Solving the Value Equation in the NICU

Timmy Ho    Madge Buus-Frank    Heather Kaplan    Marybeth Fry

Jeffrey D. Horbar, MD Moderator
Disclosure

I am the Chief Executive and Scientific Officer of the Vermont Oxford Network.

I will not be discussing the unlabeled use of any commercial product.
Session Goals

• Identify improvement opportunities for your NICU
• Learn to enhance value and reduce waste
• Develop a context for improvement by:
  – Engaging senior leaders
  – Co-designing care with families
Network Vision

To build a worldwide community of practice dedicated to providing every newborn infant and family with the best possible and ever improving medical care.
951 NICUs in 32 Countries

International
United States

0
100
200
300
400
500
600
700
800
900
1000


Vermont Oxford Network
2 million infants
69 million patient days
90% of VLBW infants in US
Our Challenge

To dramatically reduce if not entirely eliminate the major morbidities for VLBW infants.
Relative Changes 2004 to 2014

- Infection: -50%
- Eye Injury: -30%
- Brain Injury: -20%
- Death: +0%
- Bowel Injury: -10%
- Lung Injury: -10%
Death or Morbidity for VLBW Infants

60,000 VLBW infants born in 2014
Morbidities in 2014

- Lung Injury: 35%
- Infection: 25%
- Brain Injury: 15%
- Eye Injury: 10%
- Bowel Injury: 5%
### Avoidable Morbidity for Infants and Families

<table>
<thead>
<tr>
<th>Condition</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung Injury</td>
<td>2800</td>
</tr>
<tr>
<td>Infection</td>
<td>2500</td>
</tr>
<tr>
<td>Bowel Injury</td>
<td>680</td>
</tr>
<tr>
<td>Eye Injury</td>
<td>600</td>
</tr>
<tr>
<td>Brain Injury</td>
<td>430</td>
</tr>
</tbody>
</table>

Risk adjusted estimates based on 932 NICUs in 2014
Solving the Value Equation

Timmy Ho MD MPH
Disclosures

Timmy Ho has the following financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity:

– Honoraria from Vermont-Oxford Network while serving as faculty

I do not intend to discuss an unapproved/investigative use of a commercial product/device in this presentation.
The Value Equation

Value = Outcome

Clinical result → Effectiveness
Quality → Outcome

Value = Cost

Resource tallies → Cost
Dollars → Cost

Dukhovny et al., Pediatrics, 2015, In press.
Three Ways in Increase Value

1. Increase quality of care
2. Increase efficiency of care
3. Increase cost-effectiveness

Dukhovny et al., Pediatrics, 2015, In press.
### Quality of Care

**Analysis 1.21.** Comparison of More placental transfusion (delayed clamping) versus less placental transfusion (early clamping). Outcome 21 Intraventricular haemorrhage (all grades).

Review: Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes.

Comparison: More placental transfusion (delayed clamping) versus less placental transfusion (early clamping).

Outcome: Intraventricular haemorrhage (all grades).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>More placental transfusion</th>
<th>Less placental transfusion</th>
<th>Risk Ratio M-H/Fixed 95% CI</th>
<th>Weight</th>
<th>Risk Ratio M-H/Fixed 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strauss 2008</td>
<td>1/45</td>
<td>1/60</td>
<td>1.5 %</td>
<td>1.33 [0.09, 20.75]</td>
<td></td>
</tr>
<tr>
<td>McDonnell 1997</td>
<td>0/15</td>
<td>1/16</td>
<td>2.5 %</td>
<td>0.35 [0.02, 0.09]</td>
<td></td>
</tr>
<tr>
<td>Oh 2002</td>
<td>4/16</td>
<td>3/17</td>
<td>5.0 %</td>
<td>1.42 [0.37, 5.37]</td>
<td></td>
</tr>
<tr>
<td>Rabe 2000</td>
<td>1/19</td>
<td>3/20</td>
<td>5.1 %</td>
<td>0.35 [0.04, 0.09]</td>
<td></td>
</tr>
<tr>
<td>Kugelman 2007</td>
<td>2/30</td>
<td>4/35</td>
<td>6.4 %</td>
<td>0.58 [0.11, 2.96]</td>
<td></td>
</tr>
<tr>
<td>Mercer 2003</td>
<td>3/16</td>
<td>5/16</td>
<td>8.6 %</td>
<td>0.60 [0.17, 2.10]</td>
<td></td>
</tr>
<tr>
<td>Hosono 2008</td>
<td>3/20</td>
<td>5/20</td>
<td>8.6 %</td>
<td>0.60 [0.17, 2.18]</td>
<td></td>
</tr>
<tr>
<td>Hoffmeyr 1993</td>
<td>8/40</td>
<td>11/46</td>
<td>17.7 %</td>
<td>0.84 [0.37, 1.87]</td>
<td></td>
</tr>
<tr>
<td>Hoffmeyr 1988</td>
<td>8/33</td>
<td>10/13</td>
<td>22.1 %</td>
<td>0.45 [0.24, 0.85]</td>
<td></td>
</tr>
<tr>
<td>Mercer 2006</td>
<td>5/26</td>
<td>13/36</td>
<td>22.5 %</td>
<td>0.38 [0.15, 0.97]</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>260</strong></td>
<td><strong>279</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>0.59 [0.41, 0.85]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 25 (More placental transfusion), 56 (Less placental transfusion).
Heterogeneity: Chi² = 4.55, df = 9 (P = 0.87), I² = 0.0%
Test for overall effect: Z = 2.82 (P = 0.0048)
Test for subgroup differences: Not applicable.

