Thermal Fragility Among Preterm Infants at Birth

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Disclosure

• I have no disclosures of conflicts of interest.
• This presentation will not involve discussion of unapproved or off-label, experimental or investigational use of a drug.
Distribution of Admission Temperatures Among 5277 LBW Infants: 2002-2003

- In-born, 401-1499gm BW at 15 NICHD Neonatal Research Network (NRN) centers
- Direct admissions to the NICU, mean age at admit temperature 23±14 minutes
- BW (x±sd): 1032±288g, GA 28.0±2.8 wks
- Mean admit temperature: 35.9±1.0°C
- Admit temperatures: 46.9% < 36°C, 1.3% > 38°C

Laptook et al, Pediatrics 2007; 119: e643-e649
Admission Temperature for Infants ≤ 28 Weeks’ Gestation

<table>
<thead>
<tr>
<th>Gestational Age, wk</th>
<th>n</th>
<th>Birth Weight, mean ± SD, g</th>
<th>Admission Temperature, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;35°C</td>
</tr>
<tr>
<td>28</td>
<td>643</td>
<td>1088 ± 201</td>
<td>9.6</td>
</tr>
<tr>
<td>27</td>
<td>609</td>
<td>977 ± 182</td>
<td>10.7</td>
</tr>
<tr>
<td>26</td>
<td>539</td>
<td>840 ± 163</td>
<td>13.2</td>
</tr>
<tr>
<td>25</td>
<td>468</td>
<td>751 ± 130</td>
<td>20.5</td>
</tr>
<tr>
<td>24</td>
<td>397</td>
<td>655 ± 100</td>
<td>33.8</td>
</tr>
<tr>
<td>&lt;24</td>
<td>187</td>
<td>598 ± 118</td>
<td>43.9</td>
</tr>
</tbody>
</table>

- With decreasing GA and BW, the frequency of admission temperatures < 35°C and < 36°C increase

Laptook et al, Pediatrics 2007; 119: e643-e649
Interventions to Reduce Hypothermia at Birth Among Preterm Infants: RCT

- In addition to use of preheated radiant warmer
  - Plastic wrap without drying (J Pediatr 2004;145:750-753)
  - Exothermic mattress (J Perinatology 2011;31:780-784)
  - Polyethylene cap (J Pediatr 2010;156:914-917)
  - Forced air warming of the mother (Anesth Analg 2002;94:409-414)
  - Heated, humidified gas for respiratory support (J Pediatr 2015;166:245-250)
  - Increased room temperature (Am J ObGyn 2016;505:e1-e7)
Association between Admission Temperature and Mortality Among Preterm Infants

• NRN data: For every 1°C decrease in admit temp, the adjusted odds of mortality increased (OR 1.28, 95% CI 1.16-1.41) Pediatrics 2007;119:e643-e649

• Other reports: similar associations
  – California, J Perinatol 2011;Suppl 1:S49-56
  – Brazilian network, J Pediatr 2014;164:271-5
  – Canadian network, JAMA Pediatr 2015;169;e150277

• RCT of occlusive wraps to reduce mortality (J Pediatr 2015;166:262-268)
  – Occlusive wraps: higher admit temp (36.3 vs 35.7°C) but no difference in mortality

• NRN data in preparation: adjusted odds of mortality decreased for each 1°C increase in admit temp (OR .81, 95% CI .71-.91)
Conclusion: Thermal Management at Birth

• Develop a clinical bundle
  - Specific elements of the bundle need to match the needs of the clinical service

• Intermittent audits of admission temperature
  - Thresholds to trigger assessments of drifts in practice

• Association between admit temp and mortality:
  - Marker of mortality or causal is not clear