How Well Are Chronic Heart Failure Patients Being Managed?

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Heart failure (HF) remains a major public health problem, affecting 5 million patients in the United States. The personal burden of HF includes debilitating symptoms, activity limitations, frequent hospitalizations, arrhythmias, and increased mortality. Despite the compelling scientific evidence that angiotensin-converting enzyme inhibitors, beta-blockers, and aldosterone antagonists reduce hospitalizations and mortality in patients with HF, these life-prolonging therapies continue to be underutilized. Device therapy for HF, including implantable cardioverter defibrillators and cardiac resynchronization therapy, has recently been demonstrated to also result in substantial mortality reduction. Accurate evaluation of patients with HF is critical for the appropriate selection and monitoring of therapy to reduce symptoms as well as for the prevention of recurrent hospitalizations. A number of studies in a variety of clinical settings have documented that a significant proportion of patients with HF are not receiving treatment with guideline-recommended, evidence-based therapies. Treatment gaps have also been documented in providing other components of care for patients with HF, including assessment for congestion and patient education. Recent studies demonstrate that hospital-based systems can improve medical care and education of hospitalized HF patients and accelerate use of evidence-based, guideline-recommended therapies by administering them before hospital discharge. HF disease management programs have also been shown to improve HF treatment, resulting in substantial reduction in hospitalizations and mortality. Application of validated and reproducible noninvasive techniques to monitor patients with chronic HF is an important step in maximizing interventions to improve outcomes in this patient population. Further efforts are clearly needed to improve the monitoring of HF patients in the hospital and outpatient settings, as well as to ensure the implementation of effective strategies and systems that increase the use of evidence-based therapies, in order to reduce the substantial HF morbidity and mortality risk.

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Heart failure (HF) affects 5 million Americans, with 550,000 new diagnoses made each year.[1] HF is one of the few major cardiovascular conditions that is increasing in both incidence and prevalence, which places a significant burden on the health care system.[2-4] The lifetime risk of HF developing after the age of 40 is 1 in 5 for both men and women (Figure 1).[1]

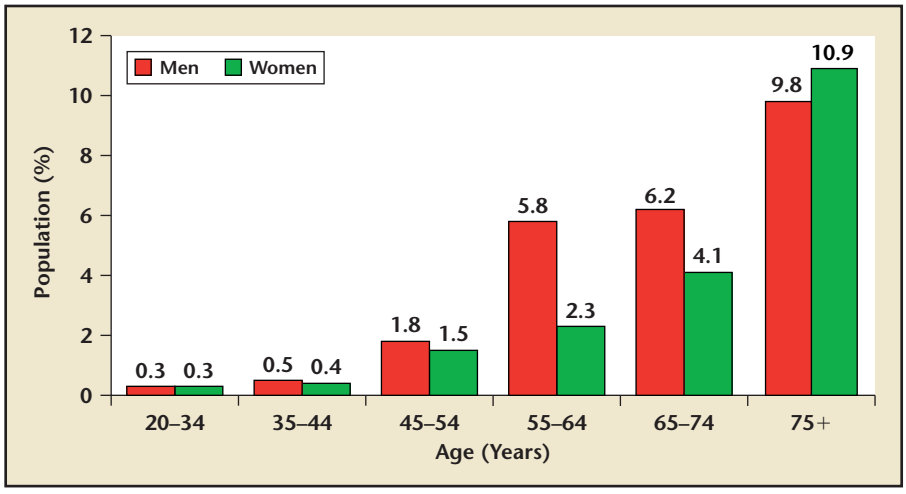

Figure 1. *The prevalence of heart failure increases with age in both men and women. With the aging of the population, the number of patients affected by heart failure is expected to rise dramatically. Reprinted with permission from American Heart Association. Heart Disease and Stroke Statistics—2006 Update.*[1]

