Management of the Patient With Congestive Heart Failure Using Outpatient, Home, and Palliative Care

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Congestive heart failure is a chronic, debilitating illness, with increasing prevalence in the elderly. It is one of the most common causes for hospital admission, and associated treatment costs are estimated at $20.2 billion. Despite improved survival with medical therapy, beneficial effects on quality of life have not been consistently reported. In addition, optimum medical therapy, as recommended by evidence-based guidelines, are not always implemented. Counseling and education involving dietary modifications, activity recommendations, medication management, self-monitoring, prognosis, coping skills, social support, caregiver stress, and spiritual needs are critical components in the management of heart failure through initial diagnosis to end of life. Within the last decade, close follow-up for congestive heart failure has been associated with decreased hospitalizations, reduced hospital length of stay, improved functional status, better compliance, lower costs, and improved survival. Research trials have mainly been observational and small, and they have used different interventions. Little has been written regarding outpatient management of the patient with advanced congestive heart failure, and none of the current published guidelines addresses recommendations for the New York Heart Association class IV (other than for transplant candidacy). New models of close follow-up for chronic and advanced congestive heart failure should be investigated. These models could be implemented in urban and rural settings and be supported by private insurance or Medicare.

Congestive heart failure (CHF) is a major chronic illness in the United States, with an enormous impact on health care costs. It is estimated that more than 4 million persons in the United States have CHF, and it is present in almost 10% of persons older than 70 years. It is the only cardiovascular disease that is increasing in incidence and prevalence.[1,2] Heart failure is the most common diagnosis in hospitalized patients older than 65 years. One third of the patients hospitalized for CHF are readmitted within 90 days of discharge.' Prognosis with CHF is poor, with 1 in 5 patients dying within 1 year of diagnosis and half within 5 years.[1,3] Survival estimates are worse for men than women; fewer than 20% of patients, regardless of age or gender, survive longer than 10 years, and CHF prognosis is worse in elderly subjects of both sexes.[3,4] Annual direct health care expenditures for CHF in the United States have been estimated at $20 to $40 billion, with $8 to $15 billion spent on hospitalization alone.1

Various disorders of the pericardium, myocardium, and endocardium can lead to heart failure, but 80% of CHF is due to left ventricular systolic dysfunction. Coronary artery disease (CAD) is the leading cause of heart failure, occurring in approximately two thuds of patients with CHF. Nonischemic CHF can be caused by hypertension (HTN), alcohol abuse, thyroid disease, myocarditis, and idiopathic reasons (idiopathic-dilated cardiomyopathy). Treatment options include nonpharmacologic measures, medication therapy, and assessment for surgical intervention.[1,5-8] Use of angiotension-converting enzyme (ACE) inhib-

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itors has improved survival and is now standard therapy unless contraindicated. Diuretics provide symptom relief by controlling fluid retention and synergistically improve the response to other drugs such as ACE inhibitors and beta-blockers. The addition of beta-blocker therapy has been favorable concerning symptom management and long-term effects. Beta-blocker use also appears beneficial for survival. Use of spironolactone, in addition to standard therapy, can reduce the risk of morbidity and death among patients with severe heart failure.[9] Counseling and education concerning dietary modifications, with sodium and fluid intake, and activity recommendations are critical components in the management of heart failure that can improve quality of life (QOL).[10]

Over the last 2 decades, new therapeutic options have improved the mortality associated with left ventricular systolic dysfunction. Within the last 10 years, new approaches for managing **heart** failure have been reported in the literature that attempt to reduce hospitalizations from CHF and implement guideline recommendations. Models aimed at care for the advanced heart failure patient are slowly emerging. This report reviews the clinical and research issues associated with integrated care for the patient with CHF in the clinic and home and when palliation is the major issue.

Outcomes With CHF

Despite the research that has led to improved survival with medical therapy, CHF is still a debilitating. progressive disease. Burns et al" described the impact of CHF on patients after hospitalization. Of the 519 patients with CHF reviewed, 35% were short of breath walking less than 1 block, 62% had fair or poor perceived health, 32% received some formal care, and 46% were rehospitalized within 1 year of discharge. Many patients had multiple medical problems: 67% with a history of CHF, 49% with history of CAD, 14% with history of chronic obstructive pulmonary disease (COPD), 37% with history of HTN and 25% with history of diabetes. The relation of daily activity levels in patients with CHF and long-term prognosis was analyzed in 84 patients with class 11 to III heart failure. all with ejection fraction (EF) less than 35%.[12] Patients were followed up for more than 1 year and received various hemodynamic and exercise evaluations. Measures of daily activity by pedometer score were a stronger predictor of death ($P < ,001$) than laboratory-based exercise tests. The Study to understand Prognoses and Preferences for Outcomes and Risks of Treatments (SUPPORT) investigators'3 found that survival among 1,390 adult patients with CHF, with median age of 68 years, was only 61.5% at 1 year. As with other reported studies, a high percentage of comorbid conditions were present: 45% with myocardial infarction, 33% with diabetes, and 20% with COPD. At 6 months, 40% of patients were dependent in 1 or more activity of daily living (ADL), even though 59% of patients reported QOL between good and excellent.

Hospitalization rates for CHF doubled between 1973 and 1986,[14] with the steepest increase among those older than 74 years. Croft et al[15] reviewed Medicare hospital claims of 631,306 patients from 1986 and 803,506 patients from 1993 who had initial hospitalizations for CHF. Age-standardized hospitalization rates for any diagnosis of CHF was higher during 1993, discharge to home health services doubled (6% to 12%), and more than 25% of all admissions, regardless of race or sex, were in patients 85 years or older. As expected, the most frequently reported secondary diagnoses were ischemic heart disease, COPD, HTN, and diabetes. Hospitalization rates may even be higher, depending on which reporting measures are used. Goff et al[16] reported that reliance on International Classification of Disease (ninth revision) codes during hospitalization resulted in missing one third of the patients with clinical evidence of acute CHF.

