Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU

Susan A. Furdon RN, MS, NNP-BC

Objectives:
- Identify one model for improving healthcare quality in the NICU
- Describe one unit’s process of translating evidence into bedside practice
- Discuss the use of ongoing audits & feedback to all members of the healthcare team to sustain the GAINS

Quality Initiatives to Improve Outcomes of VLBW
- Is Zero Possible? CLABSI Reduction After Implementation of Insertion & Maintenance Bundles
  Lynn J Spilman MS, RN, NNP-BC, Susan A. Furdon MS, RN, NNP-BC, Michael J Horgan MD, Rebecca O’Donnell, MT(ASCP), CIC
- Operation “Toasty Tot”: A Quality Improvement Initiative to Minimize Hypothermia During Delivery Room Stabilization of the VLBW Neonates
  Susan A Furdon MS, RN, NNP-BC, Joaquim M. Pinto-De-Mello MD, MPH, Susan Boynton BSN, RNC, Robin Dugan BSN, RNC, Christine Sou Dionissio BS, RNC, NNP-BC, Mary Wedrychowicz MS, RN
- “Love My Curves”: Prevention of Postnatal Growth Restriction by the Implementation of an Evidenced-Based Premature Infant Feeding Bundle
  Pauline Graziano MS, RN, NNP-BC, Michael Horgan MD, Theresa Loomis RD, CNSD

Plan Study Do Act

Disclosure
- Susan A. Furdon MS, RN, NNP-BC does not have any financial arrangement or affiliations with a commercial entity.
- Ms. Furdon will not be discussing the unlabeled use of a commercial product in her presentation.
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU
Susan A. Furdon RN, MS, NNP-BC

ELEMENTS OF SUCCESS:

Recognition & Belief:

Prior to the meeting, we didn’t believe 0 was possible
Thought sepsis evaluations & sepsis were just part of the work we did – blamed our patient population
Also thought that any unit that had small CLABSI rates must be different than us – less acute patients

Transparency of Data & Process

Definitions reviewed / operationalized
Best site (s) identified; processes at those sites described; Bundle elements defined
Networked with clinical coordinator / toured nursery & interviewed staff

(Especially grateful for the in-depth lecture by Grace Marin RN, BSN (Clinical Coordinator of Neonatal ICU @ Kravis Children’s Hospital)

Plan Study Do Act

PICC Insertion

Elements of bundle
Establish a central line kit or cart to consolidate all items necessary for the procedure (1B)
Perform hand hygiene with hospital approved alcohol-based product or antiseptic-containing soap (CHG): before and after palpating insertion sites before and after inserting central line. (1A)

AMC Change in Practice
PICC cart developed

Already implemented:
Reinforced with education/ audits
Added hand hygiene stations

Insertion

Elements of bundle
Use maximal barrier precautions (including sterile gown, sterile gloves, surgical mask, hat & large sterile drape) (1A)

Disinfect skin with appropriate antiseptic (eg CHG 2%) before catheter insertion (1A)

AMC Change in Practice
No change in policy
Did change “kit” – larger drape
Did education and staff took on role of enforcers of the 3-foot rule
No change
No change – use Opsite 3000 (Smith & Nephew)
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU
Susan A. Furdon RN, MS, NNP-BC

**PICC Maintenance**

- **Elements of bundle**
  - Perform hand hygiene with hospital approved alcohol-based product or antiseptic-containing soap before and after accessing a catheter or changing the dressing (1A)
  - Evaluate the catheter insertion site daily for signs of infection and to assess dressing integrity (1B)
  - At a minimum, if the dressing is damp, soiled or loose, change it aseptically (1B)
  - Disinfect the skin around the insertion site with an appropriate antiseptic (1A)

- **AMC Change in Practice**
  - Reinforced element with education; increased visibility of hand sanitizer along outside perimeter of our pods
  - Nursing assessment in E-HR
  - Discontinued use of Biopatch which required q7 day dressing change;
  - Changed unit standard: change dressing when damp, loosened or soiled

