Who Codes in the NICU: An Analysis of Demographics and Factors that Place Neonates at Higher/Lower Risk of a Serious Code Event and Prognosis Post-Code

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Who Codes in the NICU: An analysis of demographics and factors that place neonates at higher/lower risk of a serious code event and prognosis post-code

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**Background**
- Neonatal code events are relatively rare in the NICU
  - 10-21% of VLBW admissions1-2
  - 29-59 code events per year from 2010-2012 in our NICU; 3-7% of all patients admitted
- Most studies have stated poorer outcomes for extremely low birth weight (ELBW) infants with lower birth weight3-6, use of vasopressors4, decreasing gestational age7, renal failure8, sepsis9, and longer duration of CPR10,11. Little prognostic or outcomes literature exists for more diverse NICU populations serving both ELBW and near-term to term infants with complex medical care and congenital anomalies

**Objective**
Analyze resuscitation events in a level IV NICU from 2012-2017 to determine whether there are identifiable differences between those who have a rapid response (RR) event and those with a short or long code (SCB/LCB) and determine factors post-event that may impact survival to discharge.

**Methods**
- Retrospective review of all RR/CB events that took place at CMH from 2012-2017 (n= 507)
  - RR: Resuscitation event requiring ventilation only
  - Short Code (SCB): Resuscitation requiring chest compressions for <60 seconds
  - Long code (LCB): Resuscitation requiring chest compressions for >60 seconds
- Pre-event factors
  - Gestational age (GA), birth weight (BW)
  - Respiratory Severity Score (RSS) (FiO2 x MAP)
  - Culture, source and organism 48 hours prior
  - Medications given in the 12 hours prior
  - Urine output and renal function 24 hours prior
- Post-event factors
  - Age at time of event
  - Culture, source and organism 48 hours after
  - Urine output and renal function 24 hours after
  - Survival to discharge, cause of death
- Kruskal-Wallis, chi-square and Fisher’s exact tests were used for group comparisons

**Results**
- Factors not statistically significant between any group
  - GA or birth weight
  - BUN 24 hours before and after and Cr 24 hours before an event
- LCB significant factors compared to SCB and RR
  - Higher RSS compared to RR
  - Lower UOP 24 hours before compared to RR
  - Lower UOP 24 hours after compared to RR and SCB
- LCB had higher uses of:
  - Any pressors, dopamine, dobutamine, epinephrine
  - Bolus, IV electrolytes, diuretics
  - Hydrocortisone
- LCB events occurred earlier in the hospital stay and patients were less likely to survive 24hr after the code and less likely to survive to discharge

**Discussion**
- Requiring pressors and other medications are risk factors for LCB and subsequent death before discharge, independent of GA or BW
- Higher RSS and lower UOP before an event are predictors of a resuscitation event, particularly LCB
- Limitations:
  - Retrospective
  - No control group
  - Arbitrary distinction between LCB/SCB

**Future Research**
- Expand data set to include all data from 2017-present
- Analyze variables during the event (cause of event, duration of compressions, med given, etc.) and their effect on outcome
- Incorporate a control group to determine if there are certain risk factors that will put neonates at increased risk of a code event

**CMH NICU Demographics**

<table>
<thead>
<tr>
<th>GA at Admission</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 28 weeks</td>
<td>53%</td>
</tr>
<tr>
<td>28-36 weeks</td>
<td>28%</td>
</tr>
<tr>
<td>37-42 weeks</td>
<td>19%</td>
</tr>
<tr>
<td>&gt; 42 weeks</td>
<td>&lt; 0%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason for Admission</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anomalies or syndromes (including cardiac)</td>
<td>23%</td>
</tr>
<tr>
<td>Respiratory</td>
<td>15%</td>
</tr>
<tr>
<td>Surgical</td>
<td>17%</td>
</tr>
<tr>
<td>Prematurity</td>
<td>35%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
</tbody>
</table>

**References**