Readmission rates 6 months postdischarge for CHF are as high as 44%,[17] with exacerbation of CHF accounting for 18%. There are multiple precipitating factors that contribute to this exacerbation. More than 65% of patients admitted for heart failure exacerbation were due to lack of compliance with either drugs. dietary indiscretions, or both.18 Other factors contributing to readmission of older heart failure patients include age, gender, premature discharge, failing or nonexistent support system, and polypharmacy.[19]

In addition to progressive, poor functional status and increasing hospitalization trends, outpatient medical management of the patient with CHF does not consistently follow practice guidelines. To improve survival. maintain and improve clinicalstatus, and prevent readmission of patients

with CHF, evidence-based guidelines should be followed. Edep et al'" reported that there are substantial differences between internists, general/family practitioners. and cardiologists for implementing the Agency for Health Care Policy and Research guidelines for CHF. Only 60% to 70% of noncardiologists used ACE inhibitor therapy. In addition to underuse of medications, possibly due to unfamiliarity with doses and side effects, overburdened primary care providers also feel time constraints during clinic visits, which limit their ability to provide education on diet, exercise, and medications.

To prevent readmission, early discharge planning that incorporates social support systems, patient education concerning diet, medication, and exercise, and close medical follow-up are important components. In a recent consensus on the recommendations for the management of chronic heart failure,' it is stated that "of the general measures that are recommended in patients with heart failure, possibly the most effective (yet least utilized) is close attention and follow-up." With the increasing age and numbers of patients with CHF, and the huge financial impact of hospitalizations within this group, coordinated outpatient and home care based on physical, social, and demographic factors appear important. Goals of treatment would include adherence to guidelines to improve survival and support QOL and supportive care once the recommended therapy has been maximized and the patient is deemed not to be a transplant candidate.

Methods of Follow-Up

There is general agreement between the various heart failure guidelines that counseling concerning diet (fluid and salt restriction), exercise, symptom management, risk-factor management, medication use (dosing, polypharmacy, effect on survival), and prognosis (life expectancy, advanced directives) should be included in the management of the patient with CHF. Currently, no guidelines mention models other than standard clinic visits on implementing these aspects. Lack of systematic monitoring of patients after hospital discharge can adversely affect CHF management, General suggestions, such as using interdisciplinary health care providers, involving family members, scheduling group educational meetings, and providing nursing interventions, have been discussed. Because of limited research, there is no consensus on the best method on how or where to provide these services. Despite the prevalence of CHF in the elderly and the eventual debilitating progression of this disease, research trials have not been conducted evaluating palliative care for the patient with advanced CHF. As a result, specific recommendations for this group of patients with CHF are not available.

Various home-based and clinic programs using a disease management approach for CHF have begun to surface. Problems, such as disease severity causing homebound status. lack of transportation to access the outpatient clinic, and insurance limitations on home care benefits, can affect which patients are referred for home or clinic management. Whether patient outcomes differ with primary care providers, cardiology practices, or joint management is being investigated. Despite these various clinical problems, there is a growing body of information supporting either telephone, clinic-based, or home care for the patient with CHF. Each of these is reviewed in the following sections.

Outpatient-Based Care: Telephone Follow-Up

Several studies support a nurse-monitored telephone program that closely follows symptoms and medical compliance (Table 1). West et al[21] evaluated MULTIFIT, a physician-supervised, nurse-mediated, home-based system for heart failure management, which implements guidelines for medical and dietary therapy. A nurse manager promoted optimal doses of afterload reduction, promoted a 2-g sodium diet, and monitored for signs and symptoms of worsening heart failure by using frequent phone contact and questionnaires. Fifty-one patients were evaluated, with a mean age of 66 and multiple medical diagnoses including CAD, HTN, COPD. and diabetes. Compared with the 6 months before enrollment, general and cardiology visits declined, emergency visits declined, and hospitalizations for CHF and all causes declined. Dietary sodium intake decreased by 38% (3.393 to 2,088 mg, P = .0001), functional status improved, and afterload dosages increased (lisinopril, 17 to 23 mg, $P < ,001$; hydralazine, 140 to 252 mg, $P = .01$). At baseline, 66% of enrolled

Table 1. Telephone Care Studies With Patients With CHF

Author	No. of Patients	Design	Length of Follow-Up	Patient Characteristics	Interventions	Outcomes	Comments
West et al,[21] 1997	51	Observational, pre/ postintervention	138 ± 44 d	Mean age = 66 yr, men = 71%, NYHA class I-II = 60%, NYHA class III/IV = 40%, EF < 40%, married = 77%	Physician-supervised, nurse-mediated, home-based system with frequent phone contact/ questionnaires	38% reduction in sodium use, increased ACE dosing, improved functional status and exercise capacity, 74% reduction in hospitalizations, 53% reduction in emergency room visits, 31% reduction in cardiology visits	Initial clinic visit, management with primary doctor, implementation of CHF guidelines for pharmacologic and dietary therapy
Shah et al,[22] 1998	27	Observational, pre/ postintervention, pilot study	Mean, 8.5 mo	Mean age = 62 yr, men = 100%, NYHA class II = 37%, NYHA class III/IV = 63%, EF < 20%-35%	Nurse-monitored phone contact with patient education materials, automated reminders for medication, vital signs, and weight report	Reduced cardiovascular hospitalization, 0.6/pt yr to 0.2/pt yr and reduced LOS, 7.8 d to 0.7 d	Patients given digital BP cuff, digital scale, and pager, patients with history of nonadherence to medical appointments excluded, management with cardiologist
Heidenreigh et al,[23] 1999	68	Observational, pre/ postintervention matched control group	1 yr	Mean age = 73 yr, men = 59%, NYHA class II-III, EF 30%-45% in 55% of patients, widowed = 25%	Multidisciplinary program, nurse-directed, weekly phone contact, patient information mailed weekly, patient education and monitoring	Decreased medical claims ($8,500 to $7,400), hospitalizations, and LOS in tx group, medical claims increased ($9,200 to $18,800) in control group	Management with community doctor, patients given automatic BP cuff and digital scale
Fulmer et al,[24] 1999	50	Randomized control	10 wk	Mean age = 74 yr, married = 16%, white = 14%	Daily phone call *v* daily video-phone call *v* usual care	Compliance decreased in control group (81% to 57%), pre- and postcompliance for tx groups > 81%, SF 36 and MLHF scores improved for all groups	Referral from home health agency and urban ambulatory care clinic, MMSE > 20, compliance measured by electronic aid

