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Karen S. Yehle

Purdue University, kyehle@purdue.edu

Kimberly Plake

Purdue University, kplake@purdue.edu

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Self-Efficacy and Educational Interventions in Heart Failure: A review of the Literature

Authors: Karen S. Yehle, PhD, MS, RN, Assistant Professor, Purdue University School of Nursing; Kimberly S. Plake, PhD, RPh, Associate Professor, Purdue University College of Pharmacy

Abstract

Purpose: The purpose of this study was to conduct a systematic review of the literature to better understand how to structure educational interventions for heart failure patients to improve their self-efficacy for self-care behaviors.

Methods: A computer search of the literature from 1966 through May 2009 was conducted, yielding 84 manuscripts. All manuscripts were reviewed in relation to the search criteria, resulting in 12 articles that were evaluated.

Results: Each of the reviewed studies utilized an intervention plus education to improve self-efficacy. Self-efficacy was a primary outcome for seven of the studies, and a secondary outcome for five on the studies in this literature search. Both short and long-term interventions can improve self-efficacy demonstrating that the duration of the intervention can vary and still be successful.

Conclusion: Existing evidence suggests that it is not the amount of education (number of sessions/length of sessions) that improves self-efficacy, but some other factor or factors that remain unknown at present. Education delivery costs, flexibility, and the ability to more easily integrate new discoveries need to be explored. Interventions that include components specifically geared toward increasing self-efficacy for self-care in patients with heart failure are

needed. Learning activities need to be incorporated into patient education programs in order to provide practice time that may result in behavior changes. The opportunity to practice self-care behaviors within the context of the education provided to those with heart failure, along with ongoing support, needs to be explored in future studies.

Key words: heart failure, self-care, self-efficacy, education

Introduction

Heart failure is a chronic progressive cardiovascular condition. The incidence and economic burden of heart failure continues to increase for individuals and healthcare institutions. Approximately 5.7 million Americans are diagnosed with heart failure, and the total 2009 estimated cost is \$37.2 billion.¹ With the population continuing to age, it is expected that the number of people diagnosed with heart failure will continue to climb.

Heart failure care encompasses a complex treatment regimen that is challenging to manage. Self-care behaviors are one of the key elements in heart failure care that patients participate in for themselves.² On a daily basis, patients with heart failure are encouraged to weigh themselves daily, adhere to a low sodium diet, monitor their symptoms for worsening, adhere to a fluid restriction, and participate in physical activity. Additionally, patients with heart failure are expected to manage a complicated pharmacologic regimen and make symptom management decisions such as decreasing sodium intake or knowing when it is appropriate to call their healthcare provider. Adjusting the treatment regimen based on changes in symptoms increases the complexity of managing heart failure, as patients may experience difficulty detecting gradual, small changes in their status, and not realize the healthcare provider should be notified.³

A pivotal element of heart failure care is education. The focus of patient education is to improve self-care behaviors. Patient education topics include information about heart failure, medications, exercise, symptoms, exercise, diet, fluid restriction, and activities such as the importance of daily weighing. However, improvement in self-care behaviors or adherence to the heart failure treatment regimen may not occur even with education.²

Self-efficacy influences health choices and behaviors.⁴ Self-efficacy refers to self-confidence or the belief in one's ability to achieve a desired result, and this concept was derived from Bandura's Social Cognitive Theory.⁴ In Bandura's theory, outcome and efficacy expectations are differentiated. Outcome expectations pertain to an individual's belief that a specific behavior will lead to particular outcome. In contrast, efficacy expectation (or perceived self-efficacy) is the individual's belief in his/her ability to execute or perform the specific behavior.⁴ Perceived self-efficacy is the belief that one is able to have control of health practices, and the amount of self-efficacy one has impacts the level of goals and faithfulness to them.^{4,5}

Self-efficacy influences how one responds to challenges and set-backs, and what one expects will occur when embarking on a behavior change.^{4,5} In the case of heart failure, one key area of monitoring is weight. When weight gain occurs in an individual with heart failure, he or she should self-initiate some type of adjustment. For this adjustment to occur, he or she must have the knowledge/belief that an increase in the diuretic will reduce weight gain (outcome expectation), as well as the confidence that this action is the correct response to the weight gain (efficacy expectation).

