TELEHEALTH: IMPROVING CONFIDENCE AND SELF-CARE WITH MANAGEMENT OF HEART FAILURE

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ABSTRACT


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Heart failure, a health problem of older adults challenges the nation with the cost of unnecessary hospital readmissions. Telehealth technology is used to support individuals in their homes with disease self management. The purpose of this study is to understand how telehealth can improve confidence and management of self-care in individuals with Heart failure. This quasi-experimental study, a replication of Dansky, Vasey, and Bowles’ (2008) work, will be based on the five-stage self-care model developed by Riegel, Carlson, and Glaser. A convenience sample of approximately 200 individuals, who have been diagnosed with heart failure and request assistance with self-care, will be recruited from cardiac rehabilitation centers and/or home health agencies located in the Midwest. Confidence and self-care management will be measured with the Self-Care of Heart Failure Index (SCHFI). The findings will provide information about technological support for self-care management and confidence in clients with heart failure.
Chapter 1

Introduction and Background

Introduction

Heart failure, a prevalent cardiac disease in older adults, affects an estimated fifteen million individuals throughout the world (Oguz & Enc, 2008). Approximately five million people in the United States over the age of 65 years suffer from heart failure, the most common hospital diagnosis for individuals in this age group (Lehmann, Mintz, & Giacini, 2006). Riegel et al. (2010) estimated that 570,000 new cases of heart failure occur per year in the United States. Advancements in treatment have improved patient outcomes (Wade et al., 2011). The survival rate of heart failure patients is increasing, as evidence from the 399,000 hospital discharges in 1979 to 1,093,000 in 2003 (LaFramboise, Woster, Yager, & Yates, 2009).

Heart failure is a pathological disease in which the heart fails to pump blood effectively to meet the metabolic and oxygen demands of the body (Oguz & Enc, 2008). Heart failure is caused by common cardiac diseases such as hypertension, valvular heart disease, and cardiomyopathy (Bouffard, 2011). According to American Heart Association (2012), treatments for heart failure include lifestyle changes, medications, or surgical procedures to improve the effectiveness of the heart’s ability to pump.
As the population ages the number of individuals with heart failure will continue to rise, leading to a strain on healthcare resources (LaFramboise et al., 2009). In the United States alone, more than thirty-five billion dollars were spent on treatment of heart failure in the 2008 (American Heart Association, 2012). The American Heart Association (2012), estimated that the cost of heart failure in the United States is going to reach 44.6 billion dollars by 2015. A substantial portion of this cost is associated with hospital readmissions. Approximately 50% of individuals 65 or older are readmitted to the hospital within six months of their initial hospitalization for heart failure (Bakan & Akyol, 2007; Riegel et al., 2010). Following the diagnosis of heart failure, it is essential for individuals to learn strategies for managing the disease process. Up to 50% of readmissions may be due to noncompliance and inability to detect warning signs of exacerbation and are potentially preventable (Slater, Phillips, & Woodard, 2010).

Telehealth, a remote healthcare service, can be an important factor in decreasing readmissions and improving outcomes of heart failure patients. Telehealth does not always include clinical services, but it is the technology bridge from health care services to geographical residences (Courtney et al., 2010). Telehealth monitoring devices are approved by the Federal Drug Administration (FDA) to connect a patient’s home with a health care provider through a phone line or computer wireless system (Myers, Grant, Lugn, Holbert, & Kvedar, 2006). The telehealth monitoring device prompts the patient to check daily weights, vital signs, and oxygen saturation. In addition, any questions which may arise related to the individual’s medical treatment can be addressed (Myers et al., 2006; LaFramboise et al., 2009). Nurses in the home health agencies monitor the results from patients’ telehealth devices through a computer-based interaction (Myers et al.,
Lehmann et al. (2006) suggested that the telehealth monitoring device can be effective in managing heart failure in an ambulatory setting as evidenced by a 41% decrease of the utilization of health care resources. According to the study conducted by Myers et al. (2006), daily monitoring by a telehealth monitoring device increased confidence of patients by reducing the number of home visits, provided a cost savings, and increased individuals’ quality of life. Telehealth can provide an economical and timely method for educating and monitoring individuals while improving patient health outcomes (LaFramboise et al., 2009).

**Background and Significance**

Telehealth has been used in healthcare for multiple years. NASA is accredited for the use of telehealth in the 1960s; the system was used via satellites to transmit astronauts’ physiological states from space crafts (Winters, 2004). According to US Department of Health and Human Services (2012), “Telehealth is the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration” (p. 1). Healthcare employee shortages have lead providers to evaluate additional resources such as telehealth for home based care, reducing health care cost, and improving health care access (Myers et al., 2006). Home-based telemonitoring is a beneficial tool that may impact cost, leading to an increase in patient satisfaction (Myers et al.). Bowles et al., (2010) found telehomecare, a form of telehealth, to be widely accepted in monitoring and promoting self-care and reduction of healthcare cost in an effective manner for older adults. According to the Center for Connected Health Policy
Telehealth Advancement Act of 2011, studies have shown that telehealth programs assist in positive health outcomes, allow elderly and disabled patients to continue living in their homes, and reduce hospital readmissions and the length of stay; thereby, improving quality of life and reducing health care costs. According to Lehmann et al. (2006), a demonstration project by the Secretary of Health and Human Services was conducted on telehealth to evaluate methods to improve quality of care and reduction of expenses for Medicare participants with chronic medical conditions. Reductions were found in overall utilization of healthcare resources by 41%, physician visits by 41%, emergency room visits by 33%, and hospitalizations by 29% (Lehmann et al., 2006). LaFramboise et al., (2009) found telehealth to be a cost-effective way to promote improved health management.

According to Courtney et al., (2010), individuals who have experienced a telehealth device within their home support the use of the telehealth device. Individuals have expressed positive remarks in regards to the usage of the telehealth devices abilities to take blood pressure, heart rate, oxygenation saturations, and the ability to detect early signs and symptoms of serious medical events (Courtney et al, 2010). Young, Foster, Silander, and Wakefield (2011) found that 100% of the individuals within their study strongly agreed or agreed that the home telehealth device was easy to use. In addition, Young et al. (2011) reported 100% of the individuals would also recommend the use of a home telehealth monitoring device to others. The function of the telehealth device was reported as convenient and easy to use and an effective way to enhance older adults’ ability to monitor their heart failure through self-management (LaFramboise et al., 2009). In addition to providing support, the telehealth monitoring device provides repetitive
health education information improving the individual patient’s understanding of the disease process and self-management (LaFramboise et al., 2009). The placement of a telehealth monitoring device into a patient’s home will impact self-monitoring, decision-making, and self-care (Bowles et al., 2010)

Problem Statement

The cost of unnecessary readmissions for heart failure is a major challenge to the United States’ healthcare system (Dansky, Vasey, & Bowles, 2008). A lack of both confidence and self-care management skills in individuals with heart failure contributes to this healthcare system burden. Knowledge deficit in individuals with heart failure is negatively associated with outcomes of care (Dansky et al., 2008). Education and ongoing self-monitoring are needed to prevent costly reoccurrences of hospitalizations.

Purpose of the Study

The purpose of this study is to increase the understanding of why telehealth improves the outcomes of older patients who are diagnosed with heart failure. Specifically, this study will examine the impact of a telehealth program on the relationship between confidence in self-care management and self-confidence in home health patients. This proposed study will partially replicate the earlier study of Dansky et al. (2008).

Research Hypotheses

1. Home health patients using telehealth will report greater confidence regarding their self-management of heart failure than patients receiving standard care.
2. Confidence regarding self-management of heart failure will be positively related to self-management behaviors of home health care patients with a primary or secondary diagnosis of heart failure.

