

Self-Care Among Older Adults With Heart Failure

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Sumayya Attaallah, MSN, RN¹,
Kay Klymko, PhD, ARNP, FNP-BC², and Faith Pratt Hopp, PhD¹

Abstract

Background: It is estimated that 5.7 million Americans are living with heart failure (HF) today. Despite the fact that HF is one of the most common reasons people aged 65 years and older are admitted into the hospital, few studies describe the self-care in this older adult population. **Purpose:** The purpose of the study was to review the current literature on self-care in this population to better understand the influence of selected factors on self-care and health outcomes. **Methods:** A literature search was completed and resulted in including 28 studies. **Results:** Multiple factors have been reported as barriers to self-care including depression and presence of peripheral arterial disease. Factors having a positive effect on self-care are male gender, number of cardiologist referrals, and self-efficacy. There were few studies that described the association between cognitive functioning and self-care. There is a lack of strong evidence to support the association between self-care and health outcomes such as readmission rate, but recent studies suggest that a 30-day readmission is not a valid predictor of health outcomes. **Implications:** The assessment of the psychological factors and health care resource utilization patterns that may influence self-care is recommended. More research that addresses the role of cognitive factors in influencing self-care is needed.

Keywords

self-care, older adults, heart failure

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Introduction

About 5.7 million Americans are living with heart failure (HF) today (Mozaffarian et al., 2016). Between 2007 and 2011, the prevalence of HF increased with aging, resulting in estimations that 4.7% of adults 45 to 64 years of age and 19% of adults 65 years of age and older are affected by this disease (U.S. Department of Health and Human Services, 2012). HF is also one of the most common reasons people who are aged 65 years and older are admitted into the hospital. HF, as a prevalent admission diagnosis, is cause for alarm when considering that the estimated total cost for the care of patients with HF is US\$30.7 million annually in a population that is aging (Mozaffarian et al., 2016). It has been suggested that the high costs of health care for individuals with HF may be avoidable by applying effective programs to improve self-care management relevant to HF (Riegel et al., 2009).

Although age-related factors such as cognitive impairment, limitation in physical abilities, and social isolation contribute to the complexity of self-care among older adults with HF (De Geest et al., 2004; Kamrani et al., 2014), most studies that investigated HF

self-care have not focused on older adults specifically (Abete, 2013). Older patients with HF have demonstrated less optimal self-care than younger patients (Cocchieri et al., 2015). This decrease in HF self-care among older adults could be due to increase in visual, hearing, and cognitive impairment (Abete, 2013; Kamrani et al., 2014). Cognitive impairment has been determinate to negatively influence adherence to self-care among older adults with HF (Abete, 2013; Luyster, 2009). Further research is needed to explore the influence of age-related factors on self-care among older adults with HF which can improve health outcomes among these individuals by targeting them with age-appropriate strategies to improve self-care.

Self-care improvement programs targeted at older adults with HF may be developed based on theoretical

¹Wayne State University, Detroit, MI, USA

²Florida Health Care Plans, Holly Hill, FL, USA

Corresponding Author:

Sumayya Attaallah, College of Nursing, Wayne State University, 5557 Cass, Room # 323, Mailbox #99, Detroit, MI 48202, USA.
Email: at1468@wayne.edu



Table 1. Database Search.

Database	Search terms	Results
PubMed	<p>“heart failure” (“self care” OR “self management”) AND (readmission OR factor OR ability OR outcome OR “problem solving” OR “decision making” OR “goal setting” OR “social support” OR “cognitive function” OR “gender” OR “age” OR “health care-system” OR “patterns of living” OR “environmental factors” OR “sociocultural factors” OR “resources availability” OR “family systems” OR “health status”) AND (“last 10 years” [PDat] AND aged [MeSH])</p> <p>Filters</p> <ol style="list-style-type: none"> 1. Age 65 years and older 2. Years 2004-2015 3. Peer-reviewed journals 	248
CINAHL	<p>“heart failure” AND (“self care” OR “self management” OR readmission OR ability OR factor OR social support OR cognitive function OR age OR gender OR health care-system factors OR patterns of living OR environmental factors OR sociocultural factors OR resources availability OR family systems OR health status) AND elderly</p> <p>Filters</p> <ol style="list-style-type: none"> 1. Age 65 years and older 2. Years 2004-2015 3. Peer-reviewed journals 	632