The personal burden of HF includes debilitating symptoms, frequent hospitalizations, and high rates of mortality.[2,3] Prognosis is very poor once a patient has been hospitalized with HF; the mortality risk after HF hospitalization is 11.3% at 30 days, 33.1% at 1 year, and well over 50% within 5 years.[1,2] From 1993 to 2003, deaths caused by HF increased 20.5%. In the same period, there was little improvement in survival, with the death rates declining only 2%.[1,2] HF is the underlying or contributing cause of death in 286,700 persons annually in the United States.[1]

In addition to the risk of mortality, patients with HF have an increased risk of hospitalization. In 2003, HF resulted in 1.1 million hospitalizations, which translated into an annual estimated cost of $23 billion to $56 billion.[1,5,6] The almost 1.1 million hospital discharges due to HF that year represents a 174% increase since 1979 (Figure 2). In a study of almost 18,000 Medicare recipients with HF, approximately 44% were rehospitalized at least once in the year following their index hospitalization.[7] Nearly 20% of patients are rehospitalized twice for the same condition,[7] and a number of studies indicate that a significant proportion of rehospitalizations for HF appear to be preventable.[2,3,6] Therefore, both high risks and costs are associated with HF. These statistics emphasize the need to develop and implement more effective strategies to manage HF.

Evidence-Based Therapy for Chronic HF

There is compelling clinical trial evidence that all patients with HF caused by left ventricular systolic dysfunction of any cause, from asymptomatic left ventricular dysfunction to class IV symptoms, should be treated with angiotensin-converting enzyme (ACE) inhibitors and beta-blocker therapy, in the absence of contraindications.[2-4] ACE inhibitors reduce mortality in HF by 17% to 25%.[2,8] Evidence-based beta-blocker therapy reduces mortality by 34% to 65%.[2,9]

ACE inhibitors and beta-blockers have been shown to alleviate symptoms, improve clinical status, and reduce the risk of death or the combined risk of death and rehospitalization.[2,3] The benefits of treatment have been shown to extend to a wide variety of patients, including men and women, older and younger patients, and diabetic and non-diabetic patients with HF. Aldosterone receptor antagonists have also been demonstrated to reduce the risk of mortality in patients with severe HF and HF symptoms post–myocardial infarction.[2,10,11] National and international guidelines recommend ACE inhibitor, beta-blocker, and aldosterone antagonist therapy as the standard of care in patients with HF and reduced systolic function.[2-4] The use of the fixed-dose combination of hydralazine and long-acting nitrates is also recommended in black

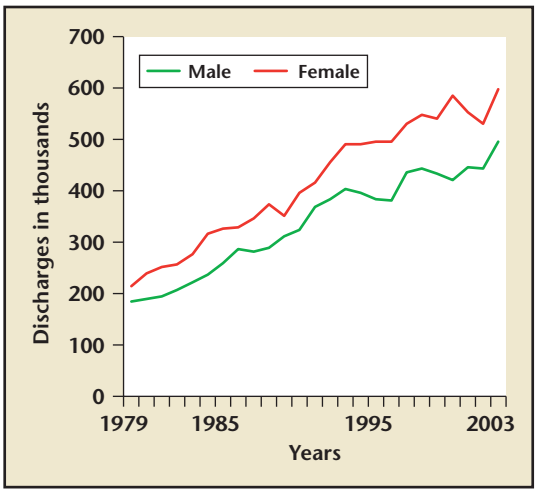

Figure 2. *Hospital discharges for heart failure rose from 399,000 in 1979 to 1,093,000 in 2003, an increase of 174 percent. Reprinted with permission from American Heart Association. Heart Disease and Stroke Statistics—2006 Update.*[1]

patients with Class III or IV systolic HF in addition to other standard-of-care therapies.[2,3]

Even with optimal pharmacotherapy, symptomatic HF is still associated with substantial morbidity and mortality. Sudden death risk is high. Implantable cardioverter defibrillators (ICDs) have been shown to provide substantial mortality benefits by preventing sudden cardiac death in patients with HF who have an ischemic substrate, poor ejection fraction, and history of ventricular arrhythmias.[12] More recently, in the Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT), patients with HF and reduced systolic function from multiple causes but without any other ICD indication had a 23% reduction in all-cause mortality.[13] Thus, there is now proven benefit with ICDs used as primary prevention in HF patients. ICDs, however, do not improve functional outcomes.