**Conceptual Theoretical Framework**

Riegel’s (2012) definition of self-care is the framework for this study. According to Riegel, Lee, Dickson, & Carlson (2009), self-care is defined as a naturalistic decision-making process involving behaviors to maintain homeostasis and response to symptoms when they occur. For this study, self-care will be conceptualized as a process including maintenance and management of heart failure (Riegel et al., 2010). Managing symptoms is a deliberate process which begins with recognition of a change, evaluation of the change, taking action, and evaluation of the final treatment (Riegel et al., 2009). The relationships assessed in this study reflect concepts according to Riegel’s framework of self-care. This framework will effectively guide this study, providing valid information and a foundation for how the study needs to be conducted and analyzed.

**Definition of Terms**

**Confidence: Conceptual Definition**

Dansky et al. (2008) defined confidence in relation to Bandura’s (1977) theory of self-efficacy, which includes four cognitive concepts: mastery of experiences, vicarious learning, modeling, and social persuasion.

**Confidence: Operational Definition**

The Self-Care of Heart Failure Index (SCHFI) (Reigel et al., 2009) will measure four specific items related to confidence in the ability to self-manage heart failure. These four items are the importance of symptoms, changes in health status, relief of symptoms,
and evaluation of effectiveness of self-management and treatment. The higher the SCHFI score, the greater the individual’s confidence (Dansky et al., 2008).

**Self-Management: Conceptual Definition**

According to Dansky et al., (2008) self-management is explained as “the process of maintaining health through positive health practices” (p. 28).

**Self-Management: Operational Definition**

The Self-Care of Heart Failure Index (SCHFI) will measure self-management with nine items; five measuring self-care maintenance activities and four measuring when symptomatic issues occur (Dansky et al., 2008).

**Limitations**

Generalization of findings may be limited as a result of the non-random convenience sample drawn from one Midwestern hospital system. Sample size may be limited by participants’ lack of response to telephone interviews. Findings may reflect participant response to one type of telehealth monitoring system rather than to telehealth monitoring in general. Findings will also be contingent on participants’ willingness to learn and consistently access the device.

**Assumptions**

1. Individuals will take control of their own healthcare problems.
2. Individuals care about their well-being.
3. Decision-making will improve confidence.
4. All participants will answer honestly.
5. Self-care management is necessary.
6. Improved relationships between individuals and their symptoms are desirable.
7. Participants will commit to treatment interventions.

8. All participants will complete symptom monitoring.

Summary

Millions of lives are affected by heart failure. It is necessary for individuals who suffer from this diagnosis to be aware of signs and symptoms to prevent reoccurrences. Individuals who utilize telehealth may decrease exacerbations through increased confidence in their self-care management abilities. The purpose of the study is to increase the understanding of why telehealth improves the outcomes of self-care management and self-confidence in older home health patients who are diagnosed with heart failure. This study will be a partial replication of Dansky, et al. (2008) study. Riegel’s Self-Care of Heart Failure Model will be the framework of this study; the study will measure confidence in self-care management in heart failure through the use of a telehealth monitoring device.
Chapter II
Review of Literature

Introduction
Heart failure, a health problem of older adults, challenges the nation with the cost of unnecessary hospital readmissions. Telehealth technology is used to support individuals in their homes with disease self-management. The purpose of this study is to understand how telehealth can improve the confidence and management of self-care in individuals with heart failure. This quasi-experimental study, a partial replication of Dansky et al. (2008) work, will be based on the five-stage self-care model developed by Riegel, Carlson, and Glaser (2000). The literature is organized into three sections: (a) self-care management, (b) patient perception, and (c) quality of care.

Theoretical Framework
Self-care, defined by Riegel et al. (2009) and Riegel (2012), forms the framework. According to Riegel et al., (2009), self-care is defined as a naturalistic decision-making process involving behaviors to maintain homeostasis and the response to symptoms when they occur. Self-care is conceptualized as a process including maintenance and management of heart failure (Riegel et al., 2010). Managing symptoms is a deliberate process which begins with recognition of a change, evaluation of the change,
implementation, and evaluation of the final treatment (Riegel et al., 2009). The stages are divided into two subgroups labeled self-care maintenance and self-care management.

The first component of self-care maintenance includes symptom monitoring and treatment adherence, which is the process individuals use to keep themselves physiologically stable. Individuals must follow the directions of medical professionals to meet these needs. The second component consists of symptom recognition. Individuals must be able to recognize the signs and symptoms of heart failure to detect if any additional response is needed. After recognition of the symptoms, self-care management is initiated, and the individual must evaluate their symptoms. Evaluation of the symptoms involves a decision-making process which allows an individual to know if a symptom needs to be treated. Treatment implementation is taking action and doing something about the symptoms. The final stage is treatment evaluation, which refers to evaluation of whether or not the treatment was effective (Riegel et al., 2009). Riegel et al. (2009) suggested individuals who practice self-care maintenance live a healthier life, follow treatment regimens, and are better equipped to monitor symptoms more closely.

Self-Care Management

Heart failure, a cardiac disease most prevalent in older adults, affects an estimated fifteen million individuals throughout the world (Oguz & Enc, 2008). Symptoms associated with heart failure result in decreased self-care and quality of life, and increased hospitalizations. Multidisciplinary teamwork is essential as patients are educated in strategies to manage symptoms and perform self-care. The purpose of the study by Oguz and Enc (2008) was to determine the symptoms experienced by patients with heart failure.
and to identify the strategies they use in the management of the disease. The authors did not specify a conceptual framework in the study.

This study took place at the cardiology polyclinic of the Istanbul University Faculty of Medicine in Turkey. The population consisted of 120 patients diagnosed with heart failure and admitted to the polyclinic between January 1, 2005 and December 31, 2005. Inclusion criteria included a diagnosis of heart failure within the last six months, a functional capacity of II-III on the New York Heart Association (NYHA) scale, 20 to 79 years of age, conscious, with the ability to read and write (Oguz & Enc, 2008). The final sample included 64 (53.3%) patients who volunteered to participate in the study.

Oguz and Enc (2008) collected socio-demographic information and data about variables related to heart failure with a researcher-developed questionnaire. Open-ended questions addressed the research questions about heart failure symptoms and self-management strategies for handling the symptoms. Reliability and validity for the questionnaire were not reported.

Descriptive and non-parametric data were collected and analyzed with significance set at p < .05. The study sample consisted of 42.2% women and 57.8% men who had an average age of 59.2 years old. There were no significant differences in marital status, education, occupation, NYHA rating, or Body Mass Index (BMI) when compared with strategies used for self-management of heart failure. Symptoms experienced by study participants included fatigue (67.2%), dyspnea (60.9%), palpitations (59.4%), edema (43.8%), nocturia (35.9%), nausea (26.6%), and/or coughing (25%). The genders differed significantly in their symptom management particularly in relation to management of fatigue ($\chi^2 = 4.240, p = .04$), palpitations ($\chi^2 = 8.6, p = .003$),
self-care strategies associated with dyspnea ($\chi^2 = 8.622, p = .003$), and management of edema ($\chi^2 = 7.370, p = .003$). Men restricted their activities when fatigued, rested with palpitations and dyspnea, and took diuretics when edema was present. Women did not rest as frequently as men when fatigued, used medications and/or oxygen for dyspnea and palpitations, and notified their physicians for presence of edema. Although treatment guidelines call for individuals with heart failure to weigh themselves daily, the finding that the majority of participants (57.8%) performed only weekly weights was consistent with the literature (Oguz & Enc, 2008).

In conclusion, Oguz and Enc (2008) found significant differences between self-care coping strategies used by men and women diagnosed with heart failure. These findings are limited by inconsistent record-keeping in the clinic and the limited number of participants with a NYHA functional capacity of II or III. Further research with a larger number of participants is needed to better determine the coping strategies used in the Turkish population. It is essential for individuals to be able to determine their symptoms and understand the strategies of self-care management to have a better quality of life with heart failure.

