Extending the Horizon in Chronic Heart Failure
Effects of Multidisciplinary, Home-Based Intervention Relative to Usual Care

Sally C. Inglis, BHSc(Hons); Sue Pearson, PhD; Suzette Treen, BHSc; Tamara Gallasch, BBSc; John D. Horowitz, PhD; Simon Stewart, PhD

Background—The long-term impact of chronic heart failure management programs over the typical life span of affected individuals is unknown.

Methods and Results—The effects of a nurse-led, multidisciplinary, home-based intervention (HBI) in a typically elderly cohort of patients with chronic heart failure initially randomized to either HBI (n=149) or usual postdischarge care (UC) (n=148) after a short-term hospitalization were studied for up to 10 years of follow-up (minimum 7.5 years of follow-up). Study end points were all-cause mortality, event-free survival (event was defined as death or unplanned hospitalization), recurrent hospital stay, and cost per life-year gained. Median survival in the HBI cohort was almost twice that of UC (40 versus 22 months; P<0.001), with fewer deaths overall (HBI, 77% versus 89%; adjusted relative risk, 0.74; 95% CI, 0.53 to 0.80; P<0.001). HBI was associated with prolonged event-free survival (median, 7 versus 4 months; P<0.01). HBI patients had more unplanned readmissions (560 versus 550) but took 7 years to overtake UC; the rates of readmission (2.04±3.23 versus 3.66±7.62 admissions; P<0.05) and related hospital stay (14.8±23.0 versus 28.4±53.4 days per patient per year; P<0.05) were significantly lower in the HBI group. HBI was associated with 120 more life-years per 100 patients treated compared with UC (405 versus 285 years) at a cost of $1729 per additional life-year gained when we accounted for healthcare costs including the HBI.

Conclusions—In altering the natural history of chronic heart failure relative to UC (via prolonged survival and reduced frequency of recurrent hospitalization), HBI is a remarkably cost- and time-effective strategy over the longer term. (Circulation. 2006;114:2466-2473.)

Key Words: cost-benefit analysis ■ heart failure ■ prevention ■ prognosis

Chronic heart failure (CHF), a deadly and disabling syndrome that affects close to 7 million Europeans and 5 million North Americans each year, is recognized as a major public health problem.1 Despite new and more effective pharmacological2 and nonpharmacological therapeutic strategies,3 the prognosis of patients with CHF remains grim. Although patients with CHF often die from a sudden cardiac event,4 the progressive and unstable nature of the syndrome still means that many patients require multiple admissions to the hospital in the last 12 months of life.5 The major component of healthcare costs for CHF is hospital treatment, which accounts for more than two thirds of such expenditure and ≈2% of total healthcare expenditure.1

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The weight of evidence from meta-analyses of >30 randomized trials of predominately nurse-led multidisciplinary management programs in terms of prolonged survival and reduced readmissions,6,7 with numbers needed to treat competitive with pharmacotherapy,7 has led to these programs’ incorporation into gold-standard management of the syndrome.8

Like other CHF-related therapeutic strategies, there are few data to describe the impact of CHF management programs on morbidity and case fatality beyond short-term follow-up.9 Why is this important? It could be argued that any therapeutic strategy that prolongs CHF-related survival in the short and even medium term is simply postponing the inevitable “burst” of recurrent and costly readmissions typically seen in clinically unstable patients with end-stage CHF.6

We have previously reported that a home-based form of CHF management might be one of the few CHF therapeutic strategies that concurrently prolongs survival and reduces recurrent hospital use over the medium term.10 After a median...
of 4 years of follow-up of 297 patients, many patients were still alive and thus still at risk of clinical deterioration and a pattern of high-cost healthcare utilization before death. The ultimate impact of this type of CHF management program when the majority of study patients have died remains unknown.

