The PROSEVA trial: Is it time to flip over the ARDS patient?

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SUMMARY
The PROSEVA trial being a randomized controlled trial has provided level I evidence for a positive mortality benefit in patients with severe acute respiratory distress syndrome (ARDS). Severe ARDS as an inclusion criterion was defined as the ratio of partial pressure of arterial oxygen to the fraction of inspired oxygen (FiO₂) being <150 mmHg, at an FiO₂ of at least 0.6 and a positive end-expiratory pressure of at least 5 cm H₂O for a patient being ventilated at a tidal volume of about 6 ml per kg (predicted body weight). In this trial, 3449 patients with severe ARDS were recruited from 27 intensive care units (ICUs) across France and Spain. Of these, 466 patients were eventually randomized and included in follow-up protocols. A total of 229 and 237 patients were assigned to the supine and prone groups, respectively. Prone-positioning sessions were planned for at least 16 hours a day in the prone group while the patients in the supine group were ventilated in the supine position. The primary outcome measured was 28-day mortality due to any reason. The secondary outcomes analysed were 90-day mortality, length of stay in the ICU and rate of successful extubation. The 28-day mortality rate was significantly lower in the prone group than in the supine group (16% v. 32.8%, p<0.001), while the corresponding rates of successful extubation were 80% v. 65% (p<0.001) and the 90-day mortality rates were 23.6% v. 41% (p<0.001). The hazard ratio for death with prone positioning was 0.39 (95% confidence interval [CI] 0.25–0.63) compared to a hazard ratio of 0.44 (95% CI 0.29–0.67) in the supine group. However, the length of ICU stay, duration of invasive mechanical ventilation, rate of use of non-invasive ventilation after extubation, incidence of extubation and the tracheostomy rate did not differ among the two groups.

COMMENT
ARDS was initially defined in 1994 by the American and European Consensus Conference (AECC). By 2013, the definition has undergone a series of modifications to incorporate the clinical spectrum, thus improving its diagnostic sensitivity and specificity. Despite many technological advances in monitoring and ventilation modalities, along with new therapeutic interventions, the mortality rates for ARDS have not shown a marked decrease as would have been expected. An example of such an intervention is the use of high frequency ventilation, which despite logical benefits and a commercial push failed to show any advantage over conventional lung-protective strategies. It has been well established over the past few decades that prone positioning for patients with ARDS on mechanical ventilation improves oxygenation. However, at many centres this modality is initiated later in the disease process or as one of the last measures. Guerin et al. in the PROSEVA trial included patients for prone positioning in the early part (12–24 hours) of ICU admission, thus including patients at much earlier stages than usually practised. Another inclusion criterion in the present study was to initiate prone positioning at a PaO₂/FiO₂ ratio of <150 mmHg at an FiO₂ of at least 0.6, unlike most centres where prone positioning is done in patients with much worse clinical parameters. The likely reason for such late initiation of ‘proning’ can only be logistical. Based on experience and on a literature search, we consider that prone-position ventilation presently practised in ICUs is suboptimal on two counts—for the duration it is used and the timing of initiation—compared to the PROSEVA trial. Guerin et al. proposed using prone sessions of at least 16 consecutive hours, a duration significantly higher than the present practice.
ventilation. One of the most strict inclusion criterion for the centres to participate in the above trial was that all 27 ICUs included had daily experience with the use of prone positioning for at least 5 years or more. Despite such extensive experience, the authors report a number of complications such as unscheduled extubations, main-stem bronchus intubations, endotracheal-tube obstruction, haemoptysis, etc. that lead to interruptions in the prone positioning protocols. Thus, centres naïve to the use of prone positioning are not likely to achieve optimal benefits and may encounter the above complications much more frequently. Another possible limitation of prone positioning is that such patients often require a high degree of sedation during the ‘proning’ sessions. It is also not uncommon for patients with ARDS to be haemodynamically unstable when blood pressures are supported by inotropes and vasopressors. ‘Proning’ such patients (needing a high degree of sedation and inotropic support) can lead to a precipitous fall in blood pressure and eventually worsen the haemodynamic profile.

Practically speaking, most ICUs in the developing world are much behind the developed world in using routine prone positioning. Caregivers still need to learn how routine mandatory ICU tasks—suctioning, wound care, tube feedings and ventilator circuit maintenance—are different for patients in the prone position.

The practical implications of the PROSEVA trial can have long-lasting results in terms of mortality benefits. However, it would be hard to expect intensivists to recommend untrained ICU staff to start ‘flipping the patients over’, leaving them there all day and half a night, subsequently trusting that the ICU team shall do it well enough to improve mortality in such patients. Thus, appropriate training of not only intensivists (in when to use ‘proning’) but also of the nursing and support staff on management of critically ill patient on advanced life support in the prone position is required before similar results can be achieved in ICUs in different countries.

The PROSEVA trial has faced some criticism. As patients had to be turned prone, the investigator reporting parameters could not be blinded. The authors did not mention total fluids utilized in the groups, as any significant difference could alter the cardiac output and eventually translate into better lung/systemic perfusion. Body mass index in both groups was around 29 kg/m²—this may not represent medical patients in obese subgroups and the results may not be well extrapolated due to additional lung atelectasis found in these patients.

In conclusion, the PROSEVA trial provides enough evidence to change our usual practice of prone positioning in an ICU and emphasizes upon early initiation of prolonged ‘proning’ sessions. The inexperience of staff in prone positioning of patients may present an initial hurdle towards adoption of these practices but the benefits definitely seem to outweigh the possible problems which may minimize with increasing experience. It is advisable that all tertiary care ICUs should initiate ‘proning’ protocols in patients who are hypoxic due to ARDS.

REFERENCES

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Should surgical residents work shorter hours?


SUMMARY
In 2011 the Accreditation Council for Graduate Medical Education (ACGME) in the USA mandated that first-year residents (PGY 1 or Interns) be allowed duty shifts of only 16 hours. The authors examined whether or not this ruling has affected their operative experience.

They studied the 249 interns’ annual case logs between 2007 and 2012 in ten general surgery residency programmes in California and Hawaii comparing the case volume for total, major and first assistant cases during the year 2011–2012 (post-shift restriction) with the four preceding years 2007–2010 (pre-shift restriction).

The median annual volume of major cases decreased significantly by 31.8%, from 80.5 to 54.9, and first assistant cases by 46.3%, from 20.7 to 11.1. The main decreases were in less complex procedures such as basic laparoscopy, soft tissue and breast surgery but not in trauma, vascular and pancreatic operations.

In their discussion the authors cite evidence in other studies that 75% of interns are dissatisfied with the 16-hour rule as it has had an adverse impact on their education. Their seniors who now have to cover their absence are dissatisfied because they (seniors) have to work harder. In another study, orthopaedic surgery residents also reported a decrease in clinical experience, number of major procedures performed, satisfaction with education and a sense of clinical