

# Enhancing Respiratory Care in Prematurity: A Dual Approach to Minimizing Invasive Ventilation in the NICU

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Our overarching aim is to reduce invasive ventilation dependence by: (1) **MIST** to reduce need for initial intubation, and (2) **standardization of extubation** to optimize success. The ultimate objective is to improve respiratory outcomes of preterm neonates.

## Minimally Invasive Surfactant Therapy (MIST)

**Background:** Data from randomized trials and their meta-analyses suggest that use of MIST (vs. routine intubation for administration of surfactant) improves outcomes.

**Objective:** Implement MIST for preterm neonates at McMaster Children’s Hospital to reduce need for initial intubation and ventilation.

**Implementation criteria:**

- Gestational ages 28<sup>0</sup> – 33<sup>6</sup>
- CPAP ≤ 8 cmH<sub>2</sub>O & FiO<sub>2</sub> ≤ 0.35
- Use of Curosurf™ and initial dose only
- Using SurfCath© with video laryngoscopy
- Premeds: Atropine + Fentanyl (0.5mcg/kg)



Challenges to Implementation	Strategies to Overcome Challenges
<b>Staffing:</b> <ul style="list-style-type: none"> <li>• Insufficient staffing</li> <li>• Staff turnover and a large proportion of junior staff</li> </ul>	<b>Focused Training:</b> <ul style="list-style-type: none"> <li>• Only the core group was trained initially</li> <li>• Gradual expansion of trained staff</li> </ul>
<b>COVID-19 Constraints:</b> <ul style="list-style-type: none"> <li>• Need for training while adhering to physical distancing measures</li> </ul>	<b>Gradual Rollout:</b> <ul style="list-style-type: none"> <li>• Initially limited to specific gestational ages</li> <li>• Restricted to business hours</li> </ul>
<b>Previous Unsuccessful Attempts:</b> <ul style="list-style-type: none"> <li>• Previous failures in implementing MIST</li> <li>• Issues included using equipment used (feeding tubes), lack of sedation, and inadequate staff training</li> </ul>	<b>Building Buy-In:</b> <ul style="list-style-type: none"> <li>• Staff needed to perceive the initiative as essential and be willing to dedicate time to it</li> <li>• Creation of a unit policy and education</li> </ul>

**Conclusions and Next Steps:** MIST as implemented appears to be successful. We are collecting further data to generate SPC charts. In Spring 2024, we will expand to babies of GA 26<sup>0</sup> – 27<sup>6</sup>.

## Standardization of Extubation

**Background:** Emerging data suggests that higher levels of CPAP (vs. equivalent) relative to pre-extubation pressures *may* reduce the risk of re-intubation.

