Acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) are life-threatening diseases, and patients with ALI/ARDS require extensive critical care support for treatment of acute respiratory failure with hypoxemia and hypercarbia, and support of other failing organs. This issue of *Critical Care Clinics* is aimed at providing an overview of the significant advances that have been made in the last decade in the understanding and treatment of this disease, and the persistent challenges that still remain.

Since the initial description of ARDS more than 40 years ago by Ashbaugh and colleagues in 1967, much has changed. Epidemiologic data confirm that there has been a significant decline in the incidence of ALI/ARDS over the past decade, related to both direct pulmonary and indirect extrapulmonary causes. Despite this reduced incidence, mortality rates in ARDS are high, at approximately 40%. Severe ARDS due to the 2009 Influenza A (H1N1) virus occurred in young adults and was associated with severe hypoxemia and high mortality rates, and epidemiologic data from this pandemic are still emerging. Our enhanced knowledge of ARDS has uncovered important limitations to the current ARDS definitions that are being used in clinical trials, and we critically evaluate the current ARDS criteria and discuss whether a new ARDS definition should be considered.

The development of the ARDS Network was a groundbreaking advance with the completion of many multicenter clinical trials of ARDS treatments that have now refined our standard therapy for ARDS. The present therapeutic approaches for ALI/ARDS include: (1) identification and treatment of the underlying cause; (2) optimal fluid management–fluid conservative approach; (3) lung protective mechanical ventilation [lower tidal volume, optimal positive end-expiratory pressure (PEEP)]; (4) avoidance of secondary lung injury and infection; and (5) supportive critical care. Despite provision of these standard treatments, some ALI/ARDS patients progress to develop severe hypoxemia, requiring additional “rescue” therapies.
Key topics reviewed in this issue include innovative treatment strategies for ARDS including high-frequency oscillatory ventilation (HFOV), airway pressure release ventilation (APRV), extracorporeal membrane oxygenation (ECMO), and extracorporeal carbon dioxide removal (ECCO₂R). Potential pharmacologic treatment strategies for ARDS include surfactant therapy, inhaled nitric oxide, prostacyclin, and corticosteroid therapy, and comprehensive reviews of the evidence supporting these treatments are provided. Prone positioning therapy and specialized nutrition support are also discussed fully as adjunct treatments in ALI/ARDS.

Recent data regarding long-term follow-up of ARDS survivors revealed sustained lung recovery with near-normal lung function, but persistent physical functional limitations, advocating for early mobility in ALI/ARDS patients during their intensive care unit stay. Significant progress has been made in the field of biomarkers for prediction, diagnosis, and prognosis in ALI/ARDS. The development and refinement of experimental models for ALI/ARDS will continue to move research forward in this important area. The current state of research in two exciting areas—the potential for gene therapy as an effective treatment for ALI/ARDS and possible cell-based therapy with mesenchymal stem cells—are both reviewed.

We would like to thank the authors for their generous contributions of both their time and their expertise in the preparation of this issue. We would also like to acknowledge Dr Richard Carlson and the Elsevier editorial staff for their tireless support and assistance in bringing this issue to completion.

We hope that this issue of *Critical Care Clinics* provides an up-to-date resource for critical care practitioners regarding the optimal management of patients with ALI/ARDS and also reviews the current areas of active investigation in this life-threatening disease.

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