

# Acute Respiratory Distress Syndrome

## Contemporary Management and Novel Approaches during COVID-19

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**A**cute respiratory distress syndrome (ARDS) is defined as hypoxemia secondary to a rapid onset of noncardiogenic pulmonary edema.<sup>1</sup> Etiologic risk factors for ARDS encompass both direct and indirect lung injuries including but not limited to pneumonia, sepsis, noncardiogenic shock, aspiration, trauma, contusion, transfusion, and inhalation injuries. Although clinical recognition and management of ARDS have improved significantly over the past 25 yr, it is still a leading cause of death in critically ill patients, with mortality rates consistently reported around 30 to 40%.<sup>2</sup> An important factor in the high mortality rate in ARDS is that treatment is mainly focused on clinical management and no targeted therapies currently exist. Furthermore, ARDS management is often challenging as it commonly occurs in a clinical setting of multiple organ failure and can also lead to the development of nonpulmonary organ injury such as acute kidney injury.<sup>3</sup> Recently, the pandemic caused by coronavirus disease 2019 (COVID-19), which results from infection by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has led to a dramatic incidence in COVID-19-related ARDS. Thirty to forty percent of COVID-19 hospitalized patients develop ARDS, and it is associated with 70% of fatal cases.<sup>4,5</sup> At the time of this writing (July 31, 2020), there are more than 4.5 million COVID-19 cases and 152,000 related deaths in the United States.<sup>6</sup> Here, we describe select management strategies that have become foundations of ARDS clinical management and provide an update of emerging approaches for the treatment of ARDS related to COVID-19.

### Clinical Treatment Concepts

#### Nationally Organized Research Consortia to Study ARDS

To improve outcomes and develop treatment protocols for ARDS, the National Heart, Lung, and Blood Institute of the National Institutes of Health (Bethesda, Maryland) funded a series of multicenter clinical trials, which formed a research collaboration called the ARDS Network (<http://ardsnet.org>, accessed July 22, 2020).<sup>7</sup> Beginning in 1994, the network studies enrolled more than 5,500 patients, included 10 clinical trials and one observational study, led

to the development of new clinical parameters such as "ventilator-free days," and resulted in seminal advances that have helped to shape current ARDS management. National Heart, Lung, and Blood Institute–funded clinical trials continue currently under the Prevention and Early Treatment of Acute Lung Injury (PETAL) Network (<http://petalnet.org>, accessed July 22, 2020). Figure 1 and table 1 briefly summarize the results and implications of the results for ARDS and PETAL Network trials, along with other important trials performed internationally.

#### Small Tidal Volumes

Among the best-established guidelines in managing ARDS patients is the use of small tidal volumes during mechanical ventilation (fig. 1). In 2000, investigators from the ARDSNet Lower Tidal Volume (ARMA) trial reported significantly decreased rates of mortality (31.0% vs. 39.8%) in ARDS patients ventilated with 6 ml/kg of predicted body weight tidal volumes versus those with 12 ml/kg of predicted body weight.<sup>8</sup> While small tidal volume ventilation remains a tenet of lung-protective ventilation during ARDS, recent efforts have sought to determine whether small tidal volumes play a lung-protective role more broadly in all critically ill ventilated patients. In 2018, the Protective Ventilation in Patients Without ARDS (PReVENT) trial indicated that ventilation with low tidal volumes may not be more effective than intermediate volumes in non-ARDS intensive care unit patients.<sup>9</sup>

#### Positive End-expiratory Pressure

In their seminal 1967 report of ARDS cases, Ashbaugh *et al.* reported that improvement of hypoxemia and atelectasis was achieved by the implementation of positive end-expiratory pressure (PEEP).<sup>10</sup> Since then, PEEP continues to be employed in ARDS management and remains the focus of many clinical research efforts. Conceptually, PEEP is administered in order to reduce atelectrauma (repetitive opening and closing of alveoli) by recruiting collapsed alveoli.<sup>11</sup> Much attention has been directed at

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# Contemporary Diagnosis And Management Of Acute Respiratory Diseasespb2003

**Gerald M. Loughlin,Howard Eigen**

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Contemporary Diagnosis and Management of Acute Respiratory Diseases M. Eric Gershwin,2003-01-01      Fundamental Nursing Skills and Concepts Barbara Kuhn Timby,2009 Now in its Ninth Edition this full color text combines theoretical nursing concepts step by step skills and procedures and clinical applications to form the foundation of the LPN LVN course of study This edition features over 100 new photographs exciting full color ancillaries end of unit exercises and extensively updated chapters on nursing foundations laws and ethics recording and reporting nutrition fluid and chemical balance safety asepsis infection control and medication administration Coverage includes new information on cost related issues emerging healthcare settings concept mapping malpractice documentation and reporting HIPAA and more All Gerontologic Considerations sections have been thoroughly updated by renowned experts

