Heart failure is estimated to affect 4 to 5 million Americans, with 550,000 new cases reported annually. In the past 3 decades, both the incidence and prevalence of heart failure have increased. Factors that have contributed to this increase are the aging US population and improved survival rates in patients with cardiovascular disease due to advancements in diagnostic techniques and medical and surgical therapies. Heart failure is a chronic, progressive disease that is characterized by frequent hospital admissions and ultimately high mortality rates. Because of its high medical resource consumption, heart failure is the most costly cardiovascular illness in the United States.

Advances in the treatment of heart failure and early intervention to prevent decompensation may delay disease progression and improve survival. After initial evaluation, further diagnostic testing, and implementation of standard medical therapy, outpatient management strategies focus on maintenance of patient stability. Patient counseling/education, promotion of compliance, and discharge planning may further contribute to clinical stability and improved patient outcomes. A variety of outpatient heart failure management programs have been implemented during the past decade. These programs may also contribute to improved heart failure patient outcomes, including decreased symptoms, improved quality of life, reduced rates of hospital admission, and decreased healthcare costs. The purpose of the present report was to examine current heart failure management strategies and programs and to provide recommendations regarding (1) the use of an integrated approach to care through systematic assessment and management, (2) counseling and education of patients, (3) promotion of patient compliance with the treatment regimen, and (4) facilitation of hospital discharge/implementation of outpatient models of healthcare delivery.

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Team Management of Patients With Heart Failure
A Statement for Healthcare Professionals From the Cardiovascular Nursing Council of the American Heart Association

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Development of an Integrated Approach to Heart Failure Management

Pathophysiology and Definition of Heart Failure

The syndrome of heart failure is a result of complex interactions among molecular, endocrine, and biodynamic systems. There are several pathophysiological mechanisms that are involved in the progression of heart failure; however, cardiac remodeling is more than likely a central feature in the progression of heart failure (Table 1). Injury can range from ischemia to myocardial toxins to volume or pressure overload. It can also be linked to genetic causes such as familial cardiomyopathies or even sporadic mutations in sarcomeric proteins. Even though these conditions are linked to different inciting extracellular stimuli (eg, myocardial infarction is linked to ischemia, hypertension is linked to pressure), there appears to be a convergence point at which the myocardium undergoes significant structural remodeling, myocyte phenotype changes, and loss of contractile function.

Through the years, heart failure has been defined in many ways. In most definitions, secondary alterations in hemodynamics were emphasized, and often heart failure was defined as a circulatory disorder secondary to left ventricular dysfunction. Recently, clinicians have recognized the need to develop a more encompassing definition of heart failure. Specifically, this definition highlights the process of left ventricular remodeling and the cellular events linked to the remodeling process, such as myocyte hypertrophy, interstitial fibrosis, myocyte dropout, and changes in the genetic expression of specific cardiac cell and subcellular proteins.

It is also important to stress that heart failure should not be defined solely on the basis of the presence or absence of congestion but rather should include a broad spectrum of characteristics, such as acute or chronic, right-sided or left-sided, systolic or diastolic, and with or without compromised organ perfusion. Indeed, in the future, as insight increases into the pathophysiology of the syndrome, additional characteristics will be included that more precisely describe perturbations characteristic of each individual patient. It is likely that these adjectives will refer to many specific hormonal, humoral, or inflammatory aspects of the syndrome. Increased understanding of the pathophysiological processes and expanded definition of heart failure provide the basis for therapy that is directed at reducing symptoms, promoting clinical stability, and decreasing disease progression.
Patient Assessment and Management

By the time a patient is enrolled in a heart failure management program, the diagnosis of heart failure, the first decisions about diagnostic procedures, and the initiation of standard therapies have usually been completed. These are well detailed in guidelines for the evaluation and therapy of heart failure. The essence of chronic heart failure management lies in the systematic approach to serial assessment and response to changes in patient status, which can be classified into 6 major areas (Table 2).

The care team must remain alert to factors that may exacerbate underlying cardiac dysfunction (Table 2). These factors may be extensions of the original cause of heart failure, such as active ischemia/infarction, uncontrolled hypertension, or heavy alcohol consumption. Viral infections and pneumonias frequently trigger decompensation episodes that can usually be reversed but may require several weeks of close supervision. Atrial fibrillation, which can cause or result from worsening heart failure, warrants the restoration of sinus rhythm or vigilant control of ventricular rate during routine activity. Obesity represents both a primary cause and an aggravating factor for heart failure.

The major focus of routine outpatient evaluation of heart failure patients is on the circulatory status at rest and with exercise. The resting hemodynamic profile can be simplified into a 2x2 table (Table 3) according to the presence or absence of evidence of elevated filling pressures (“wet” or “dry”) and the adequacy or compromise of tissue perfusion (“warm” or “cold”). Orthopnea is the most sensitive and specific symptom of elevated filling pressures, and it tends to reliably parallel filling pressures in a given patient. Nocturnal or exertional cough is often a dyspnea “equivalent.” Jugular venous distention provides the most sensitive sign of elevated resting filling pressures, whereas peripheral edema is present in some patients and rales is present in relatively few patients with chronically elevated filling pressures. Elevated right-sided pressures (right atrial pressure >10 mm Hg) are reliable almost 80% of the time for the detection of elevated left-sided pressures (pulmonary capillary wedge pressure >22 mm Hg) in patients with a primary diagnosis of chronic heart failure. Elevated right-sided pressures often do not reflect left-sided pressures in the presence of severe intrinsic pulmonary disease.

Individual patients generally have very reproducible patterns of symptoms and signs as filling pressures increase; these patterns should be documented and available to all on the care team. In the office, physical evidence of congestion is used to confirm symptoms of congestion, whereas over the phone, more use is made of the concordance of increased symptoms with weight gain attributed to fluid. Although the
severities of congestive symptoms may be comparable, clinical assessment should be directed to determine whether there is accompanying evidence of hypoperfusion (Table 3, profile C). Physical evidence of hypoperfusion includes narrow pulse pressure, cool extremities, and occasionally altered mentation, with supporting evidence sometimes provided by decreased serum sodium level and worsening renal function. Hypoperfusion is frequently difficult to identify through telephone contact but may be suspected when previously effective diuretic increases fail, visiting nurses report lower blood pressures, or patients describe increased lethargy.

The potential to effect rapid improvement in symptoms is assessed in relation to the evident circulatory status, with the goal of the restoration of profile A (Table 3). Most unplanned changes in outpatient therapy, particularly during telephone communication, are triggered by symptoms of fluid retention. Outpatients who have congestion with good perfusion (profile B) on standard therapy can generally be treated with a temporary increase in diuretics. For the patient who is of profile C (congestion with low output, “wet and cold”), it often is not possible to achieve diuresis before an improvement in systemic and renal perfusion from intravenous therapy, followed by major redesign of the oral regimen.22

Another common symptom that leads to telephone or clinic encounter is postural dizziness or weakness, which can reflect either excessive vasodilation or fluid loss. Abdominal complaints can result from hepatic congestion or primary intra-abdominal pathology. Perhaps the most challenging symptom to evaluate via telephone is general fatigue.

