

The Effect of an Interprofessional Heart Failure Education Program on Hospital Readmissions

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Abstract: Heart failure (HF) is an increasing concern to public health, affecting approximately 5.1 million Americans and costing the United States over \$32 billion annually. Compounding the concern, research has exposed the significant problem of hospital readmissions for the HF population, with an estimated 25% of HF patients are rehospitalized within 30 days of discharge. This project focuses on an education-based strategy designed to decrease hospital readmissions for this at-risk population. In particular, an interprofessional outpatient educational program (Heart Failure University [HFU]) was initiated to reduce healthcare costs and increase the quality of care for HF patients at a large private hospital in Florida. A retrospective case-control study was conducted to compare 30-day hospital readmissions of patients who attended HFU to patients who received standard education. Results indicated a significant association between HFU attendance and reduced 30-day hospital readmissions ($\chi^2 [1, N = 106] = 5.68, p = .02$). Strengthening this effect, the results showed patients who attended HFU had a significantly greater functional disability than those who did not attend ($t(104) = 2.40, p = .018$). These findings corroborate with current research on transitional care interventions and emphasize the importance of interprofessional, educational-based disease management programs for the HF population.

As a requirement of the US Patient Protection and Affordable Care Act (ACA), the US Department of Health and Human Services (HHS) established the National Strategy for Quality Improvement in Healthcare (National Quality Strategy) for the improvement of patient health outcomes, the delivery of healthcare services, and population health (HHS, 2013). The ACA and initiatives such as the National Quality Strategy has drawn the attention of policy makers, payers, and healthcare organizations toward the national state of health, the quality of care, healthcare utilization, and healthcare costs. With these issues in mind, the 2013 Annual Progress Report to Congress on the National Quality Strategy established a reduction in hospital readmission rates as a priority improvement area (HHS, 2013). In addition, the Centers for Medicare and Medicaid Services (CMS) have made 30-day hospital readmission rates a quality indicator with improvement measures specified for acute myocardial infarction, HF, and pneumonia (CMS, 2014).

Studies have shown the period shortly after hospital discharge is critical for HF readmission outcomes. Because of the complexity of HF, disease management requires lifestyle changes involving diet modification, exercise training, a complex medication regimen, and conscientious monitoring of weight. Preventable HF readmissions are often due to nonadherence to medication regimens or diet restrictions, and lack of knowledge of signs and symptoms of disease deterioration (Ditewig et al., 2010). Improving self-care by teaching essentials of HF self-management through disease management programs (DMPs) has been shown to be an effective

Heart failure (HF) is a pressing concern to public health. An estimated 5.1 million Americans are living with HF and approximately 50% will die of the condition within 5 years of diagnosis (Go et al., 2014). Yet the concern is increasing, as researchers project a 46% increase in the prevalence of HF resulting in over 8 million adults living with HF by 2030 (Go et al., 2014). The public health concerns compound with an economic burden associated with HF estimated at \$32 billion annually in the United States alone and is projected to increase to \$78 billion in the next 15 years (Heidenreich et al., 2011).

Keywords

heart failure
readmission
education
transitional care
disease management
program

strategy in decreasing negative outcomes for the HF population (Ditewig et al., 2010; Gerdes and Lorenz, 2013).

Hospital strategies to improve readmission rates range from changes in inpatient education to postdischarge follow-up interventions (Hansen et al., 2011). Although readmission reduction strategies are plentiful, there is insufficient evidence of their effectiveness and few studies reported 30-day outcomes. For example, a systematic review of 47 transitional care interventions to reduce readmission and mortality rates for adults hospitalized with HF found only three interventions proven to be beneficial: intensive home visiting programs, multidisciplinary HF clinics, and structured telephone support. Most studies in this review did not report 30-day readmission rates, and only one study reported a decreased 30-day readmission rate (Feltner et al., 2014).

Purpose

In view of the substantial social and economic burden of HF, it is essential to establish evidenced-based strategies for the reduction of HF readmissions and the quality improvement of HF care. In response to this knowledge gap, the purpose of this project was to assess the impact of an HF education-based program on hospital readmissions. Specifically, this project sought to understand the relationship between posthospital discharge HF education program attendance and hospital readmission within 30 days of discharge.

Methods

Design

A retrospective case-control design was used through database and electronic health record (EHR) review of HF patients eligible to participate in the HF education program, Heart Failure University (HFU), at a large hospital in Northeast Florida. The primary goal was to compare the number of 30-day hospital readmissions among HF patients who received bedside

education (standard care) plus outpatient attendance of HFU (intervention group) to HF patients who only received standard care (control group). Secondary intentions of this study were to predict if the number of HFU sessions attended has an effect on readmissions and to determine the reasons why patients chose not to attend HFU.