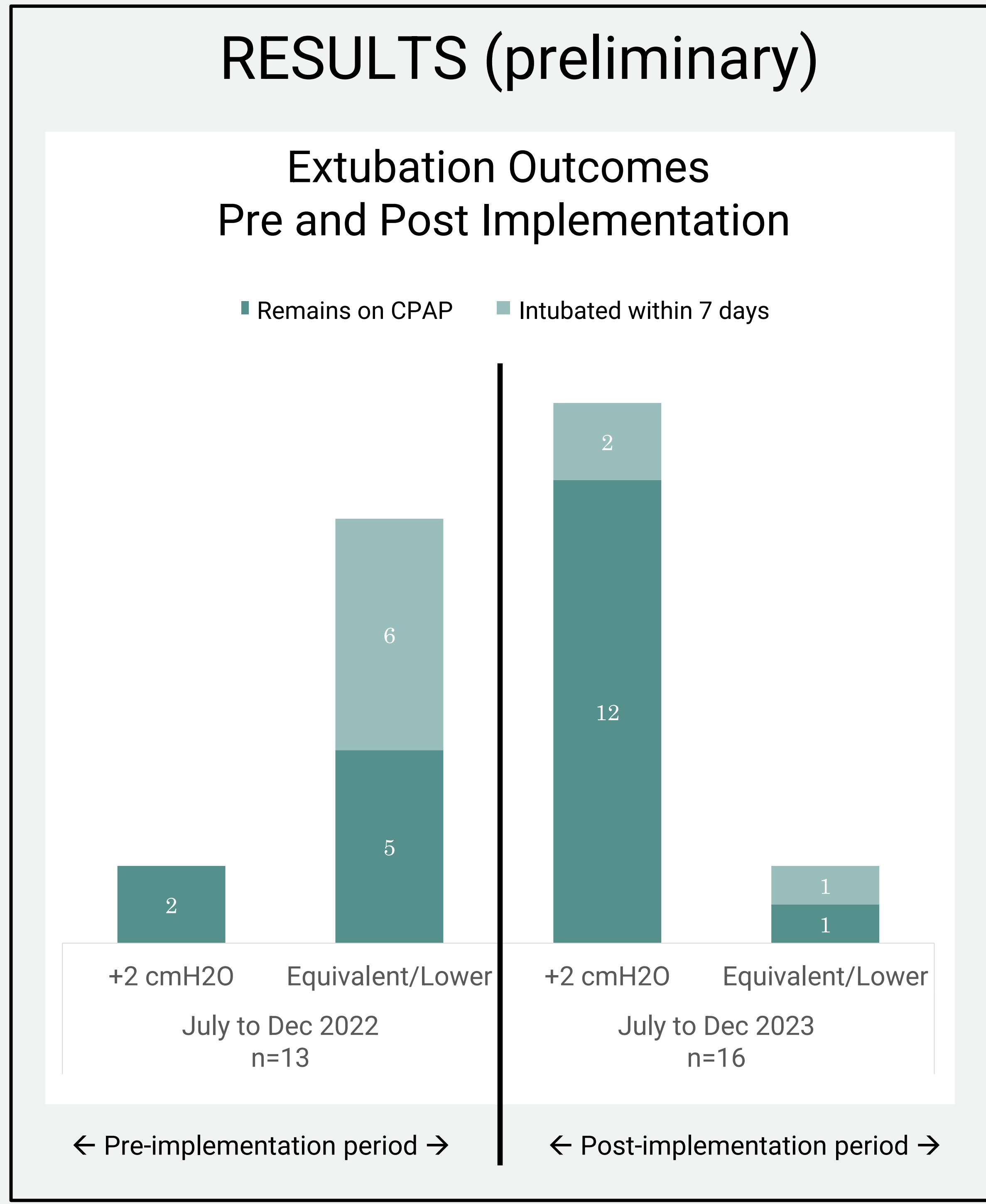
**Objective:** Standardize the peri-extubation practice, for infants <29 weeks GA including **use of higher CPAP (pre-ext MAP + 2 cmH<sub>2</sub>O)** with an aim to reduce re-intubation over 7 days.

Pre-extubation Checklist	Extubation Procedure	Post-Extubation Considerations
<input type="checkbox"/> Optimize Caffeine <input type="checkbox"/> IV Access <input type="checkbox"/> NPO x2hr Pre and Post (run Fluids) <input type="checkbox"/> Consider preparing Intubation meds	Ensure stomach is empty ↓ Disconnect ventilator circuit with ETT in-place ↓ <b>Provide supportive ventilation via ETT, target the PEEP and ΔP 6-8 cmH<sub>2</sub>O or match ventilator settings</b> ↓ Replace with NRS interface and connect to ventilator	Initial CPAP = <b>pre-ext measured MAP +2 cmH<sub>2</sub>O</b> x 6hrs  Monitor BP q4h x 12hr  During the 1 <sup>st</sup> 6 hours, can escalate if needed  Wean ONLY if evidence of lung hyperinflation, with or without related hemodynamic instability

**Note:** Higher CPAP was stipulated only when the following 3 conditions were met: (1) age ≥72 hrs; (2) pre-ext MAP ≤13 cmH<sub>2</sub>O; and (3) leak <50%.

**Post-extubation considerations:**

- **Chest X-ray between 2-4 hours post-extubation**
- **Suggested minimum re-intubation criteria x 7 days post-extubation**
- **At both 6 & 12 hrs post-extubation, if FiO<sub>2</sub> ≤ pre-extubation level & baby otherwise stable wean PEEP by 1 cmH<sub>2</sub>O each time.**



**Conclusions and Next Steps:** Standardized extubation using higher CPAP appears promising. We are collecting a larger data set to generate SPCs. A prospective CER study is also being proposed to definitively evaluate benefits and risks.