It is within this context that we prospectively examined the long-term (minimum of 7.5 to 10 years) impact of this nurse-led, multidisciplinary home-based intervention (HBI) relative to usual postdischarge care (UC) in the same typically old and fragile cohort of 297 CHF patients initially discharged from short-term hospital care.

**Methods**

**Study Cohort**

As described previously, we conducted 2 related randomized controlled trials of nurse-led multidisciplinary HBI in Adelaide, South Australia. All patients were recruited from the same tertiary referral center for the region with a specialist cardiology unit. The institution’s Ethics of Human Research Committee approved both studies, and patients consented to long-term follow-up of medical records. The process of recruitment into these 2 studies and the amalgamation of these 2 CHF cohorts have been previously detailed and are summarized according to consort guidelines in Figure 1.

From a total of 8155 hospital inpatients screened, 297 CHF patients consented to trials of a nurse-led multidisciplinary HBI study and were randomly allocated to HBI (n=149) or UC (n=148). The overall rate of recruitment of eligible patients was 76%; there were no detected differences between participating and nonparticipating patients.

The inclusion/exclusion criteria were the same for both studies. Patients were included if they were aged ≥55 years, were discharged to home, and had a diagnosis of CHF (determined by a cardiologist) and a history of ≥1 admission for acute heart failure. CHF was defined as impaired left ventricular systolic function (left ventricular ejection fraction ≤55%) within 3 months of entry to the study and persistent functional impairment indicative of New York Heart Association class II, III, or IV status. Acute heart failure was defined as pulmonary congestion/edema and acute dyspnea at rest. Patients with terminal malignancy or planned cardiac surgery were excluded.

**Baseline Data**

As reported previously, a comprehensive range of clinical, demographic, and psychosocial variables (Table 1) were collated through patient interviews and by reviewing medical records immediately before discharge.

**Postdischarge Care**

**Usual Patient Management**

All patients were subject to usual levels of postdischarge planning as employed in the cardiology and medical units at the time of recruitment to the study (1995–1998). No restrictions were placed on the extent or the intensity of follow-up. Typical follow-up included an appointment with their primary care physician and the cardiology outpatient clinic within 14 days of discharge. All patients underwent regular outpatient-based review by a cardiologist at the hospital and attended their same primary care clinic.
TABLE 1. Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>HBI Group (n=149)</th>
<th>UC Group (n=148)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic profile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>84 (56)</td>
<td>83 (56)</td>
</tr>
<tr>
<td>Mean age, y</td>
<td>75±9</td>
<td>75±8</td>
</tr>
<tr>
<td>Living alone</td>
<td>54 (36)</td>
<td>61 (41)</td>
</tr>
<tr>
<td>Non-English speaking</td>
<td>44 (30)</td>
<td>42 (28)</td>
</tr>
<tr>
<td><strong>Heart failure profile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous admission for heart failure</td>
<td>94 (63)</td>
<td>82 (55)</td>
</tr>
<tr>
<td>Mean LVEF</td>
<td>38±11</td>
<td>38±10</td>
</tr>
<tr>
<td>NYHA class II/III/IV</td>
<td>47/45/8</td>
<td>44/45/11</td>
</tr>
<tr>
<td><strong>Comorbidity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past myocardial infarction</td>
<td>82 (55)</td>
<td>74 (50)</td>
</tr>
<tr>
<td>Chronic airways disease</td>
<td>48 (32)</td>
<td>59 (40)</td>
</tr>
<tr>
<td>Chronic hypertension</td>
<td>86 (58)</td>
<td>85 (57)</td>
</tr>
<tr>
<td>Non–insulin-dependent/insulin-dependent diabetes</td>
<td>46 (31)</td>
<td>39 (26)</td>
</tr>
<tr>
<td>Mean Charlson Index score</td>
<td>2.9±1.4</td>
<td>2.8±1.4</td>
</tr>
<tr>
<td><strong>Pharmacotherapy at hospital discharge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean No. of prescribed medications</td>
<td>7.3±2.3</td>
<td>7.2±2.2</td>
</tr>
<tr>
<td>Diuretic</td>
<td>141 (95)</td>
<td>146 (99)</td>
</tr>
<tr>
<td>ACE inhibitor</td>
<td>113 (76)</td>
<td>108 (73)</td>
</tr>
<tr>
<td>Digoxin</td>
<td>103 (69)</td>
<td>93 (63)</td>
</tr>
<tr>
<td>β-Adrenoceptor antagonist</td>
<td>35 (24)</td>
<td>28 (19)</td>
</tr>
<tr>
<td><strong>Blood profile at hospital discharge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium, mmol/L</td>
<td>138±3.8</td>
<td>138±3.5</td>
</tr>
<tr>
<td>Potassium, mmol/L</td>
<td>4.1±0.5</td>
<td>4.1±0.5</td>
</tr>
<tr>
<td>Creatinine, mmol/L</td>
<td>155±8</td>
<td>143±7</td>
</tr>
<tr>
<td>Albumin, g/L</td>
<td>38.8±3.9</td>
<td>38.2±4.3</td>
</tr>
</tbody>
</table>

