Rethinking Heart Failure: Patient Classification and Treatment

HIGHLIGHTS

› Heart Failure Is the Leading Cause of Hospitalization Among Older Adults

› Rehospitalization Rates Are Not Only Increasing—They Are Accelerating
Rethinking Heart Failure: Patient Classification and Treatment

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Rethinking Heart Failure: Patient Classification and Treatment

OVERVIEW
This supplement to The American Journal of Managed Care® examines heart failure (HF) and the current and future treatment landscape, the need to reevaluate terms and definitions, and the opportunity to treat HF with the right treatment at the right time. Treatments in development and potential new investigational therapies are also discussed.

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Rethinking Heart Failure: Patient Classification and Treatment

David L. Clark, MBA, BPharm; Nihar R. Desai, MD, MPH; Gary M. Owens, MD; and Charles A. Stemple, DO, MBA

INTRODUCTION: Approaches to treating heart failure (HF), understanding of the most timely and effective interventions, and identification of appropriate patient subpopulations must evolve. HF has emerged as a chronic condition that needs to be managed on multiple fronts. Hospital resources are more limited than ever due to various factors that directly impact staff and hospital space available to manage and treat patients with HF. As a result, there is increasing attention to the current state of this progressive disease and ways to improve patient outcomes.

PURPOSE: This paper examines HF and the current and future treatment landscape, the need to reevaluate terms and definitions, and the opportunity to treat HF with the right treatment at the right time. Treatments in development and potential new investigational therapies are also discussed.

CONCLUSION: To meet the current challenge, HF treatment must adapt. For other disease states, we have more personalized, nimble, and timely treatment strategies that harness windows of opportunity to help maximize outcomes and reduce overwhelming costs to the health care system. HF treatment is evolving with new guidelines and treatments that hold the promise of greater personalization through additions to existing treatments that are directed by medical guidelines, since each patient is unique and requires more than a one-size-fits-all approach. In addition, advances in remote monitoring, in-home care, and telemedicine are creating a more individualized treatment approach. Therefore, it becomes critical for all health care decision makers to be aware of the tools and resources available in treatment guidelines, individualized treatment options, telemedicine, and other ways of expanding the existing toolbox to enhance patient centricity in HF treatment.

ABSTRACT

INTRODUCTION: Approaches to treating heart failure (HF), understanding of the most timely and effective interventions, and identification of appropriate patient subpopulations must evolve. HF has emerged as a chronic condition that needs to be managed on multiple fronts. Hospital resources are more limited than ever due to various factors that directly impact staff and hospital space available to manage and treat patients with HF. As a result, there is increasing attention to the current state of this progressive disease and ways to improve patient outcomes.

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From a payer perspective, heart failure is a growing clinical and economic issue, especially as the population ages. As new treatments come to market and the pace of innovation accelerates, payers will need to adapt their approaches to this population and update their population management approaches.

— Gary Owens, MD
President, Gary Owens Associates
KEY SUMMARY POINTS

- Growing awareness of the need for individualized care should create momentum for payers to improve coordination of care and tailor treatment for patients during their HF treatment journey.
- Earlier identification between HFpEF or HFrEF helps clinicians adapt treatment to the individual patient.
- The importance of WHF in the ambulatory population with HF and HFrEF remains poorly defined, as a large quantity of data regarding WHF has focused on those hospitalized with HF.
- New treatments that supplement existing GDMT regimens are on the horizon, and they are entering the market at an increasing pace.
- Improved EF has been introduced to describe patients with previous HFrEF who now have an EF of 40% or greater. According to 2022 revisions of the ACC/AHA/HFSA guidelines, these patients should continue their HFrEF treatment.
- Payers and other organized health care decision makers should be aware of changing tides in HF treatment paradigms.

TEXT BOX. Heart Failure at a Glance

Approximately 6.2 million adults in the United States have HF, with approximately 1 million new cases diagnosed annually—and the prevalence continues to rise.

- In 2018, HF was the cause of 379,800 fatalities.
- The 5-year survival for HF is comparable to that for lung cancer (22%) and significantly lower than that for colorectal cancer (65%).
- Among Medicare patients, the mortality rate for HF is 50% within 5 years of diagnosis.
- Patients with HFrEF have a 5-year survival rate of only 25% after hospitalization.
- Risk for death after HF hospitalization rises to as high as 35% by year 1, with risk essentially doubling with each subsequent hospitalization.

