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Evolving Tracheal Intubation Practice Patterns in the Pandemic Era

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Emergency tracheal intubation commonly is performed in the care of critically ill patients and often results in complications that range from hypoxemia to cardiovascular collapse and death.^{1,2} Substantial uncertainty exists around the best approach to prevent intubation complications; accordingly, practice patterns vary widely.³ In reality, the approach a clinician takes to intubation depends not only on individual patient characteristics but also on clinician specialty, experience, and institutional culture.

The unprecedented COVID-19 pandemic required a global reappraisal of tracheal intubation practices because of the high severity of illness and the risk of the procedure itself for the airway operator. Guidelines produced early in the pandemic recommended intubation techniques that were thought to minimize aerosol generation, reduce operator exposure to viral particles, and optimize procedural efficiency.^{4,5} At many centers, these recommendations differed from the existing culture surrounding emergency tracheal intubation and were practice-changing.

In this issue of *CHEST*, Nauka et al⁶ present a welcome analysis of the real-world effects of the implementation of intubation guidelines at a large academic medical center during the COVID-19 pandemic. With the use of

FOR RELATED ARTICLE, SEE PAGE 2112

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retrospective data from before and during the pandemic, the authors compared technique, outcomes, and complications after emergency tracheal intubation. Patients were included in the study if they required intubation outside of the operating room and ED. Critical care fellows with similar levels of intubation experience performed the majority of the intubations during both epochs. The prepandemic cohort included 782 patients who underwent intubation between July 19, 2019, and March 10, 2020; the pandemic cohort included 478 patients who underwent intubation between March 11, 2020, and May 1, 2020. Comparing the pandemic cohort with the prepandemic cohort, the authors found widespread adoption of video laryngoscopy (89.4% vs 53.3%, respectively) and neuromuscular blockade (86% vs 46.2%, respectively), and reduced use of a bag mask for preoxygenation (7.7% vs 50.8%, respectively) in intubations performed during the pandemic. These practice changes were associated not only with an increased rate of first-pass success (94.6% vs 82.9%; $P < .01$) but also higher rates of complications (29.5% and 15.2%; $P < .01$). The increased rate of complications appeared to be driven by peri-procedural hypoxemia (25.7% vs 8.2%; $P < .01$)

What can we learn from the study by Nauka et al⁶? First, this study supports that the procedural success rate for emergency tracheal intubation is modifiable with changes in intubation technique, independent of operator experience. Unfortunately, the major limitation of this retrospective study is that we cannot determine which factors were responsible for the improved first-pass success. It is tempting to attribute the improved procedural success to the increased use of video laryngoscopy; however, increased first-pass success has not been a consistent finding in prospective trials of video laryngoscopy.⁷ Likewise, although randomized trials in the operating room and observational studies in the ICU suggest improved procedural success with neuromuscular blockade during intubation, prospective randomized trials in critically ill patients are lacking.^{8,9}

Second, this study highlights that improving first-pass success is insufficient to prevent intubation complications. Complication rates depend both on procedural factors and underlying patient factors. The patients in the pandemic cohort, unsurprisingly, were

more often intubated for hypoxemic respiratory failure and had a substantially lower PaO₂/FIO₂ ratio at the time of intubation. To some extent the nature of severe COVID-19 respiratory disease may explain the increased complication rate; however, it is important to consider how COVID-19 intubation practices also may have influenced these rates. In an effort to avoid aerosol dispersion, very few patients in the pandemic cohort received noninvasive positive pressure (2.9%) or bag mask preoxygenation. Postinduction bag mask ventilation was discouraged, and passive apneic oxygen was encouraged by institutional guidelines. These practices stand at odds with the key findings of the most robust trials of emergency intubation to date: delivery of positive pressure and apneic ventilation reduce the rate of hypoxemia in emergency intubation.^{10,11} It is therefore unsurprising, especially with the concomitant greater use of neuromuscular blockade, that there would be a greater rate of postintubation hypoxemia among the pandemic group.

Finally, this study underscores the importance of carefully considering outcomes for future research in emergency tracheal intubation. First-pass success has been associated with reduced complications compared with repeated laryngoscopy attempts in prior studies.¹² However, this term lacks granularity. What is the first pass? Nauka et al⁶ defined it as the first laryngoscope blade insertion. With this definition, the airway operator may attempt and fail to pass the endotracheal tube through the vocal cords multiple times during a single blade insertion. Likewise, first-pass success does not take time from the start of laryngoscopy to successful tube placement into account. It is possible that a single attempt with video laryngoscopy may take more than two attempts with direct laryngoscopy. These unmeasured factors may have contributed to the unexpected finding in this study.

The novel risks faced in the COVID-19 pandemic changed intubation practices around the world.

These changes were born of a need to reconcile the safety of the procedure for the patient with the safety of those performing the procedure. As we emerge from the pandemic, it is worth reevaluating which of these changes are evidenced-based.

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