Enhanced Simulation to Identify Latent Safety Hazards in the NICU

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Jesse Bender, MD, FAAP, Assistant Professor of Pediatrics at Warren Alpert Medical School of Brown University, is an industrial engineer, neonatologist, and founding Co-Director of the Care New England Simulation Program. Following St. Louis University Medical School, he completed residency at Hasbro Children’s Hospital then neonatal-perinatal medicine fellowship and chief fellow at Women & Infants Hospital, RI. Under his direction, simulation has intercalated into the local operational culture, becoming a vibrant force of patient safety, quality and risk management. He developed TESTPILOT-NICU (Transportable Enhanced Simulation Technologies for Pre-Implementation Limited Operations Testing), which models a functional intensive care unit for in situ clinical systems testing. With implementations at multiple institutions, Dr. Bender is now the principal investigator for AHRQ R18 “Generalizing TESTPILOT”. His other academic interests include evidence-based quality improvement, teamwork training, debriefing faculty development, difficult conversations, transport simulation, census modeling and clinical documentation. He is a Certified Healthcare Simulation Educator by the International Society Simulation Healthcare and co-chairs the Technology and Standards Committee for the International Pediatric Simulation Society.

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Associate Professor of Pediatrics - Neonatology
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Rita Dadiz DO, Associate Professor of Pediatrics, is a neonatologist at the University of Rochester Medical Center who conducts research on educational and clinical applications of simulation-based methodologies. She directs the Simulation-Based Emergency and Patient Safety Program in the Division of Neonatology. She recently led an interprofessional team of medical and nursing providers in the development and implementation of an in situ simulation program to identify latent safety threats in preparation for transition into a new healthcare facility.

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Director Simulation Education and Research
Rush University Medical Center
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Beverley Robin MD is an Assistant Professor of Pediatrics and the Director of Simulation Education and Research at Rush University Medical Center. As such she develops and implements inter-professional
faculty development programs, based on education principles and methodologies, aimed at preparing faculty for leading simulation-based education programs. In addition to these responsibilities she has served as adjunct faculty in the Graham Clinical Performance Center at the UIC College of Medicine since 2010.

Annual Quality Congress Breakout Session, Saturday, October 3, 2015 and Sunday, October 4, 2015
Enhanced Simulation to Identify Latent Safety Hazards in the NICU
Objectives:
Recognize that safety threats emerge as care practices transition to a new NICU.
Reveal safety threats, refine process and prepare staff prior to occupancy using immersive simulation.
Identify steps for structuring, preparing, and orchestrating simultaneous multidisciplinary in-situ simulations.
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Disclosures
Related work supported in part by AHRQ R18 HS 023460-01 "Generalizing TESTPILOT"

Learning Objectives
1. Recognize that safety threats emerge as care practices transition to a new NICU
2. Reveal safety threats, refine process and prepare staff prior to occupancy using immersive simulation
3. Identify steps for structuring, preparing, and orchestrating simultaneous multidisciplinary in-situ simulations

Workshop Agenda
• (5) Introduction / Engagement
• (10) Safety threats emerge as care practices transition
• (60) Reveal safety threats, refine process and prepare staff
  – Plan: Potential threats → learning objectives → scenarios
  – Do: Orchestrate immersive in situ simulations
  – Study: Facilitated debriefing optimizes discovery
  – Act: Directed corrections and improvement cycle
• (10) Scope of effort
• (5) Wrap-up

Neonatal Safety and Quality Goals
• Safety: Reducing preventable harm
  • Benchmarking: Institution performance
  • Improvement: Support research and quality

Safety Threats Happen
• Major culture change
  • Open bay to single family room NICUs
  • Care practices and staff attitudes may not translate cleanly
• Major process change
  • Workarounds gain inertia, develop cracks when care paradigm changes
  • Human Factors examines weak process, not people
  • High Reliability Systems: make it hard to do wrong thing
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October 3-4, 2015