Abbreviations: BP, blood pressure; tx, treatment; SF 36, Short Form 36; MLHF, Minnesota Living With Heart Failure; MMSE, Mini-Mental State Examination.

patients were either New York Heart Association (NYHA) class II or III; however at 6 months, 76% of patients were listed as NYHA class I or 11. During the study follow-up period of approximately 4.5 months, the primary physician retained the overall management of the patient while communicating with the nurse manager.

Telephone management can also include the use of medical devices for assessing symptoms and treatment. Shah et al" conducted a l-year pilot study of 27 male patients with mean age of 62 years, NYHA class II to IV (63% of patients were NYHA class III/IV), and CHF caused by dilated cardiomyopathy. Patients received educational materials and automated reminders for medication compliance, self-monitored their weights and vital signs, and received weekly phone contact from a nurse. Patients with a history of nonadherence with physician appointments were excluded. Patient information was routinely sent to the primary cardiologist who determined medication changes, unscheduled office visits, or emergency room evaluation. Weight gain and shortness of breath were reported by 60% of the patients (35% and 25%, respectively). Hospitalizations for cardiovascular diagnosis and hospital days were reduced from 0.6 to 0.2 ($P = .09$) per patient-year of follow-up and 7.8 to 0.7 days per patient-year ($P < .05$). The greatest benefit was observed in the patients with more severe CHF.

The effects of a home monitoring system with an automated blood pressure cuff and a digital scale were evaluated on 68 patients with CHF with a mean age of 73 years and EF of 30% to 45%.[23] Patients were followed up for 1 year with a multidisciplinary program that coordinated care with community physicians. During weekly 10-minute phone follow-up, a nurse reviewed educational mailings on CHF management, medication use, symptoms, and vital signs. Medical claims, hospitalizations, and total hospital days decreased in the intervention group regardless of age, sex, or type of heart failure. In a randomized trial of 50 patients with CHF, with a mean age of 74 years, medication compliance decreased in those patients who received usual care rather than daily phone contact or daily video-phone call.[24]

All these studies report significant improvement with use of phone follow-up that evaluated medication use and other measures of CHF symptom management. It is difficult to generalize from these studies because most were not controlled trials, patients varied in age, and existing support structures were not defined to determine clinic accessibility.

Outpatient Care: Clinic Follow-Up

Nurse-Directed *Outpatient Clinics*

Clinic management for the patient with CHF can be provided by various health personnel and can include many aspects of care (Table 2). Nurse-directed clinics have shown significant results in implementing and managing secondary prevention in patients with coronary heart disease[25] as well as with heart failure management. Cline et al[26] conducted a prospective, randomized trial on 190 patients who were discharged with a primary diagnosis of heart failure. Baseline characteristics for control and intervention groups included mean age of 75 years; mean NYHA class 2.6; multiple diagnoses, including previous myocardial infarction, HTN, and atrial fibrillation; and 70% use of diuretics. ACE inhibitor use at baseline was 27% in the control group and 15% in the intervention group (not significant). Registered nurses (RN) with experience in heart failure provided education on heart failure and self-management with easy clinic access for 1 year after discharge. Even though survival rates were equal in both groups (70%). the mean time to readmission was longer in the intervention group than in the control group (141 v 106 days, $P < .05$), and the number of hospital days were fewer (4.2 v 8.2, $P = .07$). Both groups were evaluated at outpatient clinic appointments, and no specific guidelines were implemented in the intervention group. At 1 year, both groups had more than 95% of patients using diuretics. In contrast, ACE therapy was used for 75% of patients in the intervention arm ($P < .05$) versus 52% in the control group.

Lasater[27] also describes the effect of a nurse-managed CHF clinic on patient admission and length of stay (LOS). Collaboration with a physician, dietician, and social worker was provided for 80 patients who were observed more than 6 months with a critical path for follow-up care in the clinic setting. Readmission, LOS, and hospital charges were all decreased after intervention.

Patients enrolled in heart failure programs are typically managed by physicians with an expertise

