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Hospital-level Neuraxial Use in Orthopedics: Reply

In Reply:

We welcome the thoughtful comments by Martin *et al.* in reply to our study[1] in which we aimed to assess the relationship between hospital-level neuraxial anesthesia utilization and outcomes. While we included various outcomes, our main finding was related to cost as we demonstrated that increased hospital-level use of neuraxial anesthesia is associated with lower hospitalization cost for lower extremity joint replacements. Martin *et al.* note correctly that almost none of the clinical outcomes under study appear significantly associated with hospital-level use of neuraxial anesthesia, and while they provide three potential mechanisms to be responsible they mainly focus on "an accounting error" as the likely culprit. Indeed, accurate cost data are notoriously hard to come by,[2] and the authors are right to state that costs captured in the Premier Healthcare (Charlotte, North Carolina) database are dependent on each hospital's accounting methodology, while a smaller number of hospitals submit charges that then have to be converted using Medicare cost-to-charge ratios. Importantly, however, this is all *independent* of hospital-level neuraxial anesthesia use and thus should not affect the relative effect estimates provided in our study. We therefore respectfully disagree with Martin *et al.* on the role of accounting errors on our study results. To further evaluate the proposed mechanisms mentioned by Martin *et al.*, we performed a large number of analyses in our study for which we applied multiplicity (Bonferroni) adjustments, which is not without controversy as it results in wider CIs and increases the likelihood of type II errors[3]; this may have affected our results and thus could have been a potential mechanism behind our findings.[1] Moreover, the complication outcomes included in our study were selected based on strengths of association as well as prevalence of outcomes found in our previously published *individual-level* models.[4] This is by no means a complete selection of all complication outcomes, and it could very well be that some of the association between hospital-level neuraxial anesthesia use and cost is driven by unmeasured (and more subtle) complications. Finally, it is important to keep in mind that our study focuses on *hospital-level* and not *individual-level* use of neuraxial anesthesia. This crucial distinction may very well imply that hospitals with (a high) neuraxial anesthesia utilization in lower extremity joint arthroplasty are different in other aspects as well, including increased cost-effectiveness levels through other pathways. For example, neuraxial anesthesia is commonly mentioned in enhanced recovery pathways, which have been linked to superior outcomes. Indeed, hospitals with higher volumes of neuraxial anesthesia may therefore be more likely to have adopted these pathways, which could also be one of the drivers of the effects found in the current study.

In summary, we welcome the academic discourse by Martin *et al.*, but have to disagree on their assessment. While we welcome studies that would aim to validate our findings using alternative data sources, we feel that our results are robust, particularly because the association between cost and neuraxial volume persisted across the multitude of analyses performed in our study.

Competing Interests

The authors declare no competing interests.

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Intubation in Operating Room *versus* Intensive Care: Comment

To the Editor:

With great interest, we read the article by Taboada *et al.*[1] comparing tracheal intubation conditions in operating rooms and intensive care units. Not surprisingly, intubations in the intensive care unit were associated with worse intubation conditions and greater complications. The most frequent indication for intubation in the intensive care unit was acute respiratory failure (83%), and 63% of patients needed noninvasive ventilation before intubation.[1] Intubation was by direct laryngoscopy, during apnea. The complication of hypoxia (oxygen saturation less than 80%) occurred in 19 intensive care unit patients (9%, although it was reported incorrectly in table 2 of the article as 14%). Minimizing apnea time is important for critically ill patients in respiratory failure, who might not tolerate prolonged desaturation. There are three common ways to maintain the oxygenation during intubation, including apneic oxygenation by various techniques,[2] continued ventilation during intubation through a supraglottic airway guided by a flexible scope,[3–5] and continued mask ventilation (fig. 1) during intubation by a flexible scope.[6] We consider this method to have several advantages, including (1) apnea is almost nonexistent, and continuous ventilation increases oxygenation safety margins; (2) removing a face mask is easier than removing a supraglottic airway; (3) the technique is amenable to the nasal intubation; and (4) the method can be used with a reinforced endotracheal tube. We believe that with improved oxygenation during intubation in critically ill patients, the incidence of hypoxemia can be reduced.

Competing Interests

The authors declare no competing interests.

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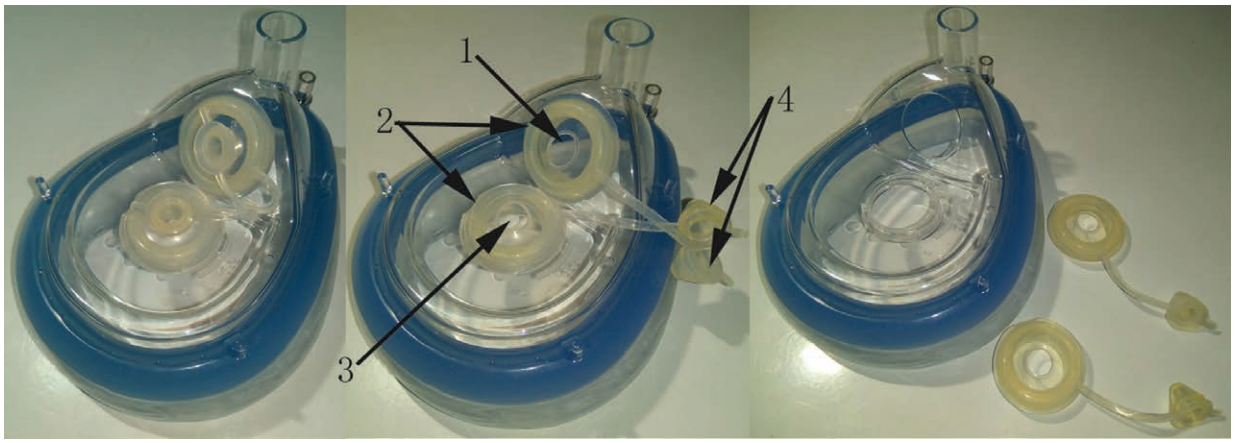

Fig. 1. Second generation endoscope and anesthesia mask (size 6). The *left* mask was sealed; the sealing cap was open in the *center* mask; and the sealing ring was taken off in the *right* mask. *Arrow 1* indicates the nasal operating hole; *double arrow 2* indicates the sealing rings; *arrow 3* indicates the oral operating hole; and *arrow 4* indicates the sealing cap.