

Homecare Therapy: A Cost-Effective Alternative Approach to the Management of Advanced Heart Failure

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Abstract

Congestive heart failure has become the most costly disease in the United States, and its incidence is increasing as the population ages. A diuretic, an angiotensin-converting enzyme inhibitor, and digoxin often constitute effective management. As the disease progresses, inodilator infusion therapy (traditionally administered in a hospital setting) is frequently the treatment of choice, dramatically improving the cardiovascular status of patients with advanced heart failure. However, the poor quality of life of these patients and the huge costs associated with their lengthy hospital stays have prompted the healthcare community to seek alternative sites for care. Home-care management, provided under a cardiologist's supervision and administered by registered nurses with extensive experience in cardiac care, is a practical, cost-effective alternative treatment for patients with advanced heart failure. These patients require intensive follow-up, patient education, and/or inodilator infusion therapy. The clinical and case studies of patients with advanced heart failure presented here demonstrate two main advantages of chronic home care: (1) dramatic improvement in quality of life; and (2) considerable cost savings.

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More than 3 million people in the United States have congestive heart failure, and more than 400,000 new cases are diagnosed annually.¹ Because the incidence of symptomatic congestive heart failure increases as populations age, the number of patients with congestive heart failure will rise markedly in coming decades.²

Today, congestive heart failure is the most expensive medical disorder in the United States.¹ Conser-

vative estimates project that the cost of care for patients with congestive heart failure exceeds \$8 billion per year.¹ During 1991, the Health Care Financing Administration expended \$5.45 billion for congestive heart failure, compared with \$2.24 billion for cancer and \$3.18 billion for myocardial infarction.³ The Veterans Administration Medical System reported spending \$93.5 million during fiscal year 1990 for the inpatient care of people with congestive heart failure.³

Heart failure is the third leading cause of hospitalization in all patients and the primary cause in those older than 65 years of age.² Approximately 35% of patients with the diagnosis of heart failure are hospitalized annually.² In one study,⁴ the 3-month hospitalization rate after an index admission for heart failure was 47%. A study³ of hospital discharges from nonfederal hospitals revealed that patients with a primary or secondary diagnosis of heart failure had an average length of stay of 7.7 days, including 3.0 days in the intensive care unit.

Not surprisingly, the hospitalization costs for patients with advanced heart failure are extremely high. One study³ used average costs in two regions of the United States to calculate hospitalization costs for nonfederal hospitals. Length of stay was estimated to be 7.7 days at center A, and actual length of stay at center B was 6.3 days. Estimated per-patient costs, which included professional fees and laboratory and pharmaceutical costs, were \$10,148 (based on costs of \$10,006 at center A and \$10,289 at center B).

The quality of life of patients with advanced heart failure is a major concern. Not only do patients bear the burden associated with any terminal illness, but they often have several comorbid conditions, including hypertension, diabetes, chronic renal disease, and atherosclerotic vascular disease.⁵ As heart failure progresses, patients become locked into a continuous cycle of acute care crises, emergency department visits, and increasingly longer hospitalizations.⁵ The cause of the situation is multifactorial, but it is becoming apparent that conventional oral therapy (digoxin,

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diuretics, and angiotensin-converting enzyme [ACE] inhibitors) is not being maximized, inodilator infusion therapy (milrinone) is underused, and patient compliance and education are poor. Evolving strategies to break this cycle include increasing physicians' awareness of the different treatment options; administering early, aggressive inodilator infusion therapy; educating patients about the importance of complying with dietary and medication regimens, and making use of alternative treatment sites, such as the home.

Although patients with advanced heart failure traditionally have received treatment as hospital inpatients, the growing number of these individuals, the high cost of hospital-based treatment, and the greater recognition of the relatively poorer quality of life of hospitalized patients have led to a search for other therapeutic approaches. As a result of research indicating that at least half of all inpatient care for heart failure could be provided in some other setting, or that it could be avoided by appropriate preventive measures, aggressive efforts are under way to develop more effective, alternative methods for treating heart failure.⁵ Today, an increasing number of patients with advanced heart failure are being treated in outpatient clinics, infusion clinics, and at home. Greater awareness of and interest in these treatment settings have resulted in the evaluation and refinement of health-care delivery at these sites.