Table 2. Clinic-Based Care With Patients With CHF

Author	No. of Patients	Design	Length of Follow-Up	Patient Characteristics	Interventions	Outcomes	Comments
Cintron et al,[28] 1983	15	Observational, pre/ postintervention	24 mo	Mean age = 65 yr, NYHA class III-IV	NP-based chronic CHF clinic	85% reduction hospital days, 60% reduction hospitalizations, reduced total medical cost of $8,009/pt, improved pt satisfaction	Unscheduled visits planned, cardiologist consult, average 18 visits/yr, pt education on medications each visit
Lasater et al,[27] 1996	80	Observational, pre/ postintervention control/experiment groups	6 mo	Not provided	Nurse-managed CHF clinic, collaborate with doctor, dietician, and social worker	Readmission decreased from 26% to 22%, LOS decreased 7.3 d to 5.7 d, hospital charges decreased $498/pt	Critical path used for follow-up care
Cline et al,[26] 1998	190	Prospective, randomized, control trial	1 yr	Mean age = 75 yr, men = 53%, NYHA class III = 62%, mean control EF = 36%, mean tx EF = 32%	Nurse-directed out pt clinic, emphasis on CHF education and management	Improved ACE use (control 52% *v* tx 75%) cost reduction of $1,300/pt, readmission time longer (141 d *v* 106 d), LOS 4.2 d *v* 8.2 d	>70% survival for both groups, all pts followed up by cardiologist in outpatient clinic, phone follow-up, easy access for unscheduled visit
Gattis et al,[31] 1999	181	Randomized, control trial	6 mo	Age range = 55-77 yr, men = 61%, white = 72%, NYHA class II = 54%, NYHA class III = 30%, mean EF = 30%	Clinical pharmacist evaluation with medical evaluation, therapeutic recommendation, pt education, follow-up telemonitoring	Mortality and CHF events lower in intervention group (P = .005), higher ACE use with intervention *v* control (P < .001)	Consulted with cardiologist
Kostis et al,[32] 1994	20	Randomized, parallel treatment groups	12 wk	Mean age = 66 yr, NYHA class II = 95%, NYHA class III = 5%, mean EF = 34%	Life-style modification program with exercise, diet, and cognitive-behavioral intervention	Nonpharmacologic therapy improved functional capacity, body weight, and depression, digoxin improved EF without change in exercise or QOL	All pts on ACE therapy, digoxin and placebo groups used as controls
Hanumanthu et al,[30] 1997	187	Observational, pre/ postintervention	1 yr	Mean age = 52 yr, men = 71%, mean EF = 26%	Enrollment in CHF/ transplant program with echo and exercise evaluation, access to home hospice care by agency	53% reduction of hospitalization, 69% reduction of CHF hospitalization, improved exercise tolerance, diuretic doses doubled at 6 mo, no change in percentage or dose for ACE/digoxin use	10% pts had home care, 87% survival rate, RN assistance with hospital and outpatient care
Fonarow et al,[29] 1997	214	Observational, pre/ postintervention	6 mo	Mean age = 52 yr, men = 81%, NYHA class III = 44%, NYHA class IV = 56%, mean EF = 21%	Comprehensive CHF management program involving diet, medication, and exercise intervention	35% reduction in total hospital admission, cost reduction of $9,800/pt, improved functional class, ACE use, and exercise tolerance	CNS used for pt education, care coordinated with referring doctor, frequent phone contact and outpatient visits

Abbreviations: pt, patient; tx, treatment; echo, echocardiogram; CNS, clinical nurse specialist.

in heart failure; they also receive specialized testing, such as echocardiograms or exercise testing with hemodynamic monitoring, and education regarding nonpharmacologic therapy. Nurse practitioners (NP) functioning as providers in CHF clinics can assist with interval examinations, patient education, and telephone care. Typically, the NP is available to see deteriorating patients between scheduled visits, thus avoiding unnecessary emergency room visits. Improved patient satisfaction, decreased hospitalizations. and reduced patient costs have been reported with an NP in CHF clinics.'"

Outpatient *Heart* Failure Programs

Heart failure programs or multidisciplinary programs have also been used in clinic practice (Table 2). Fonarow et al[29] studied 214 NYHA class III or IV patients accepted for heart transplantation over a 3-year period while enrolled in a comprehensive heart failure management program. Patients were followed up by the heart failure cardiologists, along with their referring physicians, and were seen weekly until clinical stability was determined. Education groups and individual sessions were led by a heart failure clinical nurse specialist on dietary guidelines, exercise, diuretic therapy, and prognosis. Telephone calls were made after medication change and at routine intervals. Mean *age was 52 years, 81%* were men. and EF was 21%. At 6 months, there was an 85% reduction in admissions and significant improvement in functional status ($P < .0001$). ACE inhibitor "se increased from 77% before evaluation to 95% after treatment. Vigilant follow-up with regular personal contact from the heart failure team improved outcomes. Hanumanthu et al[30] reported similar results with their heart failure program. One hundred thirty-four patients referred for heart transplantation were followed up for more than 30 days by 2 nurse coordinators and 3 heart failure physicians during hospitalizations and outpatient visits. During the year after referral, cardiovascular hospitalization decreased to 44% from 94% ($P < .01$) as well as hospitalization specific for heart failure.

Multidisciplinary Outpatient Care

Preliminary studies have suggested that a multidisciplinary approach to heart failure management improves patient outcomes (Table 2). Gattis et al[31] randomized 181 patients with CHF attending a cardiology clinic to usual care versus clinical pharmacist evaluation during clinic care. Mean EF was 30%, and the majority of patients enrolled were NYHA class II or III. For the intervention group, the pharmacist consulted with the cardiologist, provided patient education on medication use, and contacted patients by phone at 2 weeks, 12 weeks, and 24 weeks after initial evaluation. After 6 months of follow-up, the intervention group had lower all-cause mortality events and higher ACE inhibitor "se ($P < .001$). Nonpharmacologic treatment programs, including exercise training, cognitive therapy and stress management, and dietary intervention, were evaluated in patients with EF less than 40%.[32] Twenty patients, with mean age of 65 years, were randomized to placebo, digoxin, or nonpharmacologic treatment. Ninety-five percent of patients were NYHA class 11. Functional capacity, body weight, and mood status all improved in the intervention group ($P < .05$).

For clinic evaluation, patients must be cognitively intact and have regular transportation available. If these patient conditions change, the effectiveness of outpatient management can be altered. Most of the patients listed in the outpatient studies were younger than 75 years and were NYHA class 11 or III. No studies listed social variables or concomitant medical problems that could also impact clinic attendance. If patients have visual or hearing deficits, phone follow-up alone, without social support, may not be effective. Consistent contact, whether by phone or clinic, with a specified team member knowledgeable in CHF management. has been associated with hospital reduction, better medication compliance, and improved life-style modification.

