

Impact of Failure of Noninvasive Ventilation on the Safety of Pediatric Tracheal Intubation

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Background & Rationale : Non-invasive ventilation is increasingly used in critically ill children, more so to avoid tracheal intubation. But what if it fails? Does it affect the outcome of tracheal intubation when compared to those who were tracheal intubated first hand without NIV trial? Answer to this question is particularly important in cases where the decision of NIV vs Tracheal Intubation (TI) is not easy. Previous two pediatric studies on the topic were both, retrospective, single center and had limited sample size.

Hypothesis: The failing patient on NIV may have a limited physiologic reserve at the time of TI which may predispose to more severe adverse events and oxygen desaturation at the time of TI.

Objectives:

- To assess whether non-invasive ventilation failure was associated with **adverse tracheal intubation-associated events (TIAEs)** and severe oxygen desaturation (defined as $\text{Spo}_2 < 70\%$) during tracheal intubation.
- To determine the **right transition time/criteria** from NIV support to invasive ventilation.

Design: A large Prospective multicenter cohort study of consecutively intubated patients (n=956) using the National Emergency Airway Registry for Children in 13 PICU's in US and Canada.

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Pediatric Evidence And Research Learning Snippet



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Results -

A. No relation between NIV failure group and adverse tracheal intubation-associated events ($p = 0.35$) or severe desaturation ($p = 0.08$).

B. Who failed NIV more?

- Infants (47% vs 33%; $p < 0.001$)
- Patients with respiratory diagnosis (56% vs 30%; $p < 0.001$).

C. Who showed more adverse events?

In NIV failure group, **higher Fio₂** before tracheal intubation ($\geq 70\%$) was associated with adverse tracheal intubation associated events.

Conclusion - Non-invasive ventilation failure was **not independently associated** with adverse tracheal intubation associated events or severe oxygen desaturation compared to primary tracheal intubation. **Higher Fio₂ requirement** on NIV in the hour preceding tracheal intubation was associated with **adverse TIAEs**.

EXPERT COMMENT



"This study concludes no adverse effects on outcomes of tracheal intubation if one chooses to opt for NIV before moving on to tracheal intubations. However, the fact that - higher Fio₂ in the hour preceding TI was associated with severe TIAEs underlines the importance of timing for transition, and using **FiO₂ requirement as objective criteria for early switch over from NIV to invasive ventilation in failing cases.**"

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With warm regards,

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Reference

Reference : Emeriaud G, Napolitano N, Polikoff L, Giuliano J Jr, Toedt-Pingel I, et al. National Emergency Airway Registry for Children (NEAR4KIDS) Investigators and Pediatric Acute Lung Injury and Sepsis Investigators (PALISI). Impact of Failure of Noninvasive Ventilation on the Safety of Pediatric Tracheal Intubation. Crit Care Med. 2020 Oct;48(10):1503-1512. doi: 10.1097/CCM.0000000000004500. PMID: 32701551.