Intraventricular conduction disturbances are common in HF and are associated with increased mortality. Studies have recently evaluated cardiac resynchronization therapy (atrial-synchronized biventricular pacing) for HF.[14-18] Cardiac resynchronization therapy improves many of the pathophysiologic changes seen in patients with wide-QRS complexes, resulting in less mechanical dyssynchrony leading to increased left ventricular filling time, reduced mitral regurgitation, and reduced septal dyskinesis.[14] In patients with HF with New York Heart Association (NYHA) Class III or IV symptoms despite medical therapy, a prolonged QRS duration, and reduced ejection fraction, cardiac resynchronization therapy has been demonstrated to improve functional and hemodynamic status, reduce HF hospitalizations, and reduce all-cause mortality.[14-18] In a recent meta-analysis, all-cause mortality was reduced by 21% (RR, 0.79; CI, 0.66-0.96) with cardiac resynchronization therapy, driven largely by reductions in death from progressive HF (RR, 0.60; CI, 0.36 to 1.01).[15]

The combination of a cardiac resynchronization device and ICD offers additional benefits.[16,17] The benefits of evidence-based medical and device therapies are cumulative, and the use of each indicated therapy in combination results in substantial reductions in mortality, as shown in Table 1.

Neurohumoral antagonists and device therapies are indicated for systolic dysfunction HF, however, many patients with HF have preserved systolic function. The understanding of treatment for HF with preserved systolic function is more limited due to the lack of randomized data regarding the effects of ACE inhibitors, beta-blockers, and aldosterone antagonists on outcomes in this population.[2,3] However, the majority of patients with HF and preserved systolic function have comorbid conditions, such as hypertension, coronary artery disease, diabetes, and atrial fibrillation, which are themselves indications for the use of ACE inhibitors, beta-blockers, and/or aldosterone antagonists.[2,3] Thus, many of these patients may also be candidates for use of these cardiovascular protective therapies.

The Gap in Applying Guideline-Recommended Therapy in HF

Despite the wealth of scientific evidence and guideline recommendations regarding the benefits of these HF therapies, there is an extensive body of evidence documenting the fact that conventional management has left a substantial proportion of HF patients untreated with these life-saving interventions.[19-23] Longitudinal national data on outpatient use of ACE inhibitors for HF showed a modest increase in ACE inhibitor use from 24% to no more than 38% in the 12-year period between 1990 and 2002.[19] This HF treatment gap is not just a problem in the United States. The IMPROVEMENT international study of 1363 physician practices in 15 countries involving 11,062 HF patients with chronic HF found that only 60% of these eligible patients were treated with ACE inhibitors (Figure 3).[20] In addition to the underuse of ACE inhibitors, subtherapeutic dosages are commonly used.[21]

The Acute Decompensated Heart Failure National Registry® (ADHERE) reported a similar underuse of beta-blockers in 2002 through 2003, with only 47% of patients with chronic, previously diagnosed,

Table 1
Indicated Therapies in Combination Which Result in Substantial Reductions in Mortality

	Relative Risk (%)	2-yr Mortality (%)
None	—	35
ACE Inhibitor	↓23	27
Aldosterone Antagonist	↓30	19
Beta-Blocker	↓35	13
CRT alone or CRT with ICD$_{(EF\leq35,\ QRS>120)}$	↓36	8

The cumulative benefit if all 4 guideline-recommended, evidence-based, chronic systolic heart failure therapies are used is a 78% relative risk reduction in all-cause mortality. There is a 27% absolute risk reduction in mortality in as little as 24 months. The estimated number needed to treat to save a life is 4. ACE, angiotensin-converting enzyme; CRT, cardiac resynchronization therapy; ICD, implantable cardioverter defibrillator.

