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

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.
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
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

<table>
<thead>
<tr>
<th>Measure</th>
<th>Birthweight Limits</th>
<th>Inclusions</th>
<th>Exclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500-1499g</td>
<td>≥1500g</td>
<td>Inborns</td>
</tr>
<tr>
<td>IVH (Grade III &amp; IV)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>ROP</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>NEC</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MAS</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nosocomial BSI</td>
<td>Yes</td>
<td>If death, major surgery, ventilation, or transfer in/out</td>
<td>Yes</td>
</tr>
<tr>
<td>Neonatal Mortality</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Recommendation requirements - Median score of ≥7 (9 point scale), without significant disagreement, on one of two questions

- Useful for quality improvement?
- Useful for comparative reporting?

<table>
<thead>
<tr>
<th>Measure</th>
<th>Quality Improvement?</th>
<th>Comparative Reporting?</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVH</td>
<td>7*</td>
<td>6.5</td>
</tr>
<tr>
<td>ROP</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>NEC</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>MAS</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Nosocomial BSI</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Neonatal Mortality</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

* 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

Overall Rates Complications Neonatal Indicators: 2007 SID

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

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