Review Article

Thinking Outside the Box: Treating Acute Heart Failure Outside the Hospital to Improve Care and Reduce Admissions

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ABSTRACT

The management of acute heart failure is shifting toward treatment approaches outside of a traditional hospital setting. Many heart failure providers are now treating patients in less familiar health care settings, such as acute care clinics, emergency departments, and skilled nursing facilities. In this review we describe the current pressures driving change in the delivery of acute heart failure and summarize the evidence regarding treatments for acute heart failure outside of the inpatient setting. We also provide considerations for the design of future treatment strategies to be implemented in alternative care settings. (*J Cardiac Fail* 2015;21:667–673)

Key Words: Acute heart failure, outcomes.

Current financial pressures, coupled with an urgent need to improve post-discharge outcomes, have provided incentives to change health care delivery models for patients with acute heart failure (HF). As a result, care for patients with acute HF is now being delivered in settings not typically considered to be within the purview of HF providers, such as acute care clinics, emergency departments (EDs), and skilled nursing facilities (Fig. 1). This review aims to further describe current pressures driving change in the delivery of acute HF, summarize the evidence regarding

treatments for acute HF outside of the inpatient setting, and provide considerations when designing treatment strategies to be implemented in alternative care settings.

Current Forces Driving Change in Heart Failure Care

Reducing Length of Stay While Improving Transitional Care

Event-based reimbursement in the United States over the past few decades has provided incentives for progressively shorter lengths of stay for patients with HF.¹ For Medicare beneficiaries with inpatient stays, hospitals receive payments by means of the Inpatient Prospective Payment System (IPPS). Based on a diagnosis-related group (DRG), the IPPS payment covers the inpatient stay as well as any outpatient diagnostic and admission-related outpatient non-diagnostic services provided by the institution on the date of the patient's admission or within 3 days immediately preceding the date of admission.² Although there are other payment mechanisms designed to complement the IPPS (eg, the Hospital Value-Based Purchasing Program), the IPPS is the dominant financial motivation regarding length of stay.

This heavy focus on shorter lengths of stay may have had unintended consequences, including greater rates of premature hospital discharge and increased readmissions.³ An analysis of data from the multinational Acute Study of

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Fig. 1. New settings for acute heart failure care. This figure displays the changing settings for acute heart failure (HF) care over time. (A) The traditional model where patients would develop symptoms at home and then present to an HF clinic or emergency department (ED) for evaluation and/or initial management aimed at improving congestion and hemodynamics. Patients would then be admitted to the hospital for continued management and transitional care planning. (B) The model currently being adopted in many medical centers. Heart failure specialists can evaluate, manage, and treat patients with acute HF across multiple care settings. SNF, skilled nursing facility.

Nesiritide in Decompensated Heart Failure (ASCEND-HF) trial supports this observation. The mean length of stay by country ranged from 4.9 to 14.6 days (6.1 days in the United States), and countries with longer lengths of stay

for a HF hospitalization had lower rates of 30-day all-cause readmission.⁴ Although these data suggest that there may be a tradeoff regarding index hospitalization length of stay and readmission rates for patients with HF, to date

there are no data to suggest that trends for shorter hospital lengths of stay have reversed course.

At the same time, in an effort to reduce health care expenditures, there is a growing focus on reducing unplanned hospital readmissions,⁵ including for patients with HF. Over the past 5 years, the Centers for Medicare and Medicaid Services (CMS) adopted a number of policy changes to provide additional incentives for hospitals to improve transitional care and reduce hospital readmissions. In July 2009, CMS began publicly reporting risk-standardized readmission rates for select conditions, including HF, and in October 2012 CMS extended this policy by imposing cuts in total Medicare reimbursements for higher-than-predicted readmission rates. A recent analysis of hospitals with ≥ 25 discharges for each condition affected by the 2012 reimbursement policy found that 73% of hospitals received a financial penalty in fiscal year 2014.⁶ The investigators also found that excess HF readmissions were a major driver of the penalty severity compared with the other conditions affected by the policy or structural hospital characteristics, such as number of beds or teaching hospital status. The impact of these CMS policy decisions on patient care remains unclear, but they have certainly motivated the medical community to focus on HF readmissions and related transitions in care. For example, hospitals are joining national quality improvement campaigns, such as Hospital to Home and Target: HF, to share best practices.^{7,8}

Questions Facing Heart Failure Providers

These 2 goals, reducing length of stay while improving transitional care, have afforded opportunities for patients and HF providers to reconsider how care is delivered. This includes reconsidering the setting for each phase of management of acute HF care, from symptom onset at home (or a skilled nursing facility) to ambulatory clinic management to emergency services to transitional care (Fig. 1).