Self-efficacy may influence primary outcomes. Prior studies found that when self-efficacy increases, self-care ability improves.⁶⁻⁹ In a dietary behavioral intervention in patients with diabetes, the focus was not only on education, but also individualizing the patients experience with the intervention based on self-efficacy. Results from the intervention indicated patients experienced an improvement self care abilities (e.g., consumption of fewer calories and fat) and lower serum cholesterol (primary outcome).

In the literature, investigators often have assessed self-efficacy without assessing the primary outcome relevant to the chronic illness being studied. Self-efficacy is an intermediate measure. Improvement in self-efficacy suggests adherence to specific health behaviors that may influence primary outcomes. If self-efficacy does not increase during the education process, the patient with heart failure may not be adequately prepared to perform all recommended self-care behaviors. Prior studies have demonstrated that low levels of self-efficacy have been related to poor self-care adherence in patients with heart failure.¹⁰ Therefore, it is important to understand how interventions affect self-efficacy to determine how health care practitioners should approach the design of health care interventions.

The purpose of this paper was to conduct a systematic review of the literature to evaluate which components of structured educational interventions are associated with improvement in self-efficacy for self-care behaviors in heart failure patients. Specifically, the component thought to influence self-efficacy, number of educational sessions, length of individual sessions, and type of contact (face-to-face, telephone, Internet) were evaluated.

Methods

A search of the literature for evidence using the following databases was conducted: PubMed of the National Library of Medicine, COCHRANE, CINAHL, MEDLINE, ERIC, Academic Search Premier, and Health Source: Nursing/Academic Edition for articles published between 1966 and May 2009. The following MeSH terms were used for the search: *“Heart failure OR congestive heart failure” AND “confidence OR self-efficacy OR self-confidence” AND “self-care OR self-management” AND “education OR patient education OR group education” AND “support”*. Only educational intervention studies that assessed self-efficacy as an outcome were included (Figure 1). All abstracts were evaluated for inclusion and exclusion criteria. For all studies included in this review the following were included: article title, authors, date, total number of subjects, number of subjects in intervention group, number of subjects in control group (if Randomized Controlled Trial), description of the intervention, data collection time period, psychometric evidence for outcomes, outcome measurements, and results. Although this search did place restrictions on dates of published research (1966-2009), all of the studies that met the review criteria were published between 2003 through 2009.

Eighty-four articles were retrieved from the search of the above databases using the selected MeSH terms. Of these, twenty-three were duplicates, leaving 61 studies to be examined. Studies were excluded that were qualitative research (2 articles), dissertations (6), not in English (2 articles), or did not focus on heart failure patients (4 articles). Additionally excluded were interventions without an education component (2 articles), non-peer-reviewed articles (1), drug trials (7 articles), or studies without an intervention (11 articles). Also excluded were two articles describing planned procedures and analyses of trial in progress, and one review article about the effects of education that did not consider self-efficacy. Eleven studies did not

measure self-efficacy and were eliminated; leaving twelve studies to be included in this review (Figure 1).

Results

This literature search revealed that a systematic review of educational interventions designed to improve self-efficacy in self-care behaviors in patients with heart failure has not been conducted. One relevant review exists, which focused on education's role in patients with heart failure in disease management programs.¹¹ Although relevant, it did not examine the impact of education on self-efficacy.