Projections suggest that by 2030, the total cost of HF will increase by 127% to $69.8 billion, amounting to approximately $244 for every US adult.

HF Is the Leading Cause of Hospitalization Among Older Adults

Until 2012, the rate of hospitalizations for HF in the United States was decreasing; however, from 2013 to 2017, the trend reversed. In 2017, there were 1.2 million HF hospitalizations in the United States among 924,000 patients with HF, representing a 26% increase from 2013 in HF hospitalizations and the number of patients hospitalized with HF. The increase in patient hospitalizations is largely due to the aging population.

Hospitalization costs are the key driver of HF-related costs. The total cost of HF care in the United States exceeds $30 billion annually. Approximately three-fourths of patients with primary or comorbid HF who had emergency department (ED) visits and hospitalizations were Medicare beneficiaries; further, Medicare beneficiaries with HF have the highest readmission rate of patients with any condition.

Understanding the Evolution of HF

Ejection fraction (EF) has emerged as a unique predictor of CV outcomes. It is a measurement expressed as the percentage of blood the left ventricle (LV) pumps out with each contraction. Reduced EF is key to a patient’s disease progression, because a decrease in cardiac output triggers a pathologic chain of events that results in systolic HF. In fact, in patients with HF, declining LVEF is a meaningful and strong predictor of CV outcomes, including all-cause mortality, CV mortality, sudden death, HF-related death, fatal or nonfatal myocardial infarction (MI), and HF hospitalization.

HF, in general, is often described as a complex condition with a wide range of manifestations; its categorization has evolved to comprise 4 subtypes: HF with reduced EF (HFrEF), HF with improved EF (HFimpEF), HF with mildly reduced EF (HFmrEF), and HF with preserved EF (HFpEF). These subtypes differ considerably in terms of demographic distribution, underlying pathophysiologic mechanisms, and available preventive and therapeutic options.

Characterized by an EF at or below 40%, HFrEF is accompanied by progressive LV dilatation and adverse cardiac remodeling. It is often preceded by acute or chronic loss of cardiomyocytes due to ischemia, infarction, myocarditis, genetic mutation, or valvular disease.
Redefining What It Means to Have HF

The New York Heart Association (NYHA) and the American College of Cardiology/American Heart Association/Heart Failure Society of America (ACC/AHA/HFSA) are the medical societies that developed systems for classifying and staging HF. The NYHA and the ACC/AHA/HFSA have created 2 systems that are complementary.16

The NYHA classification is a subjective assessment used to characterize symptoms and functional capacity of patients with symptomatic (stage C) HF or advanced HF (stage D). It is a subjective assessment by a clinician that can change over time; however, it is widely used in clinical practice to determine the eligibility of patients for treatment strategies.16

The ACC/AHA/HFSA guidelines provide an evidence-based approach to managing HF with the intent to improve patient quality of care. The guidelines characterize HF disease progression using 4 stages; it recently underwent significant modification—including a revised definition for the condition. The changes represent a shift in perspective and a building momentum toward significant change in HF treatment. The ACC/AHA/HFSA recognized the need to provide more patient-centric, evidence-based recommendations for clinicians (Figure 5).16

A recent retrospective cohort study followed 27,323 patients and 19,445 matched controls for over 223,000 patient-years while measuring outcomes based on EF values.19 Regardless of CVD history, EF significantly predicted the risk of several different outcomes, including total mortality, CV death, CV hospitalizations, and HF hospitalizations (Figure 4).19

### FIGURE 1. Prevalence of HF Among US Adults >20 Years of Age (2015-2018)13-15

![Bar chart showing prevalence of HF among US adults by age](chart)

**Source:** Unpublished National Heart, Lung, and Blood Institute tabulation using NHANES, 2015 to 2018.

**HF:** heart failure; **NHANES:** National Health and Nutrition Examination Survey.

**FIGURE 2. HF Subtypes by EF**16

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HFrEF</strong></td>
<td>Heart failure with reduced ejection fraction (EF ≤ 40%)</td>
</tr>
<tr>
<td><strong>HFmrefEF</strong></td>
<td>Heart failure with mildly reduced EF (EF = 40%-49%) and evidence of spontaneous or provokable increased LV filling pressures (eg, elevated natriuretic peptide, noninvasive and invasive hemodynamic measurement)</td>
</tr>
<tr>
<td><strong>HFmimpEF</strong></td>
<td>Heart failure with improved ejection fraction (EF &gt; 40%) and a follow-up measurement of EF &gt; 40%</td>
</tr>
<tr>
<td><strong>HFpEF</strong></td>
<td>Heart failure with preserved ejection fraction (EF ≥ 50%)</td>
</tr>
</tbody>
</table>