Patient safety at transition
- Translate process
- Prepare staff

Process Readiness Measures

<table>
<thead>
<tr>
<th>Classification</th>
<th>Communication Device</th>
<th>Equipment</th>
<th>Staffing</th>
<th>Wayfinding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Issue</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Latent safety threat</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

Video
• We built this NICU to boost Family Centered Care
  – How ready are we?
  – Identify opportunities

Safety Threats Drive Learning Objectives
• Focus discovery on locally relevant issues

<table>
<thead>
<tr>
<th>Differences between Environments</th>
<th>Potential Safety Threats</th>
<th>Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery team recruitment</td>
<td>Neonatal team not notified of sick baby in the DR</td>
<td>LO 1</td>
</tr>
<tr>
<td>Route from DR to NICU: further</td>
<td>Incomplete complement of providers attends delivery</td>
<td>LO 2</td>
</tr>
<tr>
<td>environment</td>
<td>Prolonged transport resulting in hypothermia, risk of extubation, clinical deterioration</td>
<td>LO 3</td>
</tr>
<tr>
<td>Work space: plentiful area around</td>
<td>Doing a code situation, congested space limits access to patient or affects care</td>
<td>LO 4</td>
</tr>
<tr>
<td>patient beds becomes confined in</td>
<td>coordination</td>
<td>LO 5</td>
</tr>
<tr>
<td>single family room</td>
<td></td>
<td>LO 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 8</td>
</tr>
</tbody>
</table>

Differences between Environments | Define Potential Safety Threats | That translate into Learning Objectives |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery team recruitment</td>
<td>Neonatal team not notified of sick baby in the DR</td>
<td>LO 1 Demonstrate functional DR process and handheld technology for notification</td>
</tr>
<tr>
<td>Route from DR to NICU: further</td>
<td>Incomplete complement of providers attends delivery</td>
<td>LO 2 Access timely of emergent DR team recruitment</td>
</tr>
<tr>
<td>environment</td>
<td>Prolonged transport resulting in hypothermia, risk of extubation, clinical deterioration</td>
<td>LO 3 Determine process for recruiting backup if provider too busy to go to level 3 delivery</td>
</tr>
<tr>
<td>Work space: plentiful area around</td>
<td>Doing a code situation, congested space limits access to patient or affects care</td>
<td>LO 4 Test chosen and alternate routes from DR to NICU</td>
</tr>
<tr>
<td>patient beds becomes confined in</td>
<td>coordination</td>
<td>LO 5 Practice urgent response to clinical deterioration on route</td>
</tr>
<tr>
<td>single family room</td>
<td></td>
<td>LO 6 Evaluate best positioning of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 7 Effective task coordination with standardized staff bed positioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 8 Assess code overcrowding impact</td>
</tr>
</tbody>
</table>

RUMC NICU TESTPILOT

Latent Safety Threats by Severity

Issues count

1. Demonstrates functional DR process and handheld technology for notification
2. Access timely of emergent DR team recruitment
3. Determine process for recruiting backup if provider too busy to go to level 3 delivery
4. Test chosen and alternate routes from DR to NICU
5. Practice urgent response to clinical deterioration on route
6. Evaluate best positioning of: ventilator, HBO, bedside/code cart
7. Effective task coordination with standardized staff bed positioning
8. Assess code overcrowding impact
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Learning Objectives Interlace into Scenarios

<table>
<thead>
<tr>
<th>Baseline Vignettes</th>
<th>1st Scenario</th>
<th>2nd Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angel</td>
<td>Premature 28 weeks, incoming transport Secure endotracheal tube, set up ventilator, chest film, surfactant</td>
<td>Place central lines, hang IV Fluids, write orders</td>
</tr>
<tr>
<td>Bobby</td>
<td>Resolved cardiac hydrops, no IV, hyperkalemia, stable arrhythmia, EKG</td>
<td>If meds arrive, hung, labs sent, PAC’s resolve; otherwise progress; Improves on oscillator, bolus hypotension, vasopressors, inhaled nitric oxide</td>
</tr>
<tr>
<td>Cassius</td>
<td>Pulmonary hypertension, meconium aspiration; elective intubation, volatile SaO2, acidosis; stressed parent</td>
<td>Improves on oscillator, bolus hypotension, vasopressors, inhaled nitric oxide</td>
</tr>
<tr>
<td>Delila</td>
<td>Late preterm LGA; seizures persist despite dextrose and phenobarbital, mom anxious and demanding</td>
<td>Serial desaturation, apnea, intubate, prepare for CT scan</td>
</tr>
</tbody>
</table>

