An Economic Evaluation of a Self-Care Intervention in Persons With Heart Failure and Diabetes

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ABSTRACT

Background: Persons with concomitant heart failure (HF) and diabetes mellitus constitute a growing population whose quality of life is encumbered with worse clinical outcomes as well as high health resource use (HRU) and costs.

Methods and Results: Extensive data on HRU and costs were collected as part of a prospective cost-effectiveness analysis of a self-care intervention to improve outcomes in persons with both HF and diabetes. HRU costs were assigned from a Medicare reimbursement perspective. Patients (n = 134) randomized to the self-care intervention and those receiving usual care/attention control were followed for 6 months, revealing significant differences in the number of hospitalization days and associated costs between groups. The mean number of inpatient days was 3 with bootstrapped bias-corrected (BCa) confidence intervals (CIs) of 1.8−4.4 d for the intervention group and 7.3 d (BCa CI 4.1−10.9 d) in the control group: $P = .044$. Total direct HRU costs per participant were an estimated $9,065 (BCa CI $6,496−$11,936) in the intervention and $16,712 (BCa CI 8,200−$26,621) in the control group, for a mean difference of −$7,647 (BCa CI −$17,588 to $809; $P = .21$) in favor of the intervention, including intervention costs estimated to be $130.67 per patient.

Conclusions: The self-care intervention demonstrated dominance in lowering costs without sacrificing quality-adjusted life-years. (*J Cardiac Fail 2015;21:730−737*)

Key Words: Diabetes, cost-effectiveness analyses, self-care intervention.

The most recent statistics reveal that >5.7 million persons in the United States have heart failure (HF), with an expected growth to >8 million by 2030.[1] As the most common cause of hospitalization in older adults,[2] HF accounts for 6.5 million hospital days each year as well as >18 million office visits.[1] High economic and individual patient burden of HF is partially due to the rate of rehospitalizations, which are reported as high as 25% within 30 days,[3] 47% within 90 days,[4,5] and 54% within 6 months.[6] A striking 40%−60% of these are thought to be preventable by greater provider attention to standards of care and better patient self-care.[7−9] Diabetes mellitus is also increasing owing to aging and obesity epidemics, and studies report that ∼30%−47% of HF patients have concomitant diabetes.[10−12] There is an increased risk of mortality among HF patients with diabetes, ranging from 40% to 80% excess

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risk, and a reported 1.6-fold increase in the relative risk for rehospitalization compared with those without diabetes.[5,13−18] The prevalence of both diseases is increasing worldwide as the general population ages, with >1.5%−2% of individuals over the age of 65 years now having both HF and diabetes and exponential growth expected in the next decades.[1] Therefore, patients with concomitant HF and diabetes represent a growing population whose quality of life is encumbered with worse clinical outcomes as well as high health resource use (HRU) and costs.[19]

The purpose of the present study was to conduct a prospective cost-effective analysis of a randomized clinical biobehavioral trial (Quality HF-Diabetes) focused on improving comorbid self-care for persons with both HF and diabetes. The self-care intervention improved HF quality of life, physical function, and self-reported physical activity.[20] This analysis of HRU and costs was undertaken to provide a comprehensive picture for determining the usefulness of the intervention and implications for translation into practice.

Methods

Design, Setting, and Sample

The design and methods of Quality HF-Diabetes have been described in detail previously.[20,21] Participants were recruited during or within 3 months of an inpatient HF hospitalization at 1 of 4 participating urban hospitals from 2011 to 2013. All were large tertiary care facilities with HF outpatient clinics. Inclusion and exclusion criteria are presented in Table 1. HF-diabetes patients who were experiencing their first HF hospitalization were also excluded to allow for some experience with self-care before a comorbidity-focused intervention. All study procedures were approved by the Institutional Review Board at each participating institution, and all participants provided written informed consent. Demographic and clinical variables were collected from each patient and the medical record and consisted of age, sex, marital status, education, ethnicity, left ventricular ejection fraction (LVEF), New York Heart Association (NYHA) functional classification, and body mass index (BMI). These variables, considered to be antecedent factors influencing self-care, were used to fully describe the sample and to compare treatment groups. Participants were randomized to intervention and control groups. Data were collected at baseline (BL), and at 3 and 6 months after enrollment, such that all visits were completed within 1 year of an acute HF hospitalization.

Table 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
• Age 21−82 y • Admitting diagnosis of HF • NYHA II−IV • Concomitant type II diabetes • Planned discharge to home • English fluency • Cognitive screening • Optimal HF medications • Ambulatory	• Uncorrected hearing or vision problem • Depressive symptoms (>10 on PHQ-9) • Cognitive impairment (>11 BOMC) • Undergoing cardiac transplant or VAD evaluation • Renal failure • Lack of telephone access

NYHA, New York Heart Association functional class; PHQ-9, Patient Health Questionnaire 9; BOMC, Blessed Orientation-Memory-Concentration; VAD, ventricular assist device.

Intervention Versus Usual Care Attention Control Group

Self-monitoring is a powerful behavioral tool for self-care and behavior change.[22] A detailed explanation of the intervention is available in the previous article that fully describes the primary goals and outcomes of the study.[20] The intervention was based on principles of adult learning, motivation and feedback, and goal setting and provided both content and self-management strategies.[23−28] The intervention was initiated in the hospital setting or soon after BL data collection and study enrollment, and initially included an individualized educational and counseling session. The intervention was structured but also individually tailored based on a well established baseline HF and diabetes knowledge test and the individual medication regimen. Family members were encouraged to attend.

The research nurse (RN) provided an overview of the content with the use of a semistructured script and coordinated set of PowerPoint illustrations viewed on a laptop computer. Corresponding written materials were developed at a 6th-grade reading level and provided in the form of an ''HF-diabetes tool kit.'' The goals of the integrated intervention were to 1) provide education and skills to perform integrated self-care related to their HF and diabetes diet, medication taking, and symptom and self-monitoring, 2) enhance physical activity, 3) increase self-efficacy related to both HF and diabetes self-care, and 4) promote recognition of the interaction between self-management strategies for HF and diabetes and facilitate decision making for treatment and provider contact when symptoms occur. Content was selected from standard teaching recommendations and guidelines for HF and diabetes patients[23,25,29,30] and was reviewed in a prior pilot study by HF and diabetes experts from nursing, medicine, and nutrition.[21]

At 48−72 hours, a home visit by the RN was made to review self-monitored glucose and weight information, to provide repetition of information, and to ascertain that diet and medication-taking behavior were congruent with discharge instructions. A scripted telephone call at 7−10 days reviewed self-monitoring of glucose, weight, and symptoms and the patients' interpretation of the data, and queried about diet and medication-taking behavior. In-depth physical activity (PA) counseling occurred at the 2 week visit when participants routinely returned to the clinic. The RN emphasized why PA was helpful to both HF and diabetes, provided information on a walking protocol, safe walking, expected length, duration, and self-monitoring of walking with a pedometer and activity log and how to use this information, and utilized problem solving for issues such as location and weather to promote self-efficacy for PA. Examples of appropriate chair exercises were provided as an alternative on days when walking was not possible. Additional short (15 min), scripted telephone calls occurred at 1, 2, and 4 months to review and promote self-monitoring of glucose, weight and symptoms, patients' interpretation of the data, diet, physical activity, and medication-taking behavior. Participants in the control group received routine education and standard hospital discharge instructions from their providers and the hospital nursing staff, with all enrolling institutions routinely including family members in the discharge teaching if present. In addition to routine post-discharge follow-