**EF:** ejection fraction; **HF:** heart failure; **LV:** left ventricle.
The guidelines are evolving and bringing more attention and emphasis to HF subtypes. For example, updates include a new category of EF, HF with improved ejection fraction, or HFimpEF. In these patients, treatment should be continued to prevent relapse of HF and LV dysfunction, even in patients who may become asymptomatic, since symptom resolution and improvement in cardiac function after treatment should be classified as remission, not full and sustained recovery. According to the new guidance, patients with previous HFrEF who have an EF over 40% are now classified as having “improved EF” and should continue HFrEF treatment.

The evolution of the guidelines increasingly reflects HF as a disease without a static trajectory. There are windows of opportunity to change course and adjust treatment accordingly for a chronic condition. Another critical adaptation to the ACC/AHA/HFSA guidelines is the identification of early risk factors for HF (stage A) and patients at risk of more severe disease. This takes a more preventive approach to help provide treatment before structural changes or signs of decreased heart function occur (stage B). Stage A is now defined as “at risk for HF,” stage B as “pre-HF,” stage C as “symptomatic HF,” and stage D as “advanced HF.” The revisions also introduce a trajectory of stage C HF that recognizes that symptoms of patients with HFrEF may improve or worsen, yet the patients remain in stage C and require continued treatment or modifications.

The 2022 ACC/AHA/HFSA guidelines emphasize prevention and individualized treatment and define HF as a complex clinical syndrome with symptoms and signs that result from any structural or functional cardiac abnormality. Overall, the updated definitions, classifications, and stages of HF are steps to achieve clarity and uniformity of care. However, a rather low percentage of patients are treated by all indicated therapies, and the majority of these patients do not reach target doses of the guideline-recommended treatments. Consequently, much work needs to be done to reverse treatment inertia that resulted from many contributing factors. The NYHA functional classification system can have multiple interpretations, which is a limitation of symptom-driven treatment strategies in HF.

Changes Are Occurring on a Global Scale

Due to the need for universal consensus in the definitions and classifications of HF, members of the HFSA, the Heart Failure Association of the European Society of Cardiology, and the Japanese Heart Failure Society assembled a consensus document emphasizing that HF is a clinical syndrome with symptoms and signs that result from any structural or functional impairment of ventricular filling or ejection of blood.

Overall, the updated definitions, classifications, and stages of HF are steps to achieve clarity and uniformity of care. However, a rather low percentage of patients are treated by all indicated therapies, and the majority of these patients do not reach target doses of the guideline-recommended treatments. Consequently, much work needs to be done to reverse treatment inertia that resulted from many contributing factors. The NYHA functional classification system can have multiple interpretations, which is a limitation of symptom-driven treatment strategies in HF.

- There is a need to move away from the traditionally accepted term “heart failure” and transition to the term “heart function.”
• Clinicians should opt for the term “persistent HF” rather than “stable HF,” because, even during stable HF, there are opportunities to optimize therapies that prevent further worsening and/or deterioration or adverse outcomes.5
• “HF in remission” is defined as an important substitution for the conventionally used term “recovered HF” for patients who experience resolution of their symptoms and/or systolic function, as HF is known to frequently relapse. It is important that clinicians convey to patients that improvement does not mean that their HF is cured.5

Impact of Social Determinants of Health on HF Management

Approximately 3.6 million women in the United States are affected by HF, and their experience is different than that of men. The causes of HF in women also are different; they are linked to high blood pressure, coronary artery disease, valvular disease, and diabetes.23 These causes may explain why women with HF require hospitalization more frequently than men, with approximately 40% of patients hospitalized with HFrEF being women.22 After women develop coronary heart disease, the risk of HF is high.26 Black patients are underprescribed certain treatments. As with women, treatment modalities are different for Black patients.27 For example, hydralazine-isosorbide dinitrate (H-ISDN) therapy is recommended to treat those with moderate to severe HFrEF.16 Despite guideline recommendations, very few contemporary studies have examined the real-world use of H-ISDN. A 2017 study of 5168 Black patients with HF between 2007 and 2013 found that H-ISDN remained underused in those with HF and HFrEF.28 In addition, Black patients may need treatment adjustments based on use of concomitant therapies and differing treatment modalities compared with other patient populations.28

Despite these disparities, current evidence of HF treatment is limited to clinical trials, not real-world, patient populations.26 Therapeutic developments in HF apply mostly to men; they have not been adequately studied in women. Similarly, Black patients have been underrepresented in clinical trials, and studies have not been designed to prospectively study differences in treatment outcomes. As a result, only approximations of risks and benefits can guide therapy for the least-studied populations.29

New research is shedding light on social determinant disparities in clinical terms. For example, the concept of lifetime risk is now considered to be important, and this has shed light on population disparities in clinical terms.