Worldwide, heart failure predominately affects individuals over the age 65. The United States alone has approximately 570,000 new diagnosed cases of heart failure a year (Riegel et al., 2010). Within this age group, heart failure is the number one cause of readmissions into the hospital. Most readmissions for heart failure are thought to be preventable with accurate education and self-care management. Individuals with heart failure need to be able to recognize these symptoms and be able to identify and distinguish them from other potential health issues. If these symptoms are not caught
early, there is potential for exacerbation. The purpose of this study by Riegel et al. (2010) was to assess whether aging is associated with decreased ability to detect and interpret afferent physiological information. The authors hypothesized that younger patients would detect and interpret their heart failure symptoms more accurately than older patients (Riegel et al., 2010). The authors did not specify a conceptual framework for this study.

The locations of the study were four outpatient clinics in Melbourne, Australia. A sample of forty individuals was drawn from a population of individuals who had been diagnosed with heart failure for at least 6 months and had a New York Heart Association (NYHA) class of II or III. Exclusion criteria consisted of any disorder which caused weakness or fatigue, recent myocardial infarction, angina in the last three months, active cancer, obstructive pulmonary disease, hypocalcaemia, hyper- or hypothyroidism, weight loss for an unknown reason, institutionalization, and/or any use of psychotropic medications. Maximum variation sampling was used for monitoring participants’ characteristics including age, gender, functional class, and length of time with heart failure. The sample was divided at the median of 73 years to compare younger and older participants. Participants were primarily retired Australian men who had completed at least 12 years of school and were married. Based on the NYHA functional class scales, most were mildly symptomatic. Twenty-seven participants completed all aspects of the study including the 6-minute walk test (6MWT) and qualitative surveys (Riegel et al., 2010).

Riegel et al. (2010) defined self-care as a natural decision-making process used by individuals to maintain their health and deal with diagnosis symptoms. A cross-sectional, mixed method design was used to assess symptoms and interpretation abilities. The
variables included in the study were age, functional status, body mass index (BMI),
fitness, perceived health, and participants’ interpretation abilities (Riegel et al., 2010).
Shortness of breath was rated by participants and registered nurse research assistants
(RNRA) using the Borg Perceived Exertion Scale. Scores were obtained immediately
before and after a 6MWT, and again 5 minutes later. Congruence between the participant
and RNRA scores indicated participants’ ability to accurately detect and interpret
shortness of breath. Inter-rater reliability for the Borg measure among RNRA was
acceptable at .91 (Riegel et al., 2010). Qualitative interviews consisting of open-ended
questions and probes allowed the participants to speak freely of their experiences.
Participants were asked to describe how they detected and interpreted their symptoms
related to shortness of breath.

Riegel et al. (2010) found significant group differences in the ability to detect
early heart failure symptoms. A $p$ value of $\leq .10$ was used to determine statistical
significance due to the exploratory nature of the study. Discrepancies between
participants and RNRA were greater in the older group than the younger group across all
three measurement points. However, the only significant group difference ($p < .10$) in
discrepancies occurred immediately after the 6MWT (Riegel et al., 2010).

Similar qualitative findings reflected two key themes. First, the subtle symptoms
commonly associated with heart failure were not recognized or interpreted as an
exacerbation in the older group, but thought to be related to co-morbid conditions (Riegel
et al., 2010). Secondly, the younger group perceived heart failure symptoms as a burden
to their daily lives. In contrast, the older group identified their health more favorably even
though this perception could be a disadvantage which may cause poorer detection and
interpretation of heart failure symptoms. Additionally, one-third (31%) of the participants who were unable to accurately detect their shortness of breath (SOB) stated that friends and family typically detected this symptom before the patient did. In comparison to the discrepancy of detection data, the older group had uncertainties interpreting SOB and the younger group wanted more information and education to interpret the meaning of the symptoms (Riegel et al., 2010).

The integration of both the quantitative and the qualitative data confirmed the hypothesis that the older group had more errors in detection of heart failure symptoms than the younger group. Ninety-two percent concordance was reported when each participant’s data was compared with their narrative and self-care practices (Riegel et al., 2010).

In conclusion, the authors of the study suggest that older participants’ poor sensitivity to internal stimuli may be a cause of failure to recognize early signs of heart failure. The inability to perceive the symptoms could be due to loss of sensory neurons associated with aging (Riegel et al., 2010). Additional education about the symptoms of heart failure may assist individuals with this diagnosis to more accurately identify and interpret their symptoms.

Self-care management has been assumed to be a contributing factor to the successful treatment of heart failure. It has been hypothesized that hospitalizations, emergency department visits, and heart failure-related deaths could be reduced by the effective use of self-care management strategies. However, empirical support for this hypothesis is lacking (Lee et al., 2011). To address this lack of support, Lee et al. proposed to describe the significance of heart failure (HF) self-care management in
estimating the risks of all-cause mortality, hospitalizations, or emergency-room admissions. The study was organized around the conceptual definitions of self-care maintenance and self-care management.

This study was a secondary analysis of data from three parent studies between 2004 through 2007. All participants were recruited from academic medical centers in the East South Central and South Atlantic regions of the U. S. The sample consisted of 195 individuals with the diagnosis of heart failure and ejection fractions averaging 34.7%, age greater than 61 years old, and an average body mass index of 32.2 kg/m². Participants were predominantly male and greater than half of the participants (60.1%) fell within New York Heart Association (NYHA) functional class III or IV. Participants were followed for 364 days ± 288 days (Lee et al., 2011).

The widely used 17-item Charlson Comorbidity Index was used to establish risk related to the number of comorbid conditions. Scores greater than 5 indicate a high risk related to comorbidities. The Duke Activity Status Index (DASI), a 12-item self-report scale, was used to determine subjective functional capacity, with higher scores indicating a better functional capacity. Health-related quality of life was measured using the Minnesota Living with Heart Failure Questionnaire (MLWHFQ); higher scores are indicative of poorer quality of life. The Beck Depression Inventory II (BDI) was used to measure levels of depression with higher scores on the BDI indicating a greater level of symptoms related to depression. Although the instruments are widely used and accepted, there was no report of reliability or validity of the instruments for this study (Lee et al., 2011).
Self-care maintenance and confidence, as well as self-care management, were measured in this study. Self-care maintenance is defined as the daily routine behaviors individuals follow to maintain homeostasis. Self-care management is the process of following through the decision-making process and taking an action to prevent an exacerbation (Lee et al., 2011). Self-care maintenance was measured using two scales: Medical Outcomes Study (MOS) specific adherence scale, and the Self-Care of Heart Failure Index (SCHFI). The MOS specific adherence scale is a nine-item scale measuring adherence to a prescribed plan of care with higher scores indicating better adherence. The 15-item SCHFI contains three subscales: self-care maintenance, self-care management, and self-care confidence. Scores can range from 0 to 100 for each subscale, with higher scores indicative of higher levels of self-care maintenance, management, and confidence. For analysis purposes, scores for self-care management were divided into three categories: individuals with HF symptoms and self-care management scores below the sample mean of 63.6, individuals with HF symptoms and self-care management scores above the sample mean, and individuals with HF but who were symptom-free (Lee et al.).

Risk for a heart failure-related event during follow-up was influenced by a number of variables. Sociodemographic variables of age and gender and the clinical characteristics of BMI, depression score, and comorbidities contributed significantly ($\chi^2 = 23.31, p < .001$). Specific heart failure-related variables including functional levels, quality of life, and adherence to the prescribed treatment plan were also important (block $\chi^2 = 18.8, p < .05$; model $\chi^2 = 43.97, p < .001$). Significant individual factors that were associated with the outcome variables of all-cause mortality, hospitalization, and emergency department admission included age (HR 0.97; 95% CI 0.94 to 0.99), BDI score
(HR 1.06; 95% CI 1.02 to 1.1), prescription of a β-adrenergic blocker (HR .35; 95% CI .19 to .64) and DASI score (HR .96; 95% CI .93 to .99). In addition, participants with above-average self-care management scores (HR .44; 95% CI .22 to .88; p < .05) and participants who were symptom free (HR .48; 95% CI .24 to .97; p < .05) were less likely to undergo an event in comparison to the below-average self-care maintenance participants (Lee et al., 2011).