All patients admitted to the hospital, with a diagnosis related to HF, receive interprofessional bedside education (standard care). This standard care education is asynchronous and administered by a multidisciplinary team. Topics emphasized include knowledge of prescribed medications, diet and sodium restriction, symptoms, monitoring and recording of weight daily, exercise and activity, and contact information for questions or changes in health status. All patients are given an individualized HF handbook and written discharge instructions.

Heart Failure University (intervention group) is an optional, interprofessional outpatient program offered at no cost to the HF patients. Heart Failure University aims to provide HF patients comprehensive education on their condition, including anatomy and functions of the heart, medications, nutrition, disease management, treatment options, stress management, and physical exercises, to improve cardiopulmonary and general health. Classes are offered on a monthly basis, meeting twice a week for 2 hours at a time with the initial hour focusing on education and the second hour consisting of cardiopulmonary rehabilitation through physical exercise training. Participants are encouraged to attend as many sessions as possible.

Study Population

The study population was identified from the HFU database within the initial 13 months of HFU operation (June 1, 2013–July 31, 2014) and cross-referenced with the hospital Heart Failure Clinic registry database. Patients are identified for the HFU database through referrals by physicians, nurses, and care managers during their hospitalization period. The intervention group was comprised of patients who attended one or more HFU session(s)

during the specified period, and the control group was comprised of patients who did not attend any HFU sessions. To minimize potential confounds across samples, the control group was matched to the intervention group in terms of age, sex, race, and New York Heart Association (NYHA) Functional Classification (disease severity).

Sample

The study sample consisted of 106 participants with a mean age of 64.57 ($SD = 13.35$) years and the sex was split evenly at 53 male and 53 female participants. Most participants were Black or White (50.5% and 46.7%, respectively), with other races representing 2.8% of the sample. The NYHA Functional Classes II and III were seen most often, with Class II participants comprising 26.4% and Class III participants comprising 61.3% of the sample.

Procedure

Participants were identified and all data were collected by the first author through a retrospective review of the HF Clinic electronic databases and the hospital EHR. The 30-day readmission status was calculated using the standard counting method, which was used in benchmark research by Jencks et al. (2009) and Anderson and Steinberg (1984) (America's Health Insurance Plans, Center for Policy and Research, 2012). For purposes of this study, all-cause readmissions were chosen because from a patient's or payer's perspective any hospital readmission is a cause for concern and CMS measures unplanned readmissions for any cause (all-cause) to any acute care hospital for their 30-day readmission measures (Medicare.gov, 2014).

Statistical Analysis

Using IBM SPSS Statistics Version 22, descriptive statistics were computed and the intervention and control groups were compared for differences. The main analyses used Chi-square tests to calculate the statistical significance of 30-day readmissions between the intervention and control

groups and logistic regression to predict the probability of hospital readmission in accordance with the number of HFU sessions attended.

Institutional Review Board Approval

The study was approved by University of Florida IRB-01 and by the IRB of the participating hospital. Both facilities approved a full waiver of informed consent and a Health Insurance Portability and Accountability Act waiver of authorization.

Results

Preliminary Analyses

Analysis of the similarity of groups revealed the intervention and control groups were accurately matched for age ($t(104) = 0.000, p = 1.00$), sex ($t(104) = 0.192, p = .848$), and race ($t(103) = -0.083, p = .934$). However, there was a significant difference in NYHA Functional Classification ($t(104) = 2.40, p = .018$), such that those in the intervention group were classified as having greater functional disability than those in the control group (Table 1).

Main Analyses

A Chi-square test was used to analyze the association of 30-day hospital readmissions between the intervention and control groups. The results indicated a statistically significant relationship between 30-day readmissions and HFU attendance ($\chi^2 [1, N = 106] = 5.68, p = .02$). The standard care group was significantly more likely to have a 30-day hospital readmission, with 13 individuals or 24.5% of the group readmitted. While the intervention group, who attended 1 or more HFU session(s), had only four individuals or 7.5% of the group readmitted within 30 days (Figure 1).

To determine whether this effect was independent of the matched variables, logistic regression was used to test the effect of NYHA Functional Classification and age on 30-day readmission, whereas

Table 1. Mean (and Standard Deviations) of Control Variables as a Function of Group

	Intervention Group	Control Group
Age	64.56 (13.32)	64.56 (13.50)
Sex	0.49 (0.51)	0.51 (0.51)
Race	0.53 (0.54)	0.52 (0.58)
NYHA Functional Classification	2.52 (0.63)	2.79 (0.56)

Sex dummy coded as female = 0 and male = 1. Race dummy coded as Black = 0, White = 1, and other = 2. NYHA Functional Classification possible values range from 1 to 4.
NYHA, New York Heart Association.