The interval history during chronic heart failure management should also include questions directed to the related risks of dysrhythmias and embolic events18; these include symptoms of palpitations, presyncope and syncope, and transient defects of vision, speech, sensation, or coordination. The development of atrial fibrillation should trigger the initiation of anticoagulation therapy, as well as rate control and consideration of cardioversion.21

Patients should be questioned regarding episodic shortness of breath, which may reflect anginal equivalents or exertional increases in filling pressures already elevated at baseline. They may be reminded that either condition may respond to nitroglycerin taken to either relieve or prevent such symptoms. In addition to therapy for symptoms, patients with heart failure due to coronary artery disease should be reminded of the importance of secondary prevention with antiplatelet and lipid-lowering agents, because recurrent ischemic events are a major cause of complications and death in this population.

### Definition of Goals of Therapy: Clinical Stability

As a patient is followed in a heart failure management program, there should be explicit assessment of a composite clinical stability. The degree of instability influences decisions regarding further medical therapy, such as drugs, referral back to a heart failure specialty program, and consideration of transplantation or investigational protocols. In addition, the components of both physiological and psychosocial stability influence the allocation of valuable personnel time for further education, frequent telephone calls, and home visits.

One of the most important components of stability (Table 4) is freedom from clinical congestion, defined as the absence of orthopnea, heart-related edema, recent increase in weight or diuretic dose after repeated adjustments, and jugular venous pressure of ≤8 cm.27 Despite previous New York Heart Association (NYHA) functional class IV symptoms, patients able to achieve freedom from congestion had a 2-year survival period that approached that of NYHA functional class III patients.28 Stable patients should appear to have adequate cardiac output at rest. In most cases, a systolic blood pressure of ≥80 mm Hg and a pulse pressure of ≥25% suggest adequate cardiac output. Patients should in general be able to dress without stopping and to walk a city block. Other factors that suggest overall instability include major drug side effects likely to require the discontinuation of fundamental therapy, increasing anginal pattern, or recurrent symptomatic arrhythmias. Poor control of a concomitant disease such as emphysema or diabetes mellitus may also lead to a label of instability.

Psychosocial factors also contribute to clinical stability. Patients, often with reinforcement from their families or

### TABLE 3. Profile of Resting Hemodynamics

<table>
<thead>
<tr>
<th>Adequate perfusion</th>
<th>Critical hypoperfusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No Congestion</strong></td>
<td><strong>Congestion</strong></td>
</tr>
<tr>
<td>“Warm and Dry”</td>
<td>“Wet and Warm”</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Optimal profile: focus on prevention of disease progression and decompensation</td>
<td>Diuresis with continuation of standard therapy</td>
</tr>
<tr>
<td>“Cold and Dry”</td>
<td>“Wet and Cold”</td>
</tr>
<tr>
<td>L</td>
<td>C</td>
</tr>
<tr>
<td>Limited further options for therapy</td>
<td>Diuresis and redesign of regimen with other standard therapies</td>
</tr>
</tbody>
</table>

The letter L represents the group with low output without congestion. Patients frequently progress from profile A to profile B. When that occurs, profile C commonly occurs after profile B. For the less common profile of low output without congestion, the letter L was chosen rather than the letter D to avoid the implication that this profile necessarily follows profile C or is a less desirable profile than C. In fact, the prognosis of profile C may be worse than that of profile L.
TABLE 4. Suggested Criteria for Clinical Stability With Chronic Heart Failure

<table>
<thead>
<tr>
<th>Clinical cardiovascular criteria</th>
<th>Laboratory criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The same or improved activity since previous visit, generally walking ≥1 city block</td>
<td>Stable renal function, generally with serum creatinine of ≥2.0 mg/dL and blood urea nitrogen of ≥50 mg/dL; may be higher in patients with known intrinsic renal disease</td>
</tr>
<tr>
<td>No limitation during dressing</td>
<td>Stable serum sodium, generally &gt;134 mEq/L</td>
</tr>
<tr>
<td>Freedom from evidence of congestion: absence of orthopnea, edema, ascites, or a jugular venous pressure of ≥8 mm Hg</td>
<td>Psychosocial criteria</td>
</tr>
<tr>
<td>Angina absent or present in stable exertional pattern</td>
<td>Compliance with medical regimen</td>
</tr>
<tr>
<td>No syncope or other recurrent symptomatic arrhythmias</td>
<td>Medications</td>
</tr>
<tr>
<td>Stable fluid balance with an increase in diuretic dose of not more often than once a week</td>
<td>Salt restriction</td>
</tr>
<tr>
<td>Stable vital signs</td>
<td>Fluid restriction, if needed</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Daily weights and flexible diuretic regimen</td>
</tr>
<tr>
<td>Systolic heart failure: systolic pressure of ≥80 mm Hg, no symptoms of postural hypotension, and a proportional pulse pressure of ≥25%</td>
<td>Social support</td>
</tr>
<tr>
<td>Heart failure with “preserved ejection fraction”: control of hypertension</td>
<td>Absence of serious depression or dementia</td>
</tr>
<tr>
<td>Heart rate</td>
<td>kehr</td>
</tr>
<tr>
<td>Stability of noncardiovascular disease (examples)</td>
<td>Laboratory criteria</td>
</tr>
<tr>
<td>Control of pulmonary disease with lowest possible doses of systemic corticosteroids and inhaled β-adrenergic agents</td>
<td>Stable renal function, generally with serum creatinine of ≥2.0 mg/dL and blood urea nitrogen of ≥50 mg/dL; may be higher in patients with known intrinsic renal disease</td>
</tr>
<tr>
<td>Control of hyperglycemia without hypoglycemia in patients with diabetes mellitus</td>
<td>Psychosocial criteria</td>
</tr>
<tr>
<td>Effective therapy for gastrointestinal blood loss or iron deficiency anemia</td>
<td>Compliance with medical regimen</td>
</tr>
<tr>
<td>Laboratory criteria</td>
<td>Medications</td>
</tr>
<tr>
<td>Stable serum sodium, generally &gt;134 mEq/L</td>
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<tr>
<td>Heart rate</td>
<td>Absence of serious depression or dementia</td>
</tr>
</tbody>
</table>

Some patients never achieve all components of clinical stability. When this failure to achieve stability is due to persistent NYHA class III/IV symptoms and frequent hospitalizations, referral or return to a heart failure specialty program is often considered, if not previously made. Once in a heart failure specialty program, patients may be reevaluated for further redesign of medical therapy with combinations of effective agents, procedural intervention to treat ischemia or valvular disease, potential heart transplantation, or investigational protocols. When this failure to achieve stability is due to noncompliance, the enrollment of further ancillary social support both in and outside of the family may be appropriate. It is often difficult to decide how much of the limited personnel resources of a disease management program should be devoted to repeated education attempts after recurring failure of compliance with medications, of abstinence from alcohol and recreational drugs, of observance of salt and fluid restriction, or of routine follow-up. Patients with serious depression or other psychiatric components of instability often require ongoing psychiatric consultation.

