

A nurse-guided patient-centered heart failure education program

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Abstract

Objective/Background: Heart Failure (HF) places substantial burden on patients, families, communities, and care systems. Patients who suffer from HF often experience a decline in health resulting in recurrent hospitalizations and debilitating symptoms including breathing problems, fluid retention, and chronic fatigue. HF is the most common cause of repeat hospitalizations in the Medicare program and is estimated to cost the health care system billions of dollars each year. The objective of this article is to review the literature on educational strategies to reduce HF related readmissions and improve self-care management for patients with HF after hospital discharge.

Methods: A structured review of PubMed, CINAHL, and MEDLINE resulted in 42 articles. The studies included 13 randomized control trials, six systematic reviews, and 23 studies using quasi-experimental, retrospective or descriptive designs on HF

Practice Implications: Current research indicates that assessing patient's self-care ability and deploying standardized patient education programs focused on self-care management significantly lower exacerbations of symptoms, emergency department visits, and readmission for HF patients. Adding telephone follow-up for continued assessment and support of the patient's self-care ability can reduce readmissions by 80% and prove to be a cost effective intervention.

Measuring the patients self-care ability, deploying a standardized nurse guiding patient education program that includes telephone follow up is suggested in the evidence can result in decreased admissions and improved health outcomes.

Key words

Nursing Education, Heart Failure, Self-care management, Readmissions

1 Introduction

Implementing practice change based on valid and reliable research is necessary to promote the continual improvement of patient outcomes and the delivery of quality care ^[1]. The cardiovascular literature must be reviewed and translated to support the design and implementation of an evidence-based well structured nurse-guided heart failure patient education program.

Background and significance

More than 6.5 million Americans suffer from HF and 50% have an average survival rate of less than 5 years from initial onset of disease [2-4]. HF patients account for the highest frequency of hospital readmissions in the United States [2, 5]. It is estimated that 25%-50% of patients with HF will be readmitted within 3-6 months of hospitalization [2, 6]. Patients who suffer from HF often experience a decline in health resulting in recurrent hospitalizations and debilitating symptoms including breathing problems, fluid retention, and chronic fatigue [6-9]. Evidence suggests hospital readmissions for HF can be reduced, but the gap between the evidence on HF self-care and its application to practice remains wide [10, 11]. The purpose of the article is to provide a synthesis of evidence-based literature on HF patient education programs that reduce readmissions and offer opportunities to address gaps in knowledge regarding self-care management for HF patients.

Impact on health care costs

Health care expenditures related to HF hospitalizations are estimated to cost more than \$39 billion per year [12, 13]. Hospital readmissions result in more than \$15 billion in additional annual Medicare expenditures [3, 4, 14]. The Centers for Medicare & Medicaid Services (CMS) redesign of its Inpatient Prospective Payment System is estimated to reduce annual Medicare expenditures for readmissions by \$2.58 billion [4]. Averill and colleagues [4] state “the FY2010 budget from the Obama Administration proposed payment reductions for readmissions as one means of controlling Medicare expenditures” [4]. The metrics most often employed by policy makers have been noted to penalize hospitals for readmissions and can add up to 20% of the hospital’s inpatient payments based on comparative readmission payments [3, 7]. The most common penalty driven policy focuses on 30 day re-admission rates of HF patients.

There are several challenges to policymakers’ emphasis on 30-day readmissions from studies that examine readmissions as a marker for poor quality of care. Researchers argue that the metric is problematic because a large proportion of 30-day readmissions are not preventable and are caused by situations beyond the hospitals control such as low health literacy and mental illness [7, 15]. In a recent systematic review, only 27% of HF readmissions were deemed preventable, supporting readmissions as a poor marker for quality of care [7]. According to recent literature, common contributing factors to readmissions include poor social support, poverty, and decreased access to health care [7, 9, 15, 16]. An alternative solution to reduce hospital readmissions is for policy makers and CMS to address the causative factors of HF related readmissions and promote quality improvement programs [4, 7, 17-19].

