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One-lung Ventilation and Complications: Comment

To the Editor:

In their retrospective observational analysis of patients undergoing one-lung ventilation during thoracic surgery, Colquhoun *et al.* did not detect an independent association between a low tidal lung protection ventilation regimen and a composite of postoperative pulmonary complications.[1] However, there are two additional factors that may have an impact on this finding.

First, the right lung is larger than the left lung. Normally, the left lung receives a smaller tidal volume than the right lung. By using the same tidal volume for both the left and right lungs, it is possible that a tidal volume that is protective for the right lung may be excessive for the left lung. Without accounting for this difference, it is possible that the left lung did not accrue the full benefit of low tidal volume ventilation and might have had greater injury.

Second, respiratory rate is one of the key variables through which mechanical ventilation may injure a patient.[2–4] Reduction of respiratory rate and tidal volume ameliorates lung inflammation and injury. An increased respiratory rate may contribute to the development of dynamic hyperinflation and intrinsic positive end-expiratory pressure with multiple respiratory and hemodynamic consequences. It is well established that ventilator-induced lung injury is largely caused by the cyclic overstretch and/or collapse of alveoli. With a higher respiratory rate, there will be more such cycles and thus, more accumulated damage. Colquhoun's patients with protective ventilation had higher mean respiratory rates with larger SDs. It is possible that more patients in this group had sufficiently high respiratory rates which may have negated benefits that otherwise might have been seen with protective ventilation.

If there is a future study, it would be helpful to use different left and right lung tidal volumes, as well as ensure no differences in respiratory rate between protective ventilation and no protective ventilation patients. Such a study will require a large number of subjects and a very careful prospective study design.

Competing Interests

The author declares no competing interests.

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The corresponding author of the original article referenced above has read the letter and does not have anything to add in a published reply.

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An Updated Minimal Clinically Important Difference for the QoR-15 Scale

To the Editor:

We have previously reported the minimal clinically important difference for three quality of recovery (QoR) scales.[1] The minimal clinically important difference describes the smallest change in score that constitutes a meaningful change in health status—in our case, this pertains to QoR after surgery. We had estimated the minimal clinically important difference of the QoR-15 using an average (triangulation) of three distribution-based methods (0.3 SD, standard error of the measurement, and 5% range), and a standard anchor-based method,[2,3] resulting in an minimal clinically important difference of 8.0.[1] Distribution-based methods are based on the statistical variability of assessment scales, accounting for measurement error.[2] The anchor-based method uses repeat patient ratings that quantify the extent of change (*i.e.*, improvement or deterioration) of health status over time.[2,4–7] This method calibrates ("anchors") the change in health status—here quality of recovery measured by the QoR-15 scale—as perceived by patients relative to their previous state.

We have had an ongoing concern that our original estimation of minimal clinically important difference for the QoR-15 scale (minimal clinically important difference = 8.0) was too high. This is in part because of the discrepancy between the three distribution (mean minimal clinically important difference = 5.7) and anchor-based (minimal clinically important difference = 13) estimates in our original report[1] and experience in measuring patient outcomes after surgery in a recent large clinical trial evaluating dexamethasone in which patients reported less postoperative nausea and vomiting and less acute pain at rest.[8] This concern is further heightened when considering previous estimations of the responsiveness of the QoR-15,[9,10] which indicate very high ability to detect real change. There are several shortcomings of anchor-based methods, including that anchor questions used to establish minimal clinically important difference are rarely validated and are susceptible to recall bias[11] and will be affected by outliers. We have therefore undertaken further analysis.

An additional method of determining the minimal clinically important difference is to use receiver operating characteristic curve analysis.[12,13] A receiver operating characteristic curve plots the trade-off between the sensitivity and specificity of a binary diagnostic test, in this case correctly identifying whether minimal improvement (or greater) in QoR has occurred, according to change in QoR-15 score. We defined "minimal improvement" as a change from +1 to +2 or more (more than 1 point) on the 15-point Likert scale used in the original anchor-based method.[1] The area under the receiver operating characteristics curve (AUC) would equal 1 where a test has both perfect sensitivity and specificity, and an AUC of 0.5 represents discrimination that is no better than chance. When used for estimation of minimal clinically important difference, sensitivity is defined as the proportion of patients who report improvement based on the external criterion and have a patient-reported outcome—here at least minimal improvement in the QoR-15 score. The minimal clinically important difference is the point on the receiver operating characteristic curve that achieves the optimal trade-off between sensitivity and specificity, and the Youden index (maximal sensitivity + specificity − 1) provides an index of the improvement in sensitivity above chance at this point.[14]

Using this approach on the original dataset,[1] we found that the AUC was 0.83 (95% CI: 0.74 to 0.91), $P < 0.001$ (see fig. 1), indicating excellent discrimination.[15] A change in QoR-15 score of both 3.5 and 4.5 yielded the highest sensitivity (0.765 and 0.735, respectively) and specificity (0.758 and 0.788, respectively), resulting in a Youden's index of 0.52.

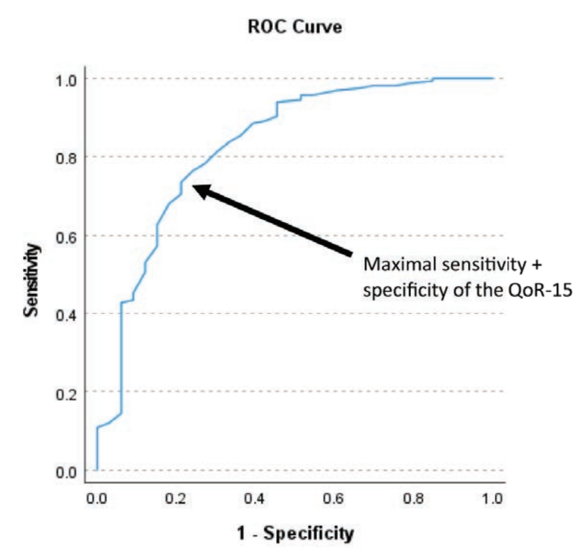

Fig. 1. The receiver operating characteristic curve (ROC) depicting sensitivity and specificity of a change in the QoR-15 score to predict minimal improvement in quality of recovery after surgery.

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