Experimental Design

Nine of the studies retrieved were randomized controlled trials (RCTs), two were treatment only studies, and one utilized a cross-sectional design. There was no consistency among the twelve studies in the choice of self-efficacy instruments, except for two studies that utilized the Self-Care Heart Failure Index (SCHFI).¹²⁻¹³ No psychometric evidence of self-efficacy instruments were reported in three of the twelve studies.¹⁴⁻¹⁶ Statistical methods for evaluating the effect of education on self-efficacy varied between studies, and included means, percents, or t- test statistics. Not every study reported statistical significance values associated with the statistical tests. Thus, it was not possible to conduct a meta-analysis in which findings were compared statistically across studies.

The randomized controlled trial (RCT) is the gold standard in experimental design. One of the strengths of this review is that the majority of the studies selected the RCT as the experimental design method. The RCT was used in nine of the twelve studies (75%) examined in this review.¹²⁻²⁰ One study design while employing randomization, was slightly less rigorous

than the other RCTs, as the primary investigator randomly assigned participants to one of three groups.²⁰ Two studies utilized prospective treatment only arms, thus omitting a control group.²¹⁻

²² Only one study in this review used a cross-sectional design.²³

Type of Contact

Of those studies that described the type of contact, subject contact occurred via the following mechanisms: 1) individual face to face sessions (3 studies), 2) telephone (0 studies as a stand-alone method), 3) group face to face sessions (3 studies), and 4) a mixed approach (4 studies). The interventions varied considerably in the methods to improve self-efficacy as identified by the investigators. Some interventions included individual face-to-face education, while others included group education, or education via a DVD, or telephone follow-up, or telemonitoring, or exercise plus education (See Table 1). In three of the 12 studies, the method to improve self-efficacy was not identified and could not be determined.^{14,16,23} A wide variety of health professionals provided the intervention to patients. The majority of studies utilized nurses.^{13-14,16,18-22} Other studies used pharmacists, health educators, or peer mentors.^{15,12} Statistically significant differences in self-efficacy were reported in multiple studies regardless of the structure of the intervention.^{12, 15-21}

Number of Education Intervention Sessions

Although it is known that education is needed by patients diagnosed with heart failure, it is not known whether the number of educational sessions influences self-efficacy of performing self-care behaviors. One educational session plus 10 follow-up telephone calls significantly improved self-efficacy (95% CI 0.7, 3.1; p=0.026) as did four educational sessions regardless of the type of delivery (Nurse TeleManagement p<0.01; Home Nurse Visit p<0.01).¹⁵⁻¹⁶

Additionally, eight weekly sessions significantly improved self-efficacy to manage disease in general within the Supportive Educative group ($t = 2.333$; $df = 12$; $p = 0.038$) as did five sessions that were delivered in three different ways (Telephonic, Home Visit, Health Buddy®) with a reported group-by-time p value of 0.027.^{20,22} As many as 18 educational sessions ($p = 0.001$) and as little as six contacts by peer mentors ($F = 5.5$, $df = 1, 56$, $p = 0.02$) both resulted in statistically significant improvements in self-efficacy.^{21,12} These results indicate that even a minimal number of educational sessions can improve self-efficacy.

Length in Minutes of Education Intervention Sessions

The amount education as measured by numbers of minutes per educational session varied widely between the 12 studies. Flynn et al. provided 19 ninety minute educational sessions over twelve months while Gary provided at least weekly education over twelve weeks.^{21,19} Riegel and Carlson's educational interventions occurred weekly for 30 days, and then monthly for 90 days.¹² Dunagan et al. provided heart failure education at least weekly over two weeks while Yehle et al. provided two education sessions eight weeks apart.^{14,13} Schreurs et al. was conducted bi-weekly four times, followed by a one-time session one month later.²² Kline, Scott, and Britton's educational sessions occurred weekly over eight weeks, while Maddison, Prapavessis, and Armstrong provided education one time over ten minutes.^{20,17} Statistically significant improvement in self-efficacy was seen in both long and short education sessions with no consistent trend in regards to time.