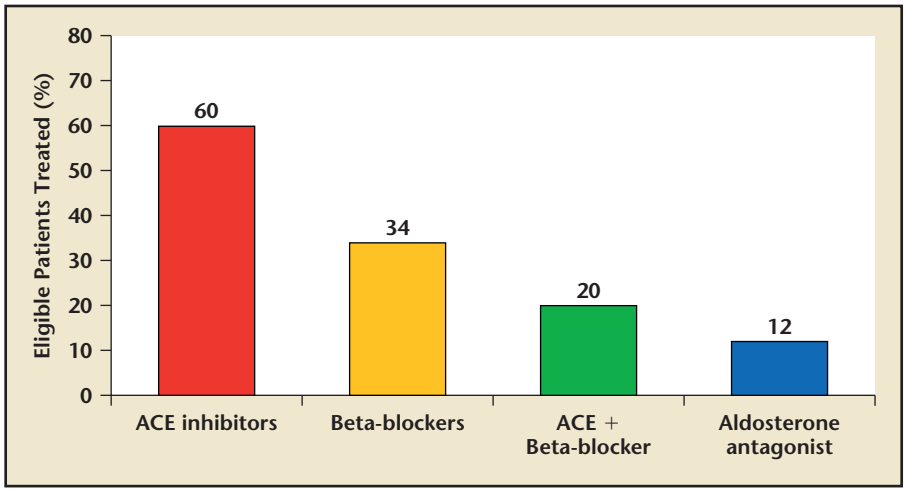

Figure 3. *In this international survey of outpatient chronic heart failure care involving 15 countries, 1363 physicians, and 11,062 patients with Stage C heart failure and documented systolic dysfunction, there were substantial treatment gaps documented in the use of angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, and aldosterone antagonists. Data from Cleland JG et al.*[20]

systolic dysfunction HF receiving a beta-blocker on an outpatient basis before admission to the hospital.[23] The international IMPROVEMENT survey showed that only 34% of patients with chronic HF were being treated with beta-blocker therapy (Figure 3).[20] A recent randomized trial demonstrated that under conventional physician-directed care, only 27% of eligible chronic HF patients began beta-blocker therapy on an outpatient basis.[24] Of the 5010 patients with New York Heart Association (NYHA) Class II-IV HF due to systolic dysfunction enrolled in the Valsartan Heart Failure Trial (Val-HeFT), only 35% were being treated with beta-blockers.[25] Underuse of aldosterone antagonists in eligible patients has also been described (Figure 1).[20]

Gaps in the provision of other aspects of HF care have also been discussed. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) developed a disease-specific Heart Failure Core Measure Set.[26] The 4 HF performance measures in the set include use of ACE inhibitors in eligible patients, evaluation of left ventricular function, smoking cessation, and patient education. Patient education is composed of written instructions and educational material on diet, weight monitoring, activity levels, medications, and symptom management. A recent analysis of the ADHERE registry involving 55,475 patients discharged from 263 US hospitals showed that only 29% of patients received complete discharge instructions.[23] Substantial gaps in the use of ICD device therapy in eligible patients have also been described.

Several studies document that processes of care provided in the hospital are strongly associated with rehospitalization and mortality.[2,3,27] Early HF readmission and 30-day mortality are independently associated with the process of inpatient care. Explicit inpatient processes-of-care indicators shown to be associated with outcome include discharge with ACE inhibitor therapy, measurement of left ventricular ejection fraction, and discharge documentation. A case-controlled study at 12 Veterans Affairs hospitals demonstrated that the risk of early readmission for HF was increased nearly two-fold when inpatient care was substandard (a readiness-for-discharge score below the 25th percentile).[27]

