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Optimizing ventilator settings in ARDS: Evidence-based guidelines and clinical practice.

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Introduction

ARDS is a critical illness with high morbidity and mortality, especially among patients requiring mechanical ventilation. Since its first description, significant progress has been made in understanding the pathophysiology of ARDS and the role of mechanical ventilation. The primary objective of ventilator support in ARDS is to ensure adequate gas exchange while avoiding further injury to the already inflamed and fragile lung tissue. This calls for evidence-based, lung-protective strategies that are now standard in clinical practice [1].

The cornerstone of ARDS ventilation is the use of low tidal volumes (4–8 mL/kg of predicted body weight) to reduce volutrauma. Landmark trials, such as the ARDSNet study, demonstrated that low tidal volume ventilation significantly reduces mortality. Maintaining plateau pressures below 30 cm H_2O is critical to avoid barotrauma, while driving pressure (plateau pressure minus PEEP) has also emerged as an independent predictor of outcomes. Clinicians must balance oxygenation goals with the need to protect lung integrity [2].

PEEP prevents alveolar collapse at end expiration, improving oxygenation and reducing atelectrauma. However, the optimal PEEP level varies among patients. While standardized PEEP/FiO_2 tables are commonly used, individualized approaches based on lung mechanics, such as esophageal pressure-guided PEEP or recruitment maneuvers with decremental PEEP trials, are being explored. Excessive PEEP may overdistend normal alveoli, causing hemodynamic compromise and lung injury [3].

Recruitment maneuvers (RMs) involve transient increases in airway pressure to reopen collapsed alveoli. While they can temporarily improve oxygenation, their routine use is controversial due to risks like barotrauma and hypotension. The ART trial, for example, found no survival benefit and potential harm from aggressive recruitment strategies. Thus, RMs should be selectively applied in cases of severe hypoxemia, ideally under close hemodynamic monitoring [4].

Excessively high inspired oxygen concentrations can lead to oxygen toxicity. Therefore, the goal is to maintain PaO_2 between 55–80 mmHg or SpO_2 between 88–95%, using the lowest FiO_2 possible to achieve these targets. Gradual weaning of FiO_2 should accompany improvements in oxygenation, along with appropriate PEEP adjustments to sustain alveolar recruitment and reduce the need for high oxygen fractions [5].

Conclusion

Optimizing ventilator settings in ARDS is a dynamic and nuanced process that balances oxygenation needs with lung protection. Evidence-based practices such as low tidal volume ventilation, appropriate PEEP, and prone positioning have become standard of care. However, individualized approaches are increasingly emphasized to address patient heterogeneity. Through continued research and clinical vigilance, outcomes in ARDS can be further improved.

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References

1. Akinbami LJ, Moorman JE, Garbe PL, et al. Status of childhood asthma in the United States, 1980–2007. Pediatrics. 2009;123:S131–S145.
2. Du Q, Jin J, Liu X, et al. Bronchiectasis as a comorbidity of chronic obstructive pulmonary disease: A systematic review and meta-analysis. PLoS One. 2016;11(3):e0150532.
3. Braback L, Breborowicz A, Dreborg S, et al. Atopic sensitization and respiratory symptoms among Polish and Swedish schoolchildren. Clin Exp Allergy. 1994;24826–835.
4. Lis G, Pietrzyk JJ. Response-dose ratio as an index of bronchial responsiveness to hypertonic saline challenge in an epidemiological survey of asthma in Polish children. Ped Pulmonol. 1998;25:375–382.
5. FitzGerald JM, Boulet LP, McIvor RA, et al. Asthma control in Canada remains suboptimal: The Reality of Asthma Control (TRAC) study. Can Respir J. 2006;13(5):253–259.

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