guidance and research evidence from the empirical literature (Oosterom-Calo et al., 2012). Some theories such as self-care deficit nursing theory (SCDNT; Orem, 2001) and the specific-situation theory of HF self-care (Riegel, Dickson, & Faulkner, 2016) may provide the needed guidance for HF self-care improvement programs. This expected role in guiding the programs is related to the fact that SCDNT (Orem, 2001) proposes factors that may influence producing self-care and the specific-situation theory of HF self-care (Riegel et al., 2016) describes the purpose of the specific behaviors that may be needed to support successful HF outcomes (Riegel & Dickson, 2008; Riegel et al., 2016). Self-care is defined as a human regulatory function that individuals have to perform to achieve health and well-being (Orem, 2001). The ability (e.g., Self-Care Agency [SCA]) to engage in self-care has also been proposed to be influenced by multiple internal factors (e.g., age, developmental state, gender, health state, sociocultural orientation, and pattern of living) and external factors (e.g., health care system, family system, availability of resources, and environmental) (Orem, 2001). Moreover, the ability of an individual (e.g., cognitive skills, decision-making ability, and goal-setting ability) is proposed to influence an individual's production of self-care (Orem, 2001). The specific behaviors that are proposed to support successful HF outcomes have been described by Riegel and Dickson (2008) as “self-care maintenance of HF.” This type of self-care maintenance “reflects behaviors used to maintain physiologic stability, symptom monitoring, and treatment adherence” exemplified by seeking assistance when worsening symptoms occur, daily weighing, and adherence to medication, diet, and exercise (Riegel et al., 2004; Riegel & Dickson, 2008).

Health care professionals planning programs to improve self-care in this population also need to be

guided by empirical evidence. The purpose of this review was to utilize current theoretical knowledge to guide an exploration of the empirical literature to better understand the relationships of selected factors to the production of self-care and the contribution of self-care to achieving successful health outcomes in older adults with HF. The reasons behind the selection of SCDNT (Orem, 2001) to guide this literature review include the following: (a) This theory provides a well-developed description of self-care, and (b) identifies the effect of a variety of social, environmental, and personal factors on self-care (Orem, 2001). This theory was used to guide the selection of search keywords as well as the organization of the extracted data in certain categories. Understanding current evidence about these important relationships will assist health care providers in developing programs that can further be tested for their effectiveness in improving self-care and HF outcomes in older adults.

Method

Studies were identified by searching the databases CINAHL and PubMed from 2004 to 2015. A 10-year time limit was used to include both classical studies and more recently published literature. The search terms used were heart failure, self-care, self-management, readmission, and a combination of terms that express the factors that have been theoretically proposed to influence self-care (Orem, 2001). A complete list of search terms is available in Table 1.

The criteria for inclusion of articles for review were original research that was peer reviewed, in the English language, and included a sample of adults who were 65 years of age and older with a primary diagnosis of HF. Articles were excluded if the study inadequately specified the age of participants or had a sample of a mean