Role of Hospital-Based Systems to Improve Quality of Care and Outcomes

A number of studies have demonstrated the role of hospital-based systems in improving the quality of care using existing resources and medical personnel; moreover, such programs are substantially more effective than conventional guidelines and care.[28,29] Based on this model, the Organized Program to Initiate Life-saving Treatment in Hospitalized Patients with Heart Failure (OPTIMIZE-HF) was developed.[30] The key objective of OPTIMIZE-HF was to improve medical care and education of hospitalized HF patients. To provide optimal therapy, it was designed to promote the accelerated adoption of guideline-recommended therapies by starting these life-saving regimens before hospital discharge in suitable patients. In addition, by studying variations in treatment use by patient and hospital characteristics it aimed to increase the understanding of the current barriers to initiation of ACE inhibitors and beta-blockers in this patient population. The program encouraged hospital-based teams to implement the comprehensive OPTIMIZE-HF process-of-care improvement tools. The materials were based on the American College of Cardiology/American Heart Association HF guidelines, recent clinical trials, and the collective expertise of the OPTIMIZE-HF Steering Committee members.[30]

As part of an enhanced treatment and discharge plan, OPTIMIZE-HF provided evidence-based best-practices algorithms, critical pathways, standardized orders, discharge checklists, pocket cards, chart stickers, and a variety of other elements to assist

hospitals in improving HF management. The hospital teams collected data during hospitalization and at 60 to 90 days post-discharge to measure and improve the management and care of patients with HF as a primary or secondary diagnosis. The registry tracked the use of life-saving therapies before and after initiation, as well as hospital progress and discharge planning. Real-time reports and benchmark comparisons between institutions both regionally and nationally were provided, allowing participating institutions to share best practices. Preliminary data show substantial improvements in the use of evidence-based HF therapies both in the hospital and at 60- to 90-day follow-up.

The American Heart Association's (AHA's) Get With The Guidelines (GWTG) program is an acute-care hospital-based quality improvement program designed to help close the treatment gap in cardiovascular disease, significantly improve patient outcomes, and move the AHA closer to its 2010 goal of reducing death, disability, and risk of cardiovascular disease by 25%.[29] The AHA initiated the GWTG program with a coronary artery disease module in July 2000, modeling it in part after the UCLA CHAMP system.[28] The GWTG program focuses on the use of treatment guidelines to ensure that patients are discharged on a regimen of appropriate medications and receive adequate counseling for risk-factor modification.

An integral part of the GWTG program is the use of the interactive AHA web-based data collection tool, the Patient Management Tool (PMT). The PMT, developed by Outcomes Inc. (Cambridge, MA) is a customizable, web-based, interactive quality improvement reporting system used to prospectively collect data and measure program performance individually or against AHA's national benchmarks over time. Drop-down reminder screens provide immediate reference to the appropriate guideline and alert clinicians to omission of needed measurements and interventions before the patient leaves the hospital. Health care professionals can also generate patient education sheets and produce a letter to be sent to the patient's primary care physician summarizing the diagnosis, procedures, risk assessment, and interventions initiated during the hospitalization. The system also may be used to collect data for the JCAHO ORYX core measure sets for acute myocardial infarction and HF. The AHA implemented a GWTG program module focused on HF in March 2005.

Outpatient Disease Management Programs to Improve Quality of Care and Outcomes

There has been much interest in identifying effective methods to improve the quality of outpatient care for HF patients while reducing costs. The traditional model of outpatient care delivery is thought to contribute to frequent hospitalizations, because in these brief, episodic encounters, little attention may be paid to the common, modifiable factors that precipitate many hospitalizations. We and others first studied the use of comprehensive HF management programs involving specialty care and a multidisciplinary team (Table 2); the goals of the HF disease management programs included optimization of drug therapy, intensive patient education, vigilant follow-up with early recognition of problems, and identification and management of patients' comorbidities.[31-33] HF patients who were cared for in these programs were shown to have significantly fewer rehospitalizations, lower health care costs, improved functional and symptom status, and better quality of life compared with either a pre-intervention time period or HF patients treated with conventional care.[31-33]

