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Evaluating Work of Breathing Measurements in Weaning

To the Editor:

The ability to identify patients who will be successfully weaned from mechanical ventilation is extremely important. Unfortunately, traditional weaning parameters have not been consistent in their ability to predict weaning outcomes. We therefore read with great interest the articles by Levy et al (CHEST 1995; 108:1018-20) and Kirton et al (CHEST 1995;108:1021-25) concerning the use of the work of breathing (WOB) as a weaning parameter. The study by Levy et al, which measured total WOB, found that it was a poor predictor of weaning outcome in medical patients. The study by Kirton et al confirmed that total WOB was a poor predictor but concluded that the patients’ WOB, defined as the WOB due to the patients’ physiologic state independent of the load imposed by the breathing apparatus, accurately predicted weaning outcomes in patients who suffered trauma. The problem with the use of bedside WOB measurements is that they add to the complexity of care of ventilated patients and require that the patients be cohorted into costly specialized care units.

We have demonstrated that the “rapid wean team” composed of pulmonologists and respiratory therapists successfully managed and weaned patients with stable respiratory failure on a general medical floor. We have also found that clinical assessment by a pulmonologist was the most accurate predictor of weaning outcome with a predictive value of over 90%. We suggest that an individualized treatment plan and close follow-up will result in safe and rapid weaning for a majority of patients. WOB measurements should be reserved for those complicated and difficult patients in whom weaning has failed for no apparent reason despite medical optimization. In this age of shrinking medical dollars, we must be wary of adopting high-tech-high-cost approaches until they have been proven to be of value.

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References


To the Editor:

We agree with Dr. Tessler that technology will not replace dedicated clinicians who apply a systematic individualized approach to weaning the mechanically ventilated patient (eg, critical care intensivists, respiratory therapists, pulmonologists, nurse practitioners, or multidisciplinary teams), resulting in decreased ventilator days and significant cost saving.1-3 The method of ventilation is also crucial. We restrict the administration of paralytics, minimize sedation, and employ pressure support ventilation as our primary ventilatory support mode; it is versatile and can be titrated to preserve physiologic work of breathing (WOB) while neutralizing inappropriate work loads (ie, disease, imposed system work).4-5 The majority of intubated patients can be weaned to minimal support and extubated using clinical acumen and/or bedside spirometric measurements. While conventional weaning parameters (eg, Vt, Vr, respiratory rate), however, have good predictive value in the short-term ventilated patient (ie, <72 h), they demonstrate poor prediction in the complex, long-term ventilated patient. In this cohort, WOB appears to be more predictive of successful weaning outcome.6

The minimally invasive respiratory monitor is transportable, can be used on the general medical floor, step down, or pulmonary unit. Our article (CHEST 1995; 108:1021-25) did not intend to imply that WOB measurements are necessary in every intubated patient. We employ noninvasive pulmonary monitoring for the following indications: (1) unexplained tachypnea or respiratory distress, (2) to guide endurance and strength reconditioning, and (3) to avoid iatrogenic ventilator dependency in the complex long-term ventilated patient caused by inappropriate ventilator settings.7

Incorporation of WOB analysis into our spontaneous breathing pre-extubation trial allowed extubation of 73 out of 418 consecutive patients who would have remained intubated because of tachypnea (respiratory rate: range=32-52 breaths/min) secondary to excessive imposed WOB (endotracheal tube, ventilator circuit, demand valve system), with a projected net savings in excess of $292,000.8 Moreover, Gluck and colleagues9 also reduced ventilated days by using an objective protocol based on esophageal pressure monitoring. In the age of shrinking medical dollars, high technology can save dollars if appropriately applied and appropriately interpreted. Minimally invasive pulmonary monitoring can provide objective information to supplement (not replace) clinical judgment.

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References

1 Cohen IL, Bari N, Strosberg MA, et al. Reduction of duration and