2 Methods

A literature search for evidence related to HF patient education was conducted using CINAHL, EMBASE, and MEDLINE databases. Search terms included *HF*, *re-hospitalizations*, *risk factors*, *intervention*, and *re-admissions*. To identify relevant papers, search limitations were set for human only, men and women, age 65 and older, English only, from 2006 to 2011. The exhaustive search resulted in approximately 773 articles that included published articles, editorials, and reviews. To further refine the results inclusion and exclusion criteria were applied. The exclusion criteria included pharmaceutical studies, articles reporting heart transplant outcomes, renal failure, studies testing reliability of diagnostics tests, and cardiac post-surgical studies. The following keywords met the criteria for inclusion: (1) readmission data, (2) acute decompensated HF, (3) comprehensive management plans for HF, (4) discharge HF hospitalization, (5) follow-up or education. As a result of applying limitations, inclusion, and exclusion criteria- the search yielded 384 articles. Duplicates and results clearly not relevant were eliminated yielding 97 articles. This group of articles was reviewed for content addressing post-hospitalization follow-up and discharge education. This rigorous process was implemented using the My NCBI© database, and Ref Works© bibliographic management software.

Final selection of articles included 6 systematic reviews, 13 randomized control trials, 14 quasi-experimental and 4 non-experimental studies. The 5 remaining studies included were expert opinions of respected authorities from organizations like the Centers for Medicare and Medicaid Services (CMS) and the American Heart Association (AHA).

Studies were reviewed and graded using the Johns Hopkins Nursing Evidence-based Practice (JHNEBP) evidence rating scales and appraisal tools. The JHNEBP tool incorporates three critical components of professional nursing: practice, education and research [20]. Since 2007, the JHNEBP model and tools have been guiding nursing professionals in their reporting of the scientific evidence. This model has been a “cornerstone” of the professional standards to guide nurses’ integration of the best available evidence, including research findings, into guiding practice decisions” [20]. Figure 2 and Table 1 summarize the major review components: strength of the evidence and quality of evidence.

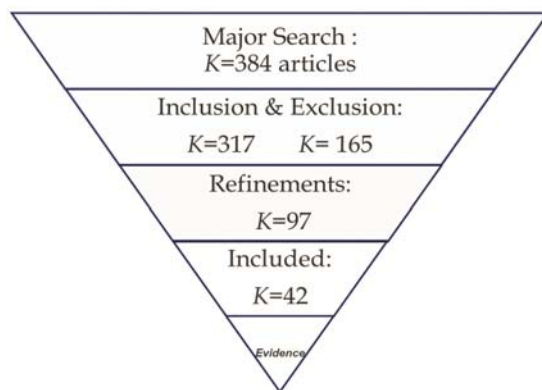


Figure 1. Search Strategy and Study Selection

STRENGTH of the Evidence	
Level I	Experimental study/randomized controlled trial (RCT) or meta-analysis of RCT
Level II	Quasi-experimental study
Level III	Non-experimental study or qualitative study.
Level IV	Opinion of nationally recognized experts based on scientific evidence or consensus panel
Level V	Opinion of expert based on experiential evidence. (Includes case studies, literature review, organizational experience, clinical expertise, quality improvement, financial data)

QUALITY of the Evidence		
A <u>High</u>	Scientific	Consistent results with sufficient sample size, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific evidence.
	Summative reviews	Well-defined, reproducible search strategies; consistent results with sufficient numbers of well-defined studies; criteria-based evaluation of overall scientific strength and quality of included studies; definitive conclusions.
	Experiential	expertise is clearly evident
B <u>Good</u>	Scientific	reasonably consistent results, sufficient sample size, some control, with fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
	Summative reviews	Reasonably thorough and appropriate search; reasonably consistent results with sufficient numbers of well-defined studies; evaluation of strengths and limitations of included studies; fairly definitive conclusions.
	Experiential	Expertise appears to be credible.
C <u>Low quality or major flaws</u>	Scientific	Little evidence with inconsistent results, insufficient sample size, conclusions cannot be drawn
	Summative reviews	undefined, poorly defined, or limited search strategies; insufficient evidence with inconsistent results; conclusions cannot be drawn
	Experiential	Expertise is not discernible or is dubious.

Figure 2. Johns Hopkins Nursing Evidence-based Practice (JHNEBP) Synthesis and Recommendations Tool

Synthesis of evidence

The selected articles were graded and synthesized for the review. Akosah and colleagues^[21], found that the implementation of a disease management program that included individualized education and early physician follow-up resulted in a 77% risk reduction for 30-day readmissions and a significantly ($p \leq .05$) lower rate of readmissions for initial diagnosis after 90 days and one year after discharge of initial diagnosis^[21]. Naylor *et al.*^[22], reported 49% fewer readmissions ($p \leq .05$) and decreased costs after implementation of an advance practice nurse (APN) protocol in a randomized control ” study to examine the effectiveness of advance practice nurse-centered discharge planning, education, and home follow-up interventions for 363 elders at risk for hospital readmission. The APN intervention proved to decrease overall costs for the intervention group in comparison to the control group by \$668.00 (\$215,378 vs. \$214,710) respectively, however, this did not reach statistical significance ($p = .70$). The results of this study are not generalizable due to the nature of the educational program. The approach of the education program posed a threat to validity because the protocol was customized, therefore not being executed in the same manner for all participants compromising the fidelity of the patient intervention.

