Original Article

Pilot Testing of the Home Care Education, Assessment, Remote-Monitoring, and Therapeutic Activities Intervention

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Abstract

The primary aim of this pilot study was to develop, implement, and test the feasibility and efficacy of the Home Care Education, Assessment, Remote-Monitoring, and Therapeutic Activities (HEART) trial, a nurse-directed multicomponent home care intervention. A total of 50 patients with a primary diagnosis of heart failure (HF) were assigned to the intervention (n = 26) or control group (n = 24) according to geographical location in a large multibranch Medicare-certified home health agency. Forty-six patients completed the study. Patients participating in the HEART intervention demonstrated significantly improved HF knowledge (F = 1.31, p < .001) in comparison with control group patients' at the study endpoint. There was a non-significant trend toward improved quality of life (QOL) and lower hospital readmission rates (6 patients vs. 9 patients) in the intervention group.

Keywords

heart failure, telemonitoring, home care, research, education, self-care

The number of patients affected by heart failure (HF) continues to grow as our population ages. Over 600,000 new cases of HF are diagnosed each year in the United States[1] and nearly 6 million Americans are currently suffering from this chronic debilitating syndrome.[2] Older adults comprise the majority of HF patients with half of all patients older than 75 years.[3]Accordingly, HF has been labeled the quintessential disorder of cardiovascular aging.[4] HF negatively affects quality of life (QOL) and increases the risk of acute hospitalization. Individuals with HF experience a multitude of symptoms such as shortness of breath, fatigue, and edema that affect their QOL.[5,6] HF is the leading cause of preventable hospitalizations in people over the age of 65 years, with a 24.8% to 29% readmission rate within 30 days of hospital discharge.[7,8]

Home care agencies serve as an important bridge to transition a significant number of HF patients from hospital to home as well as a vital service in helping patients to remain living at home. HF is a common and high-cost diagnosis in home health care with most patients being older than 70 years of age.[9] Referrals for home care services for patients with HF are generated by a variety of sources, most often hospitals. In a recent analysis of Medicare data, it was reported that approximately 74% to 81% of patients are referred to home care following a HF hospitalization and about 31% are referred by a physician or family member without prior hospitalization.[7] Among all persons with HF, those referred to home care tend to be the sickest because to qualify for Medicare reimbursement of the home care, they must be homebound and referred from a health care provider or relative due to their need for skilled services.

Although HF is highly prevalent in home care, there is little research specific to home care interventions that are most effective in this population. The majority of research to date has been on hospitalized or community-dwelling patients. In addition, most research has been conducted with patients younger than 65 years of age. Consequently, there is a critical need to better understand best practices in older adults with HF receiving home care services.

Considering the current U.S. health policy climate focused on improving health care quality while reducing costs to Medicare and other health insurers, home care interventions that could effectively improve HF care for this population hold great potential for significant cost savings and improved health-related outcomes.

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The purpose of this study was to develop, implement, and test the efficacy and feasibility of the Home Care Education, Assessment, Remote-Monitoring, and Therapeutic Activities (HEART) program. HEART is a nurse-led, multicomponent, home care intervention that combines evidence-based protocols and telemonitoring (TM) to teach patients about HF, its self-management, and strategies to improve QOL and health-related outcomes.

Background

Home care patients with HF face a complex treatment regimen. Persons with HF are expected to monitor their weight, maintain a low sodium diet, exercise, follow strict medication regimens, and make regular clinic visits.[10] Effective self-care, with daily symptom monitoring and knowledgeable decision making about symptoms when they occur, may help patients with HF maintain an acceptable QOL and avoid repetitive hospitalizations.[5] Depression is prevalent among persons with HF, complicating management and outcomes.[11] Prevalence rates of depression in HF patients have been found to be highly variable across studies, ranging from 13% to 77.5%.[12] Patients with HF who are depressed are likely to have more HF symptoms, report a lower QOL, and have higher hospitalization rates.[13,14]

How well home care patients manage their daily care and symptoms is in part determined by their knowledge of HF and understanding of its management. A specific and comprehensive plan for HF patient education is necessary to maximize treatment outcomes. Home care nurses are in an optimal position to empower patients to improve self-management, through provision of critical education in management of this complex syndrome that is HF.

Evidence-based strategies to reduce hospital admissions and improve QOL can be divided into two categories: (1) close monitoring[5,15] and (2) self-care education.[5,16,17] The first strategy involves intense follow-up of patients (e.g., frequent phone calls and medical appointments). Close phone monitoring has been used as a simple and inexpensive strategy to improve HF outcomes.[18,19] In a randomized study with 151 HF patients following hospital discharge, patients were randomized to usual care or scheduled weekly telephone calls by specially trained nurses promoting guideline-based management and self-management. Nurses screened patients for HF exacerbations, which they managed with supplemental diuretics or by contacting the primary physician for further instructions. Study findings demonstrated that the number of admissions, hospital days, and hospital costs were significantly lower in intervention group patients during the first 6 months after the intervention but not at 1 year.[18] Another study examined the impact of a hospital transition telephone intervention for older adults on medication compliance and QOL. Results showed a significantly higher level of medication adherence and self-reported QOL in intervention group patients at 1 and 3 months following hospital discharge.[19]

