

Pediatric Difficult Airway Management: Assessment and Intervention

Kelsey Eaton, DO¹; Nathan Gonik, MD^{1,2}; Jamey Snell, MD³; Kelly Levasseur, DO⁴

¹Department of Otolaryngology Head and Neck Surgery, Detroit Medical Center, Detroit, Michigan; ²Department of Otolaryngology Head and Neck Surgery, Wayne State, Detroit, Michigan; ³Department of Anesthesia, Detroit Medical Center, Detroit, Michigan; ⁴Department of Emergency Medicine, Detroit Medical Center, Detroit, Michigan

Background: Pediatric airways exemplify the adage that children are not merely small adults. Their airway anatomical differences are markedly different than that of an adult system and with evidently variable physiology. Small fully oxygenated children can desaturate to a level of 0 in by multitudes faster rate than a full-size adult. Narrowing of an airway vastly changes resistance flows in comparison to adults leading to greater volatility and fluidity of an airway status. The airway may be difficult to visually examine or obtain either through innate challenges given its differing height and anterior displacement, or due to additional factors including clefts, congenital changes, stenoses, or mandibular hypoplasia. Rapid and efficient evaluation of the airway for appropriate airway securement involves coordination of different experts and specialized equipment. Otolaryngology is often not involved until difficult situations are deemed untenable with intensive care or anesthesia. Enabling appropriate resource access and timeliness allows for improved patient care and time allocation. At the Children's Hospital of Michigan, the operating rooms hold the vast number of specific airway equipment needed for pediatric airway evaluation and intervention escalation. This equipment is not centralized and is stored in a multitude of locations, the reliability of which is dependent on stocking experience. Multiple airway emergencies had occurred over several years. These resulted in unsatisfactory outcomes despite prompt responses, appropriate staffing, and decision making. Efforts were centralized in a means to assess access and expediency of airway management with progression to the current system.

Methods: Root cause analysis was performed of the reported sentinel airway events. Anesthesia, Emergency Department, and Otolaryngology teams assessed cases for areas of potential failure and improvement. Equipment availability and readiness efficiency were deemed one of the most variable. Additionally, knowledge of predeterminate difficult airways and associated details was deemed vital to allow for appropriate planning and intervention enactment. A multidisciplinary team was tasked with creating centralized difficulty airway carts. These were then stocked with means of airways assessment and intervention within a centralized unit. Communication was enhanced with the creation of automated difficult airway warnings within the electronic health record. A standardized difficult airway note was then created to allow for quick and accessible means of reviewing prior airway assessments.

Results: This system has now been implanted within the Children's Hospital of Michigan. Airway response readiness has improved and multiple emergent airways have been attended and with successful intervention. Handoff of difficult airway informatics has improved with greater understanding between disciplines regarding necessary interventions, precautions, and escalation algorithms.

Conclusion: A centralized system of airway assessment and intervention aids in pediatric airway management. Standardized means of communicating airway difficulty improves communication and patient handoffs.