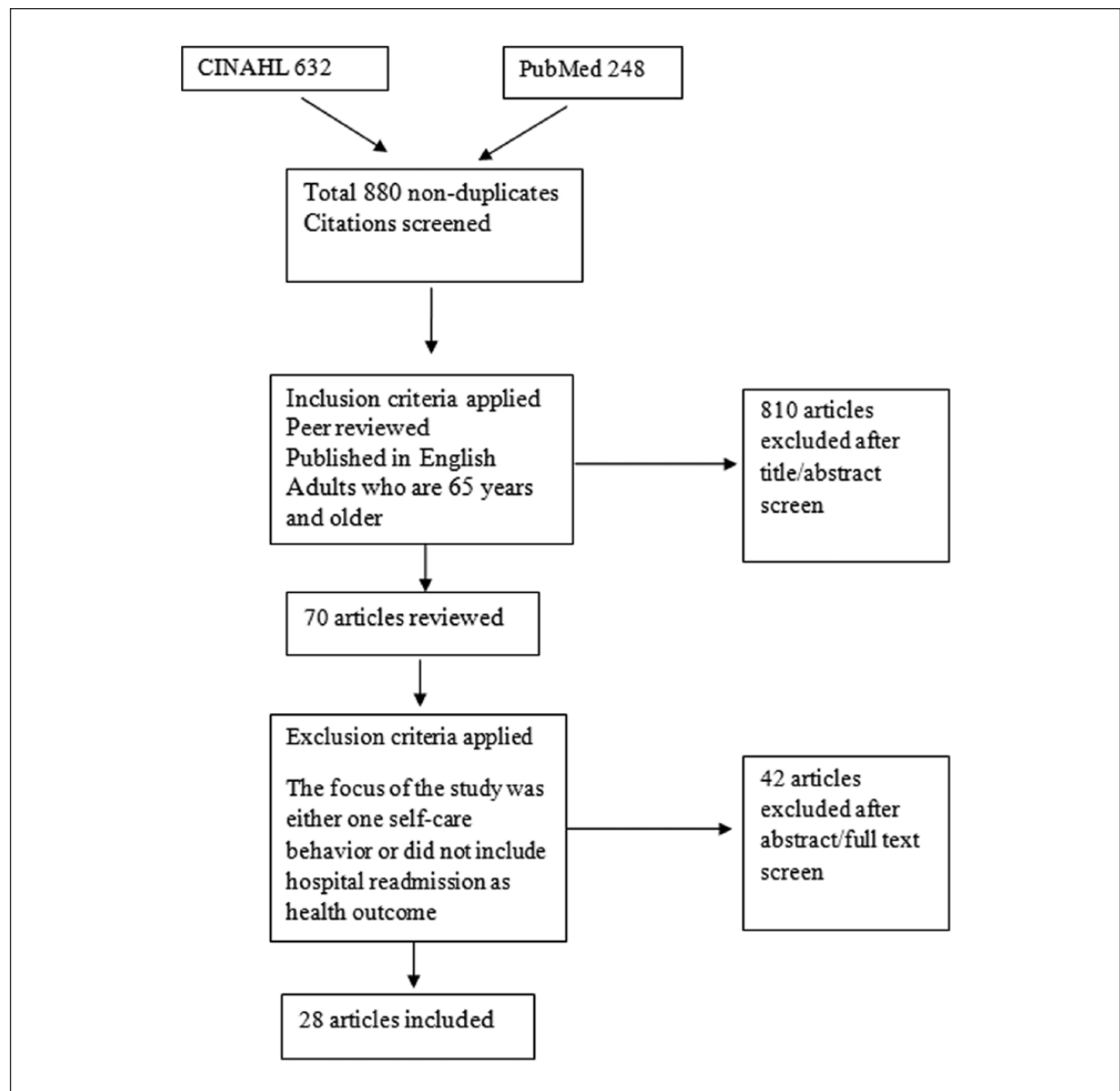


Figure 1. Strategy of selecting the used articles of the literature review.

age that was less than 65 years. The initial search resulted in a total of 880 nonduplicated articles (see Figure 1) and was followed by a second step for article selection based on a review of the published abstract for its consistency with the inclusion and exclusion criteria and resulted in the selection of 70 articles. Finally, the full text and the abstracts were reviewed again and some articles were excluded because the focus of the study was either one self-care behavior or did not include hospital readmission as a health outcome. The articles that met the inclusion criteria of the review were 28 articles. Studies were classified according to their ability to inform current scientific knowledge about five themes: (a) self-care among older adults, (b) factors (internal and external) influencing HF self-care ability, (c) individuals' abilities influence on HF self-care, (d) HF interventions, and (e) HF health outcomes.

Results and Discussion

Self-Care Among Older Adults With Heart Failure

HF self-care involves choices of behaviors to maintain physiologic stability (i.e., adherence to a medication regimen, following a low Sodium diet, and restriction of fluid intake) as well as managing symptoms (i.e., taking an extra diuretic pill, or seeking the help of a health care provider; Riegel & Dickson, 2008). HF self-care is more difficult for older adults than it is for younger adults; particularly in regard to recognizing and responding to symptoms (Riegel, Dickson, Cameron, et al., 2010). The complexity of HF self-care among older adults increases due to age-related factors such as auditory, visual, and cognitive impairment (Alosco et al., 2014; Dodson, Truong, Towle, Kerins, & Chaudhry, 2013)