Frequent follow-up appointments may be particularly important in improving HF outcomes. A recent observational study examined the relationship between early physician follow-up within 7 days of hospitalization and 30-day readmission among Medicare beneficiaries hospitalized for HF. The study population included 30,136 patients from 225 hospitals. Results from this study demonstrated that patients who received early follow-up had significantly lower rates of 30-day readmission.[20] Based on evidence that many readmissions occur before ambulatory follow-up, there has been a significant push for follow-up with primary care physician, ideally in collaboration with a cardiac specialist, within 7 to 14 days maximum following hospital discharge.[21]

Within home care settings, close follow-up strategies typically include frequent skilled nursing visits particularly during the first couple of weeks following admission to home care. One study found that increasing the nursing visit frequency within the first 2 weeks of admission to home care, known as front loading, was effective in decreasing rehospitalization by more than one half (30.4% to 16%).[22]

Technology provides an additional strategy for close monitoring of HF patients. TM is increasingly being embraced by home care agencies to provide daily monitoring services to patients with HF. However, systematic reviews,[23,24] meta-analyses,[25,26] and randomized controlled trials (RCTs)[27,28] have reported varying results in terms of the impact of TM on hospital readmissions with different HF populations, including post-hospitalized patients, community-dwelling patients, and home care patients. In addition, because multiple versions of TM were studied (telephone, automated, and biometric), valid comparisons between technologies are difficult to evaluate. Moreover, these studies did not differentiate between home care patients and community-dwelling patients. However, emerging evidence suggests that TM may be especially effective for home care patients with chronic illness, including HF.[29] A study of TM for patients with HF at 10 home health agencies in one mid-Atlantic state found that patients receiving TM had fewer hospitalizations and emergency department (ED) visits than patients in the control group. However, the differences were not statistically significant after 60 days.[30]

A few home care studies have linked TM to QOL. A recent study found TM with HF patients improved self-reported health status.[31] A qualitative study reported that patients felt a sense of peace and security with TM.[32]

The second evidence-based strategy is focused on providing HF self-care education. Several studies have focused on promoting self-care by focusing on adherence to therapy and monitoring of symptoms.[5,33-35] Intervention delivery methods used in these studies included traditional in-person one-to-one or group counseling and education sessions.[33-35] In a recent integrative review of interventions promoting self-care, 19 studies were examined.[36] Outcome measures evaluated in these studies included HF knowledge, hospital readmission, and QOL. Lengths of interventions ranged from 1 visit to 6 months. The authors reported that HF

knowledge and QOL were significantly improved in the majority of intervention group patients. Hospitalizations rates varied across studies with some studies reporting decreased rehospitalizations rates in intervention patients while other studies found no differences between intervention and control group patients. In contrast, another analysis of self-care educational interventions provided evidence that self-care education reduces rehospitalization rates but indicated that the influence of self-care education on QOL is unclear.[37]

One study compared the effectiveness of close monitoring and self-care interventions. A systematic review compared 29 trials of enhanced self-care activities or close monitoring on hospital readmission rates. Findings from this critical review indicated that self-care interventions were more effective in decreasing HF-related readmissions than those interventions using intense follow-up strategies such as telephone calls or appointments (relative risk [RR] 0.66 vs. RR 0.72-0.76). Self-care interventions decreased admissions by 34% compared with 26% with intense follow-up. However, the authors concluded that both types of interventions were effective in decreasing all-cause hospitalizations.[38]

Strategies to improve self-care in home care patients include one-on-one education during skilled nursing visits,[39,40] use of patient booklets,[39-41] telephone monitoring, and video-conferencing.[41,42] Studies in home care have reported on the efficacy of evidence-based HF educational interventions. One RCT in home care,[43] the Health Outcomes, Management, and Evaluation program, compared nurse-led evidence-based educational protocols with usual care. Findings demonstrated a significant decrease in need for skilled nursing visits and a trend toward decreased hospital admissions, with no significant differences in emergency room use, physician visits, or QOL. Another RCT used e-mail reminders.[44] The intervention led to improved health-related QOL for patients and had positive impacts on patient medication knowledge, diet, and weight monitoring.