FIGURE 5. NYHA and ACC/AHA/HFSA Complementary Classification Structures16

Stage A: At high risk for HF without current or previous symptoms/signs of HF and without structural/functional heart disease or abnormal biomarkers; with hypertension, CVD, diabetes, obesity, exposure to cardiotoxic agents, genetic variant for cardiomyopathy, or family history of cardiomyopathy

Stage B: Pre-HF without current or previous symptoms/signs of HF but with evidence of 1 of the following: structural heart disease, increased filling pressures, risk factors, and increased natriuretic peptide levels or persistently elevated cardiac troponin in the absence of a competing diagnosis

Stage C: Symptomatic HF with current or previous symptoms/signs of HF

Stage D: Advanced HF with marked HF symptoms that interfere with daily life and recurrent hospitalizations despite attempts to optimize guideline-directed medical therapy

ACC, American College of Cardiology; AHA, American Heart Association; CVD, cardiovascular disease; HF, heart failure; HFSA, Heart Failure Society of America; NYHA, New York Heart Association.

The use of guideline-directed medical therapy (GDMT) reduces morbidity and mortality in HF. However, despite a few recent breakthroughs in HF treatment, the current standard of care is falling short. Clinicians and payers are eagerly awaiting HF treatments that can improve symptoms and reduce both admissions and mortality without deleterious effects. Changes and classification schemes in the new definition offer opportunities for better communication and patient engagement, wherein clinicians can focus on implementation of GDMT across a continuum to improve outcomes.

**Guideline-Directed Medical Therapy and Individualized Strategies**

The use of guideline-directed medical therapy (GDMT) reduces morbidity and mortality in HF. However, despite a few recent breakthroughs in HF treatment, the current standard of care is falling short. Clinicians and payers are eagerly awaiting HF treatments that can improve symptoms and reduce both admissions and mortality without deleterious effects. Changes and classification schemes in the new definition offer opportunities for better communication and patient engagement, wherein clinicians can focus on implementation of GDMT across a continuum to improve outcomes.

GDMT refers to initial medical therapy with an angiotensin receptor-neprilysin inhibitor (ARNi), a β-blocker, a sodium-glucose transport protein 2 (SGLT2) inhibitor, and a mineralocorticoid receptor antagonist. Patients who do not have access to an ARNi (often for financial reasons) should receive an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin receptor blocker (ARB). As evidenced by the increase in morbidity and mortality in patients with HFrEF, optimized GDMT may no longer be viable for patients who have exhausted GDMT treatment options. In addition, some of the recommendations may be useful for early stages of HF but lack evidence of efficacy at more advanced stages.

GDMT has the potential to be the mainstay of pharmacologic therapy for HFrEF. However, it presents inherent challenges, because patients with HF represent a heterogeneous cohort with multiple comorbidities. Among Medicare beneficiaries with chronic HF, 41% to 55% have 5 or more noncardiac comorbidities, which increases the risk of hospitalization in this patient population and all hospitalizations proportionately.

A 2020 review of HF clinical trials published between 2001 and 2016 with a cumulative total of 215,508 patients uncovered that the reporting of comorbidities was more common in HF trials. Common comorbidities included hypertension, ischemic heart disease, hyperlipidemia, diabetes, atrial fibrillation, and chronic kidney disease. Conditions with the largest increases over time were hypertension, atrial fibrillation, and chronic kidney disease. In addition, overall rates of comorbidity reporting in HF clinical trials were low, which may be due to criteria excluding certain comorbidities to reduce competing mortality risk and/or to improve tolerability of therapy. Other studies have shown an increase in the number of patients with HF with multiple comorbidities over time, which may explain the recent US rise in HF mortality.