**Maintenance**

- **Elements of bundle**
  - Develop and use standardized intravenous tubing set-up and changes (1B)
  - Maintain aseptic technique when changing IV tubing and when entering the catheter including “scrub the hub” (1A)
  - Daily review of catheter necessity with prompt removal when no longer essential (1B)

- **AMC Change in Practice**
  - Closed medication system including Churchill Medical 6” trifurcated extension set
  - Tubing changes using sterile technique;
  - Reinforced ‘scrub the hub’ for 60 sec with education;
  - Implemented ‘chains’ as reminder of sterility during tubing change (30 foot rule)
  - Daily interdisciplinary review of necessity of catheter with attending on am rounds

**Space constraints: 3 foot rule around sterile procedure**

**Yoda’s Rules to Jedi Warriors:**

**DEFEAT THE ENEMY!**

1) Keep up to date!
   - All Jedi will be ‘in the know’ after the Fair

2) Organize PICC supplies
   - Dressing supplies are already in one bag
   - In process of setting up cart for insertion supplies
   - We have a vendor who will prepackage insertion supplies (will be ready ~ 10 weeks)

3) Maximum Barrier
   - Precautions: insertion of PICC
     - Mask, gowns, hat & sterile gloves
     - Sterile drape entirely covers baby
     - Mask, hat on anyone within 3 foot invisible shield

4) Use evidence for dressing changes:
   - Stop using Biopatch
   - Change dressing within 24h of insertion [remove blood]
   - Change dressing when loosened or soiled (bloody)
   - 2 person procedure to maintain sterility

5) Standardize tubing
6) Maintain sterility with tubing changes
   - 2 person technique
   - sterile field & sterile gloves/ mask with tubing changes

<table>
<thead>
<tr>
<th></th>
<th>Jedi #1</th>
<th>Jedi #2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jedi’s wardrobe</strong></td>
<td>Mask/ non-sterile gloves</td>
<td>Gown, sterile gloves, mask, hat</td>
</tr>
<tr>
<td><strong>Assembling our weapons</strong></td>
<td>Assistant for preparation of new set up</td>
<td>Prepare supplies on sterile drape</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>Remove old tubing</td>
<td>Connect new tubing to PICC using aseptic technique</td>
</tr>
</tbody>
</table>
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU
Susan A. Furdon RN, MS, NNP-BC

Standardized Tubing is a Closed Medication System ... Our weapon in fighting bacteria
- Tubing changed q 24h
- Tubing changed using sterile technique
- No entry of tubing close to the patient or the patient’s environment
- Limits the # of entries to the line per day
- Continue to scrub the hub (scrub the q-site) as medication syringe is changed (60 seconds using clock)
- Scrub the CLC valve at time of tubing change with alcohol for 60 seconds

Most important rule
8] ALL JEDI’S MUST WASH HANDS
- Use waterless skin cleanser
- Wear gloves for all patient contact

Points of clarification
- This new tubing is a trial – there will be an evaluation tool in order to give feedback
- Tubing is just for PICCs for now
- Tubing is NOT a triple lumen ie compatibility of solutions still important because the solutions come together within the tubing

CLABSI Prevention Bundle: Maintenance
Should practice extend to all lines?
- Daily assessment of catheter need
- Removal when 100-120 mL/kg/day enteral nutrition achieved
- Monitor dressing integrity & cleanliness
- Use closed system for infusion, blood sampling & medication administration
- Assemble & connect infusion tubing using aseptic technique.
- Use consistent tubing configuration

Setting UP
Insertion audits

- Completed by RN, NP or fellow who inserts the PICC
- Audit is part of the universal protocol & procedure note
- Separate section for adherence to guidelines that is not part of the medical record
- Useful to define expectations to new fellows/staff involved in the procedure

Checklist: Do They Work?