Based on a review of literature, previous research and critical reviews provide evidence of the efficacy of close monitoring and self-care education interventions in improving outcomes in HF patients. Current evidence suggests that interventions that use close monitoring and self-care education appear to be most effective in the initial period after hospital discharge but less effective in advanced stages of HF.[22] In addition, though TM is widely used in HF management, studies show inconclusive results with TM and further studies are needed to identify which patients are most likely to benefit from this technology. Furthermore, the literature identifies other factors that are critical for best outcomes in HF management such as communication and coordination across the continuum of care.[22] However, communication and coordination between home care nurses and physicians is known to be problematic. A study conducted in home care with 303 patients with diabetes, HF, or both revealed information deficits that made disease and quality management difficult.[45] Our previous research identified lack of information and communication with physicians as barriers to optimal HF care by home care nurses.[46]

The HEART intervention is based on substantial evidence that there is a need for multicomponent interventions to address the widespread effects of HF and to guide best practices in home care settings. Because of the complex nature of HF, patients can potentially have deficits that occur in multiple domains (e.g., symptoms, comorbidities, and psychosocial issues) that are expressed at varying levels of intensity. Previous research suggests that no single intervention can address all domains and indicates that multicomponent interventions are more effective.[10,26] Thus, multicomponent interventions that are evidence-based, theoretically grounded as well as feasible and acceptable, and efficacious are needed. Our HEART intervention combines evidence-based strategies to closely monitor patients and provide comprehensive HF education by nurses trained in HF working closely with patients' physicians and the interdisciplinary home care team. TM and evidence-based education protocols are used to teach patients and family caregivers to develop the self-management skills necessary to engage actively in a HF self-care plan, while addressing and managing problems that commonly occur as the syndrome progresses.

In summary, there is an urgent need for further studies in home care that address the multidimensional needs of patients and identify best practices for HF management. In addition, though decreased QOL and depression are common in this population, studies that include education to improve QOL or prevent or reduce depressive symptoms are lacking in the literature. The present study aimed to close gaps in the literature by evaluating the potential efficacy and feasibility of a home care intervention that combines TM, HF education, and wellness activities. Research questions included the following:

Research Question 1: What is the potential efficacy of the HEART intervention in improving QOL?
Research Question 2: What is the potential efficacy of the HEART intervention in improving HF knowledge?
Research Question 3: What is the potential efficacy of the HEART intervention in reducing all-cause hospital admissions?
Research Question 4: Is there evidence to support the feasibility of the HEART intervention?

Methods

Study Design and Setting

This study used a quasi-experimental, two-sample (intervention vs. control), stratified (urban vs. suburban) design with baseline and post-treatment evaluations. A large multibranch home care agency with two urban and two suburban offices agreed to incorporate the HEART intervention into their branches for purposes of this study. The two urban branches

are similar in size and serve relatively low socioeconomic status (SES) populations. The two suburban branches are smaller and serve higher SES populations. The urban and suburban branches were each randomized to the intervention or control condition. The decision to stratify the study groups based on geographic location and type of agency reflects a strategy to decrease threats to internal validity that might arise with between-sample imbalances in SES status and to reduce the possibility of information sharing (leading to cross-sample contamination) among nurses within a single location.[47]

Participants

The study was conducted with adult patients receiving home care services for HF. Patients were eligible to participate in the study if they were age 40 or older, had a primary diagnosis of HF on admission to home care, were English speaking, living at home, mentally competent to give informed consent, and had access to an in-home phone line. For this pilot study, the sample size goal was 40 to 50 patients.

Patients admitted to home care with a primary diagnosis of HF were identified by the cardiac program manager and co-investigator at the home care agency. The cardiac program manager contacted potential participants, explained the purpose of the study, performed the initial screening for eligibility, and invited patients who met the five screening criteria (same as eligibility criteria) to participate. Patients who verbalized an interest in participating in the study were told that a member of the study team would contact them to arrange an in-person visit to obtain informed consent within 7 days of admission. All study procedures were reviewed and approved by the Institutional Review Board at the first author's institution and the participating agency.

Overview of the HEART Intervention

The intervention was based on the Self-Care in HF model[48] proposing mechanisms to explain self-care behaviors in older adults with HF. The theory proposes that psychosocial status and aging status determine self-care decision making. Psychosocial factors that can influence self-care decision making include depression, anxiety, perceived control, social isolation/social support, education level, and SES. Aging factors that can potentially influence self-care decision making include cognitive status, sensory impairment, changing symptom intensity, functional status, and comorbidities.[48] Self-care is conceptualized as having three components: self-maintenance relating to monitoring symptoms, self-management referring to actions taken based on symptoms, and self-efficacy or confidence in managing HF.[48]

HEART consists of four components (education, assessment, remote-monitoring, and therapeutic activities) and represents a significant enhancement to usual care. Table 1 provides a comparison of HEART and usual care. The HEART intervention incorporates guidelines for HF education from the American College of Cardiology/American Heart Association (ACC/AHA)[49] current nursing practice guidelines[50] and builds on previous work by the research team.[27,51] It is framed by the HF Self-Care model[48] within an eight-visit sequence delivered over 1 month. Visits are front-loaded with three visits for the first 2 weeks and one visit in Weeks 3 and 4.

Education topics included eight focus areas:

- Visit 1: Understanding HF—signs and symptoms
- Visit 2: Medications—prescription and over the counter
- Visit 3: Fluids and weight
- Visit 4: Heart healthy diet
- Visit 5: Exercise
- Visit 6: Physician follow-up and communication, community resources
- Visit 7: Stress management and wellness
- Visit 8: Creating a lifelong wellness plan.

