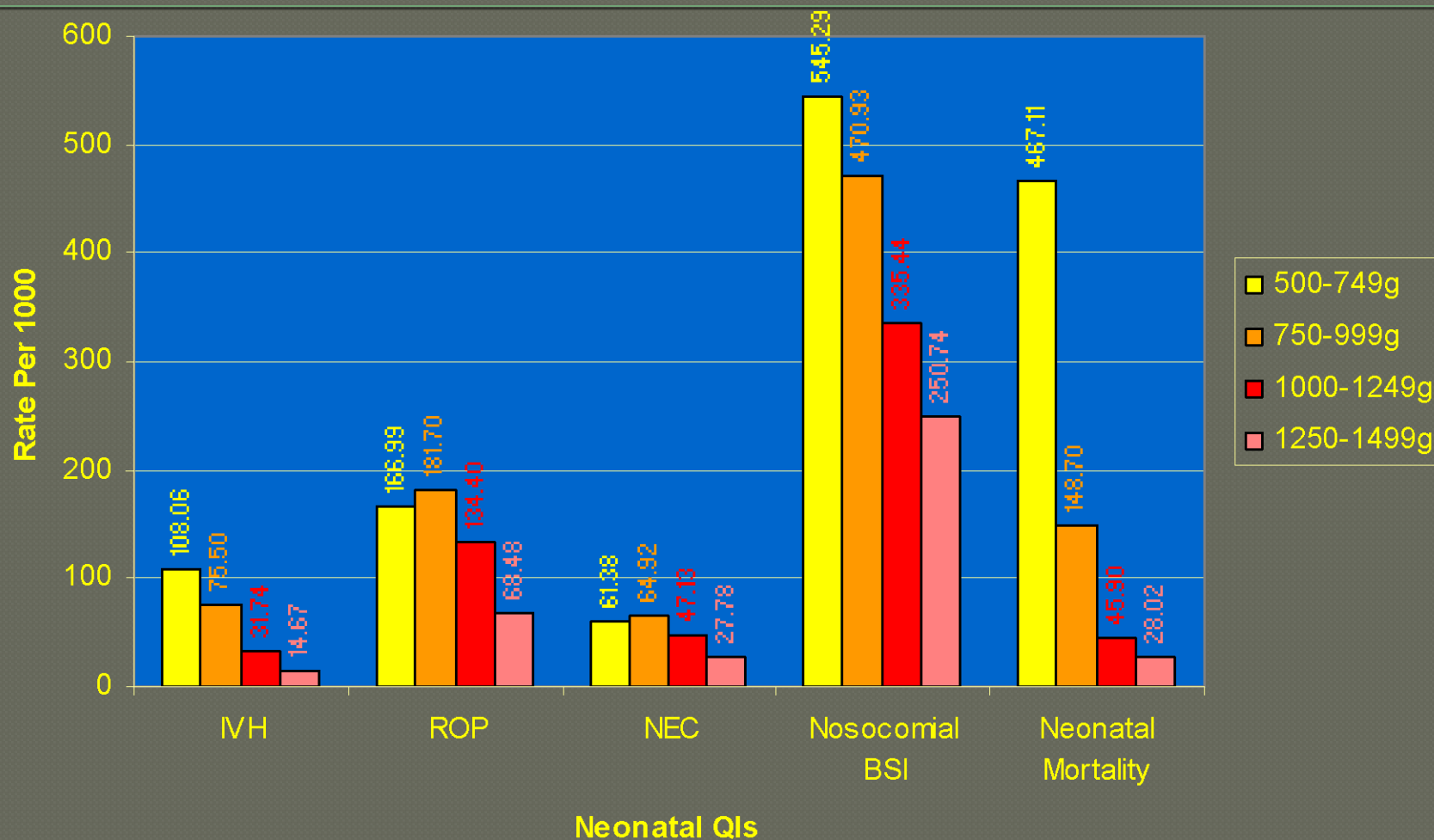
- Important outcome
- Better known relationship to processes of care (preventability)
- Fewer concerns about ICD-9-CM codes

## • Lower Rated

- Relationship to processes of care (preventability) questioned
- Concerns about ICD-9-CM codes available and limits of administrative data

# Events Potential Neonatal QI Rates: 2003 KID

Per 1000 population at risk – with birthweight groupings for <1500g



Kids' Inpatient Database 2003. AHRQ Healthcare Cost and Utilization Project. Proposed AHRQ Neonatal QIs Observed Rates.

# Overall Rates Complications Neonatal Indicators: 2007 SID



State Inpatient Databases 2007. Agency for Healthcare research and Quality Healthcare Cost and Utilization Project.

# IVH: Example of Neonatal Indicator RA Rates by Birthweight Volume Quintiles



# IVH: Example of Neonatal Indicator SD by Birthweight Volume Quintiles





# NEC: Example of Neonatal Indicator RA Rates by Birthweight Volume Quintiles



State Inpatient Databases 2007. Agency for Healthcare Research and Quality Healthcare Cost and Utilization Project.

# NEC: Example of Neonatal Indicator SD by Birthweight Volume Quintiles



# Strongest Predictors of Research NQIs

---

## ○ IVH

- C-statistic for model is 0.65
- Birthweight (OR = 3.0)
- Congenital Renal Disease (OR 3.4)
- Congenital respiratory anomalies (OR = 4.2 )

## ○ ROP

- C-statistic for model is 0.61
- Birthweight (OR = 1.7-2.6)
- Congenital respiratory anomalies (OR = 2.7)

## ○ NEC

- C-statistic for model is 0.64
- Birthweight (OR=3.0)
- Congenital GI anomalies (OR 2.8)

# Recent Coding Improvements to Neonatal Coding

---

- FY 2009 (Beginning October 2008)
- NEC
  - Adds stages of NEC to codes 777.50-777.53
  - Include only more advanced stages of NEC to standardize diagnostic criteria
- ROP
  - Adds stages of ROP to codes 362.20-362.29
  - Include only more advanced stages of ROP to focus on most serious cases

# Potential Uses of AHRQ NQIs

---

## ● Implemented NQIs

- BSI
  - Has received time limited NQF endorsement
  - QI, Comparative Reporting, research
- Mortality, Pneumothorax
  - QI, Research, limited comparisons

## ● Research indicators

- ROP, NEC, IVH
  - Establish evidence base for best practices
  - Understand variation and patterns of complications
  - Investigate administrative data validity

# Contact

---

Sheryl Davies  
[smdavies@stanford.edu](mailto:smdavies@stanford.edu)