Factors Influencing Heart Failure Self-Care Ability

Internal factors. A few studies have examined several internal factors (e.g., health status, cultural orientation) to determine their effect on the individual's ability to manage HF (Hjelm et al., 2012; Jiang, Wu, Che, & Yeh, 2013; Riegel, Dickson, Kuhn, Page, & Worrall-Carter, 2010). Hjelm et al. (2012) conducted a prospective study and recruited 702 individuals with HF who were 80 years and older to examine the longitudinal effect of HF (individual's health status) on cognitive changes (individual's ability). The cognitive abilities included processing speed, visuospatial ability, short-term memory, semantic memory, and episodic memory. At baseline, individuals with HF differed significantly from individuals without HF in spatial performance and episodic memory; individuals with HF demonstrated poorer performance than individuals without HF. However, this difference disappeared in the terminal period of the study as individuals with HF received treatment. The results suggested that an individual's health status (e.g., visuospatial ability and visuospatial ability) may affect their ability to manage HF since, visuospatial ability (e.g., recognizing shapes, following a map), and episodic memory (e.g., what the individual ate for breakfast) are likely important to adherence to medical therapy (Hjelm et al., 2012). The longitudinal nonsignificant differences in cognitive functions between individuals with and without HF are consistent with the results of Karlsson et al. (2005) in their study of 208 individuals with a mean age of 76 years who were treated for HF. These results may provide evidence that not only may health status affect ability for self-care management in HF, but that HF treatment may improve cognitive functions likely to be important in HF self-care management.

In addition to HF, health states of depression and cognitive deficits have also been determined to negatively affect adherence therapy (medication and diet recommendation) in older adults (Abete, 2013). Cameron, Worrall-Carter, Riegel, Lo, and Stewart (2009) reported high levels of depression among older adults with HF, supporting the need to carefully assess health states of individuals with HF, depression, and cognitive deficits.

Regarding culture, Jang, Toth, and Yoo (2012) found no significant differences between Korean Americans and Caucasian Americans in HF self-care behaviors; however, there was a difference in each group ranking of HF self-care behaviors. Korean Americans ranked avoiding canned soup as the ninth important behavior while Caucasian Americans ranked it as the 14th. The researchers explained that Korean Americans did not consume canned food because they are older adults who are used to consuming Korean food which is high in sodium. These findings regarding the consumption of Korean food are consistent with the results of Jiang et al. (2013) who found that cultural background affected the self-care practices (e.g., dietary intake, sodium restriction) of Chinese older adults with HF. All of the participants

believed that they avoided salty food; however, they reported eating Chinese foods which were heavily spiced and pickled. It has been suggested that the cultural experiences, practices, and beliefs of individuals be better understood to improve medical management concerning diet and fluid restriction.

Several studies explored the influence of personal characteristics directly on self-care among older adults with HF (Cameron et al., 2009; Chriss, Sheposh, Carlson, & Riegel, 2004; Peters-Klimm et al., 2013). Multiple factors were examined for their effect of self-care in various models containing variables empirically defined and consistent with the constructs of Orem (2001) which are SCA and internal and external Basic Conditioning Factors (BCFs). In a study conducted by Cameron et al. (2009), selected predictor variables for self-care maintenance and management included cognitive function, self-confidence, depressive symptoms, age, gender, social isolation, and comorbid diseases. The variance in self-care explained by these predictor variables was 39% for self-care maintenance (e.g., adherence to low sodium diet) and 38% for self-care management (e.g., ability to identify symptom changes, intervene with remedies and evaluate effectiveness of the intervention). Similarly, Chriss et al. (2004), using a conceptual model to explore predictors of self-care maintenance, found that the variables of age, gender, education, social support, comorbidity, and severity of the disease explained 14.8 % of self-care in their study at baseline. Moreover, Cocchieri et al. (2015) tested the influence of age, gender, education, marital status, job, family income, caregiver support, comorbidity, and cognitive function on HF self-care. The significant determinants of self-care maintenance for these studies were age (Chriss et al., 2004; Cocchieri et al., 2015), gender (Cameron et al., 2009; Chriss et al., 2004; Cocchieri et al., 2015), poor cognition (Cocchieri et al., 2015), depression status, experience with the disease, and self-confidence (Cameron et al., 2009). Patients who have longer experience with the disease had better HF self-care levels as well as patients with high levels of self-confidence (Cameron et al., 2009). Patients with depression were found to have accurate beliefs about HF, but not about how to control it through self-care behaviors (Albert & Zeller, 2009; Cocchieri et al., 2015). The explanatory value of comorbidity (health status) was inconsistent in these two studies. One study found fewer comorbidities were associated with better self-care maintenance (Chriss et al., 2004), whereas the other study suggested that a high number of comorbidities was associated with better self-care (Cameron et al., 2009).