Home Management of Advanced Heart Failure

The growing trend toward home management of individuals with advanced heart failure is a response to the growing number of patients, the high costs of hospitalization and rehospitalization, and the poor quality of life that these patients experience. In particular, alliances are forming between heart failure clinics and home health agencies that demonstrate expertise in monitoring cardiac patients. As summarized in Table 1,⁶⁻⁸ much has been learned during the past decade about the factors that contribute to the success of home management of patients with advanced heart failure.

Nurse Specialists. The availability of highly trained nurse specialists is one of the key elements of successful home management of these patients.⁸ Cardiac nurse specialists providing services in the home must have a bachelor's degree in nursing, often have a master's degree, and must have demonstrated proficiency in all aspects of critical care nursing (often with 5 or more years' experience in an intensive care or cardiac care unit). They usually have certifications in Advanced Cardiac Life Support and Critical Care Registered Nursing and must demonstrate the ability to communicate effectively with patients, families, physicians, and hospital staff.

Working under the supervision of a nurse case manager, nurse specialists educate patients about heart failure, monitor the patients' cardiovascular status and compliance with dietary and medication regimens, and administer intravenous inodilator therapy and diuretics as needed.⁹ They give patients increased access to accurate information about the disease and provide the reinforcement that patients need to maintain compliance with an often complex treatment regimen. In addition to making frequent, regularly scheduled visits to their homes, nurse specialists often maintain daily telephone contact with patients, speak with the patients' physicians as needed, and make unscheduled visits when problems arise, thus averting unnecessary trips to the emergency department.

Patient Education. Patients with advanced heart disease who benefit from home health management have certain common characteristics. They are emotionally stable and willing to accept responsibility for their own care,⁶ are willing and able to learn the essential information about heart failure and its treatment, and collaborate with the cardiac nurse specialist to develop realistic therapeutic goals.

This collaboration between the cardiac nurse specialist and the patient is essential to identifying appropriate outcomes and to agreeing on the means of

Table 1. Factors that Contribute to the Success of Home Management in Patients with Advanced Heart Failure

- The patient's willingness to accept responsibility for his/her own care⁶
- The patient's ability to be emotionally stable⁶
- The patient's and his/her family's understanding of the goals of the treatment program⁶
- Emphasis on patient/family education about the⁷:
 - Nature of advanced heart failure
 - Prescribed dosage and purpose of each medication
 - Reason why compliance with dietary/medication regimens is essential
 - Level of activity appropriate to the patient's condition
 - Signs and symptoms that deconditioning is occurring
 - Changes that should be reported immediately
- Stringent monitoring of the patient's cardiac and overall health status
- Availability of a highly skilled nursing team⁸
- Modification of the patient's medication regimen as appropriate to achieve optimal cardiovascular function and to minimize side effects
- Removal of barriers to patient compliance (eg, cost concerns, adverse effects)
- The patient's response, while hospitalized, to inodilator infusion therapy that will be used at home⁶

achieving them. Although patients must understand the serious implications of their diagnosis, they should be encouraged to set realistic short-term goals, such as regaining functional capacity, so that they can perform some daily activities.⁷ Patients must understand that strict compliance with the treatment regimen is essential to achieving their goals and avoiding rehospitalization.

Cost and Quality of Life. Several studies have confirmed that home care for patients with advanced heart failure can be both cost-effective and conducive to an improved quality of life.⁹⁻¹¹ In an ongoing investigation, patients of US Healthcare who have heart failure have been enrolled in an outpatient management program in which nurse case managers and specially trained visiting nurses complement the routine care provided by physicians.⁹ According to analysis of the first 78 participants in the program, the number of days of hospitalization decreased from 15,289 to 8,518, and projected annual savings totaled \$8,605 per member per year. Quality-of-life scores for the first 27 patients, as measured by the University of Minnesota Living with Heart Failure Questionnaire, improved from 66.1 to 51.1 after 3 months. (A lower score indicates a higher quality of life.)

In a study undertaken in Israel,¹⁰ 42 elderly patients with advanced heart failure (New York Heart Association functional class III or IV) who had been hospitalized at least once during the previous year were entered in a home surveillance program. Patients were monitored by a team of physicians and nurses. All patients received a weekly home visit, with additional visits provided as needed.

At the end of 1 year, the number of mean cardiovascular hospitalizations decreased relative to the number in the previous year, from 2.9 ± 1.5 to 0.8 ± 1.1 hospitalizations per year (a 72% reduction); this difference was statistically significant ($P < 0.001$).¹⁰ A statistically significant decrease in the duration of cardiovascular hospitalizations also occurred, from 23 ± 13 to 4 ± 4 days per year (83% reduction; $P < 0.001$). Half the patients were not hospitalized during this study period. When measured by a global functional status index (with 1 indicating that the patient was confined to bed and 4 signifying that the patient was independent in activities of daily living), patients showed a statistically significant improvement, from 1.4 ± 0.9 to 2.3 ± 0.7 ($P < 0.001$).