Each visit includes a HF-focused assessment and reinforcement of previous teaching. The pleasant events list, consisting of 200 events for patients to choose among, has been previously used with community-dwelling elders.[52] The list was adapted to home care to accommodate homebound status, is introduced in Visit 2, and discussed at each consecutive visit. The adapted list contains the same activities from the original list that are divided into two categories, activities that can be performed during home care and activities that can be planned after discharge. Reliability of the adapted list will be evaluated in our next larger study.

Control Condition

Usual care at the home care agency participating in the study consists of TM and unstructured education provided by generalist nurses. Nurses are given a one-page HF handout based on national guidelines on educational topics such as disease process, symptom management, diet, medications, and exercise to be covered over the episode of care. This HF pathway was developed by the home care agency participating in the study. TM is offered to all HF patients as part of standard care.

Fidelity

To increase the fidelity of the intervention, nine home care nurses received evidence-based training in HF assessment and education. The initial training consists of two 2-hour sessions that reviewed best practices in cardiac assessment, comprehensive patient and family education, and intervention protocols. The training took place in person in a conference room at the home care agency 2 weeks apart. Training was based on the American Association of HF

Table 1. Comparison of HEART and Usual Care.

HEART	Usual care
Home care education: Evidence-based training was provided to nurses, including detailed education on disease process, symptom management, diet, medications, and exercise	No formal training for VNA nurses in HF is currently in place. Nurses use a care path of major assessment and education topics pertaining to HF developed by the agency in the study
Assessment: A comprehensive HF assessment based on best practice standards was performed at each home care visit. Nurses received training to facilitate early recognition of HF exacerbation and common comorbid conditions such as diabetes mellitus and depression. Nurses also received training in depressive symptom assessment	Care is typically provided by two to three generalist nurses. No formal training for nurses is currently in place for HF assessment. Home care nurses do complete a two-item depression assessment on OASIS during admission but are not required to follow up on depressive symptoms
Remote-monitoring: TM was set up in patients' homes within 48 hours of admission. The physiological monitoring system is designed to collect blood pressure, heart rate, oxygen saturation, and weight data daily. In addition, patients were asked to respond "yes" or "no" to five questions related to HF symptoms (e.g., "Are you short of breath today?"). Patient data were transmitted to the home care agency. Data were reviewed daily by the cardiac program manager who, if necessary, responded by calling the patient and notifying the physician of any abnormal findings. Patients receive instruction, prior to the installation of TM, that it is not intended as an emergency or 24-hour monitoring system	Usual care patients received the same TM protocols and follow-up as the Intervention group
Therapeutic activities: A pleasant events list that was used in previous trials to improve QOL and to prevent/reduce depressive symptoms in community-dwelling elders has been adapted to home care by the research team. It was used as the therapeutic activities component of the HEART intervention. Patients were given a list of over 200 pleasant physical and social activities and were instructed to select and to follow at least one activity per week. Examples of the activities include walking, having a friend over for lunch, playing cards, and enjoying a sunset. Nurses develop an individualized exercise plan to enhance functional status and overall physical health for each patient	Usual care does not integrate health promotion activities or planned pleasant physical or social events. VNA nurses do not routinely assist patients with the development of an individualized exercise program. Occasionally, they do refer patients for a physical therapy consult

Note. HEART = Home Care Education, Assessment, Remote-Monitoring, and Therapeutic Activities; VNA = visiting nurse association; HF = heart failure; OASIS = Outcome and Assessment Information Set; TM = telemonitoring; QOL = quality of life.

Nurses guidelines.[50] Throughout the study, the training was reinforced by the cardiac program manager at the home care agency. Communication with physicians was included in the training. Nurses were encouraged to request additional information such as type of HF (systolic vs. diastolic), key laboratory values, and targeted weight as well as to contact physicians with early signs of exacerbation.

Measures

All patient outcome data were collected at baseline and 60 days post-baseline:

QOL was evaluated using the Minnesota Living With Heart Failure (MLHF) questionnaire.[53] The MLHF is a 21-item, self-administered questionnaire measuring the effects of HF and treatments for HF on an individual's QOL. Reliability and validity of the MLHF are supported by multiple studies.[53,54] In the most recent of these, internal consistency was estimated at 0.86 and the investigators presented evidence of concurrent and construct validity.[55]

Hospital admission rates were assessed by chart review. Information related to the occurrence of hospital readmission was collected at the 60-day study endpoint.

Knowledge of HF self-management was compared between HEART and control group participants by administering the Dutch Heart Failure Knowledge Scale[56]—a 15-item, self-administered questionnaire. Content and construct validity of the instrument were tested in 902 HF patients in 19 hospitals in the Netherlands. Cronbach's alpha for the scale was .62.[56]

Depressive symptoms were evaluated using the Patient Health Questionnaire (PHQ-9).[57] The nine items of the PHQ-9 come directly from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*)[58] signs and symptoms of major depression. Scores of 5 to 14 suggest mild-to-moderate depression. Scores greater than10 suggest a clinically significant level of psychological distress, but not necessarily a clinical diagnosis of depression. A recent randomized trial with depressed older adults found the reliability and the criterion validity of the PHQ-9 to be excellent; the test–retest reliability ranged from 0.86 to 0.91.[59]

Feasibility was evaluated with a post-intervention questionnaire completed by both HEART and usual home care groups to compare benefits and acceptability of the intervention. All patients were asked to complete a self-administered "HF knowledge and satisfaction with care" questionnaire. This nine-item questionnaire, developed by the principal investigator, consists of Likert scale responses and includes four open-ended questions that allow further comments. The questionnaire was given to patients at the 60-day post-intervention interview.