The evidence reported by Lee et al. (2011) in this study confirmed the hypothesis that self-care management related to patients’ early recognition of heart failure symptoms reduces the risk for an event of exacerbation. Decision-making based on the recognition of the symptoms of heart failure was found to be the key to prevention. Preliminary evidence in this study reveals that the more individuals are engaged in self-care management and follow the prescribed plan of care, the more likely risks for heart failure-related events will be reduced. Improvement of self-care management in heart failure patients includes not only teaching and educating individuals, but evaluating outcomes.

A significant deficit in self-care management has been found in individuals with heart failure. According to Britz and Dunn (2010), individuals who report a decrease in self-care abilities have an increase in hospitalizations and a decrease in quality of life. The purpose of this study was to determine if there were specific self-care deficits among patients with heart failure related to a decrease in quality of life at the time of discharge from an acute care setting. The self-care deficit theory of nursing developed by Orem guided the study.
The setting of the study was a Midwestern hospital selective care unit for heart failure patients; thirty subjects were enrolled in the study. Inclusion criteria consisted of admission diagnosis of heart failure, age greater than eighteen years old, and the ability to read, write, and understand English. Specific findings about the sample included an average age of 71 years with the majority being male, married and having completed high school. Seventeen percent of the participants currently smoked, and one-half reported their health as poor due to additional health diagnoses (Britz & Dunn, 2010).

Self-care was measured using the Self-Care Heart Failure Index (SCHFI). The instrument is a 22-item questionnaire divided into three subscales: self-care maintenance, self-care management, and self-care confidence. A high score on the questionnaire indicated an increase in self-care abilities based on a 4-point Likert scale (1 = never or rarely, 4 = always or daily). Quality of life was measured using the Minnesota Living with Heart Failure (MLHF) questionnaire, and 6-point Likert scale (0 = not at all, 5 = very much) was used to identify limitations to being able to live the way participants would have liked over the last month (Britz & Dunn, 2010). Cronbach’s alphas for the subscales and the total questionnaire were less than optimal: self-care maintenance was .46, self-care management was .45, and self-care confidence was .72. The Cronbach’s alpha for the total SCHFI score was .51 suggesting that the findings based on this instrument should be cautiously interpreted. However, Cronbach’s alpha for the two subscales of the MLHF was acceptable: physical quality of life was .82, emotional quality of life was .87, and the total MLHF scale was .87. No evidence of validity was provided for either scale (Britz & Dunn, 2010).
The findings related to self-care were statistically significant. In regards to the relationship of self-care and gender, females overall were more confident than males in managing and maintaining their symptoms ($r = .39, p < .05$). Subjects who reported their health as exceptional had more self-confidence ($r = .41, p \leq .05$) and fewer co-morbid conditions ($r = .39, p < .05$). The findings related to quality of life (QOL) included older adults having a better quality of life ($r = .43, p \leq .05$) than the younger adults. In addition, self-care confidence was significantly correlated to physical QOL ($r = .37, p \leq .05$), emotional QOL ($r = .45, p \leq .05$), total QOL ($r = .48, p \leq .05$), and emotional well-being ($r = .40, p \leq .05$). Furthermore, subjects who felt confident in their self-care abilities were also physically and emotionally positive in their feelings of well-being and quality of life (Britz & Dunn, 2010).

The researchers concluded that positive perceptions of health and self-confidence significantly improved individuals’ quality of life. Individuals with self-care deficits and lack of confidence need education to enhance their abilities to develop self-care management skills. The development of knowledge and skills of self-care management can increase the confidence of each individual providing overall better health and management of their disease thus decreasing the likelihood of unnecessary hospitalizations (Britz & Dunn, 2010).

Self-management of heart failure is critical to the reduction of readmissions. Telehealth technology is used to support individuals in their homes with disease self-management. The purpose of the study by Dansky et al. (2008) was to understand how telehealth can improve confidence and management of self-care in individuals with heart failure. This quasi-experimental study was based on the five-stage self-care model
developed by Riegel, Carlson, and Glaser (2000). The first hypothesis examined if participants using telehealth would report greater confidence regarding the management of heart failure than would individuals in the control group. The second hypothesis tested the relationship between confidence and self-management behaviors (Dansky et al., 2008).

The Dansky et al. (2008) study took place in Pennsylvania. A sample of 284 individuals who were enrolled in one of ten home health agencies and diagnosed with heart failure was used for this study. Individuals were randomly assigned to the intervention group or the control group. The intervention group received standard home care and either an asynchronous monitoring device or a synchronous video device which was placed in their home for the duration of the study (62 days). The control group received home care services only (Dansky et al., 2008).

The instrument used for the study was the Self-Care of Heart Failure Index (SCHFI). The instrument measured the confidence and self-care maintenance and management behaviors reported by the participants over three different data points: time 1 at admission to the home health agency, time 2 at 60 days, and time 3 at 120 days post-admission to the agency (Dansky et al., 2008). Reliability of the subscales has been reported with Cronbach’s alpha coefficients ranging from .56 to .82, suggesting the subscales with a Cronbach’s alpha < .7 should be cautiously interpreted. Four items were used to measure confidence, nine items were used to measure self-management, and five items were used to measure self-care maintenance. A general linear model (GLM) was used to test the first hypothesis; a series of regression equations were used to test the second (Dansky et al., 2008).
Findings for the first hypothesis included an improvement in confidence across all groups. However, the video telehealth group demonstrated significant improvement when compared with the other groups, with the greatest gain occurring between Time 1 and Time 2 ($p = .014$). The monitored intervention group had no significant differences from the changes in either the control group or the intervention group relating to time effect, group effect, or a marginal time-intervention effect ($p = .098$) (Dansky et al., 2008).

Findings for the second hypothesis revealed that confidence was a positive predictor of five out of nine self-management behaviors including specific routine activities and activities when symptomatic. The significant routine activities included participants who followed low-salt diet ($p = .014$) and engaged in regular physical activity ($p = .000$). When symptomatic participants reduced salt in their diets ($p = .000$), took additional diuretics ($p = .006$), and notified the doctor or nurse ($p = .002$), self-management behaviors were significantly effective in the prevention of a negative health outcome (Dansky et al., 2008).

Dansky et al. (2008) investigated the use of telehealth monitoring devices within participants’ homes to validate self-care management of heart failure. Results indicated that the monitoring device was encouraging and helpful in the management of chronic heart failure. Researchers identified a relationship between confidence and self-management behaviors. These findings suggest that confidence is a positive predictor of the ability of individuals to manage their treatment regime effectively from their homes (Dansky et al., 2008).
**Patient Perception**

Telecommunication technology is being used to provide remote monitoring of elderly individuals who suffer from chronic diseases. This technology allows older adults to be monitored from home by a nurse and may improve patient outcomes and self-care management. However, patient perceptions of this technology will influence the outcomes of the management of chronic diseases such as heart failure.

The use of telecommunications in healthcare is increasing across clinical settings and into patients’ homes. Telehealth is becoming a cost effective, self-management system that can be used by individuals to self-manage heart failure symptoms. LaFramboise et al. (2009) sought to discover perceptions about ease of use, efficacy, and difficulties encountered by patients who had completed a parent study using an in-home telehealth communication device known as the Health Buddy. The authors did not specify a conceptual framework for this study.

Focus groups of participants who had completed a minimum of six months in the parent study were held in an easily accessible conference room at the University of Nebraska Medical Center. Participants who were unable to come to the university were interviewed in their homes. Thirteen participants agreed to participate in the secondary study. Characteristics of the sample included individuals who were female (61%), lived alone (54%), white (92%), had a high school diploma (62%), and had class II heart failure (77%) according to the New York Heart Association (NYHA) classification system. Although participants who dropped from the parent study before completing the full six months were eligible, only one individual agreed to participate (LaFramboise et al., 2009). Researchers measured ease of use, effectiveness of management, support, and
difficulties with the use of the Health Buddy. Both the focus groups and the interviews were audio-taped and transcribed verbatim (LaFramboise et al., 2009).