When patients demonstrate stability in most components, further therapy is directed toward the longer-range goal of decreased disease progression. Are patients receiving optimal doses of ACE inhibitors? If ACE inhibitors previously led to symptomatic hypotension in an unstable patient, can the drugs be retested in a setting of stability? The patient who has never deteriorated or who has reestablished freedom from congestion should be considered for careful titration of therapy with β-adrenergic–blocking agents. An exercise program should be initiated or advanced as appropriate. Once the medication regimens for both symptomatic relief and long-term stability are established, there is less need for frequent ongoing evaluation through home nursing visits, office visits, or scheduled telephone contact. Graduation to clinical stability for many patients means the decreased need for intense follow-up, after a review of symptoms and signs for which patients should contact their care team. Although the intervals between contact increase, it is important to establish a schedule of telephone communication and office visits to maintain patient compliance and to allow response to clinical changes before they lead to hospitalization.

Last, patient preferences and end-of-life decisions should be discussed with patients given that the average 1-year mortality rate for heart failure is 10%, one half of all deaths will be sudden, and as many as 25% of deaths will occur without significant worsening of heart failure. All patients should be encouraged to complete some form of advance directive. Family members may choose to learn cardiopulmonary resuscitation techniques, but such training should be combined with a discussion about the potential burden of living with someone at risk for sudden death. The inclusion of counseling with cardiopulmonary resuscitation training may assist family members to better understand the risks of sudden death and to better cope with their family member’s illness. In addition, studies have been conducted regarding the training of family members of patients at high risk for sudden death in the use of external automatic defibrillators. Data from these studies are controversial and do not yet
TABLE 5. Suggested Topics for Education and Counseling

<table>
<thead>
<tr>
<th>General topics</th>
<th>Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation of heart failure</td>
<td>Nature of each drug and dosing and side effects</td>
</tr>
<tr>
<td>Expected symptoms vs symptoms of worsening heart failure</td>
<td>Coping with a complicated regimen</td>
</tr>
<tr>
<td>Psychological responses</td>
<td>Compliance strategies</td>
</tr>
<tr>
<td>Self-monitoring with daily weights</td>
<td>Cost issues</td>
</tr>
<tr>
<td>Action plan in case of increased symptoms</td>
<td></td>
</tr>
<tr>
<td>Prognosis</td>
<td>Drugs</td>
</tr>
<tr>
<td>Advanced directives</td>
<td>Compliance strategies</td>
</tr>
<tr>
<td>Dietary recommendations</td>
<td>Coping with a complicated regimen</td>
</tr>
<tr>
<td>Sodium restriction</td>
<td>Compliance strategies</td>
</tr>
<tr>
<td>Fluid restriction</td>
<td>Cost issues</td>
</tr>
<tr>
<td>Alcohol restriction</td>
<td>Drugs</td>
</tr>
<tr>
<td>Compliance strategies</td>
<td></td>
</tr>
<tr>
<td>Activity and exercise</td>
<td></td>
</tr>
<tr>
<td>Work and leisure activities</td>
<td></td>
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<tr>
<td>Exercise program</td>
<td></td>
</tr>
<tr>
<td>Sexual activity</td>
<td></td>
</tr>
<tr>
<td>Compliance strategies</td>
<td></td>
</tr>
</tbody>
</table>

Education and Counseling

Education and counseling of the patient with heart failure are essential aspects of patient care that promote clinical stability. The fundamental impact of education and counseling on positive outcomes for patients with heart failure underscored in a recent study by Serxner et al. In an intervention notable for lack of contact with a healthcare provider, these investigators tested the impact of serial mailings of educational materials on readmission rates, compliance, and costs. The educational materials were personalized; self-care was emphasized, and recommended health behaviors were promoted. The materials were mailed to patients in the intervention group 4 times at 3-week intervals for a total of 12 weeks. Compared with the usual-care control group, patients who received the mailed materials demonstrated a 51% reduction in total admissions and reduced costs and reported better compliance with weighing and following a low-salt diet.

A clear and organized plan of patient education and counseling is critical to the achievement of optimal outcomes (Table 5). Overviews of heart failure and associated symptoms, dietary recommendations, activity and exercise, and medications are taught to patients and families. Given the complexity of the information, the team approach is extremely useful in helping patients to understand and retain information about the treatment regimen. Physicians, advanced practice nurses, home health nurses, dietitians, and pharmacists all play important roles in this process. Written materials and videotapes are an additional invaluable resource for patient education but should serve as adjuncts to and not as replacements for one-on-one education.

Understanding the Symptoms of Heart Failure

An important place to begin teaching is a clear, understandable, and simple explanation of the pathophysiology of heart failure. Many patients do not understand the term “heart failure” and assume that it means that the heart has permanently failed, signifying death. The term must be explained with care, emphasizing that it is a decrease in the reserve power of the heart as a pump. This can limit the ability of the patient to perform some vigorous activities. For most patients, flow at rest and during routine activities of daily living is at normal or near-normal levels.

A clarification between expected symptoms of heart failure and symptoms of worsening failure is important. Patients must understand that progressive dyspnea on exertion or a sudden change in orthopnea or paroxysmal nocturnal dyspnea is not expected. Patients should be instructed to notify their healthcare provider immediately when they experience symptoms of worsening failure to prevent unnecessary hospitalizations or complications. In 2 recent investigations, the inability of heart failure patients to recognize early signs of worsening heart failure delayed their seeking and obtaining appropriate medical therapy.

A goal of self-management is to have patients understand the role of fluid retention in worsening symptoms and be able to seek care early, thereby avoiding hospitalization. In a retrospective review of 585 hospital admissions for heart failure, 346 (59%) were attributed to excessive sodium retention that led to volume overload. Patients should be instructed to obtain a bathroom scale and to weigh themselves each morning (after urination and before eating). If their weight changes by >2 to 3 lb since their last clinical evaluation, they should notify their healthcare provider. In some patients, a diuretic regimen that the patient adjusts on the basis of daily weight can be extremely useful. For example, if the patient gains >2 to 3 lb within 1 to 2 days and is already taking a loop diuretic, he or she might double the dose of the loop diuretic or add a small dose of metolazone (2.5 or 5 mg), with appropriate electrolyte replacement, until he or she returns to the baseline weight. Initially, close communication between the patient and healthcare provider about dosage adjustments is essential if self-management is to be effective. Teaching patients to adjust their diuretic dose on the basis of specified changes in daily weight has been successful in some programs. If patients or their family/caregiver is unable or unwilling to assume this degree of responsibility, alternatives include home visits by a nurse to administer a diuretic or “drop-in” visits by the patient to a heart failure clinic or physician’s office.

Dietary Recommendations

A 2-g sodium diet is frequently recommended. However, no studies have been conducted to evaluate specific recommendations related to sodium restriction. A 2-g sodium diet is unpalatable for some patients, whereas a 3-g sodium diet may be a more realistic target for patients with mild to moderate
heart failure. It can be achieved by avoiding salty foods (eg, canned or frozen foods) and by not adding salt to foods after cooking. If patients require large doses of diuretics to prevent fluid retention, sodium intake will have to be more severely restricted, which requires the careful reading of food labels. Dietary instruction must take into account ethnic preferences and may require individualized counseling by a dietitian.

