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CRITICAL CARE

COMMENTARY

Short people got no reason: gender, height, and disparities in the management of acute lung injury

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See related research by Han *et al*., http://ccforum.com/content/15/6/R262

Abstract

Though the benefits of lung protective ventilation (LPV) in acute lung injury/acute respiratory distress syndrome (ALI/ARDS) have been known for more than a decade, widespread clinical adoption has been slow. Han and colleagues demonstrate that women with ALI/ARDS are less likely than men to receive LPV, though this disparity resolves when the analysis is adjusted for patient height. This analysis identifies patient height as a significant factor in predicting provider adherence with LPV guidelines, and illuminates why some disparities in intensive care exist and how they may be resolved via improved utilization of evidence-driven protocols.

In this issue of *Critical Care*, Han and colleagues report that in a prospective, multicenter study of patients with severe sepsis-induced acute lung injury (ALI) and acute respiratory distress syndrome (ARDS), women were less likely than men to be treated with lung protective ventilation (LPV) during the first 48 hours of their illness [1]. This gender disparity disappeared when the groups were adjusted for height and severity of illness. In a multivariate analysis, patient height and severity of illness remained significant predictors of receiving LPV during the first 48 hours of illness. While prior research has identified physician, respiratory therapist and nurse factors as potential barriers to implementation of LPV [2,3], this study identifies a population of patients who are especially vulnerable to receiving suboptimal ventilator management when being treated for ALI/ARDS.

This observation is an important contribution to our growing understanding of why implementation of LPV in patients with ALI/ARDS is far from universal more than a decade after the ARDS Network ARMA trial demonstrated an 8.8% absolute mortality reduction [4]. The authors report that among all patients in their study, only half (53%) received LPV. Unfortunately, this proportion is similar to other reports in the post-ARMA era, reports published more than 5 years ago [5,6], suggesting the lasting impact of this advance may have been limited and has plateaued. This illustrates the difficulty of changing practice culture in the intensive care unit: despite the LPV protocol requiring no new equipment and minimal additional training, and despite unambiguous evidence of mortality benefit [4,7] and a favorable cost-effectiveness profile [8], full adoption into clinical practice simply has not occurred.

In the past 15 years, many of the greatest strides in intensive care have come not from the introduction of novel pharmaceuticals nor biomedical devices but instead from protocolized care delivery. Interventions using protocols and checklists have shown clear benefit in the management of ALI/ARDS [4], severe sepsis [9], sedation strategies [10], ventilator weaning [11] and prevention of nosocomial infections [12]. Yet in most instances, incorporation into clinical practice has been slow and incomplete, with the persistence of, and considerable variance in, critical care practices and their attributable morbidity and mortality.

A number of potential barriers to protocol implementation have been previously identified, including reluctance of providers to relinquish control, failure to recognize clinical contexts in which protocol initiation is indicated, a resistance to 'cookbook medicine' in which clinical judgment is supplanted by algorithms, and 'clinical inertia' [2,13,14]. The association identified by Han and colleagues between patient size and provider adherence with LPV is consistent with several identified by Rubenfeld and colleagues [2], namely provider discomfort with low tidal volumes and the perception that 'my patient is an exception', for some reason outside of the population of patients who would benefit from strict LPV.

The miscalculation of set tidal volume based on patients' actual body weight rather than predicted body

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weight has been identified as a barrier to implementation of LPV [2], and was observed in 73% of patients in this current study. Given that obesity is more common among women than men among US adults [15], use of actual body weight would tend to result in larger tidal volumes for women and may partly explain the disparity observed in the current study. But the significant association between patient height and adherence with LPV suggests that a more important cognitive barrier may be provider reliance on absolute tidal volumes rather than tidal volumes adjusted by patient's predicted body weight, particularly when that calculation yields a seemingly too small tidal volume. Short people with ALI are not treated with the same reasoned judgment with regards to tidal volume as taller ones are. We surmise in most intensive care units tidal volumes are routinely reported in unadjusted, absolute terms (milliliters per breath). Here a simple lesson from human factors engineering is worthy of consideration: simply switching the reporting of tidal volumes from milliliters to milliliters per kilogram of predicted body weight could potentially alleviate provider discomfort with small absolute tidal volumes and make delivery of LPV more uniform and appropriate across a diverse patient population.

Gender disparities in intensive care outcomes have been increasingly recognized in recent years, and may reflect underlying physiological differences or discrepancies in treatment delivery. In this instance a significant gender disparity in the delivery of LPV disappeared when adjusted for patient height, suggesting at least some apparent gender disparities may instead reflect other underlying variance in patient factors. This mode of analysis is important in moving beyond the recognition of disparities in care by revealing and offering the opportunity to address patient and provider factors that drive them.

Abbreviations

ALI, acute lung injury; ARDS, acute respiratory distress syndrome; LPV, lung protective ventilation.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

RPD drafted and made substantial revisions to the manuscript. RCH made substantial revisions to the manuscript.

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