The complexity of the contribution of an individual's health status in predicting their success in self-care has been further explored by Peters-Klimm et al. (2013) who reported that health state factors, such as health conditions associated with HF, may be significant determinants of self-care, along with self-care confidence and the availability of resources. Their results showed that different HF-associated medical conditions differ in

their influence on individuals' self-care behaviors; some were associated with poor self-care practices (e.g., peripheral arterial diseases), while others were associated with better self-management (e.g., presence of prosthetic heart valve). This finding could be because when patients undergo a major surgical intervention and experience improvement in their health, they become motivated to adhere to HF self-care practices, whereas patients with peripheral arterial diseases may have limited functional improvement after an exercise training program which may lead to low adherence with HF self-care behaviors (Peters-Klimm et al., 2013).

The nonsignificant and inconsistent influence of many of the personal characteristics (i.e., internal BCFs) suggests the need to study the influence of these factors on self-care abilities first, then control for their effect statistically to study the direct effect of SCA on self-care. This conclusion was confirmed by the findings of Riegel, Dickson, Kuhn, et al. (2010) which revealed that gender, an internal BCF, is an important factor affecting the ability to self-manage HF, but not self-care behaviors. Moreover, this review has found that many factors that may affect self-care remain understudied (e.g., living patterns, sociocultural, and developmental state).

External factors. External factors (health care system, family system, and availability of resources) have been studied for their direct effect on HF self-care, but not on abilities for HF self-care as has been theoretically proposed (Orem, 2001). Moreover, past studies have combined internal and/or external factors and self-care abilities without determining their independent contributions which could support or refute hypothetically proposed relationships developed from theoretical propositions. External factors studied have included social isolation and social support, and number of cardiologist referrals. All of these factors have shown no significant influence on self-care (Cameron et al., 2009; Chris et al., 2004; Peters-Klimm et al., 2013) with the exception of referrals to a cardiologist which found to be associated with higher levels of HF self-care (Peters-Klimm et al., 2013). Because none of the studies reviewed were guided by a conceptual framework, this may be a call to utilize current theoretical knowledge to systematically study factors proposed to influence self-care.

Ability Effects on HF Self-Care

According to Orem (2001), SCA is "the power to engage in action to achieve specific goals." The selected basic human capabilities foundational to SCA are sensation, attention, learning, perception, memory, work, exercise, and regulation of motivational and emotional process (Orem, 2001). Complex cognitive skills are also proposed to be a powerful enabling factor to SCA. The studies in this literature review examined executive function, memory, attention/speed of processing, reasoning, visuospatial functions, language (Alosco et al.,

2014; Alwerdt, Edwards, Athilingam, O'Connor, & Valdés, 2013; Nordlund, Berggren, Holmström, Fu, & Wallin, 2015), and health literacy (Peterson et al., 2011) among older adults with HF. Impairment in executive function (e.g., problem solving, goal setting, and decision making) has been not only detected among individuals with HF but also found to be associated with reduced independence in instrumental activities of daily living such as medication management (Alosco et al., 2014). In a cross-sectional study, Nordlund et al. (2015) found that patients with HF demonstrated cognitive impairments in the domains of speed and attention, episodic memory, visuospatial functions, and language comparing with healthy individuals in spite of reporting no known cognitive disorders. Moreover, Alwerdt et al. (2013) reported differences in memory and speed of processing between individuals with and without HF, with individuals with HF displaying poorer performance in these cognitive functions. When studying changes in cognition over time, Alwerdt et al. (2013) found no significant difference between individuals with and without HF initially in reasoning ability, but, over time, individuals with HF experienced more decline in this ability. The longitudinal decline in reasoning ability was not found for memory or speed of processing.

The findings on cognitive impairments in HF by Alosco et al. (2014) and Alwerdt et al. (2013) are also consistent with the Karlsson et al. (2005) study results indicating 12% of the HF patients had poor cognitive function as determined by getting a score of less than 24 points (raw score) out of a possible 30 total points on the Mini Mental Status Examination (MMSE) upon discharge. The MMSE has been a valid and reliable instrument that is commonly used to screen for dementia through the assessment of multiple cognitive dimensions including items that measure orientation, language, attention, visuospatial construction, and immediate and short-term recall (Kline, Scott, & Britton, 2007). Of interest, Karlsson et al. (2005) further reports that after 6 months of treatment, only 4% of individuals with HF continued having cognitive impairments. Together, these studies suggest that HF treatment may improve cognitive function, supporting the need for continuous assessment of cognitive function throughout treatment. Using the MMSE-2 revised standard version permits the calculation of an age and education-adjusted standardized *T* score which allows the interpretation of an individual's performance in comparison to their own age and educational cohort's normal distribution curve (Folstein, Folstein, White, & Messer, 2010). Moreover, an educational and interventional follow-up should be provided when the individual's cognitive status assessment suggests these activities are appropriate.