Similarly, patients who require large doses of diuretics or who have hyponatremia may also have to restrict their fluids to ≤2 L/d. Anecdotally, a significant number of patients with heart failure are under the misperception that taking diuretics requires “flushing the kidneys” with large amounts of fluids; this misperception should be quickly corrected. For some patients, fluid restrictions are difficult to follow because of excessive thirst related to decreased cardiac output. Suggestions for satisfying their thirst with sugarless hard candy or ice chips may prove helpful.

Alcohol is usually prohibited because its acute ingestion depresses myocardial contractility in patients with known cardiac disease. However, no studies of the effect of moderate ingestion of alcohol on functional status or death have been conducted. In general, alcohol use should be discouraged and should be prohibited for patients with alcohol-induced cardiomyopathy.

Other dietary restrictions should be discouraged unless clearly indicated (eg, a low-fat, low-cholesterol diet for hypercholesterolemia in patients with ischemic cardiomyopathy or a reduced-calorie diet for obese patients). Although some heart failure patients are obese, other patients with advanced heart failure experience a syndrome of chronic wasting, which can be exacerbated by unnecessary dietary restrictions. Frequent, small meals may combat the effect of anorexia caused by congestion of the gastrointestinal tract.

Activity and Exercise
Given current evidence, patients should be encouraged to stay as active as possible, including sexual activity and a moderate exercise regimen. After many years of restricting patients with heart failure from aerobic exercise, researchers have demonstrated that aerobic exercise training in patients results in improved exercise duration, less fatigue, faster pace of activities, and improved general well-being. To date, there are no data on the benefit or harm of a strength or resistance exercise program. Given the threat of complications related to increased myocardial oxygen demand in the face of isometric exercise, patients are usually counseled to avoid lifting a significant weight (eg, >20 lb) or performing exercises that cause a patient to strain (eg, performing a Valsalva maneuver).

Sexual problems are well documented and should be carefully assessed by the practitioner. Fears about physical exertion or symptoms may contribute unnecessarily to sexual difficulties. Sexual practices may have to be modified to accommodate patients with limited exercise tolerance, and practitioners should be proactive in raising this topic to avoid unnecessary anxiety on the part of the patient or partner.

Medications
Patients should be taught the name of each drug and its purpose, dosage, frequency, and significant side effects. For example, patients who take β-blockers should be told that they may experience fatigue, lightheadedness, or dizziness. They should be further instructed that the β-blocker will be up-titrated slowly, as tolerated; that side effects will decrease over time; and that they should call the healthcare team if they experience any adverse effects. Patients who are not properly instructed about the purpose and side effects of β-blockers may stop taking this medication because they think that their heart failure has worsened. Patients should also, however, be instructed that the rapid onset of severe disabling weakness during the initiation of β-blocker therapy remains an indication to seek urgent medical attention.

In addition, patients should be instructed to bring all of their medications with them to each office visit. This serves 2 purposes. First, information about each drug can be reviewed, and the patient’s knowledge can be assessed. Second, the practitioner can identify omissions, duplications, confusion about drug doses, and drug interactions. In addition, patients should be asked about over-the-counter and alternative medications (eg, homeopathic or herbal products) they may be taking. Alternative medications should not be taken without first consulting the healthcare team, and nonsteroidal anti-inflammatory drugs should be avoided completely because they can lead to renal dysfunction and renal failure.

A written medication schedule is strongly recommended for complicated medication regimens to reduce the adverse affect of polypharmacy on patients’ daily lives, patient compliance, and the potential for drug interactions. If the regimen is complex, the practitioner should review it to determine whether medications can be changed to single-dose medications. For example, some patients who require nitrates may be able to take isosorbide mononitrate once daily instead of isosorbide dinitrate 3 or 4 times daily. Patient histories should include an assessment of the degree to which medications are disruptive to a patient. Medication schedules can then be constructed to minimize their impact on patients’ daily activities and sleep schedules. For example, patients can be instructed to take their second dose of a twice-daily diuretic earlier in the day so as not to interfere with sleep. A medication schedule may also minimize the potential for drug interactions. For example, patients who are taking 2 vasoactive agents may have to be instructed to take these 2 medications at least 2 hours apart, because both can contribute to hypotension. A written medication schedule is also useful if the patient requires sudden hospitalization. In addition, a diary may provide a means to record vital signs (as needed), weight, fluid intake, or adverse events.

The goals of education and counseling are to assist patients in compliance with the therapeutic regimen, to maintain clinical stability and function, and to improve quality of life. These goals are best achieved when the patient and family are knowledgeable about every aspect of the condition and treatment and are active participants in the plan of care.

Compliance With the Therapeutic Plan of Care
The implementation of a successful therapeutic plan of care for patients with end-stage heart failure is dependent on
patient participation and compliance with the treatment regimen to adequately evaluate the efficacy of the plan and to recommend ongoing strategies for care (Table 5). Strategies to enhance patient compliance must therefore be an integral part of the overall management plan. These strategies not only must include the patient but also must integrate the roles of physicians, nurses, other healthcare providers, and healthcare organizations into the plan to ultimately improve patient outcomes.52

Research related to compliance by the patient with heart failure at the patient, provider, and healthcare system levels is limited because of the difficulty involved in the measurement of compliance at all 3 levels. Some studies have examined patient-related factors, such as lack of compliance with dietary restrictions and medications, that contribute to worsening heart failure and hospital readmission.40,53–57 Noncompliance with heart failure treatment plans was found to be common and appeared to increase as heart failure progressed.53,54,56,58 Ghali et al53 reported that an urban black population of patients with heart failure were hospitalized an average of 3 times per year due to heart failure. The major cause, which was present in 64% of cases, was lack of compliance with prescribed medication or diet plans. Vinson et al54 studied readmissions for elderly patients hospitalized with documented heart failure and discovered that as many as 53% of readmissions may have been prevented. Noncompliance with medication and diet therapy was a major cause of heart failure exacerbation in this sample. Among 7247 elderly heart failure patients on digoxin who were followed for 1 year, only 10% were compliant with their prescription.56 Sodium and volume overload, due in many cases to medication and dietary noncompliance, was a factor in 55% of readmissions for heart failure in a recent study at 2 large Midwest hospitals.40

There are many reasons that patients may not comply with a therapeutic regimen. Lack of knowledge, poor motivation, decreased understanding, lower perceived self-efficacy, forgetfulness, and decreased support from family and other caregivers have been identified as factors that contribute to noncompliance.40,53,57,59–61 A patient may not comply with a prescribed regimen because he or she is unconvinced of the benefits of doing so or because he or she perceives that the side effects or inconveniences of following the regimen outweigh any benefits. If cost is a factor in noncompliance, suggestions for lower-cost medications or financial assistance programs should be provided.