In the clinical setting, implementation of HF treatment is not consistent with current guidelines. The new ACC/AHA/HFSA guidelines call for better incorporation of and devotion to social health determinants for vulnerable patient populations at risk for health disparities. Multidisciplinary management strategies should target both known risks for CVD and social determinants of health to level the playing field and address disparate outcomes in HF. Optimal pharmacologic therapy of HF is meticulously selected based on evidence-based treatment guidelines; however, a large proportion of patients with chronic HF either do not receive GDMT or are underdosed in clinical practice. This may be due to tolerability issues related to low blood pressure, low heart rate, impaired renal function, or hyperkalemia. Adding to the complexity of HF treatment is that most patients usually receive multiple concomitant therapies. Therefore, a personalized approach to HF treatment (eg, adjusting GDMT to patient profiles) may help achieve more accurate and comprehensive therapy for each patient than is available with more traditional, forced titration of each drug class before the next treatment is started. Patients with HFrEF who develop worsening HF may not receive optimal treatment at critical times throughout their HF journey. In addition,
novel treatments are needed for patients with worsening HF, especially if they do not tolerate available HF therapies.14

Rethinking Treatment of Worsening HF

In clinical practice, patients with HF are often treated reactively after symptoms arise. In particular, attention has been focused on worsening HF (WHF), which carries an unfavorable prognosis and presents an opportunity for intensification and personalization of treatment for HF. WHF is common and defined as worsening HF signs and symptoms in a patient with chronic HF after a period of clinical stability that requires escalation of therapy.14

WHF, an effective measure in making treatment decisions, allows use of more personalized therapies at the optimal time. This may be especially critical for a patient population for whom time is of the essence and specialized therapies may help sooner.

When presenting with reduced EF, WHF is a major public health concern with substantial morbidity and mortality.19 It is now recognized as worsening or deterioration of HF signs and symptoms in a patient with chronic HF after a period of clinical stability that requires escalation of therapy and is a clinical entity independent of the location of care.37 The choice of location (eg, inpatient, outpatient, ED) is inherently subjective and subject to multiple potential clinical and nonclinical factors.37 Based on recent literature, patients with WHF typically present with any of the following parameters10:

- NT-proBNP level above 3800 pg/mL, or
- EF of 35% or less, or
- ED visit or hospitalization for HF in the past 12 months.

WHF is increasingly used as an accepted inclusion criterion, end point, or part of a combined end point in clinical trials.39 In general terms, WHF is worsening of chronic HF that occurs during hospitalization or in the ambulatory setting. It often results in adjustments to long-term therapy and inpatient hospitalization and is associated with an unfavorable prognosis (Figure 7).38-41

Emerging data suggest that WHF needs to be considered beyond hospitalization. It does not occur only in the hospital, as it is not based on location. Patients may experience WHF in the outpatient setting, and hospitalization or ED presentation may be avoided with adequately adjusted therapy.82 Select comorbidities can result in discontinuation of GDMT for hospitalized patients. For instance, worsening renal failure is common when managing chronic HF, and it may require discontinuation of ACE inhibitors/ARBs because of concerns about hyperkalemia.83 Chronic kidney disease plays an important role, as it affects up to 50% of patients with HF. The strongest predictors of adequate GDMT consist of absence of chronic renal disease or nonsustained ventricular tachycardia, low-income prescription benefits subsidy, and most recent EF evaluation occurring more than 1 month before placement of an implantable cardioverter-defibrillator.84

Essentially, HF has become a medical epidemic with significant medical and economic costs. The increasing number of individuals who will be diagnosed with chronic HF over the coming decade should cause the health care community to have an intensified focus on differential diagnosis of various causes and types of HF and the associated treatment. We must learn to individualize care for each patient in order to provide optimal medical outcomes, reduce hospitalizations, and impact long-term morbidity and mortality. This will not be an easy task but is an essential crisis that must be addressed with urgency.

— Charles A. Stemple, DO, MBA
Medical Director (Former), Humana

The most challenging patients with HF (worsening EF, renal dysfunction, borderline hemodynamics) account for a disproportionate amount of utilization and spending. For many of these patients, GDMT is not an option. It is critical to distinguish the gap between evidence and clinical practice.