Successful self-care requires purposeful decisions and behaviors based on knowledge and skills (Riegel & Dickson, 2008). Learning has been theoretically proposed to be foundational to the ability to produce self-care (Orem, 2001). Therefore, health literacy may also be

considered an important ability to perform self-care. In the Peterson et al. (2011) study, the investigators found that 17.5% of the participants with HF had a low health literacy level. These individuals seemed to be older, with lower socioeconomic status and a higher number of comorbidities. Moreover, a low level of health literacy was associated with higher all-cause mortality. Because health literacy is considered to be a modifiable risk factor for a poor disease outcome, it would be preferable to adjust the management of HF in older adults based on an assessment of their health literacy levels.

Heart Failure Interventions

Studies in this review used three interventions to enhance self-care: patient education and support, case management, and telemonitoring. These interventions varied in their specific self-care focus and the success of their outcomes with different subpopulations of older adults.

Patient education and support. The strategies for patient education and support were outpatient education and computerized information programs with or without a video program (Karlsson et al., 2005), education with mutual goal setting or supportive measures for patients (Kline et al., 2007), and education accompanied with DVD use (Boyde et al., 2013). These interventions focused on enhancing self-care practices and knowledge relevant to medication management, low sodium diet, fluid restriction, symptoms management, exercises, and weight monitoring (Boyde et al., 2013; Karlsson et al., 2005; Kline et al., 2007).

The strategy effectiveness of outpatient education combined with a computerized information program was reported on by Karlsson et al. (2005) in their randomized control trial (RCT) with a study sample of 90 hospitalized older adults with HF. The participants completed a developed questionnaire concerning knowledge about HF. Cognitive function was also assessed at the beginning of the study using the MMSE. Patients in the intervention group received regular verbal and written information from nurses about HF in combination with utilization of a computerized information program with or without a video information program. The patients in the control group received the usual primary health care. After 6 months, HF knowledge and cognition were again assessed. The results showed increased knowledge about HF among women in the intervention group in comparison with all men and other women in the control group.

In contrast to the success in knowledge outcomes in the patient education program, a comparison of supportive education and goal-setting interventions has found significant differences in the confidence of individuals to manage their HF. Kline et al. (2007) used a repeated-measure design to study these interventions in home health. In the supportive educative program, nurses provided information about strategies to self-manage HF and offered some support such as reviewing the patients'

support system, and developing plans for referral to health care providers when needed. In the mutual goal-setting approach, nurses and participants developed goals and means to attain them. Participants in both groups completed a questionnaire to measure their confidence in understanding the strategies of managing HF and a separate questionnaire testing confidence in their ability to manage HF. Comparing the outcomes of a supportive educative program and a goal-setting intervention revealed no significant difference in patients' understanding related to HF management (Kline et al., 2007). On the contrary, the supportive educative program improved the participants' confidence in their ability to manage HF.

More recent studies have added to our understanding of how to improve knowledge, confidence to manage self-care, and adherence to self-care in older adults with HF. Boyde et al. (2013) used a self-care manual combined with a DVD to improve patients' knowledge in self-care and their adherence to self-care behaviors. Self-care was measured using the Self-Care of Heart Failure Index (SCHFI; Riegel et al., 2004) consists of three subscales to measure self-care management, self-care maintenance, and self-care confidence. The results were improvement in self-care management (e.g. symptom management), maintenance (adherence to low salt diet and medication regimen), and confidence in the ability to manage HF.

Case management. A case management intervention was used in one study to enhance self-care. Similar to the patient education and support intervention, this intervention had a specific focus exploring self-care and HF outcomes.

