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RESPIRATORY THERAPY

Internship Program
Sidney Fimiani
Respiratory Therapy Internship Program
Successful Extubation of Extremely Low Birth Weight Infants to CPAP vs. RAM cannulas and the Incidents of Bronchopulmonary Dysplasia

Sidney Fimiani

Mentors: John Dickson, RRT; Firas Saker, MD
Background

• **Respiratory Distress Syndrome (RDS)** is the most common cause of respiratory distress in preterm infants.

• PEEP and intubation help treat RDS
  – Can cause Bronchopulmonary Dysplasia (BPD)

• Trials of **CPAP** (Continuous Positive Airway Pressure) vs. intubation/ventilation showed nasal CPAP reduces risk of BPD.
Hypothesis

• Both CPAP and noninvasive ventilation via RAM cannula are equally effective in preventing BPD in extremely low birth weight infants.
Abstract

• Retrospective review comparing CPAP vs. noninvasive ventilation via the RAM cannula

• **Goal:** Determine outcomes of Bronchopulmonary Dysplasia and whether or not reintubation was needed
  • Extremely Low Birth Weight (ELBW) Infants
Introduction

- **Bronchopulmonary Dysplasia (BPD)** is defined as the need for oxygen at 36 weeks corrected age or beyond.
- This chronic disease is among the most common in children, and can have detrimental effects later in life.

Introduction cont...

- BPD often occurs in infants who were diagnosed with Respiratory Distress Syndrome at birth.
  - Lack of surfactant in lungs
  - **Surfactant** lubricates the pulmonary walls and keeps the alveoli open for gas exchange.

http://www.smh.com.au/nsw/delays-may-have-caused-deaths-20110522-1ez0w.html
RAM Cannula vs. CPAP

RAM Cannula

CPAP
http://www.cuh.org.uk/rosie/services/neonatal/nicu/how_we_care/vital_needs.html
Methodology

- Data were gathered using a retrospective Epic™ chart review of neonates born at Cleveland Clinic NICU at Hillcrest Hospital.
  - Inclusion criteria: Birth weight $\leq$ 1,000 grams requiring intubation
    - Born at Hillcrest Hospital between 01/1/2011 and 12/31/2013
  - Exclusion criteria: Birth weight $<$ 500 grams and deceased babies
- 87 charts total with 75 participants
Methodology cont...

- **Demographic variables**: date of birth, gender, birth weight, gestational age, and Apgar scores.

- **Maternal risk factors**: history of chorioamnionitis and antenatal steroids

- **Clinical factors**: need for surfactant, mode of support following extubation, reintubation, patent ductus arteriosus, intraventricular hemorrhage, BPD, and length of stay.
Data

- 2 groups: BPD and no BPD
- Group 1- BPD (N=52)
- Group 2- No BPD (N=23)

Incidents of BPD in Study Population
# Results

## Demographics for Study Population

<table>
<thead>
<tr>
<th></th>
<th>Group 1 BPD (N=52)</th>
<th>Group 2 No BPD (N=23)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birth Weight</strong></td>
<td>744±138</td>
<td>804±138</td>
<td>0.086</td>
</tr>
<tr>
<td><strong>Gestational Age</strong></td>
<td>25.5±1.7</td>
<td>27.3±2.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Gender M/Total</strong></td>
<td>53.85%</td>
<td>48%</td>
<td>0.899</td>
</tr>
<tr>
<td><strong>Race W/B/Other</strong></td>
<td>20:29:03</td>
<td>11:11:01</td>
<td>0.454</td>
</tr>
<tr>
<td><strong>Apgars at 1 Minute</strong></td>
<td>2.9±1.9</td>
<td>4.7±2.2</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>Apgars at 5 Minute</strong></td>
<td>5±2.1</td>
<td>6.6±2.4</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>Antenatal Steroids</strong></td>
<td>88.46%</td>
<td>82.61%</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Chorio</strong></td>
<td>5.77%</td>
<td>0.04%</td>
<td>0.813</td>
</tr>
</tbody>
</table>
# Results cont...

## Respiratory Support for Study Population

<table>
<thead>
<tr>
<th></th>
<th>Group 1 BPD (N=52)</th>
<th>Group 2 No BPD (N=23)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extubation To</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPAP</td>
<td>23%</td>
<td>43.5%</td>
<td>0.124</td>
</tr>
<tr>
<td>SIPAP</td>
<td>38.4%</td>
<td>21.7%</td>
<td>0.196</td>
</tr>
<tr>
<td>RAM</td>
<td>36.5%</td>
<td>30.4%</td>
<td>0.703</td>
</tr>
<tr>
<td>RAM-NAVA</td>
<td>32.6%</td>
<td>30.4%</td>
<td>0.949</td>
</tr>
<tr>
<td><strong>Failed RAM to CPAP</strong></td>
<td>73.6%</td>
<td>85.7%</td>
<td>0.708</td>
</tr>
<tr>
<td><strong>Days on Extubation Mode</strong></td>
<td>28+35.4</td>
<td>42.6+38.9</td>
<td>0.642</td>
</tr>
<tr>
<td><strong>Reintubated</strong></td>
<td>59.6%</td>
<td>31.8%</td>
<td>0.122</td>
</tr>
<tr>
<td><strong>Days to Reintubation</strong></td>
<td>9+11.7</td>
<td>7.9+15.1</td>
<td>0.311</td>
</tr>
<tr>
<td><strong>Days on CPAP</strong></td>
<td>25.4+16.8</td>
<td>12.5+12.3</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Days on NAVA</strong></td>
<td>15+22</td>
<td>2.5+6.4</td>
<td>0.003</td>
</tr>
<tr>
<td><strong>Days to RA</strong></td>
<td>81+34.3</td>
<td>37.9+26.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Home on Oxygen</strong></td>
<td>38.4%</td>
<td>0%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>LOS</strong></td>
<td>120.4+45.4</td>
<td>78+20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Discharge Weight</strong></td>
<td>3146+996</td>
<td>2356+437</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Conclusion

• BPD and successful extubation seems to be comparable between CPAP and noninvasive ventilation via RAM cannula in ELBW infants.

Recommendations

- Neither CPAP, nor noninvasive ventilation via RAM cannula are advantageous over the other in preventing reintubation or BPD in ELBW infants.
- In our opinion, extubating ELBW infants to CPAP is a simple, acceptable strategy for this particular group.
- Further randomized prospective trials are needed to confirm our results.
References


Special Thanks

• Nedra Starling, MA, MPH, ABD/DrPH and the Office of Civic Education Initiatives
• Firas Saker, MD
• Shauna Hendershot, RRT
• John Dickson, RRT-NPS
• Susan Brant, RRT-RCP
• Christopher Joyce, RRT-NPS
• Nancy DeWalt, RN-PCCN
• Wasim Khasawneh
• Jalal Abu-Shaweesh
• Barbara Elliott, RN