

Intubation by Emergency Physicians: How Often Is Enough?



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Intubation is a lifesaving emergency procedure. Emergency medicine residents achieve competency in intubation through intensive training programs, which include regular and frequent performance of intubation in the emergency department (ED). What happens after residency is uncertain; maintenance of any skill is a function of the quality and intensity of initial training plus ongoing experience in clinical practice. Is the intubation experience of emergency physicians enough to maintain the competency acquired during residency?

A study in this issue of *Annals* sheds light on this question, providing the first longitudinal description of intubation performance by practicing emergency physicians. Using administrative data from a national practice group with sites in 19 states, Carlson et al¹ studied 53,904 intubations performed by 2,108 emergency physicians. During 7 years at 135 mostly community, nonacademic EDs, emergency physicians performed a median of 10 intubations per year (interquartile range 5 to 17; overall range 0 to 109). These data address an important knowledge gap; there are no other large, longitudinal studies on *individual* emergency physicians performing intubation. The authors also assessed the validity of data collection in a variety of ways, mitigating many of the biases inherent in administrative data sets.

While addressing a deficiency in the evidence, Carlson et al provoke other questions: How many intubations do emergency physicians need to perform to maintain competency? Does residency training ensure maintenance of competency independent of future experience? Do newer technologies, such as video laryngoscopy, help or hinder skill maintenance? Greater intubation experience in paramedics is associated with improved patient outcomes²;

does a similar relationship exist for emergency physicians? Put simply, how do practicing emergency physicians maintain competency with critically needed airway skills, let alone advance or acquire new skills, with only 10 intubations a year?

First, to answer questions about the procedural skills of emergency physicians, we need more data on current practice. For greater than 30 years, the National Emergency Airway Registry has collected data on ED airway management.³ The registry focuses, however, on academic centers and may not reflect practice in community EDs, where the majority of emergency care occurs. Broader implementation of a National Emergency Airway Registry–like infrastructure, leveraging the efforts of large practice groups, would greatly enhance our understanding of the distribution and performance variation of ED airway management.

Second, we need comprehensive and accurate data on intubation performance. Out-of-hospital and ED studies highlight the superiority of collecting continuous physiologic data for detecting peri-intubation hypoxemia and bradycardia.^{4,5} Furthermore, studies in pediatric EDs have reported discordances in attempt success and other process measures between the medical record and video review.^{6,7} Combining automated collection of patient monitor data with targeted video review would improve the validity of studies of ED airway management.

Third, we need better measures of airway skill. The common measures of intubation competency (eg, first-pass success) are crude proxies for skill.^{8,9} Moreover, the traditional approach to assessing competency is limited, involving often unstructured observation by a more experienced provider. Subtle hand and body movements may be essential aspects of skilled performance but invisible to the naked eye. Motion-based analysis, including the use of inertial motion units and 3-dimensional motion capture, has shown promise for accurately and precisely measuring intubation performance.^{10,11} A clinically validated profile for intubation expertise, developed through motion-based

studies, would provide a much-needed platform for accurate and reliable assessment of intubation performance while enhancing the ability to identify and address those microskills most susceptible to decay from infrequent use.

Fourth, we need a better approach to studying the high-stakes decisionmaking of ED airway management. Helping emergency physicians to make more effective airway decisions, especially under high cognitive load, may be as effective as or more effective than improving manual airway skills. There are many airway algorithms designed to improve decisionmaking, but their clinical influence is unknown. Advancing our understanding of decisionmaking during emergency airway management, including the effect of cognitive aids, will require an innovative approach to measurement. In fields such as human factors and ergonomics, there are numerous approaches to measurement that have been underused or not applied to critical decisionmaking in emergency medicine, including biometrics (eg, pulse rate variability), eye tracking, near-infrared spectroscopy, scoring tools (eg, the NASA Task Load Index), and structured interviews (cognitive task analysis).¹²⁻¹⁴ Clinical studies using a combination of these measures would both improve our understanding of how emergency physicians make airway management decisions and provide a platform to assess the effect of airway algorithms and other cognitive aids.

The study by Carlson et al addresses a critical gap in our knowledge of ED airway management while prompting us to advance our approach to airway research in emergency medicine. The decision to perform intubation for a critically ill patient is fraught with risk and stress; we must leverage technology to develop new approaches that broaden and deepen our understanding of this essential, lifesaving procedure.

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