Krumholz *et al.*^[23] concluded that one-hour face-to-face education sessions with a nurse and post hospital discharge telemonitoring could substantially reduce costs and adverse clinical outcomes for patients with HF. In this RCT, a sample of HF patients (44 intervention and 44 control) received education with telephone follow-up after discharge or usual care. The intervention resulted in 56.8% ($n = 25$) readmissions in the intervention group, compared to 81.8% ($n = 36$) in the control group receiving usual care during a one-year follow-up period ($p = .03$). The authors conclude that there was a \$7,517 reduction in costs per-person in the intervention group. Although significant a limitation of the study is that it was conducted in single hospital setting, small sample size and the optimal length of time for educational support through telemonitoring is unknown^[23].

A study conducted in Italy by Del Sindaco and colleagues^[24] examined the impact of disease management programs consisting of a collaborative approach using a team of cardiologists and nurses to provide education and follow-up for HF patients. The study participants ($n = 173$) were randomly assigned ($n = 86$) to a HF disease management program and ($n = 86$) to receive usual care. Results indicated a 36% reduction in all-cause mortality and hospitalizations for the intervention group in comparison to the usual care group. The results strongly suggest that a collaborative approach to the management of elderly patients with HF improves outcomes and is cost-effective. A limitation of this study is that the setting was a specialized HF clinic, which threatens the ability to generalize the results for less specialized clinical settings.

The intervention with the greatest impact on readmission rates was by Koelling and colleagues^[25], a randomized control trial with a large sample size ($n = 223$) testing a nurse-led education-based intervention (see Table 1). In this RCT, the authors found that hospitalized HF patients receiving hour-long, one-to-one educational sessions prior to discharge reported better compliance with self-care behaviors at 30 days, and had lower hospitalizations and mortality rates after 180 days, compared to those who only received a folder of standard written discharge information^[23]. This single site study was conducted on HF patients ($n = 223$), with an ejection fraction $\leq 40\%$. Endpoint re-hospitalizations or deaths related to HF for the intervention group were reduced by 35% within 180 days, and experienced a lower risk for readmissions (RR .065: 95% CI 0.45 to 0.93) within the same time frame ($p = .009$). Cost of care (including the cost of the intervention) was significantly lower ($p = .035$), by \$2,823 per patient^[25]. The long-term findings of this study yielded desired outcomes, consistent with the goals for a nurse-guided patient-centered HF education program.

Limitations

To date, the limitations within the literature on HF evidence based approaches to HF management outnumber the strengths. Several studies in this review reported inconsistent results. A prospective study by Rodriguez *et al.*^[26] tests the impact of quality of life scores and patient outcomes related to repeat hospitalizations and did not produce significant results due to high heterogeneity within the population regarding severity of disease, health literacy, and use of self-reported patient data, respectively. Some inconclusive results were found in articles graded with the strength of C, prompting the need for further

testing of interventions (see Figure 3). An observational study by Luthi *et al.* [27], addressed the need for further research regarding measurement of variables, thus concluding that high readmissions are a poor indicator for quality of care for patients with HF [27]. Several studies recommended strategies to promote improved outcomes for HF patients by placing emphasis on education focused on promoting patient self-care management in regards to diet, exercise, weight monitoring, and medication adherence [5-9, 13, 18, 19, 22, 23, 25-41]. However some studies were limited in offering a scientific basis, or descriptive statistical analysis to prove these interventions are effective for HF patients.

Table 1. Highlights of Studies Selected to Support the Design of a Nurse-guided Patient-centered HF Education Program.