A recent study¹¹ enrolled 18 inodilator-dependent patients into a continuous inodilator infusion program at home. The objectives of the program were to improve the patients' quality of life and to decrease the number of hospital admissions and the lengths of stay.

Patients initially received dobutamine but, because of tolerance, were switched to milrinone. The control group consisted of 18 matched patients with class IV heart failure averaging six admissions per year, with each stay averaging 7.1 days. The average cost per admission was \$9,300, resulting in a cost per year of \$56,000. The average cost for patients enrolled in the home infusion program was \$116 per day, \$3,400 per month, or \$40,800 per year. The readmission rate decreased to 2.1 admissions per year, a 43% reduction. The authors concluded that home intravenous milrinone therapy was cost-effective, and that the decreased time spent in the hospital increased the patients' quality of life.

Case Studies

The two case studies that follow exemplify the way in which aggressive home nursing management of patients with advanced heart failure can enhance quality of life while substantially reducing the cost of care. The two patients, whose home care services were provided by Case Management Associates of California, are typical of many patients with advanced heart failure in that the number of their hospitalizations gradually was increasing, and their cardiac disorders were complicated by at least one other serious condition. Case 1 describes a patient who required intense patient education; case 2 describes one who required intravenous inodilator intervention.

Case 1. MG was a 61-year-old woman with a history of multiple health problems and repeated hospital admissions, primarily as a result of advanced heart failure. Her medical history also included unstable angina, atrial fibrillation, and coronary artery disease. She had had two cardiac catheterizations within 6 months, one of which had included stent placement. In addition, she had chronic obstructive pulmonary disease, insulin-dependent diabetes mellitus, hypertension, and chronic obesity.

The frequency of MG's hospitalizations increased over an 8-month period to monthly admissions. During the ninth month, her hospital admissions were biweekly. At that point, home care services were requested.

MG received home care for 90 days and was seen as many as 3 times per week during that time. Communication took place daily between the assigned registered nurse and the patient, and almost daily between the nurse and the patient's physician. Frequent administration of intravenous furosemide and frequent cardiac monitoring were required. Monitoring often detected uncontrolled atrial fibrillation (100 bpm) and ectopy. The home health nurses deter-

mined that dietary noncompliance was a complicating factor.

After the nursing staff had addressed the issue of noncompliance by giving MG intensive education and psychological support, her condition gradually stabilized. Although some unscheduled interventions on the weekends and at off-hours during the day occurred, the patient did not require hospitalization during either the 90-day period or the ensuing 3 months. MG continues to try to follow her dietary and medication regimens, and she sees her physician regularly.

During the 9 months before home care services were requested, MG's total costs for hospitalization were \$43,600, which included hospitalization for 35 of the 270 days at a daily cost of \$1,250. Her average monthly inpatient hospital costs were \$4,900. Had MG received home nursing services (with no hospitalizations) for a full 9 months, her cost of care would have been \$12,400. This cost is equivalent to an average daily cost of \$46 and an average monthly cost of \$1,350, clearly demonstrating the cost savings of providing care to MG in her home rather than as an inpatient.

The estimated annual cost savings that could be achieved by treating a patient like MG at home rather than in the hospital also were calculated. Assuming that MG's monthly costs for hospitalization were \$4,900, her estimated 1-year inpatient costs would be \$58,800. MG received home care nursing for 90 days. Because she required intensive triage therapy, the actual costs during the first 30 days were \$3,500. The subsequent 60 days were considered to be a period of high-acuity therapy, with resultant costs of \$1,750 each month, for a total of \$7,000 for 90 days. If MG had continued receiving home therapy, the cost would have decreased to \$900 per month. Based on actual home care costs for the 90-day period and estimated costs for 9 months, her annual cost would have been \$15,100. Thus, home care nursing for a

patient such as MG would represent a cost savings of \$43,700, or 74%.

The case history of MG confirms the results of other studies, which show that, when disease progression is influenced heavily by noncompliance with the dietary or medication regimen, patients often respond well to home-based case management. The home environment usually is conducive to fostering trust between a patient and caregiver, thereby encouraging patient compliance. Avoiding hospitalization, improving quality of life, and maintaining a fairly stable condition often are attainable goals for patients such as MG.