Home Care

Home care can involve both acute care services as well as long-term care needs.[33] Usually, home care allows a disabled person to remain independent, thus avoiding institutionalization. Funding is supplied by various sources including Medicare, Medicaid, Title XX, Title III of the Older American's Act, the Department of Veterans' Affairs, state initiatives, private insurance, and direct consumer purchase. The home care industry serves

various clienteles with different medical conditions and prognoses. Program goals can incorporate convalescence from acute illness, rehabilitation, terminal care, inhome maintenance. and respite care. **Many** times family members provide a substantial portion of the informal care that is required. Generally, a home care agency uses a multidisciplinary team consisting of physicians, nurses, social workers, dieticians, occupational therapists, physical therapists, and chaplains. Paraprofessional personnel, such as home health aides, homemakers, and attendants, are also used to complete the home care services offered.

Eligibility for home care can differ according to health care benefits and payment source, but usually functional status and health care need dictates the referral. According to Medicare coverage criteria,[34] a patient can receive home care services if they are homebound or require a skilled intervention. Homebound is defined as absence from home less than 3 times per month (absence from home is attributable to attending a" adult day program, medical appointments. dialysis, or chemotherapy/ radiation treatment) and if the patient experiences a considerable and taxing effort when leaving his or her home. Skilled nursing care can only be ordered if certified as medically necessary (such as intravenous therapy), and it follows within 30 days of a hospitalization of 3 or more days. These restrictions can affect which patients are able to receive home care for CHF under Medicare Part A. Since the passage of legislation dictated by the Balanced Budget Act of 1997, NPs are now able to bill directly for home care services under Medicare Part B. This will allow more options for home care coverage for the patient with CHF, and home visits will not be restricted to only a skilled nursing need.

Home Care in the Patient With CNF

The typical home health user, as described **by a** review of Medicare beneficiaries from 1987 to 1992,[35] was female, white, and older than 75 years. Diseases of the circulatory system were the prime diagnosis for 30% of all users, either with less than or greater than 100 visits. Kane et al[36] reviewed patterns of posthospital care in 2,248 Medicare patients. Thirty-four percent of the patients with CHF received home care, and **odds** ratios for discharge ADL, prior ADL/instrumental activities of daily living, and living alone were 1.11, 1.66, and 1.83, respectively. Of the total 490 patients with CHF, mea" age was 78 years, 44% lived alone, and 67% required prior help before hospitalization. Ni et al" analyzed managed care outcomes of 5,821 patients with CHF aged 65 years or older who were discharged from the hospital. After excluding the Medicaid group ($n = 62$), between 23% and 30% of patients were 85 years or older and between 7% and 16% of patients were referred for home health care services.

Although there has not been any specific data reporting the percentage of CHF patients with spousal support, eventual functional decline can be a stress and burden for spousal caregivers. Karmilovich[38] questioned a nonprobability sample of 11 male and 30 female spouses on the level of caregiver burden and stress. There was a significant relationship ($P = .01$) between perceived difficulty in performing caregiver activities and level of stress. Demands included personal care, meal preparation and feeding, ambulation and transfers, supervision, treatments, and role alterations.

Home care appears a necessary component for heart failure treatment because ofincreasing numbers of elderly patients diagnosed with CHF, the associated functional decline, and the substantial amount of caregiver stress with patients managed at home. Home care agencies have begun to feature specialty programs for patients with heart failure.[39,40] Programs offer a variety of services such as inotropic therapy, intravenous diuretic administration, pulse oximetry, as well as case management with a multidisciplinary team. Customized cardiac home rehabilitation programs[40] educate patients with new onset or exacerbation of heart disease on nutrition, exercise, medication use, and risk factors. Outcome-based critical pathways are being used by home care agencies to document and track standards of practice while monitoring costs?'

Clinical Trials Using Home Care for Patients With CHF

Home care programs providing interdisciplinary approaches for patients with chronic illness have been reported in the literature since the early 1990s.[42] Multiple studies with home care follow-up for patients with CHF have been associ-

ated with reduced hospital admissions, improved functional status, and decreased heath care costs (Table 3). Patients have been evaluated through traditional home care coverage or by using a multidisciplinary approach.

Traditional Home Care Referral

Patients referred to a community home care agency must meet home care guidelines for acceptance. Typically, these patients with CHF have a skilled-nursing need, are followed up by a baccalaureate-prepared RN, and have access to the home care agency's multidisciplinary team. By using retrospective chart review, both Dennis et al[43] and Martens and Mellor[44] report that readmission was decreased with home care services after hospital discharge. After observing 34 patients with CHF referred to an RN case management cardiac specialty program, Lazarre and Ax[39] also found a 9% readmission rate at 90 days compared with a national average of 32%. The RN participated with other multidisciplinary team members, targeted patient-teaching material based on critical pathways, and completed frequent comprehensive cardiopulmonary assessment with electrocardiographic monitoring and pulse oximetry.

Multidisciplinary Home-Based Care

Rich et al[45,46] conducted a prospective, randomized trial on the effect of a nurse-directed, multidisciplinary intervention on 282 high-risk patients who were 70 years or older (mean age, 79 years) and were hospitalized with CHF. Baseline characteristics of the study patients revealed approximately 60% of patients lived alone. mean EFs for **both** groups were 42%. mean NYHA class 2.4, and a mean score of 5.5 for ADL. Patients in the intervention group received education on diet and medications, early discharge planning, social service consultation, and intensive follow-up consisting of home visits and frequent telephone contact. A geriatric cardiologist reviewed all medication regimens. Survival for 90 days without readmission was achieved in 91 of the *142* patients in the treatment group as compared with 75 of the 140 patients in the control group who received conventional care ($P = .09$). There were 94 readmissions in the control group and 53 in the treatment group ($P = .02$), and in a subgroup of treated patients ($n = 126$), QOL scores at 90 days improved from baseline ($P = .001$). Overall cost of care was reduced in the treatment group because of reduced hospitalizations ($460 less per patient). Rich et al" also tested the effect of a multidisciplinary intervention on medication compliance in a similar group of elderly patients with CHF. Compliance was 88% in the study group compared with 81% in the control group 1 month after hospital discharge ($P = .003$). Besides being enrolled in the treatment group, not living alone was associated with a higher compliance *rate* ($P = .09$).