Study	Year	Study Quality	Intervention	Type of study	Sample Size	Results	limitations
Akosah <i>et al.</i>	2002	Level II/B	Comprehensive disease management plan	Case control	n = 101	Fewer unplanned hospital visits in intervention group	Small sample size
Del Sindaco <i>et al.</i>	2007	Level I/A	Collaborative approach/Disease management education program	Randomized Control Trial	n = 236	36% reduction in all-cause mortality and hospitalization.	Study conducted in specialized HF clinic.
Koelling <i>et al.</i>	2005	Level I/A	One-to-one HF education prior hospital discharge	Randomized Control Trial	n = 223	Intervention participants had lower risk of readmission (RR 0.65; 95% CI 0.45 to 0.93; $p = .018$). Decrease in costs for intervention group ($p = .035$).	Conducted in a single hospital.
Krumholz <i>et al.</i>	2001	Level I/B	A formal HF education and support program	Randomized Control Trial	n = 88	Intervention group had less readmission in comparison to control group (56.8% vs. 81.8%). Cost savings of \$7,515.00 per-person in intervention group.	Study conducted in a single clinical setting. Small sample size. Not all costs (hospital and non-hospital) included or analyzed in the study.
Naylor <i>et al.</i>	1999	Level I/B	APN discharge/home care education and follow-up.	Randomized Control Trial	n = 363	Total costs for intervention group were \$668.00 less than the control group ($p = .72$)	Use of customized discharge plans per patient. Results not generalizable.

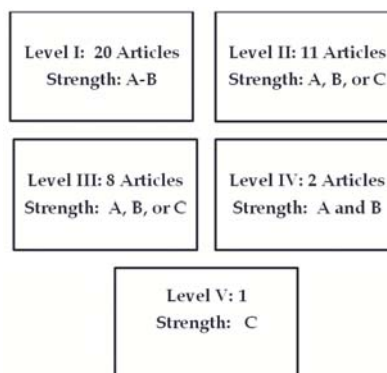


Figure 3. Strengths and Quality of Evidence

3 Summary

The literature remains limited on strength of nurse guided education plans. The Self-Care of HF Index (SCHFI) lends itself to ease of use across studies focused on improving self-care management of HF patients. The literature on self-care management of HF supports the integration of targeted interventions to improve active engagement in self-care activities [10, 11, 16, 38, 39, 41, 42]. Studies using the SCHFI instrument to examine impact of nurse-guided education identified self-care managements an important strategy for improving outcomes for patients with HF (see Table 2).

Table 2. Highlights of literature on Self-Care of HF Index Instrument

Highlights on Evidence of Measurement of Self-Care for HF			
Study	Type of Study	Intervention	Results
Cameron <i>et al.</i> 2009	Systematic review	Literature search	Rigorous psychometric testing identified 2 valid instruments developed to specifically measure self-care of HF, SCHFI and EHFScBS.
Chriss <i>et al.</i> 2004	Non-experimental, Correlational replication study.	(n = 66) participants tested on Self-Care Maintenance using the SCHFI within a 3 month period using 2 step analysis.	Self-care maintenance improved significantly over time. ($p \leq .0001$)
Davis <i>et al.</i> 2012	Randomized Control Trial	(n = 125) Self-care targeted teaching intervention	Self-care HF knowledge improved in intervention group, showing a significant difference from control group ($p \leq .001$). No impact on readmission noted, readmissions for intervention group (17.8%) were higher than control group (11.6%).
Jovovic <i>et al.</i> 2006	Systematic Review	Review of 671 citations, 6 RCTs, 857 patients.	Self-care management interventions targeted for HF patients decreased all cause readmissions (OR 0.59; 95 CI 0.44 to 0.80, $p = .001$) and all HF readmissions (OR .044; 95 CI 0.27 to 0.71, $p = .001$)
Shively <i>et al.</i> 2013	Randomized Control	6-month activation/Heart PACT intervention. Intervention group (n = 43, Usual care group (n = 41).	No significant group-by-time interventions were found for the SCHFI scales.

Self-care heart management

Experts in self-care recognize that knowledge is important, however not sufficient in attaining goals for self-care management of HF [2, 8, 41]. Challenges to self-care are evident in 25%-50% of HF patients [10, 11, 16, 38, 29, 41, 42]. In order to successfully evaluate self-care ability, a clinical measure of self-care is necessary [10, 38]. The Self-Care HF Index (SCHFI) instrument has been used to quantify self-care ability in HF patients in several published studies [39, 41]. Interventions focused on improving self-care confidence are particularly important in older adults with moderate to advanced HF [10, 39]. Common poor self-care behaviors identified in persons with HF are: 1) skipped medication, 2) dietary indiscretions, 3) fluid overload, and 4) lack of recognition of symptoms [10, 38]. The Riegel Self-Care Heart-Failure Model is focused on increasing self-efficacy for HF patients in performing self-care activities. Daily self-care activities include: 1) self-monitoring of weight gain and fluid retention, 2) adherence with prescribed medication regiment, 3) maintaining a low sodium diet, 4) exercise and 5) attending regular physician appointment [8-10, 38, 39, 41]. Riegel [39] describes self-care maintenance as the function of treatment adherence and self-monitoring. Self-care management is defined as using decision making in response to symptoms and actively managing symptoms, and self-care confidence is consistent with demonstrating self-efficacy in the ability to perform self-care [10, 38, 41]. Previous investigations on self-care propose, "A clinical measure of self-care management is necessary to quantify self-care ability in HF patients" [38].

