



## Editorial

# The Complexity in Managing Acute Heart Failure Patients in Intensive Cardiac Care Unit

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## ABSTRACT

Acute heart failure (AHF) is characterized by sudden or gradual onset of heart failure. AHF patients face the possibility of mortality, not only due to cardiovascular causes but also due to the complications arising from organ dysfunction caused by inadequate perfusion or the presence of organ congestion. It is frequent for patients with AHF to require treatment in the intensive cardiac care unit (ICCU). In this article, we are discussing and summarizing the current AHF treatment strategy in ICCU.

The role of the intensive cardiac care unit (ICCU) is changing. The ICCU has transformed from treating acute coronary syndromes (ACS) patients to providing comprehensive care for a broad population with cardiac and non-cardiac disorders.<sup>1</sup> ICCU patients now have a higher prevalence of AHF and comorbidities.<sup>2</sup> Acute heart failure (AHF) is characterized by sudden or gradual onset of heart failure (HF) symptoms or signs that require immediate medical treatment, resulting in an urgent hospital admission or emergency room visit. AHF is the main cause of hospitalization in older people, and it is associated with significant mortality and hospital readmission rates. In-hospital death varies between 4% and 10%. One-year mortality after discharge ranges from 25 to 30%, with greater than 45% readmission rates. The clinical severity and trajectory during hospitalization are influenced by the intricate interaction of precipitating factors, the underlying heart condition, and the patient's coexisting medical conditions.<sup>3,4</sup>

Patients diagnosed with AHF face the possibility of mortality, not only due to cardiovascular causes but also due to the complications arising from organ dysfunction caused by inadequate perfusion or the presence of organ congestion. Therefore, it is crucial that the treatment plan effectively tackles both of those problems.<sup>5</sup> For acute pulmonary edema, isolated right ventricular failure, and acute decompensated heart failure (ADHF) subsets, the primary treatment approach is decongestion using diuretics.<sup>3</sup> Although there is less empirical support from randomized controlled trials (RCTs) for the efficacy of decongestion in enhancing survival rates, the

impact of diuretics on alleviating symptoms and reducing organ congestion is clearly discernible. After restoring oxygen saturation through methods such as oxygen supplementation, non-invasive ventilation, or mechanical ventilation, the primary treatment objectives for patients with AHF are to achieve decongestion without retaining excess fluid, optimize perfusion pressures to maintain organ function, and initiate or continue disease-modifying oral therapies that target neurohumoral activation. These medications not only enhance diuretic response but also improve long-term survival.<sup>6,7</sup> The current guideline also recommends renal replacement therapy (RRT) when diuretics are ineffective.

A small proportion of AHF patients fall into cardiogenic shock, the most severe clinical subset marked by the presence of inadequate tissue perfusion. Cardiogenic shock patients have a mortality rate ten times higher than those without shock during hospitalization and necessitate specialized interventions.<sup>8,9</sup> The diagnosis of cardiogenic shock requires the observation of clinical indicators of reduced blood flow, such as cold and sweaty extremities, narrow pulse pressure, decreased urine output, dizziness, and cognitive impairment.<sup>3</sup> Furthermore, biochemical alterations due to tissue blood flow reduction include increased blood creatinine and lactate levels. The elevation in serum lactate level leads to metabolic acidosis. These conditions represent tissue oxygen deprivation and changes in cellular metabolism, which result in impaired organ function.<sup>10,11</sup> It is essential to mention that hypoperfusion does not always coincide with low blood pressure, as it can be maintained through vasoconstriction (with or without using

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vasopressors). However, this comes at the expense of reduced tissue blood flow and oxygenation.<sup>12</sup> Early initiation of cardiogenic shock management is crucial. Prompt recognition and treatment of the root cause, along with stabilizing the circulation and treating organ dysfunction, are crucial aspects of managing this condition.<sup>3</sup> Administration of inotropes is necessary for managing individuals with diminished cardiac output and low blood pressure. They should only be allocated to individuals exhibiting left ventricular (LV) systolic dysfunction, low cardiac output, and hypotension, which leads to inadequate perfusion of essential organs.<sup>13</sup> Patients with severe hypotension may benefit from the use of vasopressors. The objective is to enhance the blood flow to the essential organs. However, this comes at the cost of an elevation in LV afterload.<sup>3</sup> In individuals who do not respond to vasopressors and inotropes, short-term mechanical circulatory support may be used to improve cardiac output and end-organ perfusion.<sup>9,12</sup>

During hospitalization, specific treatments for the precipitating factors and underlying heart disease should be given. For example, when ACS causes AHF, myocardial revascularization has to be done. On the other hand, when bacterial infection causes AHF, optimal antibiotic treatment must be administered as soon as possible.<sup>3,5</sup> Cardiovascular physicians should be able to identify comorbidities during the initial assessment and treatment to predict the necessity of specific drugs for certain types of HF, such as HF associated with sarcoidosis or amyloidosis. They should also consider: (1) myocardial revascularization for coronary artery disease; (2) surgical procedures for congenital heart disease or valvular heart disease; and (3) LV assist device or cardiac transplantation for advanced HF.<sup>5</sup> Enrolling patients in a comprehensive multidisciplinary HF care management program is crucial. This program focuses on optimizing the dosage of disease-modifying drugs, boosting medication adherence, treating underlying comorbidities, providing cardiac rehabilitation, and ensuring scheduled follow-up with the healthcare team.<sup>5,14</sup>

In conclusion, AHF is a complex disease requiring rapid initial assessment and early treatment based on the hemodynamic subsets. It is frequent for patients with AHF to require treatment in the ICCU. Hemodynamic stabilization, treatment of the precipitating factors, and administration or up-titration of disease-modifying drugs have to be done systematically and aggressively.

# Conflict of Interest

There is no conflict of interest.

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