Micro-Preemies….Macro Outcomes
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Keywords: Micro-Preemie II Homeroom

Background: As we reviewed our Nightingale data and clinical outcomes (including mortality rate) on our micro-preemies we discovered a need to improve some of the clinical outcomes of these babies. Some of our actual outcomes were trending away from the desired outcomes. In the past our team has focused on a 1-2 specific outcomes at a time, we took this opportunity to focus on all the clinical outcomes beginning in the delivery room. Our NICU team felt we needed to standardize the care of this population in order to improve the outcomes and decrease our mortality rate.

Global AIM: Reduce mortality rate for infants 22-25 6/7 weeks to <30% and for infants 22-29 6/7 weeks to <10% by end of December 2016.

Secondary Aims:

Golden Hour Charter (Focus on thermoregulation): Fewer than 10% of babies <30 weeks will have initial axillary temp <36.5°C on admission to the NICU

Respiratory Charter: Reduce BPD rate to <15% for babies born <30 weeks by end of December 2016

Circulatory Charter: Reduce the incidence of severe IVH in infants <30 weeks 9% by end of December 2016

Family Centered Care: All eligible infants <30 weeks will do kangaroo care by the end of week one, if not sooner.

Setting: 48 bed Level 3 NICU with an average of 600 admissions a year and 2500+ deliveries. Our NICU performs all pediatric surgery except cardiac, diaphragmatic hernias and ECMO. We have a maternal and Neonatal transport team.

Mechanisms: We recognized that Micro-preemie standardization was not a priority in our unit (even though we had guidelines and protocols in place). Our NICU had and continues to have an increase in infants born <30 weeks and we recognized the need to improve the care and outcomes of these infants. We took this as an opportunity to look at all the clinical outcomes related to the micro-preemie and compare them to other VON centers and to our past data.

Drivers of Change: See Driver Diagram

Methods:

- January 2014: Flowcharted current work flow processes, Flow charts out to staff for input
- March 2014: Golden Hour: Formal audit tool initiated and general staff education rolled out-including, aim statement and initial goals, monitoring skin temps and room temps in delivery room (PDSA cycle), standardized approach to wrapping infant with NeoWrap product, transporter temp increased.
- Respiratory: Education and implementation for standardized respiratory processes for staff and RT (Respiratory algorithm for infants <30 weeks, standardization of surfactant use in delivery room for only infants requiring intubation (PDSA), standardization of nIMV and BCPAP via RAM cannula for those not requiring intubation (PDSA), Extubation criteria checklist with evaluation for extubation2x daily, nIMV standardization of settings.)
- April 2014: Developed PRBC transfusion guidelines.
- July 2014: PRBC transfusion guidelines revised and EPO guidelines approved
- August 2014: Standardized weaning from nIMV
- September 2014: Standardization of BCPAP +5 to 32 weeks PMA for infants born <30 weeks. (PDSA)
- December 2014: Vit A guideline developed and implemented into practice, Dedicated OR official for premature infants (temperature always at 77°F) (PDSA). Pre-delivery huddle and post-delivery debriefing starting. Circulatory: PDA management guidelines approved
- January 2015: Final revisions to Golden Hour Nursing policy completed, plastic lined sterile drape available for trial
- February 2015: Bedside flip cards for quick reference during golden hour admissions revised to reflect current practice and placed at bedside
- April 2015: Initial axillary temp goal increased to 36.5°C to coincide with state collaborative initiatives. Kangaroo Care staff survey (PDSA). Kangaroo Care Charter developed
- June 2015: Timed cord clamping at delivery guideline and infant first labs from placenta approved and initiated (PDSA)
- July 2015: Development of selective prophylactic indomethacin for infants <25 weeks (work in progress), Protocol for Golden Hour and Beyond in development including Core RN staff to care for tiniest of infants Volume targeted ventilation with Drager available for use. Kangaroo care guidelines revised. Stoplight and audit tool developed for Kangaroo care (PDSA).

Measures:
Primary: From Nightingale (VON Data Base):
- Mortality
- BPD
- Severe ROP
- Severe IVH
- PVL
- NEC
- Nosocomial Infection
- Pneumothorax
- Infant’s skin temperature on admission to NICU

Secondary: From NICU dashboard
- Respiratory: Surfactant in first 2 hours, CPAP to 32 weeks, number of re-intubations within 48 hours of extubation, Ventilator days(invasive vs non-invasive) vs CPAP days Balancing Measures: Pneumothorax rate, oxygen at 28 days, rate of extra uterine growth restriction
- Golden Hour: Environmental temp in the OR, infant’s skin temp in delivery room, first invasive axillary temperature in NICU (not before one hour). Balancing Measure: Hyperthermia
- Circulatory: Eligible moms receiving betamethasone and MgSO4, eligible infants receiving indomethacin, hypothermia on admission, completion of entire golden hour bundle (develop audit tool). Balancing Measures: NEC, SIP
- Family Centered Care: All eligible infants <30 weeks will do kangaroo care by the end of week one, if not sooner. Balancing Measures: Hypothermia, Dislodged ETT