- For example, emergency medicine providers serve as decision makers for the majority of hospitalizations for acute HF and provide the bulk of care in the ED setting.^{9,10} How can therapeutic and disposition decisions in the early phases of acute HF improve in-hospital acute HF care?
- Can collaborative decision-making with HF providers identify low-risk patients that can be discharged from the ED with early follow-up to venues such as same-day-access clinics?
- Can in-hospital resources be safely reduced by providing acute HF care in clinical decision units in the ED or same-day-access clinic with discharge directly to home?
- Can readmissions be avoided by incorporating post-discharge HF care into a same-day-access clinic?
- Is greater use of home health care and skilled nursing facilities, particularly with HF algorithms, of value?

There is growing enthusiasm for many of these concepts, but the history of HF is full of promising therapies that did not survive rigorous clinical evaluation.^{11–14} This history should serve as an important reminder that high-quality evidence should be used to guide changes in treatment strategies for patients with acute HF.

The Evidence Base for Heart Failure Treatment Outside the Hospital

The Treatment of Acute Heart Failure in the Emergency Department

Most initial care for acute HF is provided in an ED,¹⁰ and the ED is the portal of entry for unplanned hospital admissions for most medical conditions in the United States. The proportion of patients admitted through the ED continues to rise, generally as well as for patients with HF.¹⁵ In addition, only 20% of patients with acute HF presenting to the ED are discharged home, and this proportion has been unchanged over the past 5 years.¹⁶ Although there have been many attempts to improve this process,^{17,18} the lack of prospectively validated risk-prediction tools to determine low versus high risk limits the ability to alter this practice. An opportunity remains for collaboration among patients, ED providers, and HF providers to develop strategies to reduce hospital resources for acute HF care.

Clinical Decision Units

The use of observation billing status for Medicare patients has steadily increased over the past decade, though this designation covers care received in both the ED and a hospital setting.^{19,20} In this context though, the presence of clinical decision or observation units in EDs increased from 19% in 2003 to 36% in 2007.²¹

Initial studies of patients receiving care for acute HF in ED clinical decision units have been small, nonrandomized, and focused on short-term outcomes and financial viability.^{22,23} A retrospective study at Emory University Hospital and Emory University Hospital Midtown assessed 327 patients who received acute HF care using an accelerated treatment protocol that included cardiac monitoring, serial laboratory tests, clinical reevaluations, scheduled diuretics, and nitrates.²² Of these, 239 (73%) were discharged directly home. There was no difference in 90-day readmission rates compared with patients admitted to the hospital after a stay in the ED clinical decision unit. These data demonstrate the feasibility of treatment protocols for acute HF, and suggest that this care may be possible with less overall hospital resources and no increased risk of readmission. However, there is no prospective, multicenter, randomized trial evidence to support this. Additionally, little is known about the patient perspective, such as impact on quality of life, or the long-term trajectory of these patients. A hospitalization for HF is an opportunity for disease management education and initiation or titration of disease-modifying pharmacologic therapy, benefits that may be

difficult to achieve in an in ED clinical decision unit yet impossible to document in a small retrospective study.

Post-discharge Emergency Department Care

The ED also remains an important source of care for patients with a previous exacerbation of HF being evaluated for rehospitalization. In an analysis of ED and inpatient data available through the Healthcare Cost and Utilization Project, investigators found that among 113,033 unique patients presenting to the ED for acute HF in Florida and California, 34,793 (31%) had >2 visits for acute HF during a 1-year period.²⁴ In those 2 states, patients with >2 visits accounted for 55% of all ED visits for acute HF during the same 1-year period. These data underscore the central role of the ED in acute HF care and suggest that programs designed to optimize care for these patients in the ED could reduce rehospitalizations. However, such programs would need to be carefully designed. Rehospitalizations are associated with higher rates of subsequent adverse outcomes, such that disposition from the ED may have a lesser role for patients being considered for hospital readmission than for patients presenting to the hospital for the first time after a period of relative stability. This is somewhat at odds with public reporting and payment reforms that tend to provide greater incentive to avoid readmission than admission.

Same-Day-Access Clinics

An emerging concept is the use of a multidisciplinary HF clinic with same-day access for patients with HF.²⁵ These clinics serve as the foundational unit for HF transitional care and HF disease management programs, and they can be staffed by a variety of health care providers, eg, advanced practice providers, physicians, and social workers. Our experience suggests that many hospitals are specifically adopting the practice of same-day-access clinics for patients with HF, although there are limited data in the peer-reviewed literature to support this. Patients may benefit from intensive care in a same-day-access clinic before or after a hospitalization. Same-day-access clinics can provide treatment for worsening HF symptoms instead of a hospitalization or continue management through early follow-up after a recent hospitalization for HF, a process associated with lower hospital-level rates of early readmission.²⁶