The positive qualitative findings included ease of use and effectiveness of the telehealth monitoring device. Participants reported the Health Buddy to be easy to use and convenient. Elements that contributed to the effectiveness of the management of heart failure included teaching, promoting, and motivating the participants to be more self-reliant in their own care. Although there was no human contact, the participants felt monitored and cared for through the use of the Health Buddy. The findings also indicated that there were some difficulties encountered including the device being bothersome and complicated. Participants found the device to be bothersome due to the requirement of a phone jack and electrical outlet being necessary. Participants also found the daily questions to be boring. For some participants, the wording of potential responses to the Health Buddy questions was felt to be inadequate to describe their answer. Individual responses were varied in regards to time required in using the device. Some participants felt that 6 months was too long for the Health Buddy to be in the home. Others found themselves regressing toward previous behaviors without the frequent reminders. LaFramboise et al. (2009) concluded that post-intervention strategies should be explored.

LaFramboise et al. (2009) concluded that the Health Buddy was easy to use and effective for self-management. Improvement in knowledge and understanding of previous information provided by physicians was accomplished with the use of the telehealth monitoring device. Although there were a few difficulties with the device, overall the use of the Health Buddy promoted self-care and responsibility of the participants in their homes.
Remote monitoring devices are being utilized to bridge the geographical gap between patients’ homes and the clinical care setting by the virtual provision of information about patient blood pressures, weights, and/or specific health issues. The placement of these telehealth monitoring devices in community settings may be preferred by individuals who have financial difficulties or mobility impairment by providing timely, on-site health information (Courtney et al., 2010). Courtney et al. (2010) examined the acceptability and perceived value of community-based telehealth kiosks with regard to current health self-management practices of community dwelling older adults. The authors did not discuss any conceptual framework for this study.

The setting was a community Housing and Urban Development (HUD)-subsidized senior low-rise apartment complex located in Pittsburg, Pennsylvania. Individuals who were older than 70 years of age, had at least one chronic illness, spoke English, and were cognitively intact as evidenced by a Mini-Mental State Exam (MMSE) score greater than 22 were recruited from the residents of the apartment complex. Six residents agreed to participate in the two focus groups. Participants in the focus group included one man and five women, age 73 to 89, and all Caucasian. The three staff members who worked with the residents were interviewed with semi-structured questions relating to the acceptability and perceived value of telehealth kiosks (Courtney et al., 2010).

Two pre-implementation focus groups and individual interviews were conducted and audio-recorded. The semi-structured interview questions addressed the acceptability and perceived value of the telemonitoring kiosks with regard to self-management
practices. Credibility was established within the group by reviewing and validating the findings (Courtney et al., 2010).

According to the case manager focus group, the telehealth monitoring device would be beneficial and could enhance case managers’ relationships with the participants. However, the case manager focus group had concerns about the participants’ reactions to the device, viewing of their health care, and the location of where the telehealth monitoring device was located for the community to use (Courtney et al., 2010). In comparison to the case manager focus group, participants felt the telehealth device would detect early signs and symptoms of serious medical issues, improve their self-management skills, reduce the cost of unnecessary doctor visits as well as enhance support from their physicians.

Courtney et al. (2010) concluded that implementation of the telehealth monitoring device would be beneficial to the senior community complex facility by increasing their ability to self-manage health issues from their residence. Concerns about training sessions, privacy of health information, and the location of the device within the community living complex were expressed. Results from the study suggested that an education program would be beneficial prior to implementing the monitoring device. These findings support the possibility of community-based telehealth devices for self-care management.

Wakefield, Holman, Ray, and Scherubel (2011) evaluated patient perceptions of a nurse managed remote monitoring intervention designed to improve outcomes in older adults with co-morbid diagnoses of diabetes and hypertension. The authors did not discuss a specific conceptual framework for this study.
This study took place with the use of a monitoring device in each participant’s home. No information was provided as to the region of the country from which participants were recruited. Participants, veterans with co-morbid hypertension and diabetes, were drawn from a larger randomized, controlled clinical trial comparing two telehealth interventions with usual care. This secondary analysis examined patient satisfaction data from 129 individuals in two intervention groups. The sample was composed primarily of Caucasian men with a mean age of 68 years. The majority of the participants had completed high school and was married. A total of 113 participants (88%) completed the qualitative questions (Wakefield et al., 2011).

The monitoring device used in this study transferred data between the participant’s home and the testing center. Each group entered daily blood pressure and blood glucose results which were documented and reviewed by their care management nurse. The device prompted the participants to send the data on a daily basis prior to the end of the daily session. The low-intensity group responded to three questions each day, consisting of two everyday questions and one of seven different questions throughout the six months of the study. The high-intensity group responded daily to standard questions and questions from an algorithm focusing on diet, exercise, smoking cessation, foot care, sick days, medications, weight management, preventive care, behavioral modifications, and lifestyle adjustments. All the information obtained throughout the six months was collected using an investigator-developed, 12-item Likert-type questionnaire. The questionnaire ranged from 1 (strongly agree) to 5 (strongly disagree). At the close of the interview, study nurses used an open-ended question to ask participants about their likes and dislikes in regard to the program (Wakefield et al., 2011).
Quantitative and qualitative analyses were conducted with the data. After descriptive data were analyzed, the two groups were compared using $t$-tests. No significant differences for patient satisfaction were found between the groups except for the item stating that “the health messaging device could alert my provider to a health problem that I would not otherwise know existed” (Wakefield et al., 2011). Perhaps unexpectedly, Wakefield et al. (2011) found that the low-intensity group had significantly stronger agreement ($p = .05$, mean = 1.3) with this question than the high-intensity group (mean = 1.6).

The qualitative data included 113 participants’ responses to the open-ended question. The answers were coded and the differences between the two groups’ responses were evaluated. The responses were categorized by device design, connection speed, integration into daily routine, connection problems, nurse/self- monitoring and patient adherence, interventional questions and educational messages, general perceptions, and two-way communication. The largest number of responses included positive comments about the overall design of the in-home device. Participants were split about how well the device fit into the routine of their daily lives. Early problems related to insufficient phone lines were resolved during the study, but connections were perceived to be slow throughout the study period. Despite these problems, participants commented that the program increased their awareness of diabetes and hypertension self-management. Although the educational tips and interventional questions were seen as positive, participants commented that the information was repetitive and could be improved. Finally, a small percentage (5%) of the responses suggested that communication with the nurse should include two-way messaging rather than the limited nurse-to-patient
messages allowed by the study design (Wakefield et al., 2011).

In conclusion, the findings suggested that participants had an overall positive perception of the telehealth monitoring device used in the study. The qualitative data revealed concerns and questions about the programming and connection of the device, but overall these problems did not affect the use. The limitations of this study included the use of only one open-ended question which limited the researchers’ ability to probe for further perceptions of the monitoring device. Participants’ perceptions were limited to the one specific monitoring device in the parent study. Additional research on technological devices in the health care field is crucial in determining the effect of such devices on self-care management of health problems (Wakefield et al., 2011).

The use of telehealth monitoring is also being explored by the department of Veterans Affairs (VA). The goals of the VA related to the aging population are to meet standards of care and educate individuals on self-management, health promotion, and disease prevention. In connection with this goal, Young et al. (2011) proposed a study to probe beyond satisfaction ratings to determine which aspects of home telehealth pose challenges and frustrations for the population of aging veterans. The authors based the study on the Chronic Care Model.

The population for this qualitative study consisted of eligible veterans from a VA hospital in Missouri that serves 113,000 veterans in 44 counties. A random sample of 100 veterans was selected from the 192 enrollees in the care coordination/home telehealth (CCHT) program. The veterans were sent letters explaining the study, a consent form to sign to participate, and a request for contact information and availability. The final sample was composed of 25 veterans who agreed to participate in a 20-30 minute
interview. Because of technical difficulty with one transcript, 24 interviews were available for analysis. The sample size exceeded the qualitative analysis guidelines, and was confirmed by redundancy after twelve transcripts were examined. Study participants were mostly white (92%), married (64%), and educated at or above the high school level (84%), with a mean age of 72.6 years (Young et al., 2011). Each participant completed a standard 8-item satisfaction survey prior to the interviews to rate the care coordinator, the equipment, self-management, and overall satisfaction.