The provision to patients and their families/caregivers of behavioral strategies to increase adherence is vital. There are many strategies to assist patients to comply with their heart failure regimen, such as the use of a daily reminder routine, filling a pill box that contains 1 week’s medications, the implementation of incremental monitoring by caregivers, the use of medication information and reminder cards, and counseling.62

Healthcare providers can also contribute to heart failure patient noncompliance and rehospitalization. Impediments to patient compliance include advising changes that disregard the patient’s current lifestyle and failing to counsel or advise patients on how to adapt their current lifestyle to accommodate recommended changes.53 Healthcare providers may also make recommendations without detailing how to implement the recommendations. For example, clinicians may fail to adequately educate and counsel the patient or support person who may be responsible for purchasing food, cooking, and administering medications. Another important factor that contributes to patient noncompliance and rehospitalization for worsening heart failure is inadequate discharge planning and follow-up after discharge.54

The management of heart failure in elderly persons is often made more challenging by the presence of multiple coexisting problems.57 These factors contribute to the increased vulnerability of elderly patients to noncompliance and rehospitalizations for heart failure and include (1) the presence of comorbidities such as diabetes, chronic lung disease, and stroke; (2) polypharmacy; (3) financial concerns; (4) physical and cognitive limitations; (5) inadequate social support and social isolation; and (6) depression and anxiety. Clinicians who do not consider these factors when caring for elderly heart failure patients can contribute to patient noncompliance.

A few studies have examined the role of healthcare provider compliance with heart failure practice guidelines and the impact on patient outcomes.30,64–66 Despite the publication of consensus guidelines42,67 that established standards for heart failure medical therapy, many patients are still not prescribed ACE inhibitors, do not receive them in adequate doses, and are prescribed drugs that may have deleterious effects on heart failure.68 The use of ACE inhibitors for the treatment of heart failure in the community setting has increased from the early to mid 1990s, but the use has remained below recommendations in practice guidelines.54,65 Furthermore, more cardiologists than noncardiologists were found to conform to published guidelines (Agency for Health Care Policy and Research guidelines42) for the management of heart failure patients.65 Specifically, more cardiologists than generalists were likely to use ACE inhibitors for the treatment of mild, moderate, and severe heart failure and to titrate to doses proved to be efficacious in clinical trials.65 Other studies have found that patients who were referred to heart failure specialists had fewer hospitalizations30,37,66 and were more functional30,66 than they were before the referral.

To date, no investigators have addressed the role of healthcare organizations in the achievement of heart failure patient compliance with therapeutic regimens. To improve the compliance of heart failure patients, it is necessary to identify variables that affect compliance at the patient, provider, and healthcare system levels and to develop strategies to improve, monitor, and sustain compliance at all 3 levels. The promotion of patient compliance begins with discharge planning.

**Hospital Discharge and Outpatient Heart Failure Management Programs**

**Hospital Discharge**

The facilitation of a heart failure patient’s successful transition into the outpatient setting begins in the hospital with the
implementation of discharge planning. A successful transition can be achieved through a focused, comprehensive, multidisciplinary discharge plan that begins immediately after admission and is reevaluated at multiple times during the patient’s hospitalization. The patient and family are important members of the multidisciplinary discharge planning team. Vinson et al reported that inadequate discharge planning and follow-up were leading factors associated with the readmission of heart failure patients within 90 days of discharge. These authors defined inadequate discharge planning as “failure to involve social services and other ancillary support staff” and defined inadequate follow-up as “failure to involve home care or caregiver and inattention to follow-up visits.”

In a prospective, randomized clinical trial, Naylor et al found marked reductions in the hospital readmission rates of elderly patients after a comprehensive, multidisciplinary discharge planning program. Based on the results of Naylor et al, discharge planning should be initiated within 24 to 48 hours after hospital admission. Discharge planning should include gathering information related to sociodemographics (including the home environment and financial resources for medical care); patient use of health and social services before hospitalization; general health, functional, mental, and emotional status; knowledge of heart failure and related self-care; prehospitalization compliance with a healthcare regimen; and patient and caregiver needs and expectations at discharge. After the initial evaluation, a summary plan is drafted, components of the plan are implemented, and the plan is reevaluated regularly during hospitalization.

Discharge planning also includes an assessment of the need and subsequent plan for outpatient follow-up, which will vary from patient to patient. Some heart failure patients simply require follow-up at regularly scheduled clinic visits, whereas others require additional follow-up via telephone or home visits. Patients who demonstrate, either initially or subsequently, favorable clinical and psychosocial profiles will require less intensive follow-up to maximize outcomes. Other patients may require and will benefit from more intensive follow-up, and still others will require high-level follow-up but may not do well in any setting. Therefore, patient needs must be identified early so that resources can be allocated appropriately. Communication of the patient’s status and the plan of care to outpatient nurse coordinators and home health nurses at the time of discharge is critical to the implementation of a successful discharge plan.

Actual patient discharge typically occurs when patients have decreased symptoms, an improved hemodynamic profile, and clinical stability within the current limits of their cardiac dysfunction. The goal at the time of discharge is for the patient to not only have achieved hemodynamic stability (profile A if possible; Table 3) but also be on a regimen that is likely to maintain stability after discharge. This may be accomplished during hospitalization via temporary intravenous therapy or the redesign of the oral therapy regimen. Ongoing assessment of clinical stability after discharge, as described in Table 4 and discussed previously, is essential to reduce readmission rates.

Last, factors associated with a greater risk of heart failure exacerbation and hospital readmission must be identified.

Krumholz et al found the following factors to be significantly related to increased rates of readmission: male sex, at least 1 prior admission within 6 months of the index admission, the presence of >1 comorbidity, and a length of stay in the index hospitalization of >7 days. (In this study, index hospitalization referred to a random single hospital admission for the patient; prior admissions were admissions that occurred in the 6 months that preceded the index admission.) Identification of these high-risk patients at discharge and monitoring of them more closely in the home setting may decrease the risk of rehospitalization. With the development of an individualized discharge plan, full participation of patients and their family in the plan, and communication of the plan to the outpatient team, the potential for improved patient outcomes after discharge can be realized.

### Outpatient Heart Failure Management Programs

There is considerable diversity among outpatient heart failure management programs. These programs were designed and implemented primarily to reduce rehospitalization rates and associated costs. In most programs, an improvement in quality of life also was a major goal.

In the majority of studies, outcomes after institution of the program were compared with those before institution of the intervention. Fewer investigators used randomized controlled trials to test the outcomes of their programs. Although there is some overlap, the programs studied can be classified as follows: (1) specialty heart failure clinics, (2) specialty heart failure care outside the clinic setting that involves community outreach, and (3) increased access to primary care. In each of these programs, nurses played an integral role, and their contributions were as either managers/directors of care or coordinators/facilitators of care.

### Specialty Heart Failure Clinics

In the heart failure clinic model, care is delivered in an outpatient setting by practitioners with heart failure expertise to patients who attend the clinic. In some cases, 1 or more members of the program team deliver care while the patient is still in the hospital, but the primary site of care delivery is an outpatient clinic. In nurse-coordinated or -facilitated models, the nurse assists cardiologists in coordinating or facilitating care. In nurse-managed or -directed care, a nurse, usually an advanced practice nurse, has primary responsibility for the day-to-day care of patients.

