should help to evaluate specific therapies for the treatment of PGF (eg, nitric oxide or surfactant). In addition, the findings of this outcome model should be validated by other centers. Once validated, whether in the present or modified form, it will be useful in prospective studies to determine risk factors, causes, and treatments of PGF. The ultimate utility will be to separate true risk from myth, thereby allowing the careful expansion of the donor pool while simultaneously decreasing the incidence of severe reperfusion injury.

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The Anarchy of Weaning Techniques

Over the past 15 years, clinical studies have demonstrated methods of expediting liberation from mechanical ventilation. Since endotracheal intubation and positive-pressure ventilation engender significant risks that increase with time, personnel who care for critically ill patients are obliged to liberate the patient on the first day on which success is likely. Weaning parameters are measurements of physiologic respiratory parameters that have been used to guide such weaning decisions. Recent reviews1–2 and an international consensus statement3 have discussed the published literature examining the clinical predictive utilities of various weaning parameters. No weaning parameter is perfectly predictive,3,4 but some may be useful when used in protocols to expedite weaning and to reduce the duration of mechanical ventilation.5,6 In this issue of CHEST (see page 1947), Hoo and Park administered questionnaires to 102 respiratory therapists who practice in nine Los Angeles-area ICUs, interrogating them about the weaning parameters used in their clinical practices. Despite the abundance of scientific reports published in the past decade,1–3 the data reveal a startling degree of chaos in this area. Some parameters (ie, maximal inspired pressure, respiratory frequency, tidal volume [Vt], and minute ventilation) were measured and recorded by > 90% of respondents, but these parameters in themselves are not highly predictive of weaning outcomes. The f/Vt ratio, arguably the most predictive parameter,3,4 can be computed but was reported specifically by < 20% of respondents. This suggests that it may not have been used to guide weaning decisions. Moreover, the time of day at which parameters were measured and the methods of measurement were not uniform. Frequently, parameters were not measured using published techniques, which reduces the predictive utility of the various measures. For example, only 3 of 106 respondents measured the f/Vt properly with a spirometer during a couple of minutes of T-piece breathing.7,8 There was also significant variability in the methodology used to measure the maximum inspiratory pressure. These findings deserve comment.
To understand the importance of this study, we must first understand the role of weaning parameters in patient care. Weaning parameters assess a patient’s ability to oxygenate and/or ventilate spontaneously. Oxygenation parameters are generally permissive: that is, a patient is considered ready to wean from ventilation, from an oxygenation perspective, once the PaO₂/fraction of inspired oxygen ratio is > 120 (some say 150). Most weaning parameters index the likelihood of sustained unassisted ventilation as follows: respiratory muscle capacity; respiratory loads; or the balance thereof. It is not surprising that the f/Vt has emerged as the simplest and most predictive tool. It is the end-product of the capacity-load relationship. When capacity is insufficient to readily meet loads, patients breathe rapidly and shallowly. Does the use of weaning parameters to guide weaning decisions affect outcomes? In a seminal study, Ely and colleagues demonstrated that when the f/Vt was used to determine when to begin spontaneous breathing trials (SBTs), the duration of mechanical ventilation could be reduced compared to the situation with patients who received routine ad hoc physician-directed weaning. This important study may suggest, at first glance, that use of the f/Vt accounted for the observed positive result. However, another study, by Kollef and colleagues, yielded similar results, and the treatment arm (ie, patients assigned to a variety of weaning protocols) did not include the use of the f/Vt. Finally, preliminary data by Tanios and colleagues demonstrated that a f/Vt-centered weaning protocol was no better than simply performing daily SBTs in patients who were hemodynamically stable (ie, PaO₂/fraction of inspired oxygen ratio, ≥ 150). These results suggest the same conclusion: the intervention that reduces the duration of mechanical ventilation is not the weaning parameter that was used. Rather, the weaning parameter used was allowing patients who are hemodynamically stable and adequately oxygenated to perform daily SBTs until they pass. This approach focuses attention away from the numbers and toward the patient. In my opinion, the f/Vt is not so much a weaning parameter as it is a physiologic description of a 1- to 2-min SBT. If patients look good (ie, if the f/Vt is favorable), then simply extend the SBT to 30 to 120 min. If the patient “passes,” he or she no longer needs the ventilator, assess whether an airway is still required, and if it is not, perform a trial of extubation. One of the primary problems with using weaning parameters, even the f/Vt, is that false-negative results bind patients to ventilators needlessly. Patients whose f/Vt is not favorable ought not necessarily be precluded from undergoing an SBT. Some would argue that, in light of the above result and the risks inherent in prolonged intubation, we should err on the side of giving patients every possible opportunity to prove they are ready to be extubated. There is little potential harm if an SBT is carefully observed, and in our hands one half of those with f/Vt of 100 to 125 breaths/min/L were successfully liberated from ventilation. After all, protocols (and the weaning parameters therein) are meant to help guide and expedite, and they never should substitute for common sense.

The current study in CHEST does not examine how weaning parameters, obtained however chaotically, were applied to guide clinical decision making. However, the poor methods used to gather the weaning parameters reduce their clinically predictive utilities. So, even if the parameters were used to guide weaning decisions in a systematic fashion (which is “a leap”), they are likely to have misguided some weaning decisions. So, for me, the most disheartening aspect of the observations of Hoo and Park is that we have not learned from the data. The hard work and excellent published scholarship of the past decade may not have been translated into better patient management.

To conclude, in light of the increasing evidence and consensus on how to wean maximally, this level of anarchy is disturbing. Physicians and respiratory care leaders must assess the current guidelines and must formulate systems and protocols with which to expedite patient liberation from mechanical ventilation through daily systematic scrutiny of patient readiness. If we choose to use weaning parameters in these protocols, and I have favored the use of the mini-SBT (ie, f/Vt a la Ely et al, the parameters should be measured correctly to ensure that predictive values are preserved. In previous reviews, I have written that the art of weaning has been supplanted by the science of weaning. Indeed, this assertion was presumptuous; it assumed that good science is used to inform patient management. There is enough science to tell us how to do this thing right; it is now time to apply the science at the bedside.

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