Case 2. KM was a 58-year-old man with a significant cardiac history that included class IV advanced heart failure. In the terminal stages of his disease and exacerbated by underlying renal failure, KM required monthly hospitalization, with increasing lengths of stay, to the point that two stays were separated by only 2 weeks. During his last three hospital stays, he received inodilator infusion therapy. Each time he received this therapy, his condition improved markedly, only to deteriorate when he was weaned from the medication and discharged.

When home care services were requested, the main therapeutic goal was to provide continuous inodilator infusion therapy in an attempt to avoid bi-weekly hospitalizations and to preserve some quality of life for the patient. After home nursing care was initiated, KM did not return to the hospital for 2 months. During this period, the home care nurses taught KM and his family about the signs and symptoms of advanced heart failure and the relationship between advanced heart failure and renal failure. This education enhanced their understanding of the progressive changes that occur with advanced heart failure and the way in which inodilator infusion therapy works to control the symptoms of the disease.

After 2 months at home, KM developed an intestinal blockage that required hospitalization. Although

Table 2. Comparison of Estimated 9-Month Inpatient Costs vs Home Care Costs for Case 2 (KM)

Quarter	Inpatient		Home Care		Cumulative Savings with Home Care (\$)*
	Quarterly Cost (\$)	Cumulative Cost (\$)	Quarterly Cost (\$)	Cumulative Cost (\$)	
First	23,500	23,500	24,200	24,200	-700 (-3)
Second	32,100	55,600	24,200	48,400	7,200 (23)
Third	37,500	93,100	24,200	72,600	20,500 (22)

*Numbers in parentheses are percentages

the blockage was resolved and he was discharged after 4 days, KM was unable to recover from this setback. He died within 2 weeks. According to his physician, KM "might have spent his remaining days in the hospital and might have died with the blockage. But due to the significant improvement in his cardiac status, he was able to return home again, even for a brief period, to settle his affairs and have a dignified death."

In addition to the incalculable improvement in quality of life associated with spending the final months of life at home rather than in the hospital, KM's case also illustrates that marked cost savings can be associated with home care (Table 2). To calculate the cost savings achieved by treating KM at home rather than as an inpatient during the final months of life, the actual costs of the hospitalization for the 9 months before his transfer to home care services were compared with projected costs for 9 months of home healthcare. (Inpatient costs for KM's final hospitalization are not included in this comparison, as they are associated with treatment of an unrelated condition, intestinal blockage.)

Because KM's condition was deteriorating gradually and the lengths of his hospital stays were increasing, this cost comparison is conservative in its estimate of what KM's inpatient costs would have been had he continued to receive hospital-based inodilator therapy. Nevertheless, it gives some sense of the cost savings that can be achieved with home healthcare.

The estimated annual cost savings that could be achieved by treating a patient like KM at home rather than in the hospital also were calculated. Based on the conservative assumption that KM would be hospitalized for 8.5 days of each month, at a cost of \$1,200 per day, his 1-year inpatient costs would be \$122,400. If KM had received home healthcare treatment instead, his costs, at \$268 per day, would be \$97,820. This figure represents a savings of \$24,580, or 20%.

Conclusion

Today, congestive heart failure is the most expensive medical disorder in the United States, and its incidence is increasing as the population ages. Many patients with congestive heart failure are effectively managed with triple therapy, including a diuretic, ACE inhibitor, and digoxin. As the disease progresses, many patients also benefit from inodilator infusion therapy, traditionally administered in an inpatient setting. All too often, however, patients with advanced heart failure become locked in a continuous cycle of acute medical crises, emergency department

visits, and increasingly lengthy hospitalizations. In the case of terminal patients, whose cardiovascular status may improve dramatically with the administration of an inodilator agent, such as milrinone, deterioration recurs after they have been weaned from the drug and discharged. Noncompliance with the treatment regimen is another major contributor to the functional decline that frequently follows discharge.

In response to the high economic costs of repeated hospitalizations and the diminished quality of life that patients experience in an inpatient setting, alternative means of providing care to patients with advanced heart failure have been developed. Clinical trials and case studies have shown that home management is cost-effective and medically beneficial for many patients. Those who receive much of their care from highly trained cardiac nurse specialists often avoid costly hospital admissions, achieve improved functional status, and experience an enhanced quality of life. Home management is feasible and highly cost-effective for patients who require intensive follow-up, patient education, and/or inodilator infusion therapy.

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