### Nurse-Coordinated/Facilitated Care

The Heart Failure and Heart Transplant Program at Vanderbilt University Medical Center is a physician-directed clinic in which nurse coordinators assist with patient management. In studying this service, Hanumanthu et al compared outcomes before and after referral to the program in 134 patients (71% were men, mean age 52 ± 12 years). The program consisted of long-term follow-up by 3 physicians and 2 nurse coordinators whose practice was dedicated to the care of heart failure patients. The members of this team managed care for patients referred to the program both in the hospital and after discharge. They met periodically to integrate care with the local hospice and home health agencies.
Outcomes after referral to the program were compared with those before referral for patients followed >30 days. After referral to the program, patients' functional status, as indicated by peak VO₂, improved, as did quality of life as measured with the Minnesota Living With Heart Failure Questionnaire.80 Rehospitalizations decreased by 53%.

Fonarow et al.30 at the University of California, Los Angeles Medical Center, studied 214 patients (81% were men, mean age 52 ± 10 years) after referral to their heart failure program for heart transplant evaluation. Patients referred to the program were managed as inpatients and outpatients and followed after discharge by cardiologists with heart failure expertise and by heart failure clinical nurse specialists. Pharmacological therapy was optimized with hemodynamic monitoring, and patients received comprehensive education and counseling. Compared with 6 months before referral to the program, patients demonstrated an 85% reduction in rehospitalizations and demonstrated improved functional status as indicated with NYHA functional classification and peak oxygen consumption. The estimated cost savings for the reduction in rehospitalizations was $9800 per patient.

Nurse-Managed/Directed Care

Cintron et al71 were the first clinicians to report outcomes from a heart failure clinic. This study was unique in 2 aspects. First, these clinicians saw the need for specialty heart failure care more than a decade before most others began reporting outcomes from specialty heart failure care. Second, the heart failure clinic was managed by nurse practitioners. In this study, 15 NYHA functional class III/IV chronic heart failure patients (100% were men, mean age 65 years) were followed after referral from the in-hospital service or outpatient clinics at the San Juan Veterans Administration Hospital. Patients were referred after evaluation and stabilization with therapy recommendations from Veterans Administration cardiologists. Care consisted of follow-up assessment visits every 3 weeks in the clinic with a mean follow-up of 24 months. Patient education was emphasized at each visit, as was assessment of home problems and family support. The clinic also featured increased availability; the nurse practitioner was available on a “walk-in” basis for patients. Nurse practitioners consulted a cardiologist when necessary. After an average follow-up of 12 months, there was a 60% reduction in rehospitalizations and an 85% reduction in number of hospital days. Costs for outpatient care increased by 200% but were offset by decreased inpatient care costs, for a 75% net reduction in total medical costs. Patients reported satisfaction with the clinic; all patients preferred it and believed they received better care than they had with the regular staff clinic.

Outcomes among 21 consecutive heart failure patients (100% were men, mean age 61 years) who were referred to the Cardiomyopathy Clinic at the Veterans Administration Medical Center were examined by Smith et al.41 These investigators compared NYHA functional class, exercise time, peak oxygen consumption, quality of life as measured with the Minnesota Living With Heart Failure Questionnaire, rehospitalizations, and emergency department visits 6 months before and after referral to the clinic. In this clinic, either a heart failure cardiologist or a nurse practitioner provided care. The nurse practitioner was available by telephone for patient questions. Compared with before referral to the clinic, more patients were prescribed ACE inhibitors and at higher doses. Doses of diuretics also increased. After referral, patients exhibited improved NYHA functional class and quality-of-life scores, increased exercise time, and an 80% decrease in emergency department visits and rehospitalizations.

In a report of a Swedish experience with a heart failure specialty clinic, Cline et al73 randomly assigned 190 patients (52.3% were men, mean age 75.6 ± 5.3 years) to either usual care or the outpatient clinic program. Patients randomized to the clinic received (1) hospital and outpatient education on heart failure and pharmacological and nonpharmacological aspects of its treatment, (2) medication organizers, (3) instructions for a flexible patient-managed diuretic regimen, (4) a 1-hour information visit at home after discharge, and (5) referral to an easy-access, nurse-directed outpatient clinic with instructions to contact nurses for any problems or concerns. Patients assigned to the clinic group demonstrated a 33% longer time period to first hospital readmission than patients in the control group. In addition, patients in the clinic group experienced no increase in the number of days they were hospitalized compared with the 12-month period preceding their assignment to the intervention. Patients in the control group experienced a 59% increase in the number of days hospitalized. Clinic patients also exhibited nonsignificant trends toward fewer rehospitalizations (36%) and lower healthcare costs.

Community Outreach

In specialty heart failure care outside the clinic setting that involves community outreach, care is delivered primarily in patients’ homes. Patients do not routinely go to a clinic or other outpatient setting to receive care; rather, the healthcare provider calls on the telephone or comes to the home.

Nurse-Coordinator/Facilitated Care

Kornowski et al72 reported outcomes from an intensive home care program in Israel for NYHA functional class III/IV heart failure patients >65 years old. They studied outcomes in 42 patients (57% were men, mean age 78 ± 8 years). The program consisted of weekly home visits from a physician with a specialty in internal medicine and from a nurse, during which patients’ conditions were assessed, medications were reviewed and any necessary changes were made, laboratory tests were run, and intravenous diuretics were administered as needed. Patients could call their physician for problems, and the physician would make an extra home visit if necessary. Patients were followed for 12 months, and outcomes at 12 months before and after the program were compared. After the program, patients demonstrated a 62% reduction in the number of total rehospitalizations and a 77% reduction in associated hospital days, a 72% reduction in hospitalizations for cardiovascular causes and an 83% reduction in associated hospital days, and a significant improvement in functional status as assessed by a physician regarding the patients’ ability to perform daily activities.

A nurse-and-pharmacist team provided care for 97 heart failure patients (49% were men, mean age 75 years) in an
Australian study of a home-based intervention.\textsuperscript{62} With the use of a randomized controlled trial design, patients were assigned to either the home-based nurse-and-pharmacist intervention or usual care. The home-based program consisted of an in-hospital educational visit from the nurse followed by 1 home visit within 1 week of discharge from the pharmacist and nurse. The purpose of the visit was to assess patients’ knowledge of their medication regimen, determine compliance with that regimen (on the basis of pill count), and assess patients’ physical status. Patients who had poor knowledge of their regimen or poor compliance with the regimen received additional intervention. Information from the home visit was provided to the patient’s primary physicians. After 6 months of follow-up and compared with the usual-care group, patients in the intervention group experienced 42% fewer hospitalizations and hospital days and had lower hospital costs, although the latter did not reach statistical significance.

To determine the long-term impact of the intervention described here, Stewart et al\textsuperscript{79} extended follow-up of the original cohort\textsuperscript{62} for a total of 18 months. At the end of the follow-up period, patients in the intervention group experienced fewer out-of-hospital deaths and unplanned readmissions and required fewer days of hospitalization and emergency department visits than did the usual-care patients. As a result, the cost of hospital care was significantly lower for patients in the intervention group and more than compensated for the cost of the home-based intervention.

