

Article: Kristen A. Smith, MD, M. David Gothard, MS, Hamilton P. Schwartz, MD, John S. Giuliano, Jr., MD, Michael Forbes, MD, Michael T. Bigham, MD. **Risk Factors for Failed Tracheal Intubation in Pediatric and Neonatal Critical Care Specialty Transport.** *Prehospital Emergency Care.* 2014 Oct/December Early Online: 1-6.

Clinical Question: During pediatric and neonatal transport, what are the risk factors for failed tracheal intubation?

Introduction: Tracheal intubation has a high risk for complications, especially in the less-controlled transport setting. EMS literature shows little benefit with prehospital intubation versus bag-valve mask ventilation. However, in the pediatric population, there is increased oxygen consumption, decreased oxygen reserve, and increased gastric distention with BVM, necessitating tracheal intubation in the sicker patient. First-pass success rate for pediatric tracheal intubation ranges widely from 33 to 95% in various studies for transport and ED personnel. This study aimed to explore risk factors for these failed intubations.

Methods: This was a single institution retrospective chart review. Akron's Childrens Combined neonatal/pediatric critical care transport team consists of a pediatric/neonatal transport nurse, and transport paramedic, and a transport respiratory therapist. Patients studied included all neonatal (<30 days old) and pediatric patients <18 yo who were intubated by Akron Children's critical care transport team from 1/2007 through 6/2009. Data was extracted by PGY2 pediatric resident. Patients grouped into those with no failed intubation attempts versus those with at least one failed intubation attempt (defined as attempted laryngoscopy). Data analyzed using statistical tests, and odds ratios were calculated.

Results: 4,546 transports were done during the study period, 904 required ventilatory support. 736 were excluded as patients were intubated by referring hospital, had prior tracheostomies, or were managed by non-invasive ventilation, and another patient was excluded due to incomplete records, leaving 167 patients for final analysis. 52% were neonates and 48% were pediatric. Via univariate analysis, factors increasing risk for multiple intubations include neonates, tracheal tube size ≤ 2.5 mm, use of uncuffed tracheal tubes, not using benzodiazepines and neuromuscular blockade, presence of preexisting comorbid conditions (abdominal wall defects, asthma, CP, congenital heart disease, epilepsy, developmental delay, genetic syndromes, prematurity, laryngomalacia, tracheomalacia). In the final logistic regression model, the three remaining significant risk factors were neonatal patient, uncuffed tube, and failure to use neuromuscular blockade during premedication.

Main Limitations: Generalization limited due to:

- Did not categorize specifically who was intubating, though most times it was respiratory therapy
- Small sample size, no randomization, single center, all data was self-reported
- One data extractor raises possibility of investigator bias

Conclusions: Noting the above limitations, this study pointed out important risk factors for multiple attempts at prehospital pediatric intubation. These include neonatal patient, uncuffed tube, and failure to use neuromuscular blockade (NMB). This makes sense due to physiologic anatomy. In addition, it seems that we hesitate to use NMB that eliminates patients' spontaneous breathing since pediatric patients have less respiratory reserve and are sensitive to apnea and hypoxemia. In some prehospital protocols, NMB and sedation are not mandatory for neonatal intubations even though it is supported by the AAP position statement, and this study gives some credence to possibly standardizing it. Overall, I think this study did a good job identifying risk factors for high-risk intubations, as it intended, and it doesn't hurt to appropriately prepare when dealing with these "red-flagged" patients.