Critical Objectives Push the Envelope

<table>
<thead>
<tr>
<th>Widened Scenarios (WIHRI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code Stork</td>
</tr>
<tr>
<td>Code Blues</td>
</tr>
<tr>
<td>Slow to start</td>
</tr>
<tr>
<td>Multiple</td>
</tr>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>Power Outage</td>
</tr>
<tr>
<td>Rapid Response</td>
</tr>
</tbody>
</table>

Immersion In Situ Simulation

- One eighth of the new NICU
  - Stocked with supplies, equipment, mannequins
- Familiar or crucial cues
  - Actual monitors, vital signs
- Hybrid charts, active EMR
- ASCOM devices

Simulation Day

<table>
<thead>
<tr>
<th>Time</th>
<th>Space</th>
<th>Purpose, ground rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orient (30)</td>
<td>Room 2315</td>
<td>Purpose, ground rules</td>
</tr>
<tr>
<td>Familiarize</td>
<td>Room 2316</td>
<td>Room 2317</td>
</tr>
<tr>
<td>Sim 1 0 10 20 30 40 50 60 70 80</td>
<td>Debrief (60)</td>
<td></td>
</tr>
<tr>
<td>Sim 2</td>
<td>0 10 20 30 40 50 60 70 80</td>
<td>Debrief (60)</td>
</tr>
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Video

- Immerse process experts
  - How do narrators enhance realism?
- Simulation takes its own path
  - Identify expected and unexpected safety threats

Facilitated Debriefing

- Safe container
- Scaffolding on learning objectives
- Multiple documentaries
- Facilitation techniques

Debriefing Script

- Let’s discuss how that went:
  - We would like to hear everyone’s impressions
  - Remember this is not about learning, and we can’t
  - Constructive comments are encouraged, and we will not be too harsh
  - Try to give concrete examples, keep comments
  - I am responsible for keeping you safe, so I’ll interpose and add your points for
  - Later discussion, don’t feel personally...
- All topics are open for discussion:
  - I noticed a few zones during this stick worth discussing:
    1. Dimension 1: Video/enhancing realism
    2. Dimension 2: Video/enhancing realism
    3. Dimension 3: Video/enhancing realism
    4. Dimension 4: Video/enhancing realism
    5. Dimension 5: Video/enhancing realism
    6. Dimension 6: Video/enhancing realism

- Since nobody was everywhere, let’s start with a quick summary
  - Will the primary name in each zone give a one-line summary going on?

Iterative Improvement

- Discover, adjust, re-test
- Assign corrections to process workgroup
- Training on evolved care practices
  - Integrate solutions into orientation workshop
  - Standardized messaging

Messaging Resolutions

- Allowed
  - Families and staff may have: + Covered nurses (with a logo, cap, etc.,)
  - Not allowed
  - Families and staff may not bring in:
  - Uncovered beverages
  - Food
  - Families may eat in the NICU family lounge on the 2nd Floor Ronald McDonald area

GOSNELL NICU update

October 3-4, 2015
Explore Scope of Effort

• Key Stakeholders
• Simulation Team Roles
• Necessary Resources
• Time to prepare

Time to Prepare

• Don’t underestimate the time commitment!!!!
• When do you have access? Announced move day?
• Who has power to set technology deadlines: network, communications devices?
• Integrate with hospital-wide transition programs

Questions?

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References