Stewart et al[48,49] also analyzed the effect of a home-based intervention on 97 patients with impaired systolic function who were considered high-risk patients. Mean age was 75 years, mean EF was 38% with NYHA class II, 111, or IV, 19% lived alone, and all patients had at least 1 previous hospitalization for CHF. The treatment group received a single home visit by a nurse and a pharmacist within 1 week of hospital discharge to assess the need for further intervention from the primary care physician. The control group visited the patient's family physician within 2 weeks of discharge. After 18 months, the patients in the treatment group had fewer out-of-hospital deaths ($P = .02$) and unplanned admissions (64 v 125, $P = .02$), spent fewer days in the hospital (2.5 v 4.5 days per patient, $P = .004$), and accrued lower hospital costs (Australian, $5,100 v $10,600 per patient, $P = .02$). In another randomized trial, Stewart et al[50] investigated the effects of a multidisciplinary, home-based intervention on unplanned readmissions and survival in 200 patients with CHF. The treatment group had less events, less unplanned readmissions, and lower hospital-**based** costs. At 6 months follow-up, there was a 40% reduction in primary events with the home-based intervention group.

Kornowski et al" examined the impact of intensive home care surveillance on morbidity rates of 42 elderly patients (mean age, 78 years) with severe CHF (NYHA class III through IV, mean EF 27%). Patients were examined at least once a week at home by internists and by a trained paramedical team over a l-year surveillance period. **The year** before entry **into** the program was compared with the first year of home surveillance. Mean total hospitalization rate was reduced from 3.2 to 1.2 hospitalizations per year. cardiovascular admissions decreased from 2.9 to 0.8 hospitalization per

Table 3. Home Care Studies With Patients With CHF

Author	No. of Patients	Design	Length of Follow-Up	Patient Characteristics	Interventions	Outcomes	Comments
Dennis et al,[43] 1996	24	Retrospective chart review	1 yr	Data not specific for CHF population	Assessment and teaching by home health nurse	Number of visits inversely correlated with hospital readmission	No specific teaching or assessment intervention correlated with admission
Martens and Mellor,[44] 1997	924	Retrospective chart review	90 d	Mean age = 71 yr, men = 48%, white = 90%	Home-care nursing services after hospitalization	36% fewer readmission rates after 90 d for pts receiving home care	27% of sample referred for home care
Lazarre and Ax,[39] 1997	34	Observational	7 mo	Mean age = 71 yr	RN case management home care, cardiac specialty program, multidisciplinary team, ECG monitor, pulse oximetry, IV and inotropic therapy	9% readmission rate at 90 d	Clinical pathways used, targeted teaching, comprehensive cardiopulmonary assessment
Kornowski et al,[51] 1995	42	Observational, pre/ postintervention	1 yr	Mean age = 78 yr, men = 57%, NYHA class III-IV, mean EF = 27%	Intensive home-care surveillance	62% reduction of total hospitalization, 72% reduction in cardiovascular hospitalization, 77% reduction in LOS, improved ADL status	Weekly examination by internist and paramedical team
Wilson et al,[52] 1999	35	Observational, pre/ postintervention	3 mo	Mean age = 57 yr, men = 40%, mean EF = 20%	Home health care for IV diuresis, inotropic therapyy, monitoring of diet, medication, and symptoms	Increased hospitalization postreferral (0.45/mo to 0.66/mo)	10 pts received inotropic therapy, referral from university CHF program, 18 home care agencies used, mean visit/pt = 41 d
Rich et al,[45] 1995	282	Prospective, randomized clinical trial	90 d	Mean age = 79 yr, women = 63%, white = 45%, mean NYHA class = 2.4, mean EF = 43%, live alone = 43%	Nurse-directed, multidisciplinary home care using pt ed, med review, social consultation, diet prescription, DC planning	Survival without readmission was 64% tx *v* 54% control (P = .09), readmission was 53 tx *v* 94 control (P = .02)	Management with geriatric cardiologist, additional home care agency used
Rich et al,[47] 1996	156	Prospective, randomized clinical trial	30 d	Mean age = 79 yr, mean NYHA class = 2.4, mean EF = 42%, live alone = 43%	Multidisciplinary treatment involving pt ed, med review, diet and social consultation, post-DC follow-up	Compliance rate of 88% intervention *v* 81% control (P = .003)	Compliance assessed by pill counts
Stewart et al,[50] 1999	200	Prospective, randomized clinical trial	6 mo	Mean age = 75 yr, mean EF = 37%, NYHA class II-III = 89%, live alone = 34%	Multidisciplinary, home-based care with home visit by cardiac nurse 7-14 d post DC	Fewer unplanned readmissions (68 *v* 118; P = .03), decreased admission days (460 *v* 1,173; P = .02)	All pts were seen by cardiologist, primary care doctor or both within 2 wk of DC, usual care pts had access to home care
Stewart et al,[48,49] 1999, 1998	97	Prospective, randomized clinical trial	18 mo	Mean age = 75 yr, women = 51%, NYHA class II-III = 94%, mean EF = 38%, live alone = 39%	Single home-based intervention 1 week after hospital DC	Tx group had fewer unplanned readmissions (P = .02), less out of hospital deaths (P = .02), decreased LOS (P = .004), and lower hospital costs (P = .02)	Enrolled pts were considered "high risk" due to history of unplanned admissions for CHF

Abbreviations: ECG, electrocardiogram; IV, intravenous; DC, discharge; tx, treatment; pt, patient; ed, education; med, medical.

year, and LOS was reduced for total and cardiovascular admissions. Functional status (expressed in a 1 through 4 scale; 1 = confined to bed; 2 = needs assistance with ADLs; 3 = independent with ADL but housebound; and 4 = independent) was improved from 1.4 to 2.3 (P = .001). At 1 year, 67% of patients were prescribed ACE inhibitors and 100% were taking diuretics.