— Nihar R. Desai, MD, MPH
Yale School of Medicine

FIGURE 7. Independent of EF, Patients with WHF Represent Over Three-Fourths of All HF Hospitalizations38-41

<table>
<thead>
<tr>
<th>Condition</th>
<th>% of Hospitalizations Due to WHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>All HF</td>
<td>77%</td>
</tr>
<tr>
<td>All WHF</td>
<td>60%</td>
</tr>
</tbody>
</table>

EF, ejection fraction; HF, heart failure; HFrEF, heart failure with reduced ejection fraction; WHF, worsening heart failure.
As shown in Figure 8,10,17,39 over a 1-year period, patients with WHF had a significantly higher rate of subsequent HF hospitalization than those without WHF (53% vs 1%; \( P < .001 \)) and a significantly higher rate of composite outcome of HF hospitalization or CV death (56% vs 6%; \( P < .001 \)).10

**Effect of Hospitalization on Outcomes in Patients With HF**

With high rates of mortality and high risk of readmission, hospitalizations for HF are significant events with downstream implications for patients, health care systems, and payers. Long-term outcomes among acute HF survivors remain poor despite a similar case mix over the past 2 decades. Increased study of management strategies after hospital discharge is imperative, including but not limited to prognosis reassessment, inpatient-to-clinic transitions, and HF systems-based ambulatory care.45

Recurrent hospitalization, morbidity, and mortality as a result of HF remain high despite increasing technology for pharmacotherapy and device-based therapies.46 Patients with a lower EF have a significantly increased risk of hospitalization due to HF compared with patients with the highest EF.19 HFrEF is regarded as the most challenging HF syndrome to treat—with patients in dire need of help and having the highest rates of hospitalization.47-49

The previously mentioned 2020 case-controlled cohort study of 27,323 patient outcomes that included total mortality, CV death, CV hospitalizations, and HF hospitalizations as a function of EF found that19:

- Hospitalization rates among patients with EF below the 36% to 45% range were more than double those of other EF groups,
- HF hospitalizations were 2- to 3-fold higher among those with an EF less than 25% compared with the 46% to 55% group, and
- Overall, the highest number of hospitalizations was observed among patients with an EF from 25% to 35%.

**Rehospitalization Rates Are Not Only Increasing—They Are Accelerating**

Rehospitalization is a major issue for patients with HF, as it could increase the risk of death, result in poor quality of life (QOL), and become an enormous economic burden.50 Rehospitalization rates for HF are among the highest across diagnoses. Approximately 20% of patients with HF are readmitted within 30 days, and about 50% are readmitted within 6 months after leaving the hospital (Figure 9).51 There is a dire need for vigilance and urgency following discharge due to progressively shortened intervals from HF discharge to the next hospitalization.51

A study of 8948 newly discharged patients with HF that sought to identify predictors of hospital readmission found progressive shortening of the interval between hospitalization episodes. The multivariable analysis consisted
of a large cohort of patients with HF and found a sustained association between previous hospitalizations and the rate of subsequent hospitalizations.51

- The interval to subsequent hospitalization progressively decreases over time.52
- Median time to hospitalization decreased from 765 days for the first hospitalization to 226 days for the fifth hospitalization and to 131 days for the tenth hospitalization.52
- Previous hospitalization significantly and independently increased the risk of future hospital admission by 33%.52

**Managing Patients With HF After Discharge**

Reducing preventable hospitalizations is a national priority; however, this goal has been elusive, and efforts are needed to reduce disease burden and improve outcomes.8 There is a perception that patients treated outside of the hospital setting are clinically more stable; however, ambulatory patients with reduced EF exhibit comparably high relative rates of mortality and hospitalization.19

The trend in recent years is that CMS has cut Medicare payments and that it initiates a different payment structure for unplanned hospital readmissions within 30 days. The trend is continuing; in 2024, Bundled Payments for Care Improvement-Advanced (BPCI-A) will become mandatory. BPCI-A is a value-based payment model from CMS that encourages hospitals to improve communication and care coordination to better engage patients and caregivers in discharge plans and to reduce avoidable readmissions.19 This change makes hospitals and providers financially responsible for the very expensive post–acute care space. This includes all charges related to inpatient rehabilitation, skilled nursing facilities, long-term acute care, and home health services.

