The Makings of a Small Baby Unit
Anamika B. Mukherjee, MD, MS
Assistant Professor of Pediatrics
Loma Linda Children's Hospital
Division of Neonatology
September 28, 2016

Objectives
• What is a Small Baby Unit
• History of Small Baby Unit
• Why is a Small Baby Unit Important
• What are the critical components of creating a Small Baby Unit
• What is Needed for a Small Baby Unit to Succeed

What’s the big deal?
• Long-term outcomes of 6-year olds
• Born > 3 months preterm
  • 12% had disabling cerebral palsy
  • 22% had severe physical disabilities
  • 41% had learning difficulties
  • 20% had repeated at least one grade in school

Marlow, et al. NEJM Jan 2005
What’s the big deal?

- Long term outcomes of 8-year olds
- ELBW (<1000 g) vs. term infants
  - Asthma (21% vs. 9%)
  - Poor motor skills (47% vs. 10%)
  - Poor academic skills (37% vs. 15%)
  - I.Q < 85 (38% vs. 14%)

Hack, et al, JAMA July 2005

What’s the big deal?

- 22-month olds - VLBW (< 1500 g)
- Autism screening - 26% tested positive!
- Not a diagnosis of autism, but a red flag about communication and behavioral abnormalities

Limperopoulos, et al, Pediatrics, April 2008

Background

- Although survival of ELBW infants has improved with advances in neonatal intensive care – survivors are discharged from the hospital with neurodevelopmental delays and/or chronic medical problems.
- Collaborative quality improvement and team-based care has been shown to significantly improve outcomes

Stoll et al, Pediatrics, 2010
Nationwide Children’s Hospital
Columbus, OH

- Small Baby Guidelines
  - A multidisciplinary team developed guidelines for the standardization of care for babies born < 27 weeks gestational age.
  - A unified, interdisciplinary approach to care was used in the first week of life
  - Family-centered, developmental care principles applied

Cincinnati Hospital

- 1999 – complete renovation of 46-bed Level III NICU to provide state-of-the-art family-centered, developmental care equipment and monitoring:
  - Developmental needs of infants
  - Family needs
  - Staff needs
- Wee Care Education – entire staff educated
  - The physical environment
  - Neonatal development
  - Special feeding needs of infants
  - Incorporating families into the entire NICU process

Outcomes

- Retinopathy of Prematurity – Grade 3 or 4
  - Decreased: 14% → 8%
- Intraventricular Hemorrhage – Grade 3 or 4
  - Decreased: 11% → 3%
- Ventilator Days
  - Decreased: 2351 → 1898 days
- Length of Stay
  - 24-27 weeks at birth: 78 → 58 days = 21 days less
  - 28-30 weeks at birth: 58 → 45 days = 13 days less
  - 31-34 weeks at birth: 34 → 23 days = 11 days less
- Cost per infant:
  - $25,072 → $18,919
Nationwide’s Experience

- Prior survival of 23 weekers: 10%
- Survival after implementing standardized protocols: 78%
- Small Baby Program:
  - Dedicated small baby protocols
  - Dedicated small baby experts
  - Dedicated space staffed by devoted/specially-trained nurses

Comparison of infant outcomes before and after creation of the program:
- Shorter LOS
- Less BPD
- Less IVH

The CHOC Experience

- Hypothesis: improve outcomes in CLD by establishing a separate unit and specialized team to care for these infants
- Thought - would see decrease rates of:
  - nosocomial infection
  - postnatal growth failure
- Improved:
  - standardized clinical practice
  - staff satisfaction
The CHOC Experience

- 67 bed Level IV NICU
- Average daily census of 40
- 55-60 ELBW infants/year
- Pre-intervention: 117 infants, 2008-2009
- Post-intervention: 232 infants, 2010-2013
- Criteria:
  - 28+6/7 weeks
  - Delivered at referring hospitals
  - Transferred to SBU < 1 month

The CHOC Experience

- Interventions:
  - Creation of ELBW program, March 2010 – physically separate location
  - Lead physician and NNP
  - Creation of a Core Team: NNPs, RTs, developmental specialists, dieticians, lactation support, pharmacists, social services, transport services, HRIF

The CHOC Experience

- Continuing education:
  - Twice per week: informal talks in the SBU to discuss care practices, research, staff concerns
  - Once per week: pharmacy/nutrition rounds with neonatologist, NNP, dietician, lactation consultant
  - Quarterly 3h meetings presenting outcome data and relevant topics
The CHOC Experience

- Guidelines: 3 Phases
  - Guideline 1: Birth – 10 days
  - Guideline 2: 11 days – 30 days
  - Guideline 3: 1 month – discharge

- Priorities:
  - CPAP and earlier extubation
  - Best evidence-based practice integrated with unit culture
  - Tools integrated into standard practice prior to implementation of guidelines/checklists
  - Identification of mistakes and creation/use of checklists to address those areas