\textit{Nurse-Managed/Directed Care}

Rich et al\textsuperscript{76} conducted the first randomized controlled clinical trial of a heart failure management program based on the pharmacological and nonpharmacological management principles outlined in heart failure consensus guidelines. In this study, they pilot tested a comprehensive, multidisciplinary, nurse-directed heart failure management program. After the pilot test demonstrated the feasibility of the intervention and a trend toward fewer rehospitalizations and hospital days,\textsuperscript{76} these investigators examined the outcomes from their intervention in a group of 282 heart failure patients (37\% were men, mean age 66 ± 10 years). Outcomes before institution of the program were compared with those after institution of the program. The program consisted of (1) inpatient medication analysis and adjustment by a geriatric cardiologist, (2) intensive inpatient heart failure education by a cardiovascular nurse, (3) diet assessment and instruction by a registered dietician, (4) social services consultation and discharge planning, and (5) intensive follow-up by home health services and follow-up by the study nurse through home visits and telephone contact. At 90-day follow-up, patients in the intervention group demonstrated 56\% fewer rehospitalizations for heart failure, 61\% fewer multiple admissions, a 36\% reduction in hospital days, significantly improved quality of life as measured with the Chronic Heart Failure Questionnaire,\textsuperscript{81} and lower costs compared with the usual-care group. There was a trend toward better survival rates for 90 days without readmission in the intervention group and significantly better survival in the intervention group when the analysis was confined to patients in both groups who survived the initial hospitalization.

In testing the \textit{MULTIFIT} model that emphasizes the development of a cognitive, executive, and organizational infrastructure to promote optimal chronic disease management, West et al\textsuperscript{73} studied 51 heart failure patients (71\% were men, mean age 66 ± 10 years). Outcomes before institution of the program were compared with those after institution of the program. The program was a physician-supervised, nurse-managed home-based intervention that was based on heart failure consensus guidelines. At an initial visit, nurses educated and counseled patients on heart failure and its management and on behavioral techniques to enhance compliance. This visit was followed by weekly telephone calls for 6 weeks and continued intensive education and counseling to promote adherence to diet and drug regimens and self-monitoring of symptoms; risk factor modification; and promotion of activity. Patient care was under the control of primary physicians, but nurses contacted patients to promote optimization of drug therapy according to consensus guidelines that were adapted to local practice. A cardiologist was available for consultation on difficult cases. Doses of ACE inhibitors increased significantly after referral to the program, and dietary sodium intake decreased by 38\%. Compared with the 6 months before enrollment in the program, patients experienced a 23\% decrease in general medical visits, a 31\% decrease in visits to cardiologists, and a 67\% decrease in emergency department visits after referral. Compared with the 12 months before referral, patients exhibited an 87\% reduction in heart failure rehospitalizations and a 74\% reduction in total hospitalizations after referral. Functional status and quality of life improved after referral to the program.

In another example of a home-based telephone intervention, Shah et al\textsuperscript{74} conducted a study to improve heart failure outcomes that consisted of 8 weekly educational mailings combined with weekly telephone contact from a nurse and reminders to patients via a pager to take medications, weigh themselves, and measure their heart rate and blood pressure. A total of 27 heart failure patients (100\% were men, mean age 62 years) were studied after referral to this program from the San Francisco Veterans Affairs Medical Center. Patients’ cardiologists were given monthly reports of assessment data and were notified immediately via fax of signs of worsening heart failure and excessive weight gain. Compared with a similar period before the intervention, outcomes after an average follow-up of 8.5 months included a 67\% reduction in cardiovascular hospitalizations and 92\% fewer hospital days. The greatest program benefit was seen in the patients with the most severe heart failure.

Heart failure patients were among the targets of a comprehensive discharge planning and home follow-up program for hospitalized elders that was managed by advanced practice nurses.\textsuperscript{78} In this study, 363 elderly patients (50\% were men, 60 with heart failure) with 1 of several medical or surgical diagnoses (which were among the major reasons for Medicare beneficiary hospitalization) were randomly assigned to usual care or the program. The program consisted of individualized discharge planning followed by 4 weeks of home care from an advanced practice nurse with expertise in managing elders at high risk for poor outcomes after hospital discharge. Both patients and their family/caregivers were recipients of...
care that included assessment; education, counseling, and other appropriate intervention regarding medications, symptom management, diet, activity, sleep, medical follow-up, and emotional status. Patient and caregiver self-management was emphasized. Nurses were available via telephone for patient needs and collaborated with patients’ physicians to make needed adjustments in therapy. Compared with the usual-care control group, patients in the intervention group were significantly less likely to have a hospital readmission and had fewer multiple admissions and hospital days. In addition, time to first hospitalization was increased in the intervention group. The intervention was significantly more efficacious for patients with heart failure than for those without heart failure.

**Increased Access to Primary Care**

Weinberger et al. studied the impact of intensive primary care on outcomes in 1396 patients (100% were men, 504 with heart failure) who were veterans who had been discharged from the General Medical Service of Veterans Affairs Medical Centers with a diagnosis of diabetes, chronic obstructive pulmonary disease, or heart failure. Using a randomized controlled clinical trial, these investigators assigned enrolled patients to either usual care or a program of increased access to primary care. The intensive primary care program included care directed by teams of primary care physicians and nurses. Care consisted of (1) assessment by a primary care nurse before patient discharge of postdischarge needs, provision of relevant educational materials, and assignment of a primary care physician with a card given to the patient that contained the names and numbers of the primary care team; (2) a visit by the primary care physician before discharge to discuss the postdischarge regimen; (3) a clinic appointment within 1 week of discharge; (4) a telephone call from the primary care nurse within 2 days of discharge to assess problems; and (5) revision of the therapeutic plan by the physician and nurse at clinic visits. Outcomes included significantly greater numbers of rehospitalizations, hospital days, and multiple admissions in heart failure patients randomized to the program of increased access to primary care compared with the usual-care group. There was no difference in quality of life between the groups, but patients in the intervention group reported greater satisfaction with care.

**Conclusions and Recommendations Regarding Heart Failure Programs**

With the exception of the study by Weinberger et al., each of the programs reviewed here demonstrated positive patient outcomes. These positive outcomes included lower total and heart failure rehospitalization rates, fewer hospital days, improved quality of life and functional status, and lower healthcare costs despite the increased cost of the programs. Although most of the studies that we reviewed did not include survival analyses, probably because they were underpowered to detect survival differences, 2 studies did demonstrate a survival advantage for patients enrolled in heart failure programs.

The positive outcomes from these heart failure management programs should be considered in light of their limitations. Most of these studies were not randomized controlled trials. Only 1 program among the heart failure clinics and 3 among the community outreach programs were tested through random assignment of patients to either usual care or the program under study. The result of failure to use a randomized controlled design usually is inflation of the magnitude of the impact of the program on outcomes. The magnitude of inflation in this group of studies appears to be ~2-fold.