Duke University Hospital initiated a same-day access clinic in 2012 after observing that >50% of HF patients admitted from the ED were 1) relatively low-risk patients who may have primarily required decongestion and 2) admitted during regular clinic hours. The Duke Heart Failure Same-Day-Access Clinic features nurse practitioners with disease management expertise and daily outpatient access to intensive therapeutic services including intravenous diuretic infusions, management and titration of evidence-based therapies, and electrolyte repletion. In the first 3 years of operation, the Duke Heart Failure Same-

Day-Access Clinic handled >3,000 patient visits, and the hospital concurrently saw a 10.2% reduction in the 30-day readmission rate for patients, resulting in avoidance of financial penalties for excess readmissions. This model of health care delivery requires additional study, but this example is promising.

Home Health

Another mechanism to extend HF care out of the hospital is through the use of home health services. Home health care is often integrated into transitional care programs. But as earlier reports have highlighted, the components of home health interventions for patients with HF differ, with a variable number of visits provided by individuals with dissimilar training.²⁷ A systematic review of transitional care interventions for patients with HF concluded that home-visiting programs reduced all-cause readmissions.²⁸ Importantly, this benefit was seen in high-intensity interventions, characterized by frequent home visits starting within 24 hours of hospital discharge. This high intensity of resources may be beneficial and feasible for some patient populations and health care systems, but not all. Additionally, there is likely an opportunity for enhanced coordination with HF providers and disease management clinics.

Skilled Nursing Facilities

Owing to many of the forces detailed above, discharges to skilled nursing facilities have increased steadily over the past few decades.¹ For Medicare patients hospitalized with HF, discharges to a skilled nursing facility or intermediate care facility rose from 13.2% in 1993 to 19.6% in 2006. In an analysis of data from the Get With the Guidelines—Heart Failure (GWTG-HF) registry linked to Medicare claims, patients with HF discharged to a skilled nursing facility had an increased risk of death (hazard ratio [HR] 1.76, 95% confidence interval [CI] 1.66–1.87) and rehospitalization (HR 1.08, 95% CI 1.03–1.14) after adjustment for key patient characteristics.²⁹ These data highlight that there is a growing need for specialized HF care in skilled nursing facilities and that there may be opportunities for improvement in HF care.³⁰ There are also practical considerations that patients in a skilled nursing facility are often more stable than in the hospital and have ample opportunities for disease management education and medication titration and initiation.

One strategy for improving care in skilled nursing facilities is the implementation of specialized disease management programs tailored to this setting. Studies of skilled nursing facilities have shown that HF care is limited in many skilled nursing facilities. Of 4 facilities with a high prevalence of patients with HF surveyed by Boxer et al, none had a mechanism for tracking these patients or providing HF-specific care, such as a patient-directed flexible diuretic program.³¹ Prospective studies of interventions aimed at improving care in this setting may provide insight

on how to improve care,^{32,33} although challenges would remain regarding widespread implementation.

Opportunities for Improvement

Unfortunately, there have been few evidence-based improvements in medical therapy for acute HF over the past 40 years.^{34–36} Amid growing pressure to improve post-discharge outcomes and reduce financial burdens associated with acute HF care, incentives for innovation are increasingly favorable. Moving treatments for acute HF outside of the hospital is an opportunity to improve the value of health care by reducing health care resource utilization, improving patient quality of life, and improving post-discharge readmission rates. Following are considerations for designing out-of-the hospital treatment strategies for acute HF (Table 1).

Include the Patient Perspective in Study Designs

Study designs to evaluate treatments provided outside of the hospital should include a patient perspective. An earlier review suggests that this was largely neglected during early evaluations of HF remote monitoring.³⁷ The majority of treatments for acute HF are aimed at decongestion,³⁸ and typical end points include changes in hemodynamic status, biomarkers, symptoms, hospital stay, end-organ function, and mortality without input from patients or other stakeholders.³⁹ The evaluation of novel treatment strategies should include patient-reported outcomes. For example, the Patient-Centered Research Into Outcomes Stroke Patients Prefer and Effectiveness Research (PROSPER) study, which is a Patient-Centered Outcomes Research Institute (PCORI) initiative examining stroke outcomes uses a primary outcome of “home time” (ie, days alive and well outside any health care institution, including hospitals and skilled nursing facilities) based on input from stroke survivor focus groups and stakeholders.⁴⁰

Consider the Environment

Risk models for acute HF treatment failure, such as in-hospital mortality or readmission, typically incorporate patient demographics, comorbid conditions, left ventricular ejection fraction, and readily available laboratory data. When designing new treatment strategies for patients with acute HF with the aim of improving the value of health care, one must also consider other aspects of the HF syndrome, including education and literacy level, social support, financial considerations, and the post-discharge environment.⁴¹