Rabe et al., Cochrane Database, 2012
Efficiency

Avoid routine use of anti-reflux medications for treatment of symptomatic gastroesophageal reflux disease (GERD) or for treatment of apnea and desaturation in preterm infants.

Gastroesophageal reflux is normal in infants. There is minimal evidence that reflux causes apnea and desaturation. Similarly, there is little scientific support for the use of H2 antagonists, proton-pump inhibitors, and motility agents for the treatment of symptomatic reflux. Importantly, several studies show that their use may have adverse physiologic effects as well as an association with necrotizing enterocolitis, infection and, possibly, intraventricular hemorrhage and mortality.

Avoid routine continuation of antibiotic therapy beyond 48 hours for initially asymptomatic infants without evidence of bacterial infection.

There is insufficient evidence to support antibiotic treatment for more than 48 hours to rule out bacterial infection in asymptomatic term and preterm infants. Current blood culturing systems identify the great majority of pathologic organisms prior to 48 hours. Prolonged antibiotic use...
Cost-Effectiveness

Dukhovny et al., Pediatrics, 2015, In press.
http://www2.hawaii.edu/~yzuo/research1-surfactant.html
The Value Toolkit

• Assemble team of “Value Champions”

• Baseline assessment
  – Knowledge
  – Areas of overuse
  – Culture readiness for change

With permission modified from D Dukhovny, VON AQC 2014
The Value Toolkit

- Identify measures
- Introduce practice/culture change
  - Education
  - Integration into EMR

With permission modified from D Dukhovny, VON AQC 2014
Baseline Assessment

– Identify knowledge gaps
– Force ALL staff to actively think about value, waste and overuse in the NICU
– Address potential barriers before getting started
  • Leadership
  • Staff
  • Ethical ("Rationing")
Introducing Culture Change

– Education
  • Value Corner
  • NICU Newsletter
  • Small Groups
  • Speakers
– Innovation
  • EMR (hard stops)
  • Value and Safety Audits

With permission modified from D Dukhovny, VON AQC 2014
Madge E. Buus-Frank DNP, APRN-BC, FAAN

Executive Vice President
Director of Quality Improvement & Education
Vermont Oxford Network
VON Quality Improvement Collaboratives

Using Our *Collective* Expertise
to Solve the Value Equation

\[
\text{Value} = \frac{\text{Outcome}}{\text{Cost}}
\]
Two Collaborative Choices

**iNICQ**
- 220 Teams
- Primarily Internet-Based

**NICQ**
- 62 Teams
- Hybrid Online & Face-to-Face

Participating teams from around the world to date!
Collaborate = “Labor Together”

Goal of Measureable Improvement
Join Other Engaged Teams Learning Network
Peer-to-Peer Learning
$720 Million Dollars in Healthcare Expenditures

Patrick Data 3.4 / 1000
New Hanover Regional Medical Center

NAS Patient LOS c Chart
February - September 2014

Created NAS Admit Orderset Physician Re-Education on NAS Medical Protocol

Inter-Rater Reliability:
Initiated 2 RN-verification of any NAS score of 8 or greater

LOS in Days

NAS Patient #1-43
11 PDSA Cycles / 18 Months

1. RN scoring training/ reliability
2. Family interviews
3. Baby-centered scoring
4. Prenatal education
5. Parent symptom diary
6. Standardize score interpretation
7. Rooming-in pilot
8. “Cuddlers”
9. Full rooming-in
10. Addiction training
11. Transfers

Jan 2013: Formed Multi-D VON NAS QI team
April 2013 - Oct 2014: 11 PDSA cycles
Recent Reports of 40-Fold Differences in Antibiotic Use


What if current hospital practices were helping create an antibiotics crisis?

www.vtoxford.org/inicq2016
Solving the Value Equation

Engaging Senior Leadership

Heather Kaplan, MD, MSCE
Disclosure Statements

• Heather Kaplan has the following financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity:
  – Consultant for Vermont Oxford Network NICQ quality collaboratives

• I do not intend to discuss an unapproved/investigative use of a commercial product/device in this presentation.
Solving the Value Equation

- Evidence-Based Care Practices
- Context
- QI Methods

Senior Leadership
External Pressures
Strategic Alignment
Microsystem Leadership
Culture
Resources
Staff Motivation
Staff QI Capability
QI Team Factors
Strategy for Engaging Senior Leaders

Safe & Conventional Wins Over Fast & Flashy!