Qualitative interviews for this study by Young et al. (2011) were conducted by one individual who explored the results of the satisfaction survey. The interview script tracked all items on the survey and relied on cognitive interviewing. The data were then analyzed by researchers using text analysis and content analysis. Text analysis was used to determine the importance of the various CCHT program functions in relation to the participant’s needs or circumstances. Participants’ responses to 12 scripted probes were analyzed using content analysis. Inter-coder reliability was acceptable (kappa = .81).

Findings indicated that the participants were extremely satisfied with the CHHT program, selecting a positive result 98% of the time. According to Young et al. (2011), eighty percent of the participants agreed the care coordinators answered all questions and concerns in an easily understood manner. Responses clearly indicated satisfaction (96%) with how the telehealth system monitored functional capacity and with the ease of use. All participants agreed (54.2%) or strongly agreed (45.8%) the monitoring program changed the way they cared for themselves. However, the data revealed 9% of the participants felt the care coordinator was not always available for questions during
business hours. Based on overall satisfaction, participants agreed that they would recommend the home telehealth program to others (Young et al., 2011).

The qualitative findings supported the quantitative data regarding older veteran satisfaction with the telehealth monitoring program. Participants identified three functions as the most salient functions of the CHHT program. These functions included telecommunication between the participant and the care coordinator, education and instruction in regards to their knowledge of health conditions including the use of the telehealth monitor, and reviewing and recording of their symptoms. Providing access was referenced 161 times (59%) and included communication either with the care coordinator or the telehealth. Education and instruction was emphasized in comments about improved patient knowledge and referenced 140 times (51%) through the interviews. The third function, monitoring or tracking, was noted 127 times (47%). Participants referred to the importance of recording or reviewing of symptoms and of participants’ self-monitoring (Young et al., 2011). Thirty-one percent of statements indicated participants felt challenged by the equipment functionality and the care coordinator accessibility. Young et al. (2011) concluded that older individuals who monitor their health conditions and take partial responsibility for their care appear to invest themselves in learning about their disease process.

Quality of Care

Approximately 5 million individuals in the United States over the age of 65 years suffer from heart failure, the most common hospital admission diagnosis for individuals in this age group (Lehmann et al., 2006). Across the world, the projected growth in the elderly population suggests that in the near future, poorly managed heart failure may
contribute to a crisis in the cost of healthcare on a global scale. To decrease this risk, new strategies for the management of heart failure are being added to more traditional care management. Lehmann et al. (2006) purposed to measure the impact of telehealth management of heart failure patients on the quality outcomes of overall healthcare utilization, physician office visits, emergency department visits, and hospital readmissions. This study was part of Centers for Medicare and Medicaid Services demonstration project. The authors did not discuss a specific conceptual framework for this study.

This study took place in Manhattan and the Bronx in New York. Twenty participants from the Jewish Home and Hospital Services Lifecare Plus demonstration program were randomly selected from the demonstration project and evenly divided between treatment and control groups. To be eligible for inclusion, individuals had to be at least 65 years of age, have class III or IV heart failure, be classified as functional by a home health nurse, have a Folstein Mini Mental score of at least 24, live within the demonstration project area, and have had either three doctor visits or one hospitalization in the last 12 months (Lehmann et al., 2006).

Treatment group participants received a telehealth care monitor that measured and recorded the individuals’ weights, vital signs, and oxygenation. Each participant was also assigned a web address which allowed for communication of the findings to the nurse practitioner. The participant had access to the web address at all times to retrieve any additional instructions for managing their own care. The control group reported their findings via telephone and had contact with nurse practitioners for case management. Each control group participant received a one hour educational program on management
of their condition. Data on overall healthcare utilization, physician visits, emergency department visits, and hospitalizations were collected from both groups for six months (Lehman et al., 2006).

The study demonstrated that individuals who used telehealth to manage their heart failure had a reduction in the overall utilization of health care resources (Lehmann et al., 2006). The treatment group reduced overall healthcare resources by 41% ($p = .002$) when compared with the control group. Physician office visits were also significantly decreased by 43% ($p = .003$). Although emergency department visits decreased by 33% ($p = .38$) in the treatment group, and hospitalizations decreased by 29% ($p = .39$), the sample size was too small to find a statistically significant difference between the groups (Lehmann et al., 2006).

The projected growth of the elderly population presents a challenge for the utilization of future healthcare resources. Technology may contribute to the containment of healthcare costs as demonstrated by the findings of this study. This study by Lehmann et al. (2006) also demonstrated that telehealth technology may provide patients with an effective tool to manage heart failure in conjunction with health care providers. Further research with larger sample sizes is needed to better understand the relationship between telehealth, self-care, and healthcare utilization in heart failure patients.

Heart failure is among the most expensive medical diagnoses affecting the elderly population, and, in the United States, seventy-six billion dollars was spent on the care of individuals with this disease in 2005 (Wade et al., 2011). Heart failure continues to be a leading medical diagnosis although advancements in treatment have improved patient outcomes. The first goal of this study was to assess the impact of telehealth case
management on outcomes including quality of life, readmission to acute hospital settings, emergency department (ED) visits, and/or death. Secondly, the authors assessed the feasibility of utilizing an internet-based telemonitoring technology to facilitate case management in an elderly heart failure population with multiple co-morbidities (Wade et al., 2011). The authors did not specify a conceptual framework in the study.

Individuals residing in New Jersey, New York, or Pennsylvania were identified through medical claim and/or eligibility information from Aetna Medicare Advantage Insurance. The population consisted of 2314 individuals who had heart failure and a recent hospitalization. After all exclusions, the sample size was decreased to 316 patients who were randomized to either the telehealth case management group (N = 164) or the regular case management group (N = 152). All participants suffered from multiple co-morbid conditions and had an average age of 78.1 years. The telehealth case management (THCM) group had a slightly greater number of African Americans (24.4%) than the case management (CM) group (20.4%). These participants were also younger in age (75.8 vs. 77.7), more likely to have had coronary bypass surgery (11.1% vs. 3.9%, \( p = .02 \)), and more likely to take angio-tension receptor antagonists (31.1% vs. 20.4%, \( p = .03 \)) than participants in the CM group (Wade et al., 2011). The study took place over a six month period.

The CM group was initially contacted by case managers two to three times a week with contact decreasing over time as health issues were controlled or resolved. The THCM group received standard case management and a technology device to monitor blood pressure and weight from home. This system used the internet, allowing case managers to develop reports as each participant entered their data. The monitoring device
was also programmed to ask participants about their health status, activities, medication routine, and to provide educational videos when needed (Wade et al., 2011). Guidelines were set to alert the case manager if an individual’s results did not meet criteria according to the physician’s plan of care.

All primary and secondary variables were measured through claims or Medicare eligibility data. The primary outcome measures for this study included admission to an acute care hospital, emergency room visits, or deaths (Wade et al., 2011). Each participant’s perception of quality of life was measured via telephone before and after the intervention period, using the Quality Control Inc. SF-12 Health Survey. The experience and satisfaction of the study related to the THCM group was measured with a 10 item, 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) at the end of the study (Wade et al.). A total of 131 (81%) participants responded to the 5-point Likert scale. The authors did not include any information relating to validity or reliability of the instruments used in the study.

There were no significant differences between the two groups related to the primary outcomes of admission to an acute care hospital, emergency room visits, or deaths. However, the THCM participants logged more than 15,000 monitoring device sessions, reflecting a mean of 180 sessions per member over the 6-month period of the study. These results indicated an increased number of case manager sessions for the THCM group when compared with the CM group. The THCM group had an average of 9.4 contacts with case manager per participant per month. In comparison, the CN group averaged 3.5 contacts with case managers over a 2-month period (Wade et al., 2011).

