

# Acute heart failure: Emerging from the shadows

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**A**s we emerge from the tremendous progress of the last century, we can take genuine pride in the advances of modern treatments in reducing the morbidity and mortality of cardiovascular diseases, such as hypertension, myocardial infarction, and chronic heart failure. Unfortunately, acute heart failure (AHF) remained largely ignored during this period of discovery, with little research into its epidemiology, pathophysiology, diagnosis, or treatment. However, recent recognition of the significance of AHF has led to investigations that have provided important insights into this syndrome (1), guidelines for its treatment and diagnosis (2, 3), and novel therapies (4), as well as new chapters in leading cardiology textbooks (5). This supplement to *Critical Care Medicine* is intended to report on the current state of the art as presented by leaders in this rapidly evolving field.

Acute heart failure can be defined as the rapid or gradual onset of signs and symptoms of heart failure that result in an urgent, unplanned need for medical care. This heterogeneous syndrome is the primary diagnosis in >1 million hospitalizations in the United States alone, constituting a 174% increase from 1979 to 2003. Drawing on contemporary studies and providing the context for further discourse, Drs. Dar and Cowie (6) present a survey of the epidemiology of AHF, revealing that AHF patients are typically elderly with a

history of heart failure, coronary artery disease, and multiple other comorbidities.

Our understanding of the pathogenesis of AHF has relied heavily on our models of chronic heart failure, which initially focused on hemodynamic derangements. It is becoming clear, however, that other important mechanisms may be operative in the development of AHF, such as cytokine activation, as described by Dr. Chen and colleagues (7). The potential role of inflammation and immune activation in myocardial dysfunction and damage in the setting of AHF not only may explain the increased morbidity and mortality observed in these patients but also may provide a rationale for future therapeutic targets.

The diagnosis of AHF has dramatically improved in the last decade with the advent of new diagnostic modalities. Perhaps the most significant of these tests have been the assays for natriuretic peptides, B-type natriuretic peptide (BNP), and its precursor (NT-proBNP). Dr. Omland (8) discusses these new assays and their practical use in the clinical environment as well as their contributions to estimating clinical course and prognosis. Cardiac imaging technologies have also rapidly improved, and echocardiography is an essential tool in the diagnosis and management of patients with AHF. Dr. Ferrari (9) discusses the role of echocardiography and the exciting new techniques of cardiac computed tomography and magnetic resonance imaging in the management of patients with heart failure. Recent trials have provided new perspectives on the use of hemodynamic monitoring in patients with AHF. Dr. Cotter and associates (10) present the current data regarding invasive hemodynamic monitoring, provide guidance for the use of this important tool, and discuss new noninvasive measurement techniques.

As noted previously, AHF is a heterogeneous syndrome, and defining the subgroups of patients within this entity has implications for treatment and prognosis. Drs. Chatterjee and Rame (11) discuss

systolic heart failure in the context of AHF, including acute myocarditis. While approximately half of patients with AHF will have systolic dysfunction, the other half present with preserved systolic function, and nearly all patients have some degree of diastolic dysfunction. Dr. Kumar and colleagues (12) describe the clinical presentation and management of patients with AHF and preserved systolic function and describe the role of diastolic abnormalities in the pathophysiology of AHF. While these two clinical presentations comprise the majority, there has been an increasing appreciation of the importance of the right ventricle in patients with AHF. Dr. Greyson (13) provides a learned discussion of the pathophysiology, diagnosis, and management of right heart failure, which is increasingly recognized as a distinct entity, especially in patients with secondary pulmonary hypertension, and as a major contributor to the clinical course of patients with left ventricular failure. Two specific syndromes are defined by their clear relationship to increased morbidity and mortality. Patients presenting with or developing the cardio-renal syndrome in the context of AHF are a common dilemma for practicing physicians, and Dr. Liang and colleagues (14) extensively review the most recent studies in this field, including potential future therapies. The most feared of the syndromes subsumed by AHF is cardiogenic shock, and Dr. Topalian and associates (15) present a comprehensive contemporary survey of this devastating clinical presentation with specific reference to new pharmacologic and device treatments.

The therapies for AHF remained essentially unchanged from 1988, when milrinone was approved, until 2001, with the advent of nesiritide. As the articles included here demonstrate, there has been marked progress in our understanding of the pathophysiology, diagnosis, and clinical presentation of patients with AHF, and there have been similar advances in our knowledge of therapeutics.

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Although there has been increasing recognition that diuretics are not necessary for all patients with AHF, diuretics remain a cornerstone of AHF therapy, and Drs. Wang and Gottlieb (16) provide a contemporary perspective on these agents. Vasodilator therapy has been underused in the treatment of AHF, and Dr. Elkayam and colleagues (17) address this therapeutic class of agents with specific reference to the new vasodilator, nesiritide. Despite mounting evidence that inotropic agents can worsen outcomes, the absence of safe alternatives has necessitated the use of inotropes in a significant minority of patients with AHF. Drs. Petersen and Felker (18) describe the roles of the currently approved agents and present information on newer approaches to inotropy. The last decade has witnessed a burgeoning of new pharmacologic therapies for AHF, which are reviewed by Dr. Tavares and colleagues (19), while the increasingly important role of devices is described by Drs. Kale and Fang (20). These exciting and novel approaches provide hope that the extensive morbidity and mortality of AHF will be effectively reduced.

All of these advances have led to the development of guidelines and position papers on the classification and treatment of patients with AHF. However, none of these papers specifically addresses the crucial prehospital and early (within the first 12 hrs) treatment phase of management. In this supplement, Dr. Mebazaa and colleagues (21) present practical recommendations for the early management of AHF patients, based on the consensus from a workshop held during the Third Cardiovascular Clinical Trialists Forum. The practical guidance provided in this article not only is useful for

physicians but also provides a framework for research in this area.

AHF has emerged from the shadows as a major public health concern, consuming large portions of healthcare funds and causing marked suffering and death. Recent studies have provided important insights into the epidemiology, pathophysiology, diagnosis, and treatment of AHF, and many promising pharmacologic and device therapies are under investigation. We welcome you to share in this progress through the contributions in this supplement.

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