Heart Failure Knowledge

Knowledge, which influences self-efficacy, was measured by only three studies even though all of the interventions were educational in nature. Of the twelve studies, DeWalt et al.,

Baker et al., and Yehle et al. specifically measured and reported knowledge of heart failure.^{15, 23,}

¹³ All three of these studies significantly improved intervention group knowledge about heart failure (Table 1).^{13, 15, 23} However, no studies assessed the temporal association between knowledge acquisition and subsequent changes in self-efficacy.

Self-Efficacy Outcomes

Self-efficacy improved across studies, but statistical information about the magnitude of improvement varied across studies. Although all 12 studies included in this systematic literature review included a self-efficacy component, only eight of the studies reported comprehensive statistics about self-efficacy.^{12,13,15,19,21,23} In the studies for which self-efficacy was a secondary outcome, it was unclear which components addressed self-efficacy, and whether the intervention affected it. Six of the studies measured self-efficacy and self-care simultaneously^{12, 13, 15, 20, 21,}²³ while six of the studies measured self-efficacy but not self-care.^{14, 16-19, 22} Furthermore, some studies did not distinguish between self-care and self-efficacy, so it was not possible to disentangle improvements in self-efficacy from improvements in self care.

Multiple studies did not provide sufficient statistical evidence that the intervention impacted self-efficacy. Dunagan et al. and Schreurs et al. measured self-efficacy, but did not report statistics to assess whether self-efficacy improved.^{14,22} LaFramboise et al. measured self-efficacy and included a p value to document that it improved (p = 0.027) but did not report the statistics to document the magnitude of improvement.¹⁸ Kline et al. measured self-efficacy to manage disease quarterly, but only provided means without standard deviations at baseline and again at 12 months for one intervention group.²⁰ They provided the t-test result and p-value only for the supportive educative group and not the control group or the mutual goal-setting group

because there were not significant differences for these.²⁰ Flynn et al. did not report the statistics for the total self-efficacy instrument, but did state that the total score significantly improved, and provided a p-value for the total self-efficacy instrument ($p < 0.001$).²¹ Riegel and Carlson reported that the Self-Care Heart Failure Index (SCHFI) Confidence Subscale score improved significantly more for the intervention group ($p=0.04$, $p=0.02$, $p=0.04$), but did not report p-values for another measure of self-efficacy related to confidence in speaking with a physician.¹²

Two studies provided clear evidence of improvement in self-efficacy. Both the Nurse TeleManagement (NTM) and Home Nurse Visit (HNV) groups significantly improved self-efficacy (within group self-efficacy pre/post $p < .01$), with neither group improving significantly more than the other (between group self-efficacy pre/post $p = .78/.43$) regardless of the method used to deliver the education.¹⁶ Based on the description, the intervention likely influence self-efficacy through verbal persuasion (feedback from nurses) and/or physiologic states (feedback from telemonitoring). Exercise plus education significantly improved exercise self-efficacy including adherence to exercise, exercise barriers, exercise workload, and exercise outcomes.¹⁹ With the exercise program, patients participated in exercise regimens with facilitation by nurses. Since the patients were actually exercising, self-efficacy was likely influenced by performance accomplishments.

In contrast, two studies did not demonstrate improvement in self-efficacy or self-confidence. Although vicarious experiences can influence self-efficacy, the group education and support provided by Yehle et al. did not improve self-confidence (F time X group = .006, $df = 1,23$; $p = .938$).¹³ Baker et al. did not find a difference in self-efficacy between groups who were patients in an organization that participated in a quality improvement collaborative versus those cared for by an organization that was not a member of the quality improvement collaborative.²³

From Baker et al.'s description of the invention, the mechanism to improve self-efficacy could not be determined.²³