Data Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences for Windows (Version 20.0; SPSS Inc., Chicago, Illinois). Sociodemographic and clinical variables were summarized as means and standard deviations for continuous variables and as counts and percentages for categorical variables.

The primary outcome variable, QOL, as well as the secondary outcomes of HF knowledge and depressive symptoms were evaluated using repeated-measures ANOVA with intervention group and time as predictors of these variables. Regression analyses were performed to control for baseline differences between groups. The chi-square test was used to evaluate hospital readmission. A p value of .05 was considered statistically significant.

Qualitative data from patients' responses to the open-ended questions on the survey were analyzed using Krippendorff's[60] method of content analysis using the following process: (1) comments were coded into two mutually exclusive and exhaustive categories, positive and negative comments designated with a value of 0 and 1, respectively; (2) categories with similar content were clustered allowing for the identification of central themes and the frequency of their occurrence; and (3) positive and negative themes were compared to provide a comprehensive view of patients' perceptions of their home care experience.

Results

Study Sample Sizes and Characteristics

A total of 50 patients were enrolled in this study, 26 patients in the HEART intervention group and 24 patients in the control group. Seventy-eight patients were screened for eligibility. Of these 78 patients, 16 were excluded because they did not meet the study inclusion criteria (7 did not speak English, 5 were living in an assisted living facility, and 4 were confused and did not have the cognitive ability to participate) and 12 declined to participate (8 felt too ill to participate and 4 were not interested in participating). Figure 1 provides a schematic view of study participant recruitment. As this figure shows, we were highly successful in retaining enrolled patients; 25 out of the 26 patients participated in the 60-day follow-up data collection (1 patient died). In the control group, 21 of the 24 patients completed the 60-day follow-up assessment; 1 of these patients died and 2 others were unable to be contacted for follow-up data. Forty-six (25 control, 21 intervention) patients completed the study.

Table 2 summarizes the sociodemographic characteristics of the 50 study patients at the time of baseline data collection. Intervention and control group patients did not differ significantly from each other in terms of age, education, race/ethnicity, living arrangements, NYHA (New York Heart Association) category, or number of comorbidities. In addition, no significant differences between groups were found in the clinical baseline scores for QOL, HF knowledge, or depressive symptoms. However, significant differences between groups were found in gender and marital status. There were more females in the intervention group ($p = .048$) and more participants in the control group were married ($p = .02$).

Patient ages ranged from below 49 years to above 90 years with the majority of patients (71%) between the ages of 70 and 90. The majority were female (77% in the intervention, 50% control), Caucasian (69% intervention, 81% control) living with someone else (58% both groups), and had completed high school (46% intervention, 54% control). Most (96%) experienced NYHA class III symptoms and reported two to three comorbidities. The majority of patients were referred to home care following a HF-related hospital admission (76%) and the remaining 24% were referred from either a skilled nursing facility, physician office, or family member.

QOL

Table 3 presents outcome data related to QOL and HF knowledge. For the primary outcome of QOL, repeated-measures ANOVA followed by hierarchal regression analyses controlling for gender and marital status were used to assess differences in QOL post-intervention. Between baseline and 60 days, scores on the MLHF questionnaire improved in both groups. Analyses revealed a trend toward a greater improvement in QOL in the intervention group. However, this was not statistically significant. Mean baseline QOL scores in interventions patients were 61.8 and 42.2 at the 60-day study endpoint. In comparison, control group patients had mean baseline scores of 62.7 and 49.5 at 60 days.

HF Knowledge

Repeated-measures analysis revealed that patients participating in the HEART intervention demonstrated significantly improved HF knowledge ($F = 1.31$, $p < .001$) compared with control group patients at 60 days. As can be seen in Table 3, intervention group patients increased their HF knowledge score 3 points out of a possible 15 points post-intervention, whereas control group patients' scores remained similar at