*Respiratory Diseases: Contemporary Diagnosis and Treatment* Stephen Rogers,2019-06-05 The diseases related to the organs and tissues involved in gas exchange are called respiratory diseases They involve the conditions associated with the upper respiratory tract bronchi pleura alveoli trachea bronchioles and pleural cavity Common cold is one of the most common respiratory disease Other severe respiratory conditions include acute asthma pneumonia pulmonary embolism and lung cancer Pulmonology is the field of medicine dealing with respiratory diseases Some of the common tests used for diagnosing respiratory diseases include blood tests chest X ray bronchoscopy ultrasound computed tomography scan and pulmonary function test Medications include the intake of antibiotics and leukotriene antagonists and the inhalation of bronchodilators and steroids Different approaches evaluations methodologies and advanced studies on respiratory diseases have been included in this book It includes some of the vital pieces of work being conducted across the world on various topics related to the diagnosis and treatment of respiratory diseases With state of the art inputs by acclaimed experts of this field this book targets students and professionals

Acute Respiratory Distress Syndrome Sadatomo Tasaka,2022-02-22 Divided into thirteen chapters this book provides a wealth of research oriented findings and practical guidance ranging from the definition epidemiology and pathophysiology to the diagnosis and management of the disease Although acute respiratory distress syndrome ARDS is defined by the acute onset of noncardiogenic pulmonary edema hypoxemia and the need for mechanical ventilation it is a heterogeneous disease entity which makes it difficult to develop specific therapies Treatment tends to focus on lung protective ventilation and no specific pharmacotherapies have been identified All chapters were written by respected experts in the field and summarize the latest trends share recent research findings and outline future prospects Specific chapters are devoted to novel promising diagnostic approaches such as microRNA which may improve our ability to identify early ARDS or at risk patients In addition a dedicated chapter explores cell based therapies and regenerative medicine which offer potential therapeutic options Acute Respiratory Distress Syndrome Advances in Diagnostic Tools and Disease Management offers a valuable reference guide not only for young physicians and trainees but also for experienced or teaching physicians medical

educators and basic researchers Readers will find the latest information on ARDS and come to understand the current challenges encouraging them to further advance the diagnosis treatment and clinical research on this disease     **Diagnosis and Management of Acute Respiratory Failure** Farokh Erach Udwadia,1979     [Contemporary Diagnosis and](#)

[Management of Bronchitis](#) Antonio Anzueto,2000 Now in its 3rd edition this clear and authoritative handbook gives physicians the tools to manage bronchitis a condition that can be vexing to both patients and their physicians Each chapter is supplemented with quality artwork and tables The handbook is also available in Spanish     **Acute Respiratory Infections**

Wei Shen Lim,2012-08-02 Respiratory tract infections RTIs are the most common acute medical problem encountered in primary care Not only are RTIs very common the spectrum of disease is wide Clinical management differs according to the characteristics of the infected host and infecting pathogen Despite these features there are currently no pocketbooks that bring together clinically relevant information on this broad and important subject area in an accessible and practical manner This pocketbook offers a concise companion for health care professionals who manage patients with acute lung infections The book covers aspects related to the diagnosis and initial management of these patients with attention to specific infections which are notable for being difficult to manage common or of particular clinical importance The book will appeal to a wide variety of professionals in acute medicine respiratory medicine infectious diseases primary care and other internal medicine specialties     **Respiratory Infections** James Pennington,1983 Both a timely bedside guide to diagnosis and modern therapies and a reference text for the latest etiology oriented information on pathogenesis of respiratory infections In the five years since publication of the second edition new agents causing pneumonia have been described increasing drug resistance among established pathogens has occurred and there are some promising new therapeutic agents available Every chapter in this edition is therefore updated some like the chapter dealing with HIV associated respiratory diseases are almost entirely rewritten Annotation copyright by Book News Inc Portland OR     **Diagnosis and Management of Respiratory Diseases**

Graham K. Crompton,1980-01-01     *Clinical Focus Series®* Steven A. Sahn,2012-12-15 This book is a comprehensive assessment of the patients with COPD and asthma with appropriate diagnosis and management Review on the diagnosis and management of the patients with bronchiectasis and cystic fibrosis along with the current management of acute exacerbation A discussion of the diagnosis and management of the patients with idiopathic pulmonary fibrosis and an acute exacerbation and the management options those are currently available Extensive reviews of the treatment of acute pulmonary exacerbation of sarcoidosis and the three phases of hypersensitivity pneumonitis acute subacute

*Contemporary Diagnosis and Management of Copd* Antonio Anzueto,2014-05-14     *CURRENT Diagnosis & Treatment in Pulmonary Medicine* Michael E. Hanley,Carolyn H. Welsh,2003-10-17 The most convenient source of answers on all pulmonary conditions Practical current information for day to day diagnosis and treatment of all conditions affecting breathing The choice of pulmonologists residents students emergency clinicians and general and family medicine practitioners alike