Another potential limitation of this group of studies is restricted generalizability of the findings. Although a total of 2930 patients were studied in the group of programs described, sample sizes in individual studies were relatively small, with the exception of the study by Weinberger et al. In addition, women and minorities were unequally represented in most programs. Combined, <31% of the patients enrolled in this group of studies were women and <36% were of a racial or an ethnic minority or ethnicity was not described.

Despite these limitations, the consistency of findings among this group of studies increases confidence in the soundness of their results. Thus, together this group of studies demonstrate that it is possible to substantially reduce rehospitalization rates and costs and to improve functional status and quality of life in patients discharged from a hospitalization for heart failure when specialized care delivery models are used. However, there are unresolved challenges in the translation of these care delivery models into programs that are cost effective and efficacious in routine clinical practice.

A major challenge is to identify the combination of interventions within a given program that is effective. Because there have been no studies that compare the relative effectiveness of different programs or compare individual components of programs, there remain several unanswered questions. For example, is a truly multidisciplinary team necessary, or is it sufficient for teams of nurses and physicians to manage patients? Is an advanced practice nurse–managed clinic or home-care program more, less, or equally effective in terms of multiple outcomes compared with a physician-managed program? Future research is needed to examine which programs and components of programs are necessary to produce positive outcomes in terms of decreased hospitalizations, reduced costs, and improved quality of life.

Until such research is available, however, identification of the components common to successful programs that are adaptable to a variety of communities and settings can provide guidance to clinicians (Table 6). Optimization of medical therapy based on consensus heart failure guidelines is an important aspect of care for heart failure programs. Comprehensive and intensive patient education and counseling about heart failure and its treatment and the importance of compliance appear to be fundamental to any program.* Frequent follow-up and increased access to healthcare providers also appear to be vital components of a successful heart failure program. Equally effective

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*References 30, 37, 41, 62, 71, 73, 74, 76, 78, and 79.
TABLE 6. Components of Successful Healthcare Delivery Models for Heart Failure

<table>
<thead>
<tr>
<th>Component</th>
<th>Successful Healthcare Delivery Models for Heart Failure</th>
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<tr>
<td>Physician-directed care with assistance from nurse coordinators in patient management or nurse-managed care by experienced advanced practice cardiovascular nurses with access to a cardiologist for consultation</td>
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<tr>
<td>Intensive, comprehensive patient and family/caregiver education about heart failure with an emphasis on a low-salt diet, medications, symptoms that signal worsening heart failure, weighing, and management strategies for problems</td>
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<td>Vigilant, frequent follow-up after hospital discharge</td>
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<td>Optimization of medical therapy (ensuring patients are prescribed the appropriate drugs in appropriate doses) with published guidelines based on large-scale randomized, controlled clinical trials</td>
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<td>Increased access to healthcare professionals for problems by telephone or &quot;walk-in&quot; appointment</td>
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<td>Early attention to signs and symptoms of fluid overload (ie, flexible diuretic regimen)</td>
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<td>Supplementation of in-hospital education with outpatient education</td>
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<td>Coordination with home health agencies where appropriate</td>
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<td>Attention to behavioral strategies to increase compliance</td>
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<tr>
<td>Emphasis on addressing personal, financial, and social barriers to compliance</td>
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</tr>
<tr>
<td>Assessment and assistance in management of social and financial concerns</td>
<td></td>
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<tr>
<td>Adaptable to communities without academic medical centers.</td>
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forms of follow-up included clinic visits, telephone calls, and home visits.

Examination of the intervention tested by Weinberger et al77 provides additional insight into program components that seem to be necessary to improve outcomes in heart failure. On the basis of their data, it appears that intensive primary care alone without attention to heart failure-specific education, intensive follow-up, and optimization of medical therapy will not reduce rehospitalizations or improve quality of life.77

In making decisions about which components to include in a program, the characteristics of the target population must be examined. For example, if the heart failure population to be targeted consists of very elderly patients, a program that includes some component of home care is likely to be more successful given the mobility and transportation difficulties experienced by many elderly patients.83 In addition, elderly patients are a more vulnerable population due to often unresolved social and financial issues. The inclusion of mechanisms to address these issues is important to the success of a program.78

Another challenge in the translation of this research into practice is determining how to implement a heart failure program outside of an academic medical center. All of the interventions described above were conducted in such centers, where there is greater access to specialized heart failure professionals and other resources. Many of these heart failure programs were formed, for the most part, to conduct pharmaceutical trials or to manage patients before and after heart transplantation. The staff were thus supported either by industry funds or, in the case of transplant programs, by hospital administrators who were anxious to establish the heart transplant profile of the institution. Although the integrated approach demonstrated in these programs has become the standard by which care for patients with advanced heart failure is judged, the majority of heart failure patients are neither candidates for pharmaceutical trials nor candidates for heart transplantation. Many community-based programs are trying to provide the intensive care these patients require, although reliable sources of reimbursement for the commitment of specialized nursing are just beginning to become available.

Implementation of a heart failure program in a community setting not associated with an academic medical center depends on guidance from committed, experienced clinicians. Cardiologists and experienced cardiovascular advanced practice nurses (ie, nurse practitioners or clinical nurse specialists) manage many successful heart failure programs in a variety of communities across the United States. Routine care and follow-up are based on published heart failure consensus guidelines, and protocols or clinical pathways are developed.84–86 A team that includes physicians and nurses typically sets up these programs, and the program ideally is designed with the unique needs of the heart failure population in a given community in mind. Many existing programs offer consultative services to assist others in setting up a program.

An integral part of any heart failure specialty program is evaluation, and every program should include a plan for evaluation of its effectiveness. Evaluation of the impact of a program allows for refinement to improve program effectiveness and provides data when seeking reimbursement for a program from managed care organizations and insurance companies. Schulman et al87 described the steps for evaluation of heart failure disease management programs: (1) define the patient population (ie, define the characteristics of patients eligible for the service), (2) define the goals of the program (ie, improvement in functional status and quality of life and reduction in rehospitalizations and costs), (3) measure the effectiveness of the program, (4) analyze risk adjustment and outcomes, and (5) reevaluate the program through continuous quality improvement.

Conclusions

The incidence of heart failure is increasing. It is therefore incumbent on healthcare providers to evaluate their heart failure practices and to incorporate the most current knowledge of the pathophysiology, assessment, and treatment modalities for heart failure into their patient care. Current practice guidelines provide a basis for the treatment of patients with heart failure. Critical to the success of heart failure management is the discharge planning process and follow-up in the outpatient setting. Integration of medical care and patient education with close communication between inpatient and outpatient care providers is essential. Monitoring and enhancement of patient compliance are the responsibility of both in-hospital and outpatient heart failure team members. An integrated and innovative approach to the management of heart failure patients based on consensus recommendations can contribute to improved patient outcomes, including reduced morbidity rates, improved func-
tional status and quality of life, enhanced compliance, reduced rates of rehospitalization, reduced costs, and prolonged survival.

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KEY WORDS: AHA Scientific Statement ■ heart failure ■ prevention
Team Management of Patients With Heart Failure: A Statement for Healthcare Professionals From the Cardiovascular Nursing Council of the American Heart Association

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