However, because these initial studies of multidisciplinary disease

Table 2
Heart Failure Disease Management Components

- Multidisciplinary team: heart failure specialists, electrophysiologists, advance-practice nurses, home nursing staff, pharmacists, medical social workers, nutritionists, administrative personnel
- Detailed assessment of heart failure etiology, potential reversible causes, and related risks
- Optimization of heart failure medical therapy
- Evaluation of the need for and optimization of heart failure device therapy
- Assessment and management of patient comorbidities
- Close monitoring of volume status and application of noninvasive techniques to detect congestion
- Comprehensive heart failure education in the hospital and outpatient setting for patients and their family members
- Meticulous tracking of clinical status, laboratory data, heart failure device data, and diagnostic testing results
- Hospital discharge and continuity-of-care planning
- Increased outpatient access to health care professionals
- Long-term coordinated follow-up of patients

management interventions were non-randomized "before and after" studies, concerns were raised about their interpretation. Rich and colleagues[34] were the first to provide randomized clinical trial evidence for the effectiveness of disease management in improving clinical outcomes in HF patients. They developed a nurse-directed, multidisciplinary disease management intervention to address risk factors for readmission, including non-adherence to diet or medications, inappropriate medication prescribing, and failure to recognize HF exacerbations and seek appropriate care. In their single-center study of high-risk HF patients, they reported a reduction of HF readmissions within 90 days by 56%, all readmissions by 29%, and overall cost of care by $460 per patient.[34]

Other studies of multidisciplinary disease management interventions confirmed these findings.[35-39] Stewart and Horowitz[35] reported on a randomized, controlled trial of a home-based HF specialty intervention in Australia in which they demonstrated that patients randomized to the intervention had a better survival rate and fewer rehospitalizations than those who received usual care. Krumholz and coworkers,[36] in a single-center randomized study, tested a 1-year educational intervention without medical management in patients with HF. In intervention patients, there was a significant reduction in the primary end point of death or hospital readmission. The Specialized Primary and Networked Care in HF (SPAN-CHF) study demonstrated a 52% reduction in HF hospitalizations with a 90-day nurse-driven HF disease management intervention delivered uniformly across a diverse provider system.[37]

McAlister and colleagues[38] reviewed randomized trials of HF disease management programs published through 1999 and concluded that multidisciplinary teams providing direct specialized follow-up care reduced hospitalization and health care costs statistically significantly, whereas studies that used telephone contact to coordinate primary care services seemed to have no effect. Since 1999, several more randomized trials have been published. In an updated analysis by McAlister and colleagues,[39] HF disease management strategies that incorporated follow-up by a specialized multidisciplinary team (in either a clinic or a non-clinic setting) reduced mortality (RR, 0.75; 95% CI, 0.59 to 0.96), HF hospitalizations (RR, 0.74; 95% CI, 0.63 to 0.87), and all-cause hospitalizations (RR, 0.81; 95% CI, 0.71 to 0.92). In addition, 15 of the 18 trials reported that their disease management interventions were cost-saving, with the other 3 trials reporting cost neutrality.[39] Strategies that employed telephone contact and advised patients to see their primary care physician in the event of deterioration reduced HF hospitalizations, but not mortality or all-cause hospitalizations.

Another recent meta-analysis, including 18 trials published between 1993 and 2003, confirms that, overall, disease management interventions directed at recently hospitalized patients with HF significantly reduce rehospitalizations and health care costs with a trend toward lower all-cause mortality rates.[40] The authors concluded that if applied on a national basis, multidisciplinary disease management strategies for HF have the potential to prevent 84,000 readmissions, with an estimated reduction in Medicare payments of $424 million per year.[40]