Audits done by 2 CNS & 2 experienced PICC team nurses

- Staff know we are actively looking at set up/ dressing integrity/ scrub the hub & line necessity
- Currently, staff provide the ‘answer’ before the question is asked
- Increased conversation about the PICC itself during rounds
- Parents know the plan!
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU
Susan A. Furdon RN, MS, NNP-BC

Recipe ‘worked’ right away
- Stick to a new diet – belief that this recipe ‘worked’:
  - Reinforced the change in behavior
  - Hardwired that change
  - In turn, results supported additional recognition to staff for their efforts

Recipe for Success
- Interdisciplinary Recognition – “we had a problem”
- Sterile tubing change respecting space
- Accessing line outside patient environment
- Multidisciplinary effort to evaluate need for Central access DAILY

Plan Study Do Act

CLABSI Prevention Bundle: Leadership
- Administrative involvement & support for zero HAIs
- Engage staff with feedback
  - Posting days since last CLABSI
  - Posting rates of CLABSI
- Perform investigation of each CLABSI
- Surveillance activities for critical processes
  - Hand hygiene
  - Line management and entry
  - Off unit procedures
  - Stop the line support
- Trained personnel to perform specialized maintenance activities

Investigating Failure
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU

Susan A. Furdon RN, MS, NNP-BC

How do we maintain the success of our current recipe as we go forward?

AMC’s CLABSI rate since initiative started

AMC’s CLABSI initiative

<table>
<thead>
<tr>
<th>Year</th>
<th>CLABSI</th>
<th>CL Days</th>
<th>Rate per 1000 CL Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>38</td>
<td>3389</td>
<td>11.2</td>
</tr>
<tr>
<td>2008</td>
<td>4</td>
<td>3382</td>
<td>1.19</td>
</tr>
<tr>
<td>2009</td>
<td>1</td>
<td>4706</td>
<td>0.21</td>
</tr>
<tr>
<td>2010</td>
<td>5</td>
<td>4268</td>
<td>1.17</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>3219</td>
<td>0.93</td>
</tr>
<tr>
<td>2012</td>
<td>ZERO!</td>
<td>4041</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>3</td>
<td>3875</td>
<td>0.77</td>
</tr>
</tbody>
</table>

ELEMENTS OF SUCCESS:

- BENCHMARKING
- TRANSPARENCY IN DATA
- BUNDLE ELEMENTS
- UNIT CHAMPION(S)
- COMMUNICATION: EVIDENCE TRANSLATION IN ACTION
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU
Susan A. Furdon RN, MS, NNP-BC

Getting To Zero CLABSI! … A Believable Goal?

We must focus on the patient & challenge ourselves to no longer accept the unacceptable…

CLABSI ARE PREVENTABLE

Maintaining Normothermia in the Delivery Room for Preterm Infants: OPERATION: TOASTY TOT

Admission temperatures related to mortality

AMC’s Admission Temperatures: VLBW

Comparison showed an increase in hypothermia on admission

AMC: a “better performer” when compared within Vermont Oxford Network (VON) – 2005 & 2006

AMC discontinued use of chemical warm packs for neonatal stabilization in 2007 after one infant experienced focal skin injury


46% of initial temperatures of VLBW < 36°C

28% increase in mortality for every 1°C decrease in temperature

AMC: a “better performer” when compared within Vermont Oxford Network (VON) – 2005 & 2006

AMC Period I

2006 to mid 2007
Chemical warm packs consistently used

AMC Period II
Mid to end 2007
Chemical warm packs were discontinued
**Methods**

- Mobilized to make a change!
- Downward trend of AMC’s admission temperatures of VLBW
- Impact of hypothermia as described in the literature

**Identify Unit ‘champions’:**
- Developed an interdisciplinary & interdepartmental (NICU & DR) workgroup to improve outcomes
- Standardized stabilization processes in the DR to enhance infant temperature
- Identified measurable objectives
- Utilized Plan-Do-Check-Act methodology