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**Diagnosis and Management of Acute Respiratory Failure, an Issue of Critical Care Clinics** Philip Yang,Annette Esper,2024-04-28 In this issue of Critical Care Clinics guest editors Drs Philip Yang and Annette Esper bring their considerable expertise to the topic of Diagnosis and Management of Acute Respiratory Failure Top experts in the field cover invasive mechanical ventilation pharmacologic treatments in ARF fluid management in ARF management of ventilator dyssynchrony identification and routine management of ARDS adjunctive management in ARF and ARDS and much more Contains 13 relevant practice oriented topics including MV in ventilatory hypercapnic respiratory failure ARF in pregnancy ARF in neuro injuries and head trauma ventilator weaning extubation and prolonged mechanical ventilation physical and cognitive impairment in ARF and more Provides in depth clinical reviews on diagnosis and management of acute respiratory failure offering actionable insights for clinical practice Presents the latest information on this timely focused topic under the leadership of experienced editors in the field Authors synthesize and distill the latest research and practice guidelines to create clinically significant topic based reviews    **Respiratory Disease** Anne E. Tattersfield,Martin W. McNicol,2012-12-06 Respiratory Disease the latest volume in the Treatment in Clinical Medicine series is in two parts the first reviews the background to each of the main respiratory diseases with particular emphasis on management and treatment The second reviews the main drugs used in respiratory practice in more detail and combines a pharmacological appraisal with a more personal assessment of their role and value in treatment Practical aspects of management are emphasised Where uncertainty exists the authors have described their own practice The book aims to fill the gap which exists between textbooks of respiratory medicine where there is often insufficient space to cover treatment in detail and pharmacological textbooks which are not concerned with practical management problems It is intended for respiratory physicians general physicians and senior medical students and will provide useful background information for researchers entering the the field

**Etiology and Treatment of Acute Lung Injury** Sadis Matalon,Jacob Iasha Sznajder,2001 This book contains contributions of internationally known basic scientists and clinicians with expertise in various aspects of lung injury and repair This monogram on the pathophysiology and treatment of Acute Lung Injury contains five different sections each one

with contributions from both basic and clinical scientists outlining existing controversies and how they can be resolved by future multidisciplinary studies. The various sections discuss sodium transport and fluid clearance across the normal and injured lungs, the role of the pulmonary surfactant in the pathogenesis and treatment of ARDS, mechanisms and modification of acute and chronic lung injury, ventilatory strategies for the management of acute respiratory distress syndrome and nitric oxide friend or foe.

*Challenging Concepts in Respiratory Medicine* Lucy Schomberg, Elizabeth Sage, Nicholas Hart, 2018-01-25 A case based guide with expert commentary. *Challenging Concepts in Respiratory Medicine* deals with contemporary clinical scenarios in respiratory medicine. Each chapter is based around a real life case and interspersed with the most up to date evidence management strategies, guidelines and controversies in management. As the reader works through each case there are a number of Clinical Tips, Learning Points and Landmark Trial Summaries to enhance the learning process along with an Expert Commentary written by a nationally or internationally renowned expert in that particular field. This will provide a unique inside track on how the experts approach these types of challenging cases. The approach taken in this series is highly attractive to those in training preparing for their specialist exams.

*Respiratory Emergencies* Stephan Kamholtz, Alan M Fein, David Ost, 2006-10-27 This comprehensive but practical reference is an informative guide to the management of acute respiratory problems in the hospital setting. Evaluation of the patient with breathing difficulties is often challenging since the differential diagnosis is broad and the use of the wrong treatment can exacerbate the problem. This book helps the practising clinician to recognize both common and more unusual causes of respiratory distress in a patient and assists them in making the correct diagnosis by enhancing their understanding of the application and significance of tests of pulmonary function and pulmonary imaging studies and through improved knowledge of the underlying physiology of acute and chronic respiratory failure that underpins clinical practice in this area. To enhance this bench to bedside approach authors illustrate their material with helpful management algorithms and each chapter will conclude with a summary of key points.

Acute Respiratory Distress Syndrome James A. Russell, Keith R. Walley, 1999-05-28 ARDS A Comprehensive Clinical Approach focuses on the clinical assessment and management of patients with ARDS.

**Pediatric Respiratory Medicine** Lynn Max Taussig, Louis I. Landau, 2008-01-01 This user friendly text presents current scientific information, diagnostic approaches and management strategies for the care of children with acute and chronic respiratory diseases. A consistent chapter format enables rapid and effortless location of the most current protocols on manifestations, etiologies, triggers, approaches to treatment, complications and preventative strategies. Includes guidance on differential diagnosis to help determine which disease or condition the patient may have. Uses extensive color coded algorithms to facilitate quick diagnosis, management and treatment decisions. Provides the latest scientific information and diagnostic and management strategies for the care of children with respiratory illnesses. Presents cutting edge coverage with new information on the biology of and the influences on the respiratory system during childhood as well as the diagnosis

and management of both common ie wheezing infant cystic fibrosis tuberculosis and Respiratory Disease in Children  
Gerald M. Loughlin,Howard Eigen,1994 A text in pediatric pulmonology that represents the practice of expert clinicians The first section is devoted to discussion of how growth and development affect the respiratory system The second section updates applications of the diagnostic tools used in evaluating children with respiratory disease The next three sections focus on clinical problems first as unknowns then as specific respiratory diseases and finally as respiratory aspects of non pulmonary diseases The final section reviews the rationale behind modern respiratory care with an introductory chapter on how to evaluate the results of clinical trials Annotation copyright by Book News Inc Portland OR

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