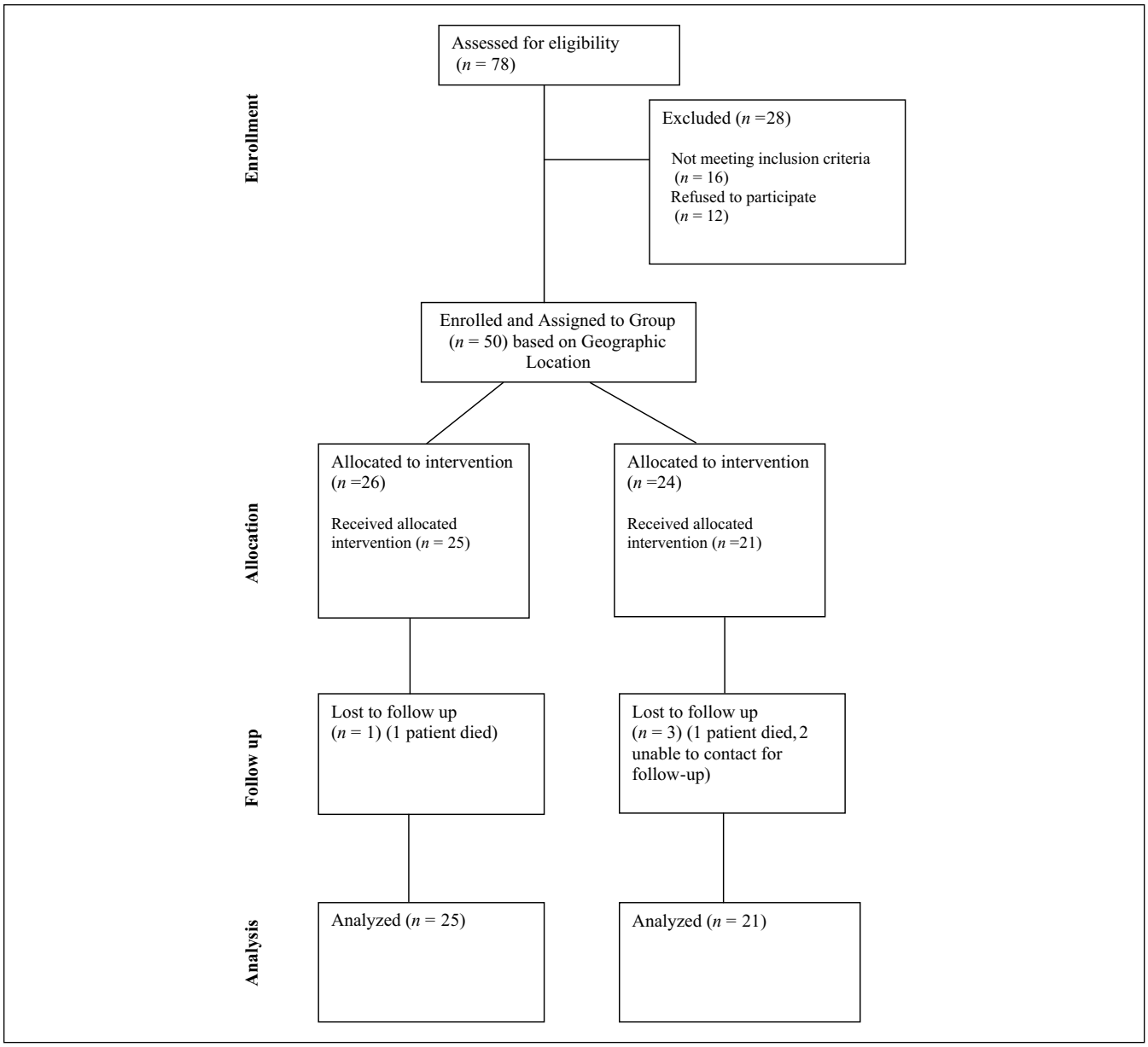

Figure 1. Study participant recruitment and flowchart.

baseline and 60 days. This effect remained significant after controlling for gender and marital status.

Hospitalization

There was a trend toward lower all-cause hospital readmission rates in the intervention group, but this was not statistically significant. During the 60-day study period, 6 patients in the intervention and 9 patients in the control group were hospitalized. Of the 15 patients hospitalized in this study, 6 of those hospitalizations occurred during the first 30 days (3 intervention and 3 control group patients). In addition, there was also a trend toward fewer HF-related hospital admissions (4 intervention, 6 control) that was non-significant.

Depression

Baseline PHQ-9 scores for patients in the study ranged from 0 to 3, with a mean of 1.2, indicating that in this particular sample, the majority of patients did not report depressive symptoms. PHQ-9 scores of less than 3 are associated with the absence of depressive symptoms; thus, it was not surprising that no significant effects were demonstrated in the sample.

Post hoc Power Analysis

Post hoc power analyses were performed on non-significant outcomes of QOL, depression, and hospitalization to determine if there was sufficient power to accept non-significant

Table 2. Baseline Characteristics of Study Patients, by Treatment Group.

	Intervention		Control		
Demographic	Frequency	%	Frequency	%	*p* value
Age (years)					.191
Below 49	4	15	1	4	
50-59	0	0	3	12.5	
60-69	7	27	0	0	
70-79	2	8	7	29	
80-89	8	31	10	42	
90 or higher	5	19	3	12.5	
Gender					.048
Female	20	77	12	50	
Male	6	23	12	50	
Education					.730
Elementary	3	11.5	4	17	
High school	12	46	10	42	
Associate's degree	7	27	4	17	
Bachelor's degree	0	0	1	4	
Master's degree	1	4	2	8	
Other	3	11.5	2	8	
Race					.174
Caucasian	21	81	23	96	
African American	4	15	0	0	
Asian	0	0	1	4	
Other	1	4	0	0	
Marital status					.022
Single	7	27	3	13	
Married	4	15	7	29	
Divorced	8	31	1	4	
Widow	7	27	13	54	
Living arrangements					.963
Alone	11	42	10	42	
With someone else	15	58	14	58	
Work					.107
Full-time	0	0	1	4	
Part-time	0	0	2	8	
Retired	18	32	18	75	
Missing	7	27	1	4	
Comorbid diagnoses	2.4	88	1.8	88	.306

Table 3. QOL and HF Knowledge at Baseline and 60 Days.