Data/Results: See attached graphs/charts
Discussion: The standardization of care of the micro preemie infant through the development of guidelines and protocols has shown some promising results in our clinical outcomes. We continue to look at our current process and guidelines to identify what works well and what needs revision. We have been challenged by staff buy-in (nursing and provider) with some changes and by working with other departments to make changes that impact our tiniest babies’ outcomes (thermoregulation in OR, delayed cord clamping).
We are continuing to develop a protocol for the Golden Hour and Beyond (including core staff to care for the micro-preemie), with completion of the entire golden hour bundle (in relation to sIVH). We are also focusing on kangaroo care/developmental care in our micro-preemie patient.

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<thead>
<tr>
<th>Outcome</th>
<th>Primary Drivers</th>
<th>Secondary Drivers</th>
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<tbody>
<tr>
<td>Prenatal Care</td>
<td>Antenatal Steroids</td>
<td>Fetal Care Center</td>
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<td></td>
<td>Prenatal Counseling</td>
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<td>Delivery</td>
<td>Delayed cord/clamping/milking</td>
<td>Initial labs from placenta</td>
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<td></td>
<td>Dedicated OR for Preterm delivery with set temp of 77 F</td>
<td>Chemical mattress/Neowrap/temp monitoring in the delivery room</td>
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<td>Teamwork/Collaboration in the delivery</td>
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<tr>
<td>Golden Hour Resuscitation &amp; Stabilization</td>
<td>Temperature Control/Initial Admission Temp/Delivery Room Respiratory Management/Surfactant/Intubation vs Nimv vs BCPAP/Timing of hands on vitals/IV access &amp; fluids</td>
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<tr>
<td>Prevention of BPD</td>
<td>Surfacectant administration/Ventilator Weaning Protocol/Extubation criteria/Nimv guidelines/HFJ/Volume control ventilation/BCPAP to 32 weeks/Vitamin A/Post-natal Steroid administration</td>
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<tr>
<td>Prevention sIVH</td>
<td>Ensure all eligible women get MgSO4 neuroprotection and betamethasone prior to delivery/delayed cord clamping/Infant first labs from placenta/Transfusion protocol/selective prophylactic indomethacin/core RN staff to care for Micropreemie population</td>
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<tr>
<td>Kangaroo Care</td>
<td>Kangaroo care guidelines/Daily discussion on rounds/Skin to skin as soon as medically able/Parent involvement</td>
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<td>Growth and Nutrition</td>
<td>Early TPN/IL, Feeding guidelines/exclusive use of Breastmilk/Prolact guidelines/nutrition labs</td>
<td>Days to full feeds/Growth velocity/Extra uterine growth restriction/NEC rate</td>
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<tr>
<td>Prevention of CLABSI</td>
<td>CLABSI team developed, Sterile (hat, mask, sterile gloves)IV changes and IV med administration, Maximum barrier precautions for PICC dressing change, PICC kit change. Tracking days between infection and line days</td>
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Severe Retinopathy of Prematurity in CFH NICU Inborn 22-29 weeks Compared to VON Type B NICUs

Any Late Infection in CFH NICU Inborn 22-29 weeks Compared to VON Type B NICUs
Bronchopulmonary Dysplasia in CFH NICU Inborn 22-29 weeks Compared to VON Type B NICUs

Necrotizing Enterocolitis in CFH NICU Inborn 22-29 weeks Compared to VON Type B NICUs
Mortality Excluding Early Deaths 22-29 weeks Inborn
CFH NICU: Average 14%
VON Type B NICU: Average 14% with IQR 8-19%
Severe Intraventricular Hemorrhage in CFH NICU Inborn 22-29 weeks Compared to VON Type B NICUs

- sIVH CFH NICU
- VON Type B NICU Average
- VON Type B NICU 25%tile
- VON Type B NICU 75%tile

First Surfactant Dose
Infants 22-29 Weeks Gestation
CFH NICU 2013-2015

None
Delivery Room
First 2 Hours
Over 2 Hours

2013 CFH
2014 CFH
2015 CFH
VON NICU Type B
Admission Temperature for
Consecutive Admissions 22-29 week Infants
CFH NICU 2015

% at or above old Target 36.0°C = 100%
% at or above new Target 36.5°C = 90%

Consecutive Admissions January through August 2015