There were no significant findings in group differences relating to their
perceptions of quality of life. The mean total score of the 5-point Likert scale measuring satisfaction with the experience was a positive score of 4.4. More than 93% of the THCM group shared positive feedback on the use of the monitoring device, support which was provided, and the protection of privacy during the study (Wade et al., 2011).

Overall, the study sample experienced an improvement in the form of fewer hospitalizations during the intervention period with or without a monitoring device (Wade et al., 2011). Additionally, participants in the THCM group had no apparent benefit in regards to morbidity, mortality, or quality of life. However, successful patient outcomes may depend critically on the delivery of a monitoring device such as the telehealth monitoring device used within the study. The results of the study indicate a need for systematic evaluation of the benefits of available telemonitoring devices prior to widespread usage in clinical settings.

Due to the increase in medical cost for treatment of congestive heart failure (CHF), it is essential researchers conduct studies related to therapeutic methods for health improvement strategies. According to Myers et al., (2006), home-based telemonitoring may be an answer to addressing the medical costs, increasing patient satisfaction, and decreasing readmission rates. Home health care has been known to be a cost effective alternative to hospitalization, allowing for individuals to be cared for at home by nurses. The purpose of the study was to assess the effectiveness of home telemonitoring in patients with class III or IV CHF and who were recently discharged from the hospital. The authors did not provide a conceptual framework for the study.

The study took place in Boston, Massachusetts between September 2003 and February 2005 with individuals who were affiliated with a local home health agency.
Two groups were included in the study: the telemonitor group and the usual care group. Both groups received assistance for approximately two months. The telemonitor group received home health care and home monitoring with the telemonitoring device while the usual group received only assistance by home health care (Myers et al., 2006). Criteria to participate in the study included primary diagnosis of CHF with a New York Heart Association (NYHA) classification of III or IV, age greater than 64 years, English-speaking, cognitive ability to learn new material, less than three comorbidities, a working landline telephone, and a Medicare fee plan (Myers et al., 2006). Of the 120 patients approached to participate in the study, 83 met inclusion criteria and agreed to be in the telemonitor group. A second group of 83 randomly selected home health patients who met the same inclusion criteria were used as a reference group. Individuals who completed greater than two weeks of the study were included in the final analysis (Myers et al., 2006).

Primary outcomes included in the study consisted of the number of skilled nursing home visits, hospitalizations, emergency room visits, and cost. The average number of home visits per month was determined by dividing the total number of home visits made by total number of days in home care for all participants. The quotient was then multiplied by thirty days. In comparison, cost of home care was determined by the difference in skilled home visits between the groups (Myers et al., 2006). In addition, participants’ perceptions of the physical and psychological effects of the use of the telemonitoring device were measured with the SF-36 v.2 Quality of Life survey upon entry into and again at discharge from the study. Although the SF-36 is widely used, the authors did not provide evidence for reliability or validity in this sample.
A significant difference was found between groups in the number of home visits. The telemonitor participants received 5.8 home visits per month compared to 8.2 home visits for the usual group ($p < .0001$) resulting in a cost savings per participant of $189.92. However, there were no significant differences in hospitalizations ($p = .21$) or emergency department visits ($p = .77$). Telemonitor patients were significantly more likely to prescribed diuretics than the usual care group ($p = .04$). Prescribed medications for both groups suggested variation from best practice guidelines (Myers et al., 2006).

Myers et al. (2006) compared findings of the SF-36 v.2 Quality of Life (QOL) survey administered at entry to and exit from the study. Quality of life improved for the telemonitoring group, but the fact that only the telemonitoring group completed the QOL instrument is a limitation to the study. Due to the lack of comparison between the two groups there is no way of knowing if improvement had anything to do with the intervention. In addition, only 60% of the telemonitoring group completed the QOL survey.

Myers et al. (2006) concluded that although home health visits decreased with the use of the telemonitoring device within homes and a cost savings was realized for the telemonitoring group, readmission rates or emergency room visits did not have a significant change. In addition, it would have been beneficial for the researchers to have evaluated QOL in the usual group as well.

Educational programs have been found to be a key element in quality of care for patients with heart failure. Bakan and Akyol (2007) utilized the Roy Adaptation Model (RAM) to develop an educational, exercise, and social support program for individuals
diagnosed with heart failure. The purpose of the study was to examine the effects of such a program on adaptation in persons with this diagnosis.

The setting was a cardiology and internal disease polyclinic in a state hospital in Turkey. Forty-four participants were randomly divided into two groups. The intervention group lost one participant due to moving away from the study location. Inclusion criteria consisted of literacy, ability to communicate verbally, diagnosis with heart failure for six months prior to the study, New York Heart Association (NYHA) functional classification II-III, ejection fraction 40%, no hearing or visual deficits, no mental disorders, no myocardial infarction in the past year, and plans to remain in the city for the length of the study period or be able to be reached by telephone communication (Bakan & Akyol, 2007). There were no baseline differences between the intervention and control groups concerning education level, age, gender, and NYHA class. The intervention group had a mean age of 62.7 years, was 61.9% female, 52.4% married, and approximately 20% of the participants were on a heart medication (Bakan & Akyol, 2007).

Information on patient demographics, physiological status, and number of hospital admissions due to heart failure was collected on forms developed by the investigators (Bakan & Akyol, 2007). Quality of life (QOL) was measured using the Minnesota Living with Heart Failure Questionnaire (MLWHF) at baseline and again three months into the study. The MLWHF consists of physical subscales and emotional subscales. Cronbach’s alpha coefficients were acceptable for the total score (α = .83) and the physical subscale (α = .87). Reliability for the emotional subscale was below acceptable levels with a reported alpha coefficient of .61. The Interpersonal Support Evaluation List (ISEL) - short form was used to measure the availability of individual
specific support systems, and an acceptable Cronbach’s alpha of .79 was reported for this study. The six-minute walking test (6MWT) was used to evaluate participants’ physiological mode of adaptation (Bakan & Akyol, 2007).

The intervention group received two in-person counseling sessions, two phone calls, and one group meeting over a 3-month period. Spouses and partners were encouraged to attend. Information was provided about the management of heart failure using multiple strategies. The control group received usual care (Bakan & Akyol, 2007).

Although there were not significant between-group differences at baseline, the intervention group improved significantly ($p < .05$) in the physical and emotional dimensions of the MLWHF, the 6MWT, and social support over the 3 months of the study. These findings were not seen in the control group. In contrast, the 6MWT decreased over the same time period for the control group. Mean scores for total cholesterol (52.73 to 39.71) and LDL levels (36.75 to 27.05) of the participants in the intervention group were significantly lower from baseline to three months ($p \leq .05$). Again in contrast, there was not any statistically significant difference for the control group for these dimensions. The mean HDL levels of the two groups had no significant differences throughout the length of the study (Bakan & Akyol, 2007).

In conclusion, the RAM-adaptation program had an effect on the adaptation of patients with heart failure relating to physiologic, self-concept, interdependence, and role function modes. The interventional group had an increase in quality of life and functional capacities (Bakan & Akyol, 2007). Educational programs and additional research are necessary to provide knowledge and skills needed in assisting individuals with effective ways of adapting to heart failure.
Summary

Heart failure is a chronic illness affecting 15 million individuals worldwide. Unnecessary hospital readmissions occur due to patients’ lack of knowledge and ineffective self-care behaviors related to management of this diagnosis. This literature review provides evidence that, with the use of a telecommunication device within the home, individuals with heart failure can increase self-confidence which may lead to an improvement in self-care management and a decrease in costly readmissions.

Self-care management is essential for cost containment in individuals who suffer from heart failure. The effect of education in strategies to manage symptoms and perform self-care was explored in the literature review. The studies of Lee et al. (2011), Riegel et al. (2010), and Dansky (2008) identified self-care management to be a positive indicator in the prevention of heart failure exacerbations with the use of the in home telemonitoring device. Additional research has distinguished a deficit in self-care management relating to early recognition of symptoms in heart failure exacerbations (Britz & Dunn, 2010). This recognition decreased hospitalizations and increased individuals’ quality of life. Many factors influence a deficit in the self-care management of heart failure. All studies supported the importance of self-management of heart failure, and early symptom recognition to prevent unnecessary exacerbations and hospitalizations.