	Intervention group	Control group	
Outcome variable	*M* (*SD*)	*M* (*SD*)	*B* value (*p*)
QOL			
Baseline	61.88 (22.14)	62.73 (21.48)	105 (.745)
60 days	42.21 (19.39)	49.57 (22.83)	308 (.362)
HF knowledge			
Baseline	10.81 (2.88)	13.45 (1.84)	001 (.979)
60 days	10.00 (2.34)	10.94 (2.18)	131 (.004)

Note. Hierarchical linear regression analyses are controlled for gender and marital status. QOL = quality of life; HF = heart failure.

results. Analyses confirmed that the study was underpowered to detect meaningful differences in the QOL, depression, and hospitalization and would require a sample size of 76, 72, and 100, respectively, to achieve 80% power.

Feasibility: Patient Self-Reported Knowledge and Satisfaction

Table 4 summarizes results of the post-intervention feasibility measure pertaining to perceived knowledge completed by intervention and control group patients at the 60-day follow-up interview. Intervention patients reported a significantly higher level of perceived HF knowledge from their home care experience compared with control group patients

Table 4. Participant Responses to the Post-Intervention Feasibility Measure Regarding Perceived Knowledge.

	Intervention	Control
My home care experience has enabled me to:	*M* ± *SD*	*M* ± *SD*
Understand HF	3.83, 0.491	3.53, 0.514
Monitoring my symptoms of HF	3.91, 0.417	3.53, 0.514
Understanding my medications	3.83, 0.491	3.00, 0.791
Understanding my diet	3.70, 0.635	3.24, 0.831
Follow an exercise program that fits my abilities	3.70, 0.559	3.12, 0.697
Manage my stress	3.61, 0.783	2.65, 1.057
Incorporate pleasant physical and social events into my life	3.70, 0.559	2.41, 1.004
Communicate better with my doctor	3.74, 0.619	2.94, 0.966
Develop a self-care plan to manage my HF	3.65, 0.647	3.12, 9.28

Note. Perceived knowledge measure scores range from 1 = *strongly disagree* to 4 = *strongly agree*. HF = heart failure.

($F = 1.24$, $p < .001$) on the post-intervention questionnaire. Scores on the nine-item perceptions of self-reported HF knowledge questionnaire for intervention patients ranged from 2 to 4 with a mean overall score of 3.3, where 4 was the highest level of agreement on the response scale. In control group patients, scores ranged from 1 to 4 with an overall mean score of 3.06. Intervention patients scored highest perceived knowledge marks on Question 2 (monitoring my symptoms of HF) and lowest on Question 6 (manage my stress).

Study patients were asked to respond to four questions related to satisfaction: (1) "What are your overall feelings related to your home care experience?" (2) "What was done especially well by the home care nurses?" (3) "What could have been better about your home care experience?" and (4) "What changes would you suggest?" Overall satisfaction was high in both the intervention and control groups. The vast majority (90%) made positive comments regarding their home care experience. It was apparent from patient comments that home care was an essential service. The importance of home care in helping patients to maintain independence and remain at home was described by an intervention group patient: "The VNA provides an excellent service. It helped me to stay at home. I do not know what I would have done without it." A control group patient stated, "I was happy to have this service, it was a very positive experience." Most patients provided comments about the TM. An intervention patient stated, "The TM helped me to develop a daily routine, I now start every day by weighing myself, taking my medications, and checking to see if I have any fluid in my extremities or feel short of breath." Another patient commented, "I did not want to give up my TM machine, it made me feel safe and I wish I could buy it for myself." A few patients ($n = 3$) did not enjoy their TM. As one patient said, "The TM made me nervous, I was worried every day that I gained weight, I am glad I do not have it anymore."

Study patients were able to describe several areas which were done especially well by the nurses. Patients repeatedly used words such as "informative," "helpful," "caring," and "excellent" to describe their nurses. Although the majority of patients ($n = 40$) had several positive comments regarding nursing care, there was a difference between their comments related to their ability to manage their HF. Whereas control group patients tended to make general comments such as "the nurses were easy to talk to" and "the nurses closely follow-up on my care," intervention patients provided more specific examples of HF management. A majority of the intervention patients ($n = 18$, compared with control group, $n = 8$) confirmed that the program had improved specific health behaviors as well as coping strategies. One intervention patient described the knowledge gained from the home care experience, "I loved the HF booklet, it covered all the things I need to know and do to control my HF." Another patient added, "The pleasant events list was great, it was nice to include something that made me happy."