Chi-square tests were used to test the effect of sex and race on 30-day readmission. The NYHA Functional Classification variable showed a significant positive association with 30-day readmission ($B = 2.13$, Wald's $\chi^2 = 7.14$, $p = .008$); as disease severity (NYHA Functional Classification) increased the number of 30-day readmissions also increased. There was no association between 30-day readmission and age, sex, or race (all $ps > .64$).

Logistic regression was used to predict the probability of hospital readmission in accordance with the number of HFU sessions attended. Values of HFU attendance had a possible range from 0 to 8, with 33% ($n = 35$) of the sample attending all eight HFU sessions. Results indicated a marginal negative relationship ($B = -0.14$, Wald's $\chi^2 = 2.92$, $p = .088$). In particular, more

HFU sessions attended was associated with fewer 30-day readmissions.

Exploratory Analyses

A frequency distribution was used to determine the reasons why patients chose to decline HFU participation (Figure 2). The majority of the sample (64.2%) did not answer the phone call(s) by the clinic staff and 23.6% had messages left on their voice mail or with a family member. This was followed by participants who answered the phone but were not interested in HFU attendance (5.7%). The other category represented 2.8% of the sample and a small percentage of patients were willing to consider HFU participation but did not want to commit at that time (1.9%). Finally, a small percentage did not want to

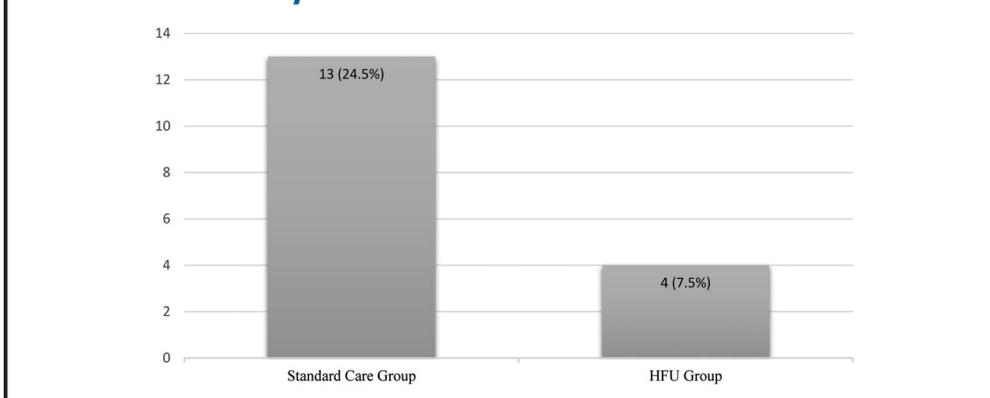
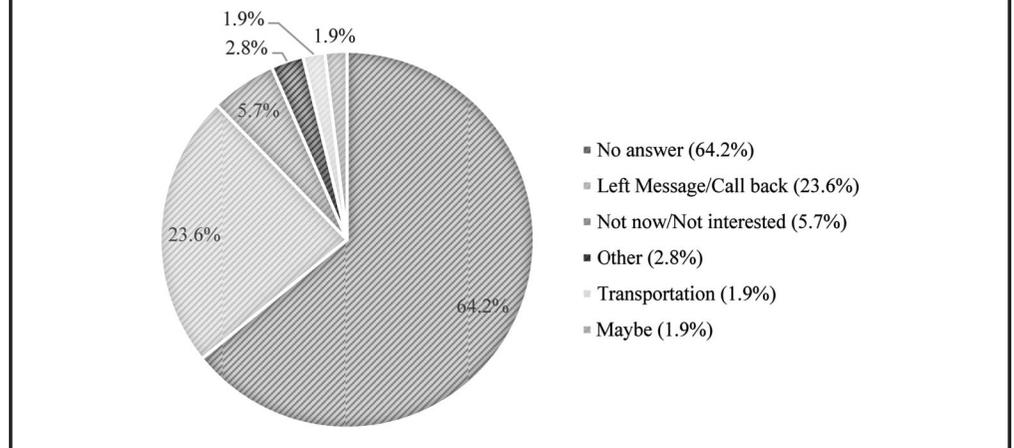
Figure 1. Thirty-day readmission results. HFU, Heart Failure University.