The studies included examined the impact of telemonitoring devices on individuals’ perceptions of their ability to self-manage heart failure symptoms. The Wakefield et al. (2011) and Young et al. (2011) studies supported participants’ overall positive perception of the use of a telemonitoring device within their homes. The individuals who monitored their health conditions took partial responsibility for their
care. The use of the monitoring device was reported to be beneficial by increasing the older adult’s ability to self-manage their health issues from home. Additional studies in this literature review supported perceptions not only of the participants and their independent use of the telemonitoring device, but also included the perception of the case manager or care givers (Wade et al., 2011; Young et al., 2011). The use of the telemonitor device was supported and reviewed by measuring the ease of use, effectiveness, support, and difficulties individuals may have while using the device in their homes (Courtney et al. 2010; LaFramboise et al. 2009).

This literature review also focused on the quality of care in relation to decreasing readmission rates, increasing patient satisfaction, and decreasing medical costs with the use of the telemonitoring device. Lehmann et al. (2006), Myers et al. (2006), Bakan & Akyol (2007), and Wade et al. (2011) identified the telemonitoring device as providing positive results in participants’ quality of care. The findings indicated telemonitoring devices are beneficial, allowing individuals with heart failure to be more responsible in their own management and, as a result, decreasing readmission rates, increasing satisfaction, and improving quality of life. This literature review supports and provides background on heart failure relating to quality of care with the use of the telemonitoring device.

Telemonitoring promotes self-care and responsibility in individuals with heart failure. Research needs to be continued to efficiently provide effective information to healthcare providers of the benefit of the telemonitoring devices. Limitations included small sample sizes, use of only one device per study, open-ended questions, patient population, length between occurrences and the interpretation of symptoms, and the
effects of the specific interventions without the study. Future research is needed to analyze the effects of home monitoring devices and self-care management, identifying the factors in which effect prevention of readmissions. Additionally, teaching is essential in self-management and continuation of independent living. The results will be evidence that the benefits of telemonitoring at home and the individuals’ outcomes will provide a positive result for healthcare providers and technology.
Chapter III
Methodology

Introduction

Heart failure affects millions of individuals in our world today, and the number continues to increase as our population ages (Britz & Dunn, 2009). This health problem challenges the nation with the cost of potentially avoidable hospital readmissions related to a deficit in self-care management. The research literature suggests that self-care management of heart failure increases quality of life and improves individual well-being through supportive telehealth technology. The purpose of this proposed study is to investigate how telehealth can improve the confidence and management of self-care in individuals with heart failure. This is a partial replication of the Dansky et al. (2008) study, based on the five-stage self-care model developed by Riegel et al. (2000). This chapter includes information on the population, sample, procedure, measurement, and research design planned to guide this study.

Research Hypotheses

1. Home health patients using a telehealth device will report greater confidence regarding their self-management of heart failure than patients receiving standard care.
2. Confidence regarding self-management of heart failure will be positively related to self-management behaviors of home health care patients with a primary or secondary diagnosis of heart failure who utilize a telehealth device.

Population, Sample, and Setting

Using convenience sampling, two hundred patients will be recruited from the population of patients discharged with the diagnosis of heart failure from a large Midwestern hospital system. The sample will consist of all individuals who meet the inclusion criteria. These criteria are admission into an accredited home health agency associated with the hospital system and a primary or secondary diagnosis of heart failure.

Protection of Human Rights

The study will be submitted for approval to the institutional review boards of Ball State University and the Indiana University Health system. Study-related information will be mailed to each individual who meets the criteria. After individuals receive study information, they may indicate their desire to proceed in the study by responding by phone the primary investigator. Each interested participant will receive a cover letter and an informed consent document containing full disclosure about the study at the Registered Nurse’s (RN) first home visit. During this visit, the home health nurse will complete the informed consent process. Any further questions the individual may have in regards to the study will be answered, and potential risks and benefits will be discussed.

Benefits from participation in this study include increased understanding of and confidence in the self-management of heart failure. Participation is voluntary and patients have the right to refuse any portion of the study. No aspect of the patients’ care will be affected by their decision. Study data will be kept separate from medical records and will
be accessible only to study personnel. All data collected will be kept confidential using a password-protected computer. Any written documentation will be entered into the password-protected files and then shredded after cross-checking for accuracy.

**Procedures**

The study will be presented to nursing executives from IU Health and the associated home health agencies prior to IRB review. Details regarding the training and use of home health RNs for recruiting participants and implementing the study will be discussed. The manufacturer of the telehealth monitoring devices will be approached to underwrite study costs including provision of monitors to each participant and the training of home health RNs in the use of this equipment. Once IRB approval is obtained, individuals will complete the informed consent process and be randomly assigned to either the intervention group or the control group. The intervention group will receive home health care and be provided with a telehealth monitoring device in their home. The control group will receive standard care on a weekly basis. The home health care nurse will collect demographic data from all participants and return the data to the principal investigator. For intervention group participants, the nurse will install the telehealth monitoring device in participants’ homes and provide instruction to the participant and family.

**Research Design**

This study will use a repeated measures design. The purpose of the repeated measures design is to measure the same variables multiple times between two groups over a specific period of time (Sullivan, 2008). This design will be used to study variables
among heart failure participants including their self-confidence and self-management across 3 time points: baseline, 60 days, and 120 days.

Instrumentation, Reliability, and Validity

Riegel’s Self-Care of Heart Failure Index (SCHFI) will be used to measure participants’ confidence and self-care management. The instrument is estimated to take 10 minutes to complete for each patient. The SCHFI is divided into three sections which measure confidence, performance of routine maintenance activities, and self-care management of symptoms. A four-point Likert scale (never or rarely = 1, sometimes = 2, frequently = 3, always or daily = 4) measures participant response. Confidence in self-care is measured by four items: the evaluation of importance of symptoms, recognition of changes in health status, action that relieves symptoms, and evaluation of the effectiveness of self-management of treatment. The higher the score the more confident the participant is with their self-care. Self-care management will be measured with nine items. Five items measure routine maintenance activities including daily weights, low-sodium diet regimen, regular exercise, weight maintenance, and annual flu vaccine. The remaining four items address self-care management of heart failure symptoms: reduction of salt and fluids in diet, taking an extra diuretic, and calling the health care provider (Riegel et al., 2008). Riegel et al. (2004) reported reliability for this instrument with Cronbach’s alpha coefficients ranging from .56 to .82 for the three subscales. The SCHFI is being updated and reliability is still being tested. However, a panel of six experts rated the items and concluded with overall content validity 96% (Riegel, 2012).
Data Analysis

Descriptive statistics will be calculated for the demographics, and will also be used to analyze variables, including participants’ confidence and self-care management behaviors. Mean scores and standard deviations will be determined at the beginning of the trial for a baseline and then again at 60 days and 120 days of the study. Analysis of variance (ANOVA) will be used to test the hypothesis of the two groups’ equality (Burns & Grove, 2009). A repeated measures design of a general linear model will be used to measure the effects of confidence on participants’ self-care management behaviors. The significance level will be set at .05.

Summary

In this chapter, the methods and procedures to be used have been described. The purpose of this study is to understand how telehealth can improve the confidence and self-care management of heart failure, leading to a positive impact on reduction of cost and readmission rates. A convenience sample of 200 home health care patients who have a diagnosis of heart failure will be recruited. Riegel’s Self-Care of Heart Failure Index (SCHFI) will be used to measure the variables of confidence and self-care management. Data will be collected and analyzed by registered nurses. This study will partially replicate a prior study by Dansky et al. (2008) in an effort to corroborate findings supporting the relationship between confidence and positive self-management behaviors in patients diagnosed with heart failure.
References