*The Quality Improvement Charter*
What is a QI Charter

• Describes the rationale, goals, barriers, and resources needed for a QI project
• Establishes the expectations and scope for the QI effort
• Reflects what QI team members and leaders are seeking from the effort in which they are investing
How Can a Charter Help You Engage with Senior Leaders?

- Charter serves as a **contract between your QI team and the organization’s leaders**
- Helps **achieve leadership commitment and ownership**
- Provides **visibility and accountability** for your QI work
- Helps **generate agreement** on the business case, goals, scope, timeline to ensure the project (as chartered) support the organization’s strategy
- Helps **secure resources** needed for the project to be successful
- **Clarifies what your leaders expect of your team** so you are more likely to meet expectations
Reducing Necrotizing Enterocolitis (NEC) in Infants ≤1500 grams Across 3 Cincinnati NICUs
Make the Business Case
Answer the “Why” with something a senior leader would find compelling
Make sure you have outcome, process and balancing measures!

Include a measure of the numerator and denominator of the value equation (outcomes & cost) or a measure of resource utilization

Work with your senior leader to set goals that are realistic but will also push your team to excel
Focus on those barriers where senior leaders may be able to assist—resource needs, cooperation with other divisions, smoothing over high level resistance...

Think about starting with a short term ask that is an easy “yes” for leadership

Consider asking for help other than $
Come up with a plan to update your leaders—communicate early and often.

Estimate time required for team members and ensure leaders support this time.

Remember this is a contract!

Leadership is important at many levels including unit (medical/nursing), division, and senior levels.

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**Communication Plan**

- NEC QI team will present at Perinatal Institute QI Steering Committee every other month.
- NEC QI team will meet with Senior VP of Quality every 6 months.

**Project Team Roles and Responsibilities**

<table>
<thead>
<tr>
<th>Team members</th>
<th>Roles</th>
<th>Responsibilities</th>
<th>% Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amy Nathan, MD</td>
<td>Team Leader</td>
<td>Lead local team</td>
<td>5%</td>
</tr>
<tr>
<td>Heather Kaplan</td>
<td>Physician Lead</td>
<td>Lead local team</td>
<td>5%</td>
</tr>
<tr>
<td>Laurel Moyer</td>
<td>Physician Lead</td>
<td>Lead local team</td>
<td>5%</td>
</tr>
<tr>
<td>Trayce Gardner</td>
<td>Dietitian</td>
<td>Feeding Standardization, formula prep; Data entry</td>
<td>10%</td>
</tr>
<tr>
<td>Heather Williams</td>
<td>NNP</td>
<td>Case Review, PDSA testing-Aspirates</td>
<td>10%</td>
</tr>
<tr>
<td>Nancy Howard</td>
<td>NNP</td>
<td>Case Review, PDSA testing-Aspirates</td>
<td>10%</td>
</tr>
<tr>
<td>Kim Moore</td>
<td>RN</td>
<td>PDSA testing-formula preparation, aspirates</td>
<td>5%</td>
</tr>
</tbody>
</table>

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**Sign Off**

- Team Leader: ___________________________ Date: ___________________________
- Medical Director: ____________________ Date: ___________________________
- Nursing Director: ____________________ Date: ___________________________
- Division Director: ____________________ Date: ___________________________
- Senior Leader: ________________________ Date: ___________________________
Solving the Value Equation in the NICU: Engaging Families as Partners in Care

Marybeth Fry, M.Ed
NICU Family Care Coordinator, Akron Children’s Hospital
NICQ Next Family Leader, Vermont Oxford Network
Disclosure Statement

Marybeth Fry has the following financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity:

Faculty for Vermont-Oxford Network with honoraria

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Gratitude Statement

My sincere thanks to Kate Robson, Amy Nyberg, Ginny Shaffer and Joanna Celenza for their valuable insight into family integrated care.
"Making the decision to have a child is momentous. It is to decide forever to have your heart go walking around outside your body."
~ Elizabeth Stone
Don’t assume that you know when/how family advisors can assist with a project, policy or initiative - being open to their wisdom at any moment might bring some perspective that otherwise would be missed.

Joanna Celenza
*Match the mechanism to the project*

Do you need ...

- A survey?
- An in-person focus group?
- An online focus group?
- A family advisory council?
- A parent panel?
- Family faculty?
- Parent representatives for committees?
- A short-term volunteer?
- A long-term volunteer?
- A parent on staff?
Gauge readiness

Is your staff ready?  

Is this family member ready?
Match the person to a mentor

Who on your staff can ...

- Meet with parents before and after meetings to debrief?
- Check in regularly with parents to see how projects are going?
- Give parents orientation to the unit “from the other side”?
- Be a champion for parent involvement in your unit?
Excerpted from *Powerful Partnerships: a Handbook for Families and Providers Working Together to Improve Care*

Don’t worry about exposing the system’s weaknesses to families. They already know about them.

Patient and family-centered care is about doing things with families, not to or for them.

Whether it is a quality improvement project or some other work, involving families from the very beginning is the best way to get it right.

Just get started.