Due to the expansion of BPCI-A, 90-day spending will become an increasingly important payment benchmark.19 The first study of its kind examined 90-day spending from 2016 to 2018 Medicare claims for 935,962 patients discharged following HF hospitalization. Despite assumptions that most post-90 day costs would occur in the first 30 days, an even distribution by month seems to occur with two-thirds of costs happening in the second and third months.19 Figure 10 illustrates differences in 90-day hospital readmission rates for HF vs all causes over 7 years.55

**Procedure Costs for HF May Be Higher Than Anticipated Due to Complications and Readmissions**

Overall, procedures for HF help to save lives, and they may improve QOL for many patients. But these benefits come with a high rate of possible complications.16 LV assist device (LVAD) therapy has become the prevailing surgical treatment (exceeding heart transplantation) for patients experiencing symptoms of advanced HF that are refractory to GDMT.16 LVAD therapy is impactful and is associated with important improvements in survival, functional status, and QOL. For these reasons and because of the limitations of heart transplantation, the number of patients receiving durable LVAD therapy as destination therapy continues to grow.

However, the cost of LVAD therapy is following the same trend. Despite demonstrating survival and QOL improvement in some patients compared with other medical and surgical interventions, LVAD therapy may not be cost-effective. Readmissions can be unpredictable and may be due to complications of device therapy (eg, gastrointestinal bleeding, stroke, device infection, or thrombosis). Readmissions may also occur for reasons unrelated to the LVAD.16 Some data suggest that lower social and economic conditions may be a large driver of readmissions. Social factors (eg, living alone, unmet functional needs, limited education, lack of self-management skills) are most predictive of readmission.16

- In a 2017 study of 220 Medicare patients with LVADs implanted from 2009 to 2010, the mean cost of LVAD implantation was $175,420, and the mean cost of pump replacement was $90,147. Patients had a combined 529 admissions in the year before LVAD implantation and a combined 589 admissions in the year afterward.57
- All-cause readmission after implantation led to $7088 more in costs; hospitalization was 3.5 days longer than before implantation (both, P < .001).57

**FIGURE 10.** 90-Day Hospital Readmission Rates Over 7 Years—HF vs All-Cause55
The HF Epidemic in the COVID-19 Era

A pandemic within a pandemic, HF was recognized as a global pandemic before the COVID-19 crisis due to its high prevalence worldwide and the likelihood of a dramatic increase in HF as the aging population grows.\(^6\) Patients with HF admitted to the hospital with concomitant COVID-19 have a very poor prognosis.\(^9\) A retrospective analysis concluded that the risk of mortality in hospitalized HF patients with COVID-19 was higher than the overall risk of inpatient mortality overall (50% vs 23%, respectively).\(^4\) It was also found that patients with HF who had COVID-19 were 24% more likely to die in the hospital.\(^5\)

Out of necessity, the primary focus of hospitals shifted from providing a wide variety of medical care to treating the morbidity and mortality of patients with COVID-19.\(^6\) Lower procedure volumes have raised concerns over long-term adverse CV health outcomes resulting from the decreased rate of diagnosis.\(^6\) A 2020 study of 909 inpatient and outpatient centers was designed to determine the full magnitude of fewer diagnostic heart disease procedures being performed due to COVID-19 and the impact of this on long-term CVD outcomes. Procedure volumes decreased by 42% from March 2019 to March 2020 and by 64% from March 2019 to April 2020.\(^6\)

Delays in Care Are Creating a Sense of Urgency

Treatment delays and decreased diagnoses raise serious concerns for long-term adverse CV health, and the long-term impact of comorbid CV risk for those with COVID-19 is still being determined. A 2020 study that investigated immediate consequences of the Danish COVID-19 lockdown for patients with HF found that the usual incidence rates of hospitalization with WHF or of a diagnosis of new-onset HF were reduced by approximately 30% after lockdown.\(^6\) These data have raised concerns that patients with HF are currently undertreated, which may negatively impact prognosis in the longer term.\(^6\)

The rapid adoption of telehealth over the past few years has become important in facilitating continuity of care. Patients at home can be monitored through dedicated applications, telephone calls, or devices. Virtual visits and forward triage allow screening of patients with signs or symptoms of decompensated HF. Patients receiving care in a hospital may benefit from remote communication platforms. After discharge, patients may undergo remote follow-up or telerehabilitation to prevent early readmission.\(^6\)

Critical Need for Transitional Care Programs for Patients With HF

Transition of care (TOC) in the context of HF management refers to individual interventions and programs with multiple activities designed to improve shifting between therapeutic settings, most often from hospital to home. TOC in HF typically involves home visits by nurses to monitor and manage signs and symptoms and deliver patient education after discharge. PredischARGE health education and counseling (eg, discharge planning, health education, discharge counseling, and patient-centered discharge instructions) are important components of TOC intervention.\(^5\)