Outpatient HF disease management programs reported to date have differed substantially in intervention focus (such as patient self-management, medication management, and care coordination), mode (telephone, home, or specialty clinic visit), timing in relation to index hospitalization, intensity (frequency and duration of contacts), disease manager training, cardiologist involvement, and nature and extent of interaction with the patient's primary care physician.[38-40] Furthermore, even with a similar focus, different disease management programs may substantially differ in their ability to implement change and improve health-related outcomes. Although some HF disease management programs have proven to be effective, others have not. Significant additional attention is needed in developing, testing, and demonstrating best practices and sharing information on successful program components across a variety of care settings. Disease management programs should include ongoing and scientifically based evaluation, including consensus-driven performance measures and clinical outcomes (Table 3).[41,42]

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Monitoring Patients With HF

In patients with chronic HF, the symptom history is most frequently relied on in assessing change in clinical status. Patients with worsening HF may present with symptoms of increased fluid retention, fatigue, or

Table 3
American College of Cardiology/American Heart Association Performance Measures for Outpatients With Chronic Heart Failure

1. Initial laboratory tests
2. Left ventricular systolic function assessment
3. Weight measurement
4. Blood pressure measurement
5. Assessment of clinical symptoms of congestion
6. Assessment of clinical signs of congestion
7. Assessment of activity level
8. Patient education
9. Beta-blocker therapy in patients with heart failure and left ventricular systolic dysfunction
10. Angiotensin-converting enzyme inhibitors or angiotensin receptor antagonists in patients with heart failure and left ventricular systolic dysfunction
11. Warfarin therapy in patients with atrial fibrillation

Adapted with permission from Bonow RO et al.[42]

decreasing functional capacity. Dyspnea at rest or minimal exertion, orthopnea, and paroxysmal nocturnal dyspnea may indicate elevated left-sided filling pressures, whereas decreased appetite, abdominal discomfort, nausea, and vomiting may be caused by right-sided volume overload.[43] However, many HF patients have significant hemodynamic abnormalities without overt congestive symptoms at rest or minimal exertion.[44] Furthermore, patients with congestive symptoms frequently feel back to baseline early after adjustment in diuretic therapy, even when they remain decompensated by other measures. As a result, chronic HF patients frequently have minimal symptoms at rest or mild exertion while still having ventricular filling pressures much higher than those considered optimal for maintenance of stability.[43]

The physical examination, although part of the routine assessment of HF patients, has well-documented limitations, even in expert hands. The physical examination is often insufficiently sensitive and specific enough for assessment and monitoring of therapy.[44] Lung examination for rales is not predictive of elevated filling pressures in patients with chronic HF. Despite the presence of pulmonary congestion confirmed by hemodynamic measurement, rales can be absent in over 80% of patients with chronic systolic HF because of increased lymphatic drainage and other compensatory changes.[43] The S3 is appreciated in only 20% of patients with documented elevation in pulmonary capillary wedge pressure. The assessment of jugular venous pressure can provide some insight into ventricular filling pressure but can be difficult to assess, especially in patients with obesity. Other signs of right-sided HF, such as peripheral edema, are only present in approximately 50% of patients with elevated ventricular filling pressures and are frequently present in other non-cardiac disease states.[43] Thus, although signs and symptoms of HF provide some guidance, they are not sufficient indices of the adequacy of therapy in patients with chronic HF.[44]

Even when obvious symptoms and signs of congestion are present, patients often delay seeking medical attention. Studies have shown that patients may have had significantly worsened symptoms for 3 to 5 days before seeking medical attention.[2] Data from studies of implantable hemodynamic monitoring devices and thoracic impedance monitors show that increases in ventricular pressure and/or decreases in thoracic impedance frequently occur several days before worsened symptoms.[45,46] Pressures further increased and/or thoracic impedance decreased in the 24 to 48 hours after hospitalization for acute decompensated HF.[45,46]

These findings suggest that the early increases in ventricular filling pressures and/or decreases in thoracic impedance do not produce severe symptoms until pressures and/or thoracic fluid content increase further. Information from implantable hemodynamic and/or thoracic impedance monitoring systems could thus be useful by providing early warning of an impending exacerbation. This information may also allow detection of mild volume overload while the patient is still asymptomatic, allowing for adjustment of therapy.[45] The application of therapeutic interventions earlier may result in a substantial reduction in the need for hospitalization and in health care utilization.[45]