Figure 2. Frequency distribution of reasons to decline Heart Failure University (HFU) participation.



participate because of transportation issues (1.9%).

Logistic regression was used to offer insight into the factors that impact HFU attendance. Specifically, the analysis focused on any association between the number of attempted contacts clinic staff made in regard to HFU participation or the hospital length of stay and HFU attendance. Results indicated a significant association between the number of contacts and HFU attendance ($B = -0.80$, Wald's $\chi^2 = 5.24$, $p = .022$); as the number of contacts decreased HFU participation increased. The length of hospital stay did not show an association with HFU attendance ($p = .40$), but length of hospitalization was associated with readmission ($p = .035$).

Discussion

In light of the social and economic burden that HF readmissions place on patients and healthcare systems, the purpose of this project was to assess the impact of an interprofessional DMP (HFU) on hospital readmissions. Findings support the efficacy of HFU in decreasing 30-day readmissions compared with those HF patients who did not participate in HFU, despite greater disease severity at outset. These results support the evidence of educational-based interdisciplinary DMPs as an effective

strategy to reduce HF readmissions (Ditewig et al., 2010; Feltner et al., 2014; Gerdes and Lorenz, 2013; Willey, 2012).

On analysis of the matched groups, it was discovered that the NYHA Functional Classification was significantly greater in the intervention group than in the control group. This increases the importance of our findings because the HFU group had a significantly greater disease severity, yet significantly less 30-day readmissions as compared with the control group. Granting all this, a bias must be considered because of the self-selection of HFU participation. There may have been a bias to attend HFU by patients who were less healthy and therefore more motivated to engage in their health.

Of note, the exploratory analyses revealed several intriguing findings concerning those most likely to attend education-based programs. For instance, those with the least number of contacts were more likely to participate in HFU. It may be that patients who chose to attend the program had a higher level of motivation and health engagement than those who did not attend. Strategies to increase participation may include more robust attempts at patient health engagement and self-management during the hospital stay followed by only one or two compelling attempts to enroll the patient in HFU.

Understanding the demographics of those individuals most likely to seek out education seems critical given the documented positive association between HF-based education and reduced readmission.

Our finding that an increased hospital length of stay correlated with an increased likelihood of all-cause 30-day hospital readmission adds to the conflicting data concerning the relationship between hospital length of stay and readmission risk. An international study by Eapen et al. (2013) found a significant inverse relationship between length of stay and all-cause 30-day readmissions for HF patients. Other researchers (Kociol et al., 2013) found there was no association between 30-day readmission rates and length of hospital stay. Further investigation is needed to define the relationship between hospital length of stay and 30-day readmissions for the HF population.

Finally, the project sought to offer insight into why individuals choose to decline HFU attendance. Interestingly, most eligible patients (for various reasons) were not directly contacted by the clinic staff and only a small minority of patients offered a tangible reason (Figure 1). These findings suggest that more proactive measures to contact patients directly about education-based programs like HFU, such as information sessions before patient discharge, might prove fruitful in generating greater attendance.

Limitations

Several limitations of this study should be noted. This study took place within a single hospital system and the findings should be generalized with care. In addition, the researchers only investigated readmissions within one hospital system, which included three local hospitals. With a total of 15 hospitals within fifty miles of downtown Jacksonville, it is possible that readmission rates were higher than determined in this study due the potential of readmission to a hospital outside the participating hospital system. Finally, as a retrospective study, all study data rely on the quality of the original documentation and limit any additional information that may have been obtained.

Suggestions for Future Research

This study shed light on multiple areas of future research. Specific to the HFU program, future research should be focused on a cost–benefit analysis, comparing the costs of running the program with the costs of HF readmissions. Also, investigation of the period immediately after HFU participation could provide insight into the patient’s quality of life and factors leading to or preventing hospital readmissions. Furthermore, because relatively few of those eligible chose to participate in HFU, research of HF patient engagement is needed to examine patient participation in health decisions and medical plan adherence, as well as hospital strategies to increase patient health engagement.

Implications for Practice

In conclusion, our findings corroborate those of other researchers: interdisciplinary, education-based DMPs that focus on knowledge and self-management are an effective strategy to reduce HF readmissions. Our research adds to this knowledge by providing an example of an established interprofessional HF education program and its effect in relation to 30-day readmissions, a time frame in which current HF readmission research is lacking. With these findings, the HFU program provides an example of an effective transitional care intervention that could be used as a model for similar healthcare systems.

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J. N. Clarkson is a current employee of the hospital system where this research was conducted. For the remaining authors no conflicts of interest were declared.

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