Patients identified a few areas that could have been better with their home care experience and suggested improvements to the program. These comments were similar between intervention and control group patients and tended to be centered around home care scheduling ($n = 6$), flexibility in times for home visits ($n = 4$), and spending more time on specific HF topics such as medications ($n = 3$). However, the majority (90%) of comments to these last two questions were summarized by a patient: "Nothing, keep up the great work the agency is doing."

Nurse Satisfaction

To further evaluate feasibility, nurses who delivered the home care intervention were informally interviewed to evaluate their satisfaction with the HEART intervention. Home care nurses reported a high level of satisfaction with the intervention. Nurses enjoyed the HF booklet as much as their patients. One nurse commented, "The booklet helped me to organize the information I was presenting to patients and to make sure I included all the important educational components." Nurse empowerment was apparent in their comments. As one nurse stated, "I have a new appreciation of evidence-based HF care and feel able to meet the needs of my patients." In the next phase of our study, formal measures to evaluate nurses' knowledge of evidence-based HF

management as well as measures to collect feasibility data from home care managers and physicians will be included in the study design.

Discussion

This pilot study reported on the potential efficacy and feasibility of the HEART intervention among home care patients with HF. Study outcomes that were evaluated related to efficacy included QOL, HF knowledge, hospitalizations rates, and depressive symptoms. The results indicated that patients who participated in the 1-month intervention significantly increased their HF knowledge and demonstrated a non-significant trend in improved QOL and decreased hospital admissions compared with their control group counterparts. Depression levels were low in this group at baseline and remained low throughout the study period, and were also lower than national reported rates of depressive symptoms among older adults.[12]

Content analysis of patients' comments on the post-intervention feasibility measure related to their perceptions of HF knowledge and satisfaction supports the acceptability of the HEART intervention. Results showed that intervention patients perceived themselves better able to monitor and manage their HF compared with their control group counterparts. Nurses' comments reinforced the feasibility of the intervention and the ease of implementing the program within their normal routine.

The findings from this study provide the foundation for future research efforts and home care program development. Based on the results of this study, we can make four recommendations. First, we recommend that home care agencies, who have not already done so, consider developing an evidence-based HF program for nurses. Given the widespread incidence and chronic nature of HF failure and the consequences of insufficient management, home care agencies must adequately educate their staff caring for this patient population. An assessment and educational program dedicated solely to HF or incorporated into annual competency testing may ensure an optimum level of nursing knowledge necessary for the effective management of HF.

In this study, TM was included in both intervention and control group treatments as the home care agency that participated in the study offers TM as a part of usual care. Findings from this study suggest that TM combined with structured evidence-based education delivered by nurses with expertise in HF was associated with better outcomes than TM with unstructured education provided by generalist home care nurses.

Second, we recommend including a wellness component to HF management programs such as the pleasant events list used in this study in HF care. Equally important to helping patients understand HF maintenance and management is to bring happiness to their lives. Patients who perceive a higher QOL are likely to have fewer depressive symptoms and be more motivated to be active participants in their care, which is crucial for HF self-management.[13] Many intervention patients in this study commented that incorporating at least one pleasant event in their lives lifted their spirits and helped them to try to live well with HF.

Third, we recommend including additional measures such as self-care capacity, health literacy, cognitive status, and social support in future research studies in home care. Previous research indicates that these patient factors influence HF management and outcomes.[10] An understanding of a patient's health status related to these factors would allow home care nurses to tailor self-care education for individual patients to allow for maximum benefit of home care interventions to improve outcomes.

Our last recommendation refers to adding a booster session 1 to 2 weeks following home care discharge. Once patients have been discharged and formal care has ended, new challenges may occur that could be addressed early to avoid complications. This session could be conducted by phone to reinforce previous teaching and extend teaching related to any new issues that arise. Because the hospital readmission rate is high in this group, a booster session may contribute to better long-term outcomes.

Limitations

There are four primary limitations of the study: (1) use of a quasi-experimental design that assigns participants to study conditions without the benefits of randomization and (2) restriction of the study sample to a single, multibranch, home care agency in Connecticut. These limitations affect the generalizability of study findings to other HF populations. In addition, (3) as pilot studies are underpowered to detect meaningful differences in clinically important measures,[36] the outcomes of QOL, hospital admission, HF knowledge, and depression examined in this study should be interpreted with this limitation in mind, and (4) this pilot study did not collect any cost or benefit data; therefore, readers may not wish to invest in a similar program until a cost–benefit analysis can be conducted. We plan to include these data in our next study.

Conclusion

The HEART intervention was designed to be an effective and feasible multicomponent HF program that could be easily implemented in the context of normal home care processes. Results from this small pilot study provide preliminary evidence that the multicomponent intervention used in this study holds promise as a best practice strategy for HF home care by combining close monitoring with front-loaded visits and TM along with structured self-care education provided by nurses with expertise in HF. Further research with larger sample sizes using a randomized design in diverse home care settings is needed to explore the effectiveness of HEART

intervention in improving clinical outcomes and decreasing hospital admissions.

Declaration of Conflicting Interests

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