Although it is commonly believed that congestion merely contributes to symptoms of HF, clinical and experimental data suggest that congestion actually contributes to the progression of chronic HF.[47] Chronic increase in left ventricular filling pressures augments left ventricular wall stress, stimulates the local release of angiotensin II and other neurohormones, promotes pathologic

ventricular remodeling, contributes to mitral and tricuspid regurgitation, causes subendocardial ischemia, and may contribute to myocyte death by apoptosis or necrosis.[47] As a result, persistent elevations in ventricular filling pressures may be an important contributing cause of HF disease progression and mortality.

Earlier identification and treatment of congestion may thus prevent subsequent hospitalization and improve outcomes in patients with chronic HF. Continuous ambulatory hemodynamic monitoring and/or thoracic impedance monitoring has been shown to provide detailed information on HF patients' status that may be helpful in day-to-day volume management of these patients.[45,46] The information provided by this monitoring may further enhance the ability of disease management programs to improve HF patient management. The integration into routine clinical practice of validated and reproducible noninvasive techniques to monitor chronic HF patients appears to be an important advance in guiding the optimization of interventions to improve clinical outcomes.

Conclusions

The management of chronic HF poses a tremendous challenge, but there are substantial opportunities to improve care. It has been clearly documented that not enough has been done to ensure the use of evidence-based, guideline-recommended therapies and optimize care in patients with HF. Despite compelling scientific evidence of the benefits of ACE inhibitor, beta-blocker, and aldosterone antagonist therapy, a substantial proportion of HF patients are not receiving treatment. Similarly, there are currently large numbers of HF patients eligible for ICD and cardiac resynchronization therapy who have yet to receive these life-prolonging therapies. A review of the evidence from recent trials and clinical studies provides a compelling argument for implementing evidence-based therapies as part of a systematic approach to address the underlying pathophysiology of HF. Outpatient HF disease management programs are designed to accelerate the initiation of evidence-based medications, patient education, and other essential aspects of HF patient care and thus increase patient adherence to recommended therapeutic regimens. Early identification and treatment of congestion may prevent subsequent hospitalization and improve outcomes in patients with chronic HF.

The clinical history and the physical examination, although part of the standard approach to evaluating and monitoring patients with chronic HF, have important limitations. New validated and reproducible noninvasive techniques are now available to detect congestion and to monitor patients with chronic HF. The successful implementation of enhanced monitoring techniques and disease management for HF may enhance the quality of HF care and, as a result, substantially reduce the risk of hospitalizations and death in the very large number of patients with this condition. ■

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Main Points

- Studies show that a significant proportion of patients with heart failure (HF) are not receiving treatment with guideline-recommended, evidence-based therapies such as beta-blockers, aldosterone antagonists, and device therapy including implantable cardioverter defibrillators and cardiac resynchronization.
- The Organized Program to Initiate Life-Saving Treatments in Patients Hospitalized with Heart Failure (OPTIMIZE-HF) was developed to promote the accelerated adoption of guideline-recommended therapies by starting life-saving regimens before hospital discharge in suitable patients. Similarly, the American Heart Association's "Get With The Guidelines" program is a quality improvement program for hospitals that is designed to help close the treatment gap in cardiovascular disease and significantly improve patient outcomes.
- Certain multidisciplinary HF disease management programs that optimize drug therapy, educate patients, and provide thorough follow-up have been shown to reduce hospital readmissions and overall costs; however, more development of these programs is needed to produce the most benefit.
- The physical examination is often insufficiently sensitive and specific enough for assessment and monitoring of HF therapy, and patients may have minimal symptoms or fail to seek medical care when their therapy is failing to maintain stability. Thus, implantable hemodynamic and/or thoracic impedance monitoring systems may be helpful in providing early warning of an impending exacerbation.

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