The Canadian Neonatal Network™/Le Réseau Néonatal Canadien™

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Research Proposal

Comparison between primary modes of ventilation in preterm infants born at < 26 weeks' gestation in Canadian Tertiary NICUs: A retrospective cohort study

Investigators: Ayman Abou Mehrem, Georg Schmolzer
Email: Ayman.AbouMehrem@albertahealthservices.ca; schmolze@ualberta.ca

Background

Despite increasing use of noninvasive respiratory support as primary mode of support after birth in micropreterm infants, the vast majority (77%) require mechanical ventilation in the first postnatal week (1). Canadian centres adopted modalities of ventilation as a primary mode of invasive ventilation when intubation is required, including conventional tidal ventilation (CTV), high frequency oscillatory ventilation (HFOV), and high frequency jet ventilation (HFJV). The literature shows comparable outcomes between centres adopting different modalities (2); however, there is lack of evidence to support the superiority of any mode (3).

Aim

To study the impact of the mode of mechanical ventilation on the following: 1) short term respiratory outcomes, and 2) BPD severity.

Design

Retrospective cohort study including Canadian centres who admit >10 eligible infants per year.

Inclusion criteria

Preterm infants born at GA 220/7 – 256/7 weeks of gestation between January 1, 2024 and December 31, 2024 with possibility of extending the data collection for another year.

Exclusion criteria:

1) outborn infants, 2) congenital anomalies or chromosomal abnormalities, 3) intubation after postnatal day (PND) three, 4) use of pressure-controlled ventilation without volume targeting.

Exposure groups

This is first intention mode of ventilation and divided into 3 groups; 1) CTV (volume targeted), 2) HFOV (with or without volume targeting), and 3) HFJV.

Primary outcome

PND at final successful extubation defined as extubation from endotracheal ventilation without reintubation during the hospitalization.

Secondary outcomes

Variables to be collected by the participating centres:

- Respiratory severity score (RSS) defined as the product of multiplying mean airway pressure and fractional inspired oxygen (FiO2) at PND 3, 7, 14, 21, 28, 35, 42, and postmenstrual age of 36 and 40 weeks.
- If RSS is unavailable due to transition to nasal cannula, FiO2 will be collected instead.
- Rescue change of ventilation mode due to oxygenation or ventilation failure.
- Air leak during mechanical ventilation.

Variables to be abstracted from the CNN database:

- Death during hospitalization.
- Postnatal steroid use

- Days of oxygen use, invasive ventilation, and non-invasive ventilation
- BPD and its severity as per the CNN definition.

Feasibility and potential centres

We approached centres that admitted > 40 infants at gestational age <29 weeks in 2023. At this point, 6 centres expressed interest. The site should admit ≥10 eligible infants to be able to participate in the study. This allows for sufficient data from each site.

Future direction

This is a pilot study that aims to provide data for future prospective randomized trial or comparative effectiveness study comparing various modes of ventilation in this population.