In the Peters-Klimm et al. (2010) study, the case management program consisted of two strategies to improve self-care as measured by the European Heart Failure Self-Care Behavior Scale (EHFScBS) which is a valid and reliable tool (Jaarsma, Årestedt, Måtensson, Dracup, & Strömberg, 2009). The EHFScBS consists of 12 items that reflect recommended behaviors (e.g., daily weighing, fluid restriction) for individuals with HF. The two strategies used in the case management program were telephone monitoring and home visits. Older adults with HF received regular monitoring by telephone from physician assistants working in a primary care setting over a year and during three home visits. The investigators found their intervention was successful in improving in the adherence to HF self-care behaviors and health outcomes (i.e., HF-related hospital admission; Peters-Klimm et al., 2010). These researchers' results were confirmed by Mantovani, Ruschel, de Souza, Mussi, and Rabelo-Silva (2015) who tested the influence of receiving nurse-led home visits after hospital discharge on treatment adherence among 32 patients with HF. The patients showed significant improvement in adherence with HF self-care after receiving three home visits over 45 days after hospital discharge.

Telemonitoring. A telemonitoring intervention was used in multiple studies to enhance self-care. Similar to other interventions, there was a focus on enhancing self-care and successful health outcomes using diverse intervention methods.

Fursse, Clarke, Jones, Khemka, and Findlay (2008) used a clinical protocol for their 12-week telemonitoring intervention with 29 older adults from a primary care center. A telemonitor unit with a touch screen was used to enter data from attached devices that assessed blood pressure, oxygen saturation, and weight. The protocol was developed to enhance the accuracy of determining the patients who needed the intervention. The investigators determined the interventions were successful in the reduction of blood pressure as a result of more individuals seeking medication and medical advice.

In contrast to Fursse et al.'s use of a unit with touch screen for their telemonitoring intervention, Lind and Karlsson (2013) developed a digital pen-based telemonitoring system used with 14 individuals with HF over 12 months. The system reported vital signs, weight, and medication intake using a digital pen and a daily health diary form. The system generated an alarm when study participants reported abnormal values compared with certain limits stored in the system. The clinicians checked the system daily, and if they detected any deterioration related to HF (e.g., shortness of breath), they contacted the participant and intervened accordingly. Study findings included that participants reported the system was easy to use, facilitated contact with their clinicians, and increased their participation in their care. Of particular interest is that hospital readmissions were prevented for all study participants.

Providing additional knowledge on the effectiveness of telemonitoring interventions in different age groups, Lemay, Azad, and Struthers (2013) compared older adults (75 years of age and older) with younger adults' (less than 75 years of age) hospital utilization and outcomes following a telemonitoring intervention initiated prior to hospital discharge. The purpose of the intervention was to help participants successfully transition from the hospital to their homes by improving self-care and adherence to best practice guidelines. Expert nurses monitored 594 study participants with HF by evaluating the data (i.e., vital signs and weight) which were daily transmitted from the participants' home monitors through a telephone line to a central monitoring station. The usual duration of the intervention was 3 to 4 months, followed by a reassessment of the participants to determine the need for continuation of the intervention. The study results showed that there was no difference between older and younger participants with HF in the number of interventions for abnormal vital signs or the number of times that changes on the cardiac medication regimen occurred. Moreover, the number of emergency room (ER) visits and hospitalizations did not differ between the two groups. For the same duration of time (3 months), Evangelista et al. (2015) compared standardized hospital

discharge care with a remote monitoring system (RMS) of care for its influence on HF self-care in older adult patients with HF ($N = 21$). The investigators found that the patients receiving the RMS of care showed significant improvement in HF self-care as measured by the SCHFI (Riegel et al., 2004) in comparison with older adults receiving standardized care.

Interventional studies varied in their measured outcomes with few studies focusing on specific self-care behaviors in older adults with HF. Those studies that were successful in improving self-care behaviors used more than one strategy (Boyde et al., 2013; Peters-Klimm et al., 2010). In several research studies that used the strategy of telemonitoring, the sample size was small (Evangelista et al., 2015; Fursse et al., 2008; Lind & Karlsson, 2013) or the program had unclear guidelines for the duration of telemonitoring follow-up (Lemay et al., 2013; Lind & Karlsson, 2013). Despite these limitations, there was sufficient evidence that telemonitoring can be easy to use for older adults with HF (Lind & Karlsson, 2013). It has been concluded by investigators that telemonitoring programs enhance the patient's ability to monitor their vital signs, and successfully helped them to control blood pressure (Fursse et al., 2008).