Self-efficacy was not measured consistently across studies. Flynn et al. assessed changes in the Patient Skill Acquisition Scale ($p < 0.001$), a patient-rated scale measuring the level of practice with heart failure self-care abilities, and the Dispositional Hope Scale Total Score ($p < 0.001$), which indicates the degree of belief that one can be successful achieving a goal and possesses the ability to reach goals (Table 1).²¹ Additionally, Flynn et al. reported a significant improvement ($p < 0.001$ to $p < 0.05$) in four of the five subscales of self-efficacy for self-care skills at 52 weeks (Table 1).²¹ Only the Self-Monitoring Subscale was not statistically significant at 52 weeks.²¹ As levels of practice (e.g., performance accomplishments) and the degree of hope improved, they may have positively influenced self-efficacy. However, it is unclear how these three outcomes relate to each other without a control group, and it cannot be assumed that improvement occurred as a result of the intervention.

According to Bandura's Social Cognitive Theory, self-efficacy or efficacy expectations can be influenced in four main ways through performance accomplishments (success in modifying behavior), vicarious experiences (learning from others who are modifying a behavior), verbal persuasion, (encouragement and support) and emotional arousal (emotions experienced in changing, such as anxiety).⁴ Of these four mechanisms, performance accomplishments are the most potent in affecting self-efficacy.⁴ None of the investigators specifically identified the way in which self-efficacy was influenced. From the description of the intervention, however, the way in which self-efficacy was influenced can be elucidated. No study specifically linked components of the intervention to change in self-efficacy.

Discussion

The number of people diagnosed with heart failure continues to increase indicating a building need for tailored intervention. There is little consensus, however, about how to intervene with heart failure patients to improve self-efficacy. Education contributes to patient knowledge, but does not necessarily influence the confidence one has in performing a behavior.^{10, 24} Although a key component to self-management, scant literature addresses self-efficacy and its role in caring for patients with heart failure. Investigators often measure self-efficacy as an outcome (primary or secondary), but it is sometimes difficult to identify the intervention component directly influencing this in patients.

The interventions did not identify or consistently use one approach to influence self-efficacy. The interventions that demonstrated patient improvement in self-efficacy used a variety of approaches. Those that did not observe improvement may not have had a component that affected self-efficacy. Although all interventions reviewed herein were educational interventions which should positively impact self-efficacy, none described which components of the intervention should have influenced self-efficacy. Bandura's theory indicates that education alone does not singularly affect self-efficacy.^{4,5} However, education does have an influence on outcome expectations, which leads to improvement in self-efficacy.^{4,5} The specific aspect of the educational intervention that may influence self-efficacy was unclear, as were other factors that may have influenced self-efficacy. In addition to perceived self-efficacy, the other core determinants of the Social Cognitive Theory such as knowledge, outcome expectations, goals, perceived facilitators, and impediments need to be examined individually as factors that may influence self-care.^{5, 25}

Much still needs to be learned about the impact of education on self-efficacy in patients with heart failure, as there are a limited number of studies that have been conducted. To date, 12 intervention studies have examined heart failure education and its influence on self-efficacy. The studies in this review add to the understanding of heart failure education and its influence on self-efficacy by demonstrating that it is not the number of educational sessions, the length of the particular educational session, or the medium employed (e.g. face-to-face, telephone) that determines if self-efficacy improves. Self-efficacy can improve using a variety of educational delivery systems.

Even though authors did not specify which components of their intervention should affect self-efficacy, results suggest that several educational intervention approaches appear to be effective in increasing self-efficacy, e.g. one-to-one or group education. Both individual education and group education may improve self-efficacy of self-care behaviors among patients with heart failure (See Table 1). As noted in this review, one-on-one educational interventions were reported to successfully increase self-efficacy in self-care activities in nine of the twelve studies.^{12, 14-20, 23} Results were inconsistent when group education was provided. Schreurs et al. reported that self-efficacy improved using group education, but did not report the self-efficacy statistics.²² Flynn et al. reported a statistically significant improvement in self-efficacy at 52 weeks with group education, but only reported a p value ($p < 0.001$) for the total self-efficacy score.²¹ The group education and support Yehle et al. provided did not improve self-efficacy in self-care (See Table1).¹³ Definitive conclusions about the impact of group education on self-efficacy cannot be made from these three studies. Additionally, it is difficult to draw conclusions about what factors in the educational interventions most influenced self-efficacy because studies did not report patient responses to specific aspects of each intervention.