Values are mean±SD or n (%). LVEF indicates left ventricular ejection fraction; NYHA, New York Heart Association; and ACE, angiotensin-converting enzyme.

**Home-Based Intervention**

The rationale and specific details of the study intervention have been described more extensively in previous publications (also available on request from S.S.) and arose from our group’s wider interest in the value of home-based, chronic disease management.

Consistent with the reality of dealing with patients with multiple disease states and many different preventable reasons for recurrent events while recognizing the need to deal with the most “high-cost” users of the healthcare system, we specifically focused on CHF patients and designed an intervention that would deal with all their potential healthcare needs (hence our focus on all-cause events). Our eclectic approach was built on earlier research relating to comprehensive geriatric assessments, the application of a broad range of adult learning theories relating to life-long learning, and the principles of individual and community empowerment to facilitate self-determination (in this case, self-care).

In essence, patients assigned to HBI received the same level of care as those assigned to UC plus the prospectively designated study intervention. As such, HBI comprised a structured home visit within 7 to 14 days of discharge, by a nurse and pharmacist or by a qualified cardiac nurse. During the home visit, patients underwent a physical examination and a review of their adherence to and knowledge of their condition and prescribed treatments as well as an assessment of their social support system. Factors likely to increase the immediate and longer-term probability of hospital readmission or death were identified. For example, home visits revealed that close to 40% of patients were found to have undiagnosed early clinical deterioration and often an impaired ability to recognize signs of an impending crisis. Moreover, up to 50% of patients exhibited poor self-care behaviors and/or were consuming potentially harmful agents (e.g., a nonsteroidal antiinflammatory agent). On the basis of this comprehensive home assessment, patients and their families (if appropriate) received a combination of remedial counseling, introduction of strategies designed to improve treatment adherence, introduction of a simple exercise regimen, and incremental monitoring by family/caregivers. Those with signs of clinical deterioration were immediately reviewed by their primary care physician or cardiologist, and remedial action was taken. Those with problems in managing their medications were referred for long-term support by their community pharmacist. Irrespective of the outcome, a comprehensive report was sent to the patient’s primary care physician and cardiologist detailing both the assessment and any actions taken or recommended.

All patients were subject to telephone follow-up over 6 months to ensure that patients were receiving appropriate levels of support, and the patient’s physicians and/or community services were contacted to address any problems. Over the same time frame, 25% of patients initiated telephone calls for advice and/or to arrange an urgent review. Both short-term (intensive) and long-term (predominantly routine and surveillance) management strategies were therefore applied as part of the HBI.

The only clinically important differences between the form of HBI applied in these 2 studies (except the personnel involved) were that the first cohort received some additional information about their condition and treatment during their index admission (although this was shown to have minimal effect on outcomes) and, in the second cohort, 7 patients received repeat home visits if they survived a readmission within 6 months.