In contrast. Wilson et al[52] reported a higher frequency of hospitalization with the implementation of a home health care program. Thirty-five patients were referred to community home health agencies from a university heart failure program. Mean age was 57 years, EF averaged 20%. and 43% had heart failure caused by CAD. Referral to a home agency (18 different agencies were used) was for intravenous diuretic therapy (n = 19), home inotropic therapy (n = 10), and general symptom and diet management (n = 6). Eighteen of the patients died while enrolled in home care, and 17 patients were discharged. Hospitalization was noted 3 months before referral and 3 months while in home care. After referral to home care, there were 0.66 hospitalizations per month as compared with 0.45 hospitalizations per month before referral ($P < .05$). These patients had a high mortality and most patients were referred for intensive, aggressive medical therapy unlike the older patients enrolled in other home care studies for posthospitalization medical and symptom management.

In general, home care for elderly patients with CHF decreased hospital admissions and health care costs. Home care ranged from routine assessment with patient education to intravenous therapy. LOS in community home-care programs is dependent on a skilled-nursing need, and there are no specific studies addressing the use of advanced practice nurses for long-term follow-up for patients with CHF who have difficulty accessing clinic care. Patients generally appear to benefit from close follow-up that provides symptom management and reviews medication therapy. Coordinating cardiology care with primary care providers also seems to encourage adherence to guidelines.

Patients With Advanced Heart Failure

None of the CHF guidelines published addresses end-of-life care for the patient with CHF.[1,6-8] The guideline recommendations focus on diagnosis, prognosis, surgical interventions, prevention of heart failure, and medical treatment. The European Society of Cardiology statement on heart failure[5] discusses worsening heart failure and end-stage failure, but this was in relation to transplantation. Recipient guidelines for transplantation53 cite poor prognosis from coexistent systemic illness and psychosocial instability as secondary exclusion criteria. The task force also reports that older age has been historically considered a primary reason for exclusion. With limited available transplant organs and highly selective criteria, most elderly patients will eventually decline to NYHA class IV status without being offered transplantation.

Recommended drugs, such as ACE inhibitors, and invasive procedures, such as pacemakers, can improve survival but do not necessarily improve QOL. One therapy, vesnarinone, caused increased deaths but was associated with improved QOL.[54] Cardiac pacemakers and automatic implantable cardioverter defibrillators (AICD) have become more common therapy for patients with CHF because they prevent death from lethal arrhythmias. The issue of deactivation of the AICD may arise in the terminally ill patient.[55] Preferences for either QOL or survival become more crucial when discussing treatment preferences in the end-stage patient with CHF. Lewis et al[56] reported that more than 70% of patients (n = 75) interviewed would trade all or none of 2 years to feel better.

Management of end-stage heart failure requires an interdisciplinary team to address medical, psychological, social, and spiritual needs. New home care models, such as the Medicaring Collaborative Project, [57] emphasize coordinated care consistent with patient wishes, symptom management to prevent exacerbations, maintenance of function and QOL with good medical care, patient education with concentration on treatment preferences, and family support, especially in the time near death. Some problems, such as adequate 24-hour coverage, must he incorporated into these advanced CHF treatment models.

Palliative and End-of-Life Care

Several problems arise in planning end-of-life care for the patient with CHF. There are no well-defined models for end-stage care in this group of patients. Traditionally, hospice care was offered to

terminal cancer patients, but hospice agencies have begun to tailor prognosis criteria for other chronic illnesses. A 6-month prognosis must be determined to enroll the patient in a hospice program, and the patient must agree to nonaggressive care. In contrast to cancer, predictions of timing of death can be difficult for CHF. Deaths can result from strokes, myocardial infarction, arrhythmias, or infection. Most patients will continue to functionally decline and become resistant to increasing doses of medical therapy, with their cause of death resulting from progressive hemodynamic decline. Fox et al[58] were unable to predict a survival prognosis of 6 months or less in patients with CHF with various criteria based on national hospice guidelines. Of the patients with CHF who died, almost 80% were predicted to live 6 more months just 3 days before death.59 Predictions for risk of death associated with ischemic or dilated cardiomyopathy increases to greater than 50% in the presence of hyponatremia ($\leq$ 134 mEq/L) and any 2 additional factors, including pulmonary arterial diastolic pressure greater than 19 mm Hg, left ventricular diastolic dimension index greater than 44 mm/m^2, peak oxygen consumption during exercise testing less than 11 mL/kg/min, and the presence of a permanent pacemaker.60

Inability to predict actual time to death leads to continued hope, with the patient making the transition from gravely ill to terminally ill difficult.5' To date, the SUPPORT trial is the largest trial analyzing patient preferences, prognosis, treatment, and outcomes.[61] In this trial, only 23% of 936 NYHA class IV patients with CHF refused resuscitation. Of the 600 who responded 2 months later, 19% changed their preferences. The SUPPORT investigators also characterized the dying experience of older and seriously ill patients in 4,124 patients through family report.[62] Even though 59% of the patients desired comfort care during the last days of life, symptoms such as pain. dyspnea, and fatigue were very prevalent, and care was at odds with preference in 10% of all cases. Of the 263 patients with CHF, more than 65% suffered severe dyspnea 3 days before death. More than 40% of the CHF group received at least 1 of 3 life-sustaining treatments (feeding tube, ventilator, cardiopulmonary resuscitation) during the last 3 days before death. Unfortunately, this emphasizes that most patients, regardless of preference, were treated aggressively.