It is not evident, however, from any of the studies, except Yehle et al. whether or not family members or a support person were present during the educational intervention.¹⁴ Social support from families, along with continued supportive education and self-care tactics, is needed to sustain improvements seen in self-care soon after discharge.²⁶ Family member involvement plus education reduced urine sodium levels in patients with heart failure when compared to education alone.²⁷ For those studies that occurred in the participants' home, the likelihood of a family member being present is higher than the interventions that took place outside the home, but this factor cannot be assumed.

Standardization in self-efficacy measurement will help to better clarify the pathways between interventions and self-efficacy. Without standardization of measurement there is no consistency or a mechanism to clearly compare outcomes between studies. Standardization in the measurement of self-efficacy would also bring clarity in conceptual frameworks. In the 12 studies examined, varying conceptual frameworks were employed to demonstrate education's effect on self-efficacy changes.

Bandura's Social Cognitive Theory provides an approach to assist practitioners in the development of interventions in patients with chronic health conditions.^{4,5} Perceived self-efficacy, a component of Bandura's theory, is the belief of the individual in his/her ability to perform behaviors. In many of the interventions in this review, the interventions focused on improving self-efficacy with the intent of affecting the performance of self care behaviors. According to Bandura, there are four ways in which efficacy expectations are influenced, including performance accomplishments, vicarious experiences, verbal persuasion, and emotional arousal. Many of the interventions did not specify the component used to influence self-efficacy in the performance of self care behaviors. To effectively impact self-efficacy,

influence self care behaviors, and improve health outcomes, practitioners must include components from the theory in the design and implementation of their interventions.^{4,5}

Limitations

The small number of intervention studies that examined the impact of an educational intervention on self-efficacy is a limitation of this systematic review. Also, two of the 12 studies included in this systematic review were pilot studies.^{13, 21} Six other studies enrolled less than 100 participants.^{12, 17-20, 22} The lack of a gold standard for measurement of self-efficacy, as well as the inability to conduct a meta-analysis, is also a limitation and prevented the possibility of conducting a meta-analysis. Furthermore, it was not possible to disentangle self-efficacy and self care, or whether there were other mediators that explain the association between self-efficacy and self care.

Conclusion

The growing numbers of studies, especially randomized controlled trials (RCT) that examine self-efficacy in self-care behaviors, confirm that self-efficacy is an important component of interventions to improve self care. Even though self-efficacy is not a primary outcome, it can influence the performance of therapeutic behaviors that impact primary outcomes. What was learned from this review is how to deliver the intervention, but much still remains to be done in understanding what components of educational interventions are critical for improved self-efficacy. How much education (length of session/number of sessions) may not be as important as providing enough support and practice for the patient to have confidence in managing self-care on a daily basis. Of the various modalities used, no single modality for

education stood out as being more effective than the others. Education delivery costs, flexibility, and the ability to more easily integrate new discoveries need to be explored.

Manuscripts do not provide enough detail on how the theoretical underpinnings of the study influenced the development of the components of the educational intervention.

Interventions that include components specifically geared toward increasing self-efficacy for self-care in patients with heart failure are needed. Learning activities need to be incorporated into patient education programs in order to provide practice time that may result in behavior changes. The opportunity to practice self-care behaviors within the context of the education provided to those with heart failure, along with ongoing support, needs to be explored in future studies. Self-efficacy attitudes influence how people act, what they believe, and how motivated they are, which may be important factors in heart failure self-care. These variables need to be further examined in sufficiently powered, multi-site, large randomized controlled trials to avoid potential selection bias.

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