**Study End Points**

The following end points were prospectively examined in a blinded manner: (1) all-cause mortality; (2) the composite end point of event-free survival (event was defined as all-cause mortality and/or unplanned readmission); (3) frequency, length of hospital stay, and type of admission (elective/unplanned); and (4) healthcare utilization costs and subsequent cost per life-year saved.

**Study Follow-Up**

With the use of a regional, computerized medical record system and death registry, all inpatient and outpatient hospital activity and fatal events were recorded for each patient from the time of study recruitment until December 31, 2005, for surviving patients. Only 3 patients failed to “register” on these data sets in any way; all 3 were confirmed to be alive and living in the region within 5 years of their index admission (censored at this time). Hence, we collated up to 10 years of actuarial survival and morbidity data (minimum, 7.5 years).

**Statistical Analysis**

All data were analyzed with the use of SPSS version 12 on an intention-to-treat basis according to study group assignment. Significance was accepted at the 0.05 level (2-sided). The following methods of analysis of baseline and end point data were used: χ² analysis (95% confidence intervals [CIs] where appropriate) for discrete variables, Student t test for normally distributed continuous variables, and Mann-Whitney test for non–gaussian distributed variables (data still presented as mean±SD). To adjust for differences in survival and duration of follow-up, event frequency was calculated as a mean number of events per patient per year of follow-up. Kaplan-Meier curves were constructed with the use of time-dependent, all-cause survival, and event-free survival data followed by analysis with both the log-rank test and Breslow test to determine any differences in the number and/or timing of the events between the groups. To examine the independent effects of treatment mode and a number of baseline variables such as age, sex, comorbidity, and treatment on event-free survival and all-cause mortality,
a Cox proportional hazards model, with initial entry and stepwise rejection of baseline variables at the 0.1 and 0.05 levels of significance, respectively, was used to derive relative risk (RR) and 95% CI. Healthcare costs were calculated from known hospital costs on the basis of diagnostic-related groupings (costs standardized to the midpoint of the study [2002]10) and an adjustment for other-related healthcare expenditure. The latter was calculated on the basis of in-hospital activity being 70% of total expenditure1; our previous analyses suggested that this remained constant for both groups over time despite an initial increase in community-based healthcare after the HBI. In this respect, the initial cost of the study intervention was also added to the calculated costs for the HBI group with an adjustment for the additional cost of extra pharmacist and primary care physician visits in the first 6 months.

The authors had full access to the data and take responsibility for its integrity. All authors have read and agree to the manuscript as written.

Results
Baseline Characteristics
As reported previously,10 this was a typically old and fragile cohort of patients with CHF (Table 1). When the 2 study cohorts were combined according to treatment mode, they were well matched for all but 3 of a comprehensive list of demographic, clinical, and psychosocial parameters: At baseline, HBI patients were more likely to have a prior acute myocardial infarction, left bundle-branch block, and higher blood urea concentration.

All-Cause Mortality
As expected, case fatality was high during a minimum of 7.5 years of follow-up. Overall (Figure 2), statistically fewer patients in the HBI group compared with UC died during this period: 114 (77%) versus 132 (89%); P=0.0006, log-rank test. Median survival in the HBI cohort was almost twice that of UC (40 versus 22 months), and, on adjusted analysis, HBI was associated with a 40% reduction in the risk of a fatal event over the duration of study follow-up (P<0.0001). Other baseline predictors of greater longevity were preserved left ventricular systolic function (survivors had a baseline left ventricular ejection fraction of 41±10% versus 35±10% for deceased patients) and fewer comorbidities as measured by the Charlson Index18 (2.6±1.2 versus 2.9±1.4). The mean age at death was 77.5±9.3 years (range, 57 to 84 years), whereas survivors were aged 84.2±8.1 years (range, 66 to 103 years) when censored.