TOC in HF requires optimizing communication among stakeholders, identifying patients at high risk, assessing health-related QOL, and ensuring accurate and adequate knowledge for nurses or other clinical leaders. Patient experiences during TOC can be stressful, particularly when posthospitalization care is poorly executed as the result of inadequate coordination of resources or follow-up. Fragmentation of patient care is characterized by ineffective communication among providers and across health care agencies, insufficient patient and caregiver education, poor continuity of care, and limited access—all of which contribute to reduced quality and unfavorable cost outcomes.\(^6\)

Physiologic, functional, social, cultural, and psychological patient characteristics and unmet needs may also affect HF rehospitalization during TOC. In a study of physical, psychological, social, and existential unmet needs of 132 patients enrolled in cardiac rehabilitation, key points identified were difficulty in motivation to leave home, anxiety when short of breath, general anger and frustration, lack of control of life, depression, unwell feeling, fears of experiencing MI or stroke, forgetting to take medications, lack of understanding about the current situation among family and friends, and obstacles to coping with work around the home.\(^6\)

As the COVID-19 pandemic demonstrated, acceleration of telehealth strategies can be implemented to ensure continuity of care for patients with HF. Telehealth may increase access and be more convenient for patients with HF who may not be able to receive specialty health care services because of geographic location, physical disability, advanced chronic disease, or difficulty in arranging transportation.\(^6\)

Drug Classes and Development

Significant scientific breakthroughs in managing HFrEF have been realized in recent decades.\(^6\) ARNI (sacubitril/valsartan) has become well established as a first-line agent in HFrEF treatment due to its beneficial impact on cardiac remodeling.\(^8\) In addition, vasodilators (eg, vericiguat) stimulate soluble guanylate cyclase and increase cyclic guanosine monophosphate production.\(^4\) This may decrease afterload and preload on the myocardium and improve morbidity and mortality in patients with chronic HFrEF.\(^9\) SGLT2 inhibitors
When Patients Are Out of Options

For many patients with meaningful comorbidities, limitations in current treatment options present a prevailing challenge. Many patients have reached their individualized limits; however, risks of subsequent hospitalization and death remain significant. In all, HF continues to be a leading cause of hospitalization.12

Unfortunately, multiple factors can have a major impact on the likelihood of patients with HF receiving target doses of GDMT. Lower systolic blood pressure and other unfavorable prognostic factors (eg, more severe NYHA functional class, older age, chronic renal insufficiency, and recent hospitalization for HF) generally occur in most patients not achieving target doses of GDMT.71 In addition to WHF, these factors limit current therapeutic options and success.

Conclusions

Reaching adequate GDMT targets is the foundation of HF treatment. However, many patients do not receive optimal levels of therapy, or they may need more individualized treatment (ie, adjunctive therapy) if their management is not optimized on GDMT. This underscores the need for additional therapeutic options to be used with the current standard of care. A personalized patient approach after initiating GDMT—rather than the more traditional, hierarchical, standardized, one-size-fits-all approach—may lead to more effective therapy for each patient.32

New milestones for the optimal treatment of HF emerge as data are reported, clinical trials continue to resemble the general population more closely, and consideration is given to social determinants, underlying causes of HF, individual patient characteristics, and the specific natural disease course. For example, the emergence of telemonitoring and telehealth during the COVID-19 pandemic led to the adoption of these important modalities to facilitate continuity of care. As HF classification systems become more nuanced, the wait-and-see approach to treatment is being reconsidered, with the hope of shifting the treatment paradigm by using timely and more adaptive interventions. This earlier identification of patients at high risk of poor HF outcomes may be an important step in improving their prognosis.73

Selecting treatment based on patient characteristics (eg, sex, race, genetic predisposition) is also important to decrease rates of mortality and hospitalization.34 Timely interceptive treatments can make significant strides in HF when time is of the essence. As previous “add-on” medications are expanding into frontline use, the need for personalized treatment continues to grow, and new additions to treatment are needed to optimize care and reduce costs.

Improvements in the outpatient care of HF would help discharged patients receive comparable care outside the hospital. Because most patients with WHF have gradual onset of congestive signs and symptoms, there is an extremely important and time-sensitive window of opportunity to halt HF worsening and avoid the need for hospitalization. The coincidental evolution of treatment guidelines and of telemedicine and novel therapeutics on the horizon provides momentum and much needed hope for people with HF. ■

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