Editorial

Bench to Bedside to Home: Homing-in on Therapy that Begins at Home

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The management of acute decompensated heart failure has traditionally focused on the treatment of patients within the four walls of hospitals. Patients who have manifest heart failure typically have pulmonary congestion, and, in some patients, decreased cardiac output with hypoperfusion may dominate the presentation. Traditionally, right heart catheterization was used to determine and monitor filling pressures to better manage heart failure, but studies from the Evaluation Study of Congestive Heart Failure and Pulmonary Artery Catheterization Effectiveness (ESCAPE) trial suggested that the risk to benefit ratio of this procedure was such that the incremental value of routine right heart catheterization with hemodynamic evaluation came into question.[1] The quest for early detection of pulmonary congestion resulted in the development of several noninvasive modalities for hemodynamic evaluation. The value of these modalities should increase if rehospitalization rates decrease. This means that the focus of management of heart failure begins at home.

Better understanding of the pathogenesis of heart failure suggests that hemodynamic impairment in this syndrome is not limited to the perturbation of cardiac filling pressures but also encompasses alternations in the entire vascular system.[2,3] The quest for early detection of acute decompensated heart failure would, therefore, require technology that would detect these changes both in the heart and the vascular system. The detection of pulmonary congestion[4] requires determination of left-sided filling pressures, such as atrial pressure, pulmonary capillary wedge pressure, and left ventricular end-diastolic pressure. The detection of right-sided heart failure requires measurement of right-sided filling pressures, such as central venous pressure, particularly in the setting of hypotension. Current noninvasive modalities, including implantable hemodynamic monitors, typically detect pressures in the right heart, which are then used to estimate left-sided filling pressures.[5,6] The new paradigm that "acute vascular failure" or "stiff central arteries" contributes to decompensated heart failure should stimulate the development of new technologies to detect hemodynamic changes in the central arteries, including the aorta.[2,3]

In this issue, William T. Abraham, MD, and one of us invited a world-class team of leading experts in the field of cardiovascular hemodynamics to elaborate on the current relevance of hemodynamics in the management of acute decompensated heart failure (ADHF). The first step is early detection of heart failure and these new disruptive technologies provide us with details of predictors of ADHF, such as measures of filling pressures,[4] weight gain due to edema, and shortness of breath. The next step would be the ability to deliver

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therapy in real-time to be effective. The latter would require the development of a comprehensive disease management program that is patient-centric. This is particularly important as more and more elderly patients develop heart failure.[7] Development of all technologies starts at the bench before it arrives at the bedside. Although the management of ADHF is at the hospital bedside, prevention of symptomatic progression is at home.[8] Preventive strategies, such as diminution of fluid overload, interdiction of medication, nontreatment of cardiac arrhythmias, and myocardial ischemia, have shown to be beneficial in heart failure.[9,10] All of these approaches could be modified, augmented, or triggered based on "early warning" information that might be at hand. We hope that this issue will provoke thought and more research that will focus on developing technologies, algorithms, disease-management programs, and therapies that start at home—it is time to "home-in" on the domiciliary management of heart failure.

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