**Objectives of Quality Initiative**

- To optimize/standardize the delivery room thermoregulation procedures to maintain temperature 36.5-37.5°C in the VLBW (birthweight < 1500g) born at the regional center
- To improve the prevalence of admission temperatures 36-38°C for inborn VLBW infants to > 90%

**Objectives of Quality Initiative**

- To optimize/standardize the delivery room thermoregulation procedures to maintain temperature 36.5-37.5°C in the VLBW (birthweight < 1500g) born at the regional center
- To improve the prevalence of admission temperatures 36-38°C for inborn VLBW infants to > 90%

**Effectiveness of Quality Initiative**

- Admission temperature standardized: measured prior to transfer from the stabilization bed to the admission bed
- Data collected & submitted to QI data coordinator
- Accuracy of data: State Perinatal data sets compared with Vermont Oxford data
- Graphic display developed & updated monthly

**Increasing staff awareness of the problem**

- “Call” for participants in workgroup
- Graphic display developed & updated monthly – provided feedback to medical & nursing staff in the NICU
- Develop a logo / name for our project to OPERATION TOASTY TOT

**Temperature Measurement**

- Admission temperature standardized: measured prior to transfer from the stabilization bed to the admission bed
- Data collected & submitted to QI data coordinator
- Accuracy of data: State Perinatal data sets compared with Vermont Oxford data
- Graphic display developed & updated monthly
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU

Susan A. Furdon RN, MS, NNP-BC

OPERATION TOASTY TOT
Target the Pink Zone
Goal >/= 90% in-born VLBW between 36-38°C

Statistical improvement after education: 2008

Thermoregulation Bundle

Toasty Tot initiative continued:
New Cycle PCDA ...

2009: 92% admission temperatures of VLBW in the target zone!
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU

Susan A. Furdon RN, MS, NNP-BC

Lower proportions of hypothermic infants after staff education & Operation Toasty Tot bundle implementation

Conclusion:
- 403 inborn VLBW babies over 36 months
- Lower proportions of hypothermic infants after staff education and Operation Toasty Tot bundle implementation in month 15
- Initial data showed more consistent improvement in lowest birthweight category (GA <29 weeks); bundle strategies then extended to those ≥29 weeks
- Objective achieved: > 90% temperatures in VLBW admissions between 35-38°C
- Hyperthermia (>38°C) incidence was ~2% both before and after bundle implementation

Objective achieved: > 90% temperatures in VLBW admissions between 35-38°C

Objectives:
1. Develop an evidenced-based enteral feeding “bundle” to address standardization of nutritional practices
2. Improve nutritional intake of VLBW infants
3. Establish goal: > 90% of admitted AGA VLBW infants will be discharged home above the 10th percentile for weight and head circumference

Background
- Postnatal growth restriction remains a major morbidity for VLBW (<1500g) infants affecting health & neurodevelopmental outcomes
- Despite early initiation of optimized parenteral nutrition, the majority of VLBW infants fall short of expected growth trajectories
- A retrospective review of Albany Medical Center NICU feeding practices/growth outcomes completed to identify baseline practices.
- An interdisciplinary workgroup reviewed current literature on feeding practices and outcomes.
- An evidenced-based enteral feeding bundle was developed and presented to the medical team for consensus.
- Interactive education of the bundle elements was provided to all NICU staff. Education included a review of current evidence, planned changes in practice, resource materials and an auditing tool.