HF Health Outcomes

In recent years, the use of hospital readmission rate has become one of the most clinical significant measures of the ultimate health outcome for individuals with HF. Furthermore, HF hospital readmission rates are considered a hospital quality measure that is monitored nationally by the Center for Medicare Services (CMS, 2013). The national U.S. 30-day HF readmission rate was 23.2% (292,938 patients were readmitted out of 1,262,826) between 2009 and 2012 (CMS, 2013). The CMS compares the readmission rate of a hospital with the national 30-day readmission rate and categorizes the hospital into one of three categories (i.e., no difference than U.S national rate, worse than U.S national rate, and better than U.S national rate; CMS, 2013).

Many studies have been conducted with an interest in reducing HF readmission rates (Feltner, 2014). In one of the earlier studies, Sethares and Elliott (2004) used a case control design with 33 older adults in their case group and 37 older adults in the control group. They proposed to examine the effect of a tailored message intervention on HF readmission rates. The patients in the case group completed a scale to assess perceived benefit and barriers to HF self-care behaviors, and then if the patients agreed on barriers and disagreed with the benefits of the behaviors, they received the tailored message. The results revealed that the intervention was not effective in reducing HF readmission rates in the case group in comparison with the control group. It was suggested that this finding may be because the intervention focused on changing the beliefs of the participants with HF rather than focusing on the medical management of the

participants. Lind and Karlsson (2013) also used newer technology in the form of a pen-based telemonitoring intervention over a 13-month study period to reduce readmission rates among 14 older adults with HF with a history of a maximum of six hospital admissions in the prior 12 months. In this intervention, the patients have a digital pen and a health diary they use to report some values such as weight and symptoms such as shortness of breath as well as behaviors (e.g., taking p.r.n. medications after being taught how to use the equipment for 30-60 min by a nurse). This intervention was reported as acceptable and useful for their participants who had a decreased rate of readmission.

Despite the successes of these few recent studies in reducing hospital readmissions, a different approach to study design has recently been suggested which challenges scientists to address known factors that influence hospital readmissions. In this literature review, three studies were found that examined the factors that affect readmission rates (Schmeida & Savrin, 2012; Sona et al., 2012) which have been reported as a high level of morbidity, a low level of independent functioning, and multiple medication use (Sona et al., 2012). Surprisingly, living alone, cognitive limitations, immobilization, and lack of social support have not been associated with hospital readmission (Sona et al., 2012). At the state level, Schmeida and Savrin (2012) analyzed state-level data of Medicare patients in 50 states to explore the factors that predict high readmission rate among HF patients. According to the results, these factors are more total days of care per 1,000 Medicare enrollees, high median income, and high percentage of drug coverage. Moreover, it has been suggested that adding socioeconomic factors such as poverty rate, educational level, and housing vacancy rate to hospital readmission calculations may result in more useful results such as improving quality of care (Nagasako, Reidhead, Waterman, & Claiborne Dunagan, 2014). It is also suggested that race may also be an additional factor to consider as one study found that the length of hospital stay and the number of performed procedures are affected significantly by race (Wheeler et al., 2004). Using a qualitative approach, Enguidanos, Coulourides Kogan, Schreiber-Baum, Lendon, and Lorenz (2015) recruited six patients with HF and three with cancer to explore the reasons for 30-day admission from the patients' perspective. The interviews revealed three themes that were lack of motivation and support for self-care particularly caregiver support, acceptance of the condition and desire for aggressive care, and poor quality of care as well as access to care. Of particular interest is a more recent study that suggests "30-day readmission" is not a good predictor of outcomes in patients with HF. Kociol et al. (2013) compared "30-day readmission rates" and "total episode of care inpatient days" to determine the best indicator of HF outcomes. Total episode of care (EOC) inpatient days are defined as "the total hospital days including index admission and any hospital days that are

related to readmission within 30 days" (Kociol et al., 2013). Although there was no association between 30-day readmission and decreased 30-day mortality, better performance on the EOC was associated with decreased 30-day mortality. Based on these results, the view of "30-day readmission rate" as an indicator for HF outcome and management needs to be reevaluated.

Conclusion

This review identified a limited number of studies in older adults with HF regarding factors affecting self-care, patient's ability to perform the required self-care activities, interventions to improve self-care, and a selected HF outcome. There are many factors influencing HF self-care that need to be further explored. Emotional, psychological, and cognitive assessment should be carried out before and through the implementation of HF management programs. Modifications for HF self-care interventions should be considered when provided to older adults. More research is needed that address older adults' experiences with HF and its management to improve self-care and health outcomes.

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