Five year experience (2007-2011) with necrotizing enterocolitis at Kosair Children’s Hospital in very low birth weight infants (<1500gms)

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Background
Neonatal necrotizing enterocolitis (NEC) is a worldwide cause of profound morbidity and mortality primarily among very-low-birth-weight infants (<1500gms) but also seen in term and near term infants. NEC is associated with a substantial neurodevelopmental delay and increased medical costs. (Holman RC 2006) (Hirsh SR 2005). It is a disease process of the gastrointestinal tract characterized by inflammation of the bowel wall, with or without bowel necrosis, in the absence of mechanical obstruction. (Thompson AM 2008) (Suh P 2008) NEC may present with many different clinical symptoms including feeding intolerance, bloody stools, abdominal distension, fever, anemia, bradycardia, and lethargy. (Thompson AM 2008)

The incidence of NEC remains relatively consistent, occurring in 5-10% of VLBW infants. (Thompson AM 2008) (Ling H, 2005) Despite advances in the care of premature newborns and significant amounts of research dedicated to NEC, the exact etiology is unknown. However, it is agreed that it is a multifactorial disease process, which includes infection, alteration of GI tract bacterial colonization, feeding intolerance, circulatory instability, and activation of inflammatory mediators. (Thompson AM 2008) (Suh P 2008)

Recently, there have been observational reports of a temporal association between packed red blood cell transfusions and the diagnosis of NEC (TANEC). (Mohamed A 2012) (Blau J 2011) To date, studies are predominantly observational in nature, have some issues with bias and confounding, and have an association in about 5-10% of NEC cases. (Agwu JC 2004) (Sallomon H 2012) However, some institutions have implemented policies regarding feeding status during transfusion exposures. (El-Dib M 2011)

This study was undertaken with the hypothesis that NEC incidence is higher in infants who are transfused within the first 48 hours of life. The objective of this study is to review NEC cases at our NICU for 5 years and identify any association between NEC and transfusion exposure. The results will have the potential to impact clinical decision making and improve patient outcomes.

Methods
This was a retrospective chart review of all infants admitted to Kosair Children’s Hospital between 2007-11 and subsequently diagnosed with necrotizing enterocolitis (Bell’s stage ≥ 2). Electronic medical records were reviewed.

Inclusion criteria:
• BW <1500g
• Admission within 72 hours of birth
• Bell’s stage II or greater

Data collection included:
• Birth weight
• Maternal age
• PIH
• Maternal race
• Maternal education
• Birth weight
• Gestational age
• Birth indication
• Antenatal steroids
• Pre-NEC medical course
• Transfusion history within 48 hours of diagnosis

Results

Table 1: Yearly total admissions VLBW infants (<1500 g) and NEC cases

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Admissions VLBW Infants (&lt;1500 g)</th>
<th>NEC cases Total</th>
<th>NEC cases Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1,500 g BW</td>
<td>72</td>
<td>3.9%</td>
</tr>
<tr>
<td>2008</td>
<td>1,500 g BW</td>
<td>110</td>
<td>5.8%</td>
</tr>
<tr>
<td>2009</td>
<td>1,500 g BW</td>
<td>62</td>
<td>4.3%</td>
</tr>
<tr>
<td>2010</td>
<td>1,500 g BW</td>
<td>5</td>
<td>0.3%</td>
</tr>
<tr>
<td>2011</td>
<td>1,500 g BW</td>
<td>31</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

Table 3: Infection profile

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>Total (n)</th>
<th>Pre-NEC (n)</th>
<th>NEC cases Total (n)</th>
<th>NEC cases Pre-NEC (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTI</td>
<td>128.9 ± 5</td>
<td>2.7 ± 2</td>
<td>13.3% ± 5</td>
<td>0.70 ± 2</td>
</tr>
<tr>
<td>Bacterial pneumonia</td>
<td>146.6 ± 7</td>
<td>25.4 ± 4</td>
<td>17.1% ± 7</td>
<td>1.83 ± 4</td>
</tr>
<tr>
<td>Bowel perforation</td>
<td>178.3 ± 8</td>
<td>38.3 ± 5</td>
<td>22.1% ± 8</td>
<td>1.29 ± 5</td>
</tr>
</tbody>
</table>

Table 4: Details surrounding NEC diagnosis

<table>
<thead>
<tr>
<th>NEC diagnosis (n)</th>
<th>Diagnosis prior to initiation of transfusion</th>
<th>NEC within 48 hours of initiation or completion of transfusion (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any NEC</td>
<td>28</td>
<td>13</td>
</tr>
<tr>
<td>Fortified HM*</td>
<td>5 (18.3%)</td>
<td>2 (7.1%)</td>
</tr>
<tr>
<td>Plain HM*</td>
<td>25 (41.7%)</td>
<td>11 (39.3%)</td>
</tr>
</tbody>
</table>

Conclusion
The overall rate of NEC for our NICU was similar to nationally reported rates, while mortality in our cohort was lower than national figures.

Acknowledgments
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References

Limitations
This study was limited by the variability in the diagnosis of NEC, the accuracy of the chart and at times, data was simply not available.

Conclusions
1. The overall rate of NEC for our NICU was similar to nationally reported rates, while mortality in our cohort was lower than national figures.
2. Year to year variability in rates of NEC was seen.
3. Late onset sepsis and TANEC were more common than expected.

We speculate that strategies to decrease both late-onset sepsis and transfusion exposure will improve outcomes.