The Self-Care HF Index

The Self-Care HF Index (SCHFI) is a 22-item questionnaire that uses a combination of 4-point Likert scale and dichotomous responses. The SCHFI instrument measures self-care abilities by including vital elements for three subscales;

self-care maintenance, self-care management, and self-care confidence. Each subscale is scored in ranges of 0-100, with a consistent measure for self-care adequacy for scores 70 or greater in each category^[11, 16, 38, 39]. The self-care maintenance subscale includes 10-items testing maintenance of health, asking questions like “How routinely do you do the following; Weigh yourself? Check your ankles for swelling” or “Ask for low salt items when eating out or visiting others?”^[39]. The 6 item Self-care management and self-care confidence scales are only used if the participant experienced trouble with breathing or ankle swelling with in the past month. The self-care management subscale tests the ability treat known symptoms of HF. Questions in the 6-item self-care management portion ask “If you had trouble breathing or ankle swelling in the past month, how likely are you to try one of these remedies?” Remedies listed include reducing fluid intake, taking extra diuretic medication, or calling a health care provider for guidance.^[39] The 6 item self-care confidence section of the questionnaire tests the participants perception of their confidence for providing self-care based on skills related to self-care maintenance and management of HF; asking questions like “ In general, how confident are you that you can: keep yourself free of HF symptoms” and “Do something to that will relieve your symptoms?”^[39].

The evidence on Measurement of Self-Care for HF shows that the SCHFI instrument is a reliable and valid tool and only one of two known tools available to measure self-care management specific to HF. In a literature review by Cameron and colleagues^[11], a 14 instruments were identified to measure self-care with only the SCHFI and European HF Self-care Behavior Scale (EHFScBS) being specific to HF. After undergoing rigorous psychometric testing, the SCHFI instrument demonstrated 6 aspects of validity and the EHFScBS demonstrated 5 aspects of validity^[2, 11, 42]. Reliability and validity of the SCHFI tool has been confirmed in previous studies. A study conducted by Riegel and colleagues^[39], performed psychometric testing for reliability and validity of the Self-Care HF (SCHFI) tool and reported *a* coefficients of .56 for self-care maintenance, .29 for self-care management, and .82 for self-care confidence^[39, 41]; Shively et al, 2013) Coefficients tested in a another study by Buck and colleagues, Cronbach *a*'s were .61, .63, and .77 for maintenance, management, and confidence subscales, respectively^[10]. Similar studies concluded the use of SCHFI tool is reliable for helping health practitioners identify areas of need for HF patients^[10, 11, 39].

4 Conclusion

Standardized patient education programs focused on self-care management have significantly lowered exacerbations of symptoms and readmissions for health failure patients^[2, 10, 13, 21, 25, 42]. Recommendations from the literature highlight implementation of a standardized patient HF education program focused on promoting self-care management^[2, 9, 10, 38, 39, 42]. Recommended daily self-care activities for people living with HF include weight monitoring, adherence to a strict medication regimen and low-salt diet, self-monitoring of symptoms, exercise, and regular physician visits^[10, 25, 39, 40]. Studies suggest there is an increased need for nurse-guided HF patient education with home-based telephone follow-up after hospital discharge^[5, 21, 22, 25, 33, 35, 37, 43-48]. The strategies suggested from the evidence include implementation of a standardized nurse-guided HF patient education program, home-based telephone follow-up interview and a standardized assessment tool to measure self-care management after hospitalization^[2, 9, 11, 16]. Furthermore, researchers conclude that improvements in self-care management from implementation of standardized education can be measured using the Riegel Self-Care of HF Index (SCHFI) instrument^[2, 10, 11, 39]. A possible outcome of improving self-management is that it may also reduce 30-day hospital readmissions^[9, 13, 16, 38, 41].

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