Small Baby Guidelines Study

Table 1. Patient Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Comparison (N=40)</th>
<th>Small Baby Guidelines (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (g)</td>
<td>718 ± 141</td>
<td>723 ± 177</td>
</tr>
<tr>
<td>Gestational age (wks)</td>
<td>25.0 ± 1.2</td>
<td>24.5 ± 0.8</td>
</tr>
<tr>
<td>on admission (days)</td>
<td>2.0 ± 2.1</td>
<td>2.4 ± 2.3</td>
</tr>
</tbody>
</table>

Mean ± Standard Deviation

Small Baby Guidelines Study

Table 2. Patient Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Comparison</th>
<th>Small Baby Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survived first week</td>
<td>80%</td>
<td>93%</td>
</tr>
<tr>
<td>Survived to discharge</td>
<td>70%</td>
<td>76%</td>
</tr>
<tr>
<td>Age at discharge (days)</td>
<td>143 ± 76</td>
<td>104 ± 46d</td>
</tr>
<tr>
<td>BPD</td>
<td>8.7%</td>
<td>8.6%</td>
</tr>
<tr>
<td>Discharge on oxygen</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>RHH survivors</td>
<td>21%</td>
<td>34%</td>
</tr>
<tr>
<td>Secured RHH survivors</td>
<td>46%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Mean ± Standard Deviation or Percent of Patients

*S Small Baby Guidelines group different from comparison group, p < 0.05*
The CHOC Experience

- Outcome Measures:
  - Reduction of chronic lung disease, oxygen requirement at 36 weeks
  - Nosocomial infection
  - Post-natal growth failure
  - Other comorbidities: severe IVH, PVL, NEC, pneumothorax

- Process measures:
  - Resource utilization: labs, radiographs
  - Staff satisfaction
  - Family satisfaction through consistency in care

Themes from the CHOC Experience

- Program ownership
- Continuity of care
- Core interdisciplinary team
Now What?
- It all starts with … a single idea
- Commitment from leadership
- A committed steering committee
- A needs’ assessment
- Introduction of the concept to the Unit
- Detailed proposal and financial backing specific to the site
- Identification and staged addressing of each obstacle/need

The Next Steps
- Update/establishment of data tracking methods
- Defining population and patient flows
- Defining approach to physician and nursing patient assignments/continuity
- Implementing practice to be incorporated in guidelines
- Trialing staffing prior to implementation
- Equipment/space/construction

The Next Steps
- Revision, discussion, circulation, and finalization of detailed protocols/guidelines/checklists by all disciplines
- Invitation of self- and nominated individuals committed to the principles of the SBU
  - After review of process, protocols, guidelines with opportunity for input – confirming adherence to finalized guidelines
- Formal staff training – didactics and simulation
  - To include both SBU intended participants and ono-participants
Now What?
- It all starts with … a single idea
- Commitment from leadership
- A committed steering committee
- A needs’ assessment
- Introduction of the concept to the Unit
- Detailed proposal and financial backing specific to the site
- Identification and staged addressing of each obstacle/need

The Next Steps
- Update/establishment of data tracking methods
- Defining population and patient flows
- Defining approach to physician and nursing patient assignments/continuity
- Implementing practice to be incorporated in guidelines
- Trialing staffing prior to implementation
- Equipment/space/construction

The Next Steps
- Revision, discussion, circulation, and finalization of detailed protocols/guidelines/checklists by all disciplines
- Invitation of self- and nominated individuals committed to the principles of the SBU
  - After review of process, protocols, guidelines with opportunity for input – confirming adherence to finalized guidelines
- Formal staff training – didactics and simulation
  - To include both SBU intended participants and ono-participants
The Role of Our Families

- Changing view of family role in medicine over the last few decades
- Family role is central to success of SBU
  - Creating/maintaining an environment that understands their stressors and offers simple solutions
  - Encouraging their frequent presence
    - Family room – parenting books, magazines, children’s books
    - Resource area for coffee
    - Volunteer station to support family room for service/monitoring
    - Photo Board of SBU Team Members
    - Specialized discharge class
    - Strong emphasis and support of breastfeeding
    - Bedside whiteboards – “Goals of the Day”

Communication Challenges

- Creating a sense of urgency and excitement about developing a SBU Program
- Addressing/dispelling fears
- QI Board that includes data and QI processes
- Pre-shift Brief Huddle, using at tool/template for structure – attended by multidisciplinary team
- All team members present for bedside rounds
- Frequent, constant, on-going communication about new data with a system for implementing process changes
- Required team-building activities

“Stronger Together”

- Cannot succeed with the efforts of a single person or discipline
- Dependent upon buy-in by all disciplines
- When it is a reality – will represent the ultimate accomplishment in teamwork
- Represents why we all chose to be a part of healthcare – to be a part of and contribute meaningfully to something better
Acknowledgements

Dr. Elba Fayard, Dr. Douglas Deming, Dr. Raylene Phillips, Dr. Andrew Hopper, Dr. Yona Nicolau, Tristine Bates