Event-Free Survival
By study completion, only 6 patients (2%) remained event-free from death (see above) or an unplanned readmission (83% of both groups). HBI was associated with a significant increase in event-free survival relative to UC: a median of 7 versus 4 event-free months (P=0.0144, log-rank test and P=0.008, Breslow test) (Figure 3). On average, HBI patients experienced 198 more days of hospital-free survival than UC patients (1448±1187 versus 1010±999 days; P<0.001). Greater comorbidity (Charlson Index score) was the only other significant predictor of event-free survival, although being prescribed a β-blocker at baseline was also a borderline predictor in this regard (RR, 0.76; 95% CI, 0.57 to 1.01; P=0.060).

Recurrent Hospital Stay
Figure 4 compares the accumulative total of unplanned readmissions during follow-up according to study assignment. Consistent with previous reports, HBI patients accumulated fewer unplanned readmissions in the short to medium term (see inset comparing rate of readmissions per patient at risk each year of follow-up). However, with ~30 more survivors in the latter stages of follow-up and a consistent rate of readmission (~1 readmission per patient at risk each year of follow-up), overall, the HBI group accumulated more unplanned readmissions during follow-up (560 versus 550). Figure 5 shows a similar pattern of recurrent hospital episodes for the 2 groups overall. When we adjusted for the duration of follow-up (and extended HBI-related survival time), however, the rate of readmission was significantly lower in the HBI group; 3.66±7.62 versus 2.04±3.23 admissions per patient per year (P=0.039). However, patients in the UC group still accumulated more days of recurrent hospital stay (4671 versus 4312 days). This equated to a
significant difference of 28.4±53.4 versus 14.8±23.0 days per patient per year of follow-up (P=0.045). Average length of stay for readmitted HBI versus UC patients was slightly lower at 8.2±5.5 versus 8.8±6.5 days (P=NS). Overall, HBI patients accumulated more elective admissions (159 versus 92 predominantly routine surgical procedures; P=NS) and associated days of hospital stay (313 versus 218 days).

**Healthcare Costs**

Table 2 summarizes the cost of health care for the 2 study groups during prolonged study follow-up. During almost the entire remaining life span of this cohort, the cost-benefit of HBI was estimated to be AU $1729 per additional life-year gained.

**Discussion**

The present unique study demonstrates the enduring benefits of HBI relative to UC on survival, hospital activity, and healthcare costs during the normal life span of 297 typically old and fragile patients with CHF. In contrast to those assigned to UC, patients exposed to HBI had more prolonged survival while avoiding the typical pattern of recurrent hospital stay for at least 5 years after study intervention.

Although this apparent alteration in the natural history of CHF did not persist completely (it was clear that during the latter stages of follow-up some surviving HBI patients became clinically unstable, requiring recurrent hospitalizations), it took 7 years for the HBI group to match the UC group for unplanned hospital activity. Moreover, after a decade of follow-up, the survival benefits derived from being exposed to HBI persisted at a highly competitive cost (equivalent to US $1400 or €1000) per additional life-year gained.

