Assessing the Impact of an Educational Intervention on Nurses’ Knowledge of CHF

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Abstract

Purpose: To examine whether an educational session on heart failure (HF) management and associated self-care activities improves cardiac nurses’ knowledge of HF principles.

Methods: A pre/post interventional design was implemented to evaluate nurses’ knowledge of HF. Nurses in the state of Florida within four area codes were given a pre-survey, the Atlanta Heart Failure Knowledge Test, distributed by email using Qualtrics. An educational in-service in the form of a PowerPoint with voiceover was distributed to the nurses via email. Then, an online post-survey using the same questions was administered to access the change in participant responses.

Results: Registered nurses (n = 26) living in one of four zip codes in the state of Florida, completed both the pre- and post-test. Most participants were female (n = 23; 88.5%) and age 31-40 (n =7; 26.9%) or 61-70 (n =7; 26.9%) years old. The majority of participants had a bachelor’s degree in nursing (n =15; 57.7%) and had been in nursing for >25 years. There was a statistically significant difference in the total knowledge scores between pre- (M=25.19, SD=1.94) and post-test (M=25.33, SD=1.91), t(20)=.57, p<.001. This suggests a change in nurses’ knowledge of HF after the educational session. There were improvements in nurse knowledge of pathophysiology, sodium consumption, and medications in the context of HF treatment and recovery.

Discussion and Conclusion: The findings of this study reveal a moderate gap in nurses’ knowledge of HF and discharge education. Findings also indicate that an online educational session is successful in increasing nurses’ knowledge of HF principles.
Introduction

There are approximately five million people diagnosed with heart failure (HF) in the United States (Heart Failure Statistics, 2019). Furthermore, HF is accountable for 11 million doctors’ visits each year and more hospitalizations than all cancers (Heart Failure Statistics, 2019). HF also has the highest 30-day readmission rate among chronic medical diseases (Nair et al., 2020). According to the Affordable Care Act, hospitals cannot receive reimbursement from Medicare and Medicaid companies when readmission rates are high (Chamberlain et al., 2018).

Nurses are often the last person patients see at the hospital before discharge and are responsible for providing discharge education. Therefore, it is important for nurses to understand the disease process of HF and appropriate self-care behaviors that patients need to engage in following discharge. Raines and Dickey (2019) assessed the lack of education among adults hospitalized with HF by identifying the patients’ self-care behaviors and knowledge levels. They found that lower patient knowledge levels resulted in increased readmissions (Raines & Dickey, 2019). The results also showed that patients had difficulty using their knowledge to improve their self-care. Therefore, identifying patients’ learning needs and knowledge deficits is important, as appropriately educating HF patients can increase their confidence and improve their self-care. Since everyone learns differently, discharge education should be tailored to the individual.

Many factors can influence a person’s disease and their ability to perform self-care and can be categorized according to the problem, person, and environment (Riegel et al., 2022). For example, neurohormonal, inflammatory, and hemodynamic illness-related issues contribute to cognitive impairment in people with HF, thus making self-care more difficult for patients (Riegel et al., 2022). Furthermore, many people with HF have other chronic conditions which further
complicate patient’s ability to adequately care for themselves (Riegel et al., 2022). On the other hand, personal motivation is a quality that increases one’s energy and ability to perform self-care (Riegel et al., 2022). One’s environment and available resources may also play a role in HF self-care (Riegel et al., 2022). For example, individuals living in rural areas are more susceptible to poor self-care due to decreased resources and little healthcare access (White-Williams, et al., 2020). It is important for nurses to recognize how these factors influence patient’s health and tailor education based on these factors. This could be done via more time educating patients upon discharge or coordinating with case management and family. Above all, nurses must understand these factors and be properly educated on self-care in HF.

Educational sessions on HF disease management activities and discharge toolkits may improve nurses’ knowledge of HF and contribute to decreased HF readmission rates (Layton, 2019