

In Reply:—We thank Drs. Calder, Yentis, and Patel for their interest in our article.¹ We agree that the use of neuromuscular blocking drugs (NMBDs) in emergent airway management is an important topic. While Drs. Calder, Yentis, and Patel mirror our own clinical observations, we believe that there is not enough evidence at present to recommend the use of NMBDs for emergent intubation. For example, the suggested sentence, “If mask ventilation is impossible the evidence suggests that a NMBD will permit ventilation or intubation” reflects clinical observation, but has not been tested during emergent airway management outside of the operating room. Calder *et al.* suggest that the results of the study on predictors of difficult and impossible mask ventilation² by Kheterpal *et al.* has confirmed that the nonevidence-based practice of not administering an NMBD until ventilation has been demonstrated is unsound. However, in the discussion of their paper, Kheterpal *et al.* state that the results of their study may have been skewed by the preoperative concern by anesthesia providers, and awake fiberoptic intubation may have been performed in many patients in whom difficult mask ventilation or intubation was expected.

We are not convinced that muscle rigidity caused by opioids is solely responsible for the observed increase in complications. Opioid-induced muscle rigidity usually occurs in high concentrations generally reserved for “cardiac inductions,” and is infrequently in low doses used during routine anesthetic inductions.³ Furthermore, muscle rigidity primarily inhibits mask ventilation, an aspect of emergent airway management that was not addressed in our study.

We feel that there is equipoise for the use of muscle relaxants for emergent intubations. It is apparent that a randomized control trial is needed to address the question whether routine use of NMBDs is best practice for emergent airway management or not. The current regulatory climate in the United States is essentially prohibitive to conducting such a study.⁴ Going forward, we must rely on large observational studies to answer many of the questions surrounding emergent airway management.

We also thank Drs. Mhyre, Martin, Ramachandran and Kheterpal for their interest in our article. We agree that cofounders may have influenced our results and highlighted this point in the limitation section of our article.⁵ However, the parameters mentioned in the letter may or may not influence the results of our study. While there was a difference in location, whether complication rates in intensive care unit or floor patients differ is unknown. For example, Jaber *et al.*⁶ reported severe complications in 28% of intensive care unit patients requiring intubation, a complication rate that is comparable to complications reported during emergent intubations outside of the operating room.⁷

Drs. Mhyre and colleagues report that the addition of a senior resident to the emergent airway team resulted in a complications rate of 2.3% in 2,400 intubations. This is a very impressive result and far below published data.⁵⁻⁹ They link their low complication rate to the availability of a bougie. In our institution the emergent airway bag contains a bougie, and all of our anesthesia providers are thoroughly trained in its use. We are not aware of any studies showing that the use of a bougie decreases the esophageal intubation rate in emergent intubations outside of the operating room. On the other hand, severe complications such as pharyngeal wall perforation have been reported

with its use,¹⁰ and we would therefore advise against the routine use of the device.

As the authors point out, time of day has been shown to affect the outcome of several emergency situations. Analysis of our data revealed an increase in complications at night as compared with day (20% *vs.* 9%, $P = 0.04$). We do not have data on nursing vigilance, time from call to arrival of the emergent airway team, and so forth. These aspects are clearly important and may influence not only the outcome of emergent intubations, but also provide rationale for the implementation of rapid response systems.

It is obvious that implementation of 24/7 supervision of emergency intubations will require choices. In many centers without 24/7 attending anesthesiologist presence, improved training and a system of two providers might be the best that can be provided. However, in tertiary care centers with a high volume of emergent intubations, we believe that supervision of emergent intubations is the preferred option.

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