These data raise a number of important issues, not all of which can be covered adequately in this article. However, some important findings require comment. First, regardless of the obvious benefits of HBI, this study reconfirms that CHF is a truly malignant condition. During prolonged follow-up, 77% and 89% of the HBI and UC cohorts, respectively, had died; only 6 patients avoided either death or an unplanned hospital stay. Those exposed to HBI, however, derived considerable benefits in terms of prolonged survival (on average 1.2 years) even when adjusted for potential confounders and without being routinely reexposed to HBI when surviving a recurrent hospitalization. This finding is consistent with that reported in recent meta-analyses of CHF...
management programs\textsuperscript{6,7} and greater than that attributable to angiotensin-converting enzyme inhibitor therapy in comparable patient cohorts.\textsuperscript{19} Because of their more prolonged survival, HBI patients ultimately accumulated more unplanned readmissions, but the overall rate of hospital activity was significantly reduced. Any therapeutic strategy that can “buy” an additional life-year at a cost of < US $50 000 (€41 000) in the short term is generally considered competitive and is often publicly funded.\textsuperscript{20} For example, implantable cardiac defibrillators at an estimated cost of US $27 000 to US $50 500 per additional life-year gained, with increasing cost competitiveness over time, are routinely supported by public funds.\textsuperscript{3,20} In comparison, we found that HBI was initially associated with cost savings (over the first 5 years) and, with similar funding commitments, could treat many more patients (a ratio of close to 1:100 patients per annum would be a reasonable estimate).\textsuperscript{1} Ironically, because of the lack of systematic funding for CHF management programs in Australia,\textsuperscript{21} the lack of long-term contamination of our original cohort from a formal service enabled us to perform this study. Overall, these data provide more compelling reasons for the systematic application of multidisciplinary programs of care to cost-effectively alter the natural history of CHF.

Clearly, there is likely to be some scepticism surrounding the potential long-term impact of a relatively brief intervention (at most, a 6-month active program of support), and the present study has some important limitations (see below). It should first be noted that such doubts surrounded our initial reports of the survival benefits conveyed by HBI in our earlier reports\textsuperscript{12,22} before subsequent meta-analyses of many other studies.\textsuperscript{6,7} Moreover, we recently documented the long-term benefits of this form of intervention in a large group of patients with a range of chronic disease states.\textsuperscript{23} Within the limitations of our inability to track in any detail the patterns of healthcare patients received beyond the first few years and via hospital care, what are the likely mechanisms of beneficial effect? For example, it would be improbable to suggest that patients exposed to HBI experienced an “epiphany” at their first home visit and decided to make drastic changes to their lifestyle and health behavior. It is more probable that HBI triggered a number of small but positive and synergistic changes in patients, their caregivers, and their healthcare team.

Our survivors are not the youngest patients with the least amount of cardiac disease or comorbidity. The efficacy of many of the individual components applied within the cocktail of strategies encompassed by HBI is now well established. These include improving treatment adherence rates,\textsuperscript{24,25} improving patient understanding of underlying disease processes and treatment,\textsuperscript{26} promoting more active self-care behaviors,\textsuperscript{27} appropriate seeking of medical assistance in the event of clinical deterioration,\textsuperscript{16} and increasing levels of healthcare surveillance in high-risk individuals.\textsuperscript{26} The overall benefits of comprehensively assessing patients in their own home and providing a tailored intervention based on the same are now well established by meta-analyses.\textsuperscript{7,28,29} It is also significant that the Australian healthcare system enabled us to stimulate long-term strategies at little or no cost to patients (eg, sustained medical and pharmacy surveillance in the community) based on the comprehensive assessment of risk during the initial home visit. Although these strategies appear to work as a whole, the precise mechanism of beneficial effect of this form of intervention still remains unclear. In terms of corroborating evidence, we know that

### Table 2. Cost Analysis of HBI Relative to UC

<table>
<thead>
<tr>
<th>Outcome per 100 Patients</th>
<th>HBI Group</th>
<th>UC Group</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival time/study follow-up</td>
<td>405 y</td>
<td>285 y</td>
<td>120 more life-years</td>
</tr>
<tr>
<td>Cost of intervention</td>
<td>$100 000</td>
<td>...</td>
<td>+$100 000</td>
</tr>
<tr>
<td>Cost of unplanned hospital stay</td>
<td>$2 170 470</td>
<td>$2 367 081</td>
<td>−$196 611</td>
</tr>
<tr>
<td>Cost of elective stay</td>
<td>$147 046</td>
<td>$103 108</td>
<td>+$43 938</td>
</tr>
<tr>
<td>Cost of additional care/treatment*</td>
<td>$849 856</td>
<td>$589 723</td>
<td>+$260 133</td>
</tr>
<tr>
<td>Total cost of healthcare</td>
<td>$3 267 372</td>
<td>$3 059 912</td>
<td>+$207 460</td>
</tr>
</tbody>
</table>

