

Variability in Pediatric Emergency Airway Management Laryngoscopy Modality: Clinical Equipoise or Unwarranted Clinical Variation?

Michael D. April, MD, DPhil*; Adit A. Ginde, MD, MPH

*Corresponding Author. E-mail: Michael.D.April@post.harvard.edu.

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SEE EDITORIAL ARTICLE, P. XX.

To what extent is clinical practice variation warranted or not? This question arises from the study by Miller et al¹ of laryngoscopy modality and intubation outcomes among pediatric patients requiring emergency airway management. This prospective observational multicenter study measured first-attempt intubation success for 1,412 intubation encounters. They found an association between video-assisted laryngoscopy and increased odds of first-attempt intubation success. Of the 11 participating pediatric emergency departments (EDs), the percentage of intubations using video-assisted laryngoscopy ranged from 12.9% to 97.8%.¹ Do these differences reflect equipoise between direct and video-assisted laryngoscopy or unwarranted variation?

The study of clinical practice variation has grown rapidly as a field over the last century. In 1938, an epidemiological study of tonsillectomy among British schoolchildren famously concluded that geographical differences in incidence of the procedure defied “any explanation, save that of variations of medical opinion on the indications for operation.”² The Dartmouth Atlas of Health Care project studied medical care delivery and resource utilization for residents living in more than 300 aggregated hospital referral regions and defined 3 categories of clinical care variations. These include effective care (interventions for which evidence demonstrates effectiveness), preference-sensitive care (conditions for which multiple acceptable options exist, the choice of which depends upon patient preferences), and supply-sensitive care (services for which resource availability determines frequency of use).³ This editorial explores whether the choice of laryngoscopy modality in children undergoing emergency intubation represents unwarranted variation in effective care.

The emergency care of children may be more susceptible to variability than that of adults. This is due in part to the

comparative infrequency of certain pathology, critical diagnoses, and interventions such as advanced airway management. These factors diminish the volume and quality of evidence available to guide clinical practice. One tertiary pediatric ED with an annual census of 90,000 visits reported 147 intubations more than a year (1 in 612 visits).⁴ In contrast, a general ED with a census of 60,000 visits of all ages reported 610 intubations (1 in 98 visits).⁵

This difference in volume is not unique to the EDs in these studies. The National Emergency Airway Registry (NEAR) is a network of more than 20 community and academic centers reporting airway management data. Parallel NEAR studies of adults and children compared first-attempt intubation success for video-assisted laryngoscopy versus direct laryngoscopy augmented by various maneuvers such as laryngeal manipulation, ramped positioning, and bougie use.^{6,7} Both studies found an association between video-assisted laryngoscopy and first-pass success, but notably, the adult study reported a sample size of 11,714 analyzable encounters versus 625 for the pediatric study. Similar differences in procedural volume between adult and pediatric EDs have been discussed elsewhere and ultimately mean less data available to advance the frontiers of optimal pediatric care.⁸ When there is less capacity to define effective care, increased practice variation seems inevitable.

Practice variation is not inherently problematic. For those aspects of airway management for which the existing evidence suggests comparable outcomes, such as the choice of succinylcholine versus rocuronium, practice variation is acceptable.⁹ Variation becomes troublesome to the extent that it corresponds to differences in patient outcomes. Notably, Miller et al¹ reported higher odds of first-attempt intubation success at sites with high utilization of video-assisted laryngoscopy ($\geq 80\%$ of intubations) as compared with sites with low utilization ($< 20\%$ of intubations). This finding echoes the aforementioned NEAR pediatric data

showing an association between video-assisted laryngoscopy and first-pass success.⁷ First-attempt intubation success is not itself a patient-centered outcome, but multiple studies indicate an association between multiple intubation attempts and adverse events including cardiac arrest in adults and children alike.¹⁰⁻¹²

The existing literature, although not yet definitive, suggests optimal outcomes with video-assisted laryngoscopy. As with all observational data, association does not equate causation, and residual confounding remains a possibility. There are not yet any randomized trials of pediatric patients to compare outcomes for video-assisted and direct laryngoscopy in ED settings. A recent operating room-based meta-analysis of pediatric randomized trials found no difference in anesthesiologist time to intubate or first-pass success based upon modality of laryngoscopy.¹³ Two relatively small ED randomized trials in adults also found no difference in outcomes.^{14,15} Many unanswered questions remain such as the impact of variables including operator training level, anticipated patient difficulty, blade geometry, and video visualization patterns.¹⁶ Given this ambiguity and apparent equipoise that remains even with the existing adult randomized trial data, variations in video-assisted laryngoscopy use in pediatric EDs may not necessarily be problematic.

That said, we believe video-assisted laryngoscopy in children represents the optimal strategy most supported by the existing evidence, even if the data informing that approach remains incomplete. In a recent editorial in this journal, Driver¹⁷ makes a case we find compelling that video-assisted laryngoscopy with a standard geometry blade should be the default modality for essentially all emergency airway management outside of clinical trials, while awaiting further definitive evidence. This approach allows operators to perform standard direct laryngoscopy with the benefit of video augmentation when warranted for a challenging airway, while posing no apparent disadvantages or additional patient risk. Professional societies and medical directors alike should consider protocolizing such recommendations with a current lower grade of evidence, while carefully monitoring patient outcomes and emerging research to refine clinical practice.¹⁸ The ongoing DirEct Versus Video Laryngoscopy multicenter randomized trial of adults undergoing emergency tracheal intubation (NCT05239195) should add clarity to the impact of video-assisted laryngoscopy on outcomes. It is our hope a similar randomized trial in children may be forthcoming in the future. Pending the results of these studies, video-assisted laryngoscopy with a standard geometry blade leverages the

potential benefits of both video-assisted and direct laryngoscopy.

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Author affiliations: From the Evans Army Community Hospital, Fort Carson, CO (April); 40th Forward Resuscitative Surgical Detachment, Fort Carson, CO (April); Department of Military and Emergency Medicine, Uniformed Services University of the Health Sciences, Bethesda, MD (April); and the Department of Emergency Medicine, University of Colorado School of Medicine, Aurora, CO (Ginge).

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