Feeding Bundle – Jan 2010

<table>
<thead>
<tr>
<th>Elements</th>
<th>Objectives</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Substrate</td>
<td>Preferred: Breast Milk</td>
<td>- Formula: Premature 24 cal</td>
</tr>
<tr>
<td>Feed Initiation</td>
<td>&lt;Goal: by DOL 2 (within 24 hrs of birth)</td>
<td>- Volume/Frequency pre-defined by weight (10-20 ml/kg/day)</td>
</tr>
<tr>
<td>Feed Advancement</td>
<td>No &gt; 20 ml/kg/day per pre-defined advances unless PO feeding</td>
<td>- Advance daily if meets tolerance definition</td>
</tr>
<tr>
<td></td>
<td>&amp;/NPN: Premature 24 cal</td>
<td>- Goal: 140-160 ml/kg/day enteral intake</td>
</tr>
<tr>
<td></td>
<td>Less than 1 KG</td>
<td>- Less than 1 KG:</td>
</tr>
<tr>
<td></td>
<td>Men (10-20 ml/kg/day) x 5 days</td>
<td>- Advance daily as tolerated to goal.</td>
</tr>
<tr>
<td></td>
<td>Begin increase feed day 6</td>
<td>- Greater than 1 KG:</td>
</tr>
<tr>
<td></td>
<td>Advance daily as tolerated to goal.</td>
<td></td>
</tr>
</tbody>
</table>

Pauline Graziano MS, RN, NNP-BC, Michael Horgan MD, Theresa Loomis RD, CNSD

"Love My Curves": Prevention of Postnatal Growth Restriction by the Implementation of an Evidenced-Based Premature Infant Feeding Bundle

"Love My Curves": Prevention of Postnatal Growth Restriction by the Implementation of an Evidenced-Based Premature Infant Feeding Bundle

Pauline Graziano MS, RN, NNP-BC, Michael Horgan MD, Theresa Loomis RD, CNSD

Objectives:
1. Develop an evidenced-based enteral feeding "bundle" to address standardization of nutritional practices
2. Improve nutritional intake of VLBW infants
3. Establish goal: > 90% of admitted AGA VLBW infants will be discharged home above the 10th percentile for weight and head circumference

Background
- Postnatal growth restriction remains a major morbidity for VLBW (<1500g) infants affecting health & neurodevelopmental outcomes
- Despite early initiation of optimized parenteral nutrition, the majority of VLBW infants fall short of expected growth trajectories
- A retrospective review of Albany Medical Center NICU feeding practices/growth outcomes completed to identify baseline practices.
- An interdisciplinary workgroup reviewed current literature on feeding practices and outcomes.
- An evidenced-based enteral feeding bundle was developed and presented to the medical team for consensus.
- Interactive education of the bundle elements was provided to all NICU staff. Education included a review of current evidence, planned changes in practice, resource materials and an auditing tool.

Feeding Bundle – Jan 2010

<table>
<thead>
<tr>
<th>Elements</th>
<th>Objectives</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Substrate</td>
<td>Preferred: Breast Milk</td>
<td>- Formula: Premature 24 cal</td>
</tr>
<tr>
<td>Feed Initiation</td>
<td>&lt;Goal: by DOL 2 (within 24 hrs of birth)</td>
<td>- Volume/Frequency pre-defined by weight (10-20 ml/kg/day)</td>
</tr>
<tr>
<td>Feed Advancement</td>
<td>No &gt; 20 ml/kg/day per pre-defined advances unless PO feeding</td>
<td>- Advance daily if meets tolerance definition</td>
</tr>
<tr>
<td></td>
<td>&amp;/NPN: Premature 24 cal</td>
<td>- Goal: 140-160 ml/kg/day enteral intake</td>
</tr>
<tr>
<td></td>
<td>Less than 1 KG</td>
<td>- Less than 1 KG:</td>
</tr>
<tr>
<td></td>
<td>Men (10-20 ml/kg/day) x 5 days</td>
<td>- Advance daily as tolerated to goal.</td>
</tr>
<tr>
<td></td>
<td>Begin increase feed day 6</td>
<td>- Greater than 1 KG:</td>
</tr>
<tr>
<td></td>
<td>Advance daily as tolerated to goal.</td>
<td></td>
</tr>
</tbody>
</table>
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU

Susan A. Furdon RN, MS, NNP-BC

<table>
<thead>
<tr>
<th>Elements</th>
<th>Objectives</th>
<th>Details</th>
</tr>
</thead>
</table>
| Breast milk Fortification | Fortify BM to 24 cal/oz using liquid HMF once enteral feeding volume 50 ml/kg/day | Management of Residuals:  
+ 25% residual of daily enteral intake AND normal exam  
+ Definition of Intolerance: > 50% residual of daily enteral intake while feeds advancing; > 30% residual once tolerating full feeds, OR abnormal exam  
Definition of Abnormal Findings:  
- Abdominal distension, discoloration, qable loops, absent bowel sounds  
- Bloody stool  
- Bilious aspirates (defined by color chart)  
- Vital sign instability/Change from baseline status |
| Feed Tolerance         | Definition of Tolerance: < 50% residual of daily enteral intake AND normal exam  
+ Definition of Intolerance: > 50% residual of daily enteral intake while feeds advancing; > 30% residual once tolerating full feeds, OR abnormal exam | |

Same recipe to achieve goals
- NYS data sharing & evidence evaluation
- Bundle Elements brought to medical & nursing leadership team for consensus
- Bundle elements and background evidence brought to nursing staff
- Data collection
- Evaluation & new cycle of implementation

Outcomes!
- Average DOL to First Feeding decreased from day 10 to day 2.
- Average day to Full Feedings decreased from day 28 to day 16.
- Average day to re-gain Birth Weight decreased from day 22 to day 10.

Outcomes: Nutrition Initiative

All NYS RPCs

Infants discharged > 10th percentile for weight

| Percentage of Newborns Discharged Below Fenton’s 10th Percentile for Weight |
|-----------------------------------------------|-----------------|-----------------|
| Source: NYS NICU Module Data                  | 2009            | 2010            | Jan-Sep 2011    |
| AGA @ Birth                                  | 20.0            | 21.1            | 20.2            |
| AGA @ Discharge                               | 20.4            | 18.4            | 20.4            |

<table>
<thead>
<tr>
<th>AGA @ Birth</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGA @ Birth</td>
<td>90%</td>
<td>80%</td>
<td>70%</td>
</tr>
<tr>
<td>AGA @ Discharge</td>
<td>90%</td>
<td>80%</td>
<td>70%</td>
</tr>
</tbody>
</table>
Beyond CLABSI: Sustaining Gains from Three Quality Improvement Efforts in the NICU

Susan A. Furdon RN, MS, NNP-BC

Conclusions:
- Establishing a standardized approach to feeding initiation and advancement (Feeding Bundle) significantly decreased the number of days in initiating feedings, reaching full feeds, and regaining birth weight in our institution.
- Adherence with bundle (now > 90%) has led to improved growth outcome measurements for both weight and head circumference measurements.
- Continuing to work towards goal of > 90% of AGA at birth infants maintaining > 10th percentile measurements at discharge.
- Additional monitoring has revealed AMC NICU’s central line utilization rates have fallen below national averages.

Advanced Practice Nurse: Bridging the Evidence to Practice
- Review science behind evidence as foundation of bundle elements
- Clinical knowledge & expertise
- Develop bundle elements into actionable care at the bedside
- Provide education to nurses & physicians
- Clinical presence: Provide support with ongoing audits/feedback

Quality Improvement ...
- Reliably adhering to defined practices on a daily basis is immensely challenging.
- APN can focus on education & support of practice changes – both nursing & medical team.
- Organizational commitment to change is key to APN’s ability to fulfill this aspect of their role.

APN Colleagues: Providing leadership for Quality initiatives
- CLABSI Reduction
  - Lynn Spilman MS, RN, NNP-BC
  - Sue Furdon MS, RN, NNP-BC
- Thermoregulation Initiative
  - Christine Reu Donlon MS, RN, NNP-BC
  - Sue Furdon MS, RN, NNP-BC
- Nutrition Initiative
  - Pauline Graziano MS, RN, NNP-BC

RECOGNIZE THE TEAM @ ALBANY MED!

Ongoing, continuous auditing and feedback has successfully affected a culture of practice change resulting in a new standard of care and improved outcomes at our institution.