*Calculated on the basis of hospital care being 70% of total healthcare expenditure.\textsuperscript{1}
surviving patients (and, more important, their families) almost always remember the home visit and comment on the care and attention they received during and after the event. Initial resistance to this form of intervention from primary care physicians in the region was also replaced by active support with feedback indicating that their management was more effective because of a better understanding of the patient, the patient’s treatment goals, and personal circumstances. In terms of hard evidence of the positive impact of HBI, we have documented not only a reduction in hospitalizations related to the adverse effects of prescribed pharmacotherapy14,17 but also a significant improvement in the profile of serum digoxin and international normalized ratio levels (215 patients in total), indicating a greater proportion of HBI patients maintaining therapeutic levels at up to 6 months (S. Stewart, PhD, unpublished data, 1999).

Whatever the benefits derived from HBI, their effect (at least in terms of hospital activity) appears to be limited to ~5 years before a new cycle of potential clinical deterioration begins to emerge. Clearly, as part of a formal CHF management program, there would be mechanisms to actively intervene and/or provide more appropriate palliative support.13 Certainly, recent data from a CHF management program in Spain30 suggesting that the initial, positive impact of a clinic-based multidisciplinary intervention in CHF was attenuated at 12 months after cessation of active management reinforces the need to monitor health outcomes and reinter-\v

vene when necessary, particularly when there are no mechanisms for further community-based intervention. A United States–based study employing an intervention similar to our own (but perhaps more CHF-specific) demonstrating short-term (90-day) but not longer-term (mean, 283 days) benefits also contrasts with our data.31 Apart from the potential benefits of being less CHF-specific in our approach to optimizing health outcomes, it is certainly possible that we were more successful (in the Australian healthcare environment) in stimulating more long-standing, positive changes in healthcare management.

The present study has a number of limitations that require comment. Although this represents a prospectively planned analysis of long-term health outcomes in this cohort of patients, it is important to remember that we have combined the results from 2 study cohorts and have minimal data to fully understand beneficial mechanisms of effect. For example, we were unable to add any other potentially important clinical variables (eg, subsequent pharmacotherapy or cardiac function) to our multivariate analyses. We also cannot discount the possibility that knowledge of the intervention by hospital physicians altered the threshold for hospitalization in favor of the HBI group. These results need to be confirmed by other programs (particularly in other healthcare systems) that apply a similar intervention (ie, home-based) and more fully elucidate potential mechanisms of beneficial effect. Moreover, we were unable to fully determine patterns of community-based healthcare utilization beyond that reported previously and extrapolated these costs for our cost-benefit analysis. However, the potential cost competitiveness of HBI (even with higher than expected community costs) would remain robust relative to other forms of CHF treatment.1

Despite these and other limitations, we have now observed that a relatively inexpensive form of HBI confers considerable benefits over the short11,12 (6 to 12 months), medium10,22 (1 to 4 years), and now longer term (7.5 to 10 years). Although the recent evolution of multidisciplinary CHF management has seen a predominance of clinic-based programs of care, there are well-documented difficulties in forcing typically old and fragile patients with CHF to regularly attend a hospital.32 As such, these data reaffirm the potential advantages of visiting CHF patients in their own home to determine the best strategies to maximize their health and address potentially fatal clinical and social issues, particularly when the information gained is used wisely and long-term health plans are implemented.

In conclusion, therefore, a simple cost- and time-effective nurse-led multidisciplinary intervention performed in the patient’s home after hospitalization relative to UC has the potential to extend the horizon of survival with CHF while cost-effectively reducing the frequency of recurrent hospitalization.

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Disclosures

None.

References


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