The importance of the post-discharge environment was highlighted in recent studies evaluating the association between community-level socioeconomic status (as opposed to individual socioeconomic factors) and readmissions for patients with HF.^{42–44} In one study, patients living in neighborhoods with low socioeconomic status were more likely to be readmitted for HF within 6 months after discharge (odds ratio 1.35, 95% CI 1.01–1.82) compared with patients living in neighborhoods with high socioeconomic status, and the results were consistent after multivariable adjustments for individual demographics, clinical factors, and individual socioeconomic status.⁴³ However, a similar study using data from GWTG-HF linked to Medicare claims and more aggregate county-level data on socioeconomic status found more modest associations between county-level socioeconomic status and 30-day outcomes.⁴⁴ Taken together, these 2 studies suggest that the local environment probably plays a role in readmissions, but a more detailed understanding of the community may be important.

Incorporate Novel Diagnostics and Mobile Technologies

Future out-of-hospital treatment strategies for acute HF will likely benefit from incorporation of emerging technologies. For example, wireless implantable hemodynamic monitoring systems are now available as a treatment strategy to reduce hospital readmissions for patients with HF.⁴⁵ The incorporation of these devices into routine practice has not been evaluated, but this technology and other types of wearable devices that routinely capture biometric

Table 1. Considerations When Designing Out-of-Hospital Treatment Strategies for Acute Heart Failure

Suggestion	Description
Incorporate the patient perspective.	Evaluations comparing treatment strategies for acute HF must consider patient-centered outcomes and not only focus on resource utilization and readmissions.
Consider environmental factors that influence heart failure symptoms and treatments.	Treatment strategies designed for out-of-the-hospital settings should consider appropriate education levels, socioeconomic barriers, caregivers, and other aspects of the post-discharge environment.
Harness technology.	To add value to the health care system, new treatment strategies must be efficient and implemented across multiple health care settings, ideally incorporating technology solutions that are scalable and offer opportunities to collect patient data across multiple domains.
Align incentives.	Providers, payers, and policy makers must continue to align financial incentives to improve care across the patient experience. The current fee-for-value system that is incorporated into the fee-for-service system offers opportunity for this.
Consider the impact of noncardiac conditions and create a multidisciplinary team.	Noncardiac conditions greatly affect outcomes for acute HF, and strategies should consider incorporating elements of disease management for comorbid conditions. Input from non-HF providers will be essential.

data may be useful adjuncts to identify early HF symptoms in patients with either chronic HF or a recent acute HF exacerbation. For example, a treatment strategy of discharging low- to intermediate-risk patients from the ED to home instead of hospitalization may be safer if patients are also monitored with wearable activity monitors.

Continue to Align Incentives

Despite the policy changes discussed above, the current health care model continues to largely entail episode-based payments for individual events. The resulting silos of care hamper care coordination. Ongoing policy changes are likely to further challenge this paradigm and create opportunity for health care organizations to improve the longitudinal patient experience across treatment locations. For example, Medicare now provides reimbursement for transitional care management and recently announced goals to have 85% of all Medicare fee-for-service payments tied to quality or value by 2016, 90% by 2018.⁴⁶ Accountable care organization works to further integrate care by sharing cost savings with providers and health systems. The value and effect of such changes on reimbursement will require additional study, but they have already significantly altered the care delivery landscape for patients with acute HF.

Use Every Available Tool

The evaluation and management of acute HF is often complicated by noncardiac comorbid conditions, such as pulmonary disease, renal disease, iron deficiency, and sleep-disordered breathing.^{47,48} In addition, among reasons for 30-day readmission after an HF hospitalization, most are not HF related, including 39%–47% for noncardiac reasons.^{49,50} Out-of-hospital treatment strategies may be improved by incorporating elements of disease management for comorbid conditions. This is particularly relevant for HF with preserved ejection fraction, which is increasing rapidly in prevalence and accounts for a growing share of HF hospitalizations.⁵¹ Currently, evidence-based therapies for HF with preserved ejection fraction are lacking, and guidelines emphasize the management of comorbid conditions.³⁶

These data also suggest that effective interventions require contributions from non-HF providers. Successfully treating patients with acute HF outside the hospital will require tremendous care coordination with primary care providers, providers in other medical specialties, pharmacists, case managers, and other health care workers.

Conclusion

Current financial pressures, coupled with an urgent need to improve post-discharge outcomes, have pushed treatment of acute HF outside of the traditional hospital setting. Despite relatively limited evidence to support HF treatment outside the hospital, components of outpatient and transitional acute HF care are expanding. These emerging models offer important research opportunities to assess ambulatory

approaches to acute HF care so that our rapidly evolving delivery systems optimize care efficiency and health outcomes for the millions of patients with HF.

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