To receive hospice care, the patient must agree to palliative care. This terminal care is generally mutually exclusive and separate from treatments that cure the underlying disease or treat the underlying pathophysiology. Symptomatic care, whether offered in the home or with inpatient hospice, can include diuresis, morphine, or supplemental oxygen without hospitalization. Many patients are not ready to accept this course of treatment unless impending death is foreseeable. It is not surprising that the average terminally ill patient enters hospice 1 month before death, and 16% enter only 1 week before death.[63] Of the 263 patients with CHF in the SUPPORT trial,[62] 58% died in the hospital, 27% died at home, and only 3% died in hospice.

Hospice care can save costs if used in the last 2 months of life. It does this by reducing hospitalizations but becomes more costly if provided for a full year before death.[64] Cost savings to the health care industry from advanced planning for end of life thus far have been minimal.64 Patients seer" to prefer home treatment of a" acute illness as a" alternative if the outcomes are equivalent to those of hospitalization.[65] Overall, patients preferred treatment at the site associated with the greatest chance of survival.

Because of Medicare restrictions, hospice is used late in life, and other options for end-of-life care should be available before such severe decline. Advanced planning is more likely to occur with continued patient-provider relationships,[64] thus health care models that support continuity of care for the patient with CHF by using constant providers should improve treatment planning and discussion of end of life. In a recent study in which patients, families, and providers were interviewed regarding the components of a good death, 6 important themeswere noted.[66] These included pain and symptom management, clear decision making, preparation for death, completion of life review and conflicts, contributing to others, and affirmation of the whole person. These results highlight the importance of discussing treatment preferences.

Conclusions

Preliminary research suggests disease management programs that provide close follow-up for the patient with CHF appear to be effective in

reducing hospital admissions. In addition, they lowered cost and improved QOL, functional capacity, compliance with medication and diet recommendations, and patient satisfaction. A continuum of care should be available for all NYHA classes for the patient with CHF, including clinic care through to hospice care. The poor prognosis and increasing prevalence of CHF among the elderly underscore this importance. The goals of care for every class should try to reduce unnecessary hospitalizations and provide QOL with symptoms reduction, whether at initial diagnosis or at end of life.' Slowing disease progression, maintaining or improving functional capacity, and decreasing risk of death by using established guidelines are appropriate unless the patient has agreed to end-of-life care. The use of medical staff experienced in heart failure, management contributed to adherence with guideline recommendations.

Areas *for* Further Research

Previous research trials have mainly been observational, using small sample sizes and diverse interventions.[67] Other interventions, such as exercise and psychosocial intervention, have not been adequately studied. The effect of close follow-up on survival as well as end of life is unknown. Further research needs to be conducted despite the initial positive outcomes. Realistic programs need to be developed that can be incorporated in academic urban and rural settings with sufficient reimbursement.

Even though the multidisciplinary approach to heart failure seems advisable, there is not an optimal method that adjusts for NYHA class, type of intervention, site of care, and recommended health care provider. What are the benefits of home care if patients are able to access the clinic setting? When can phone follow-up adequately provide patient care in conjunction with limited clinic follow-up? How can registered and advanced practice nurses (APN) complement physician care? CHF management programs must tailor services, with consideration for frailty, sensory deficits, access to transportation, and family/social support. New research suggests the use of APNs for comprehensive discharge planning and 6-month home-care follow-up in the frail elderly reduced admissions, lengthened time between discharge and readmission, and decreased health care costs.[68] With the estimated $20.2 billion costs associated with CHF, cost-effectiveness of multidisciplinary care is desperately needed along with the cost analysis of drug therapy alone.[69]

The importance of QOL and psychosocial factors as part of CHF outcomes has not been adequately investigated. Drugs, such as ACE inhibitors and beta-blockers, have improved survival, but at present, there is no conclusive evidence that specific therapy improves QOL. In addition, high-risk, comorbid conditions, such as stroke and myocardial infarction, can worsen QOL. As patients progress to advanced heart failure. symptom management rather than mortality may be the goal of treatment.'0 Relief of symptoms, psychological well-being, social interaction, minimal assistance with self-care, and good cognitive function can all be markers associated with positive QOL. Unfortunately, the prevalence of depression in the elderly patient with CHF is not well known and is probably under reported." Of the 292 patients with CHF reviewed who were hospitalized and older than 65 years, absence of emotional support was associated as an independent predictor of fatal and nonfatal cardiovascular events in the year after admission.72 New health status measures for CHF that are easily distributed and obtain clinically meaningful outcomes are being developed.[73] QOL versus survival decisions are unique for each patient and, therefore, emphasize the importance of implementing patient-negotiated goals throughout all phases of heart failure.

Guidelines for advanced heart failure are necessary because of the eventual, progressive functional decline and unpredictable prediction of death. Because legislation now allows NPs to receive direct reimbursement for patients billed under Medicare B, frail elderly patients with CHF who have difficulty accessing clinics are now eligible for long-term home care. Programs such as MEDICARING[57] can offer comprehensive care with creative combinations of aggressive and supportive care instead of traditional rescue care. Services in the MEDICARING model include constant primary care provider regardless of setting, case management of home, personal and emergency care, access to 24-hour urgent care advice, and inpatient respite care. These models allow for home care that is not time-limited or restricted by hospice criteria. Recently, algorithms have been

proposed for managing complex or refractory heart failure that include home therapy and hospice choices.[74] Inpatient hospice units can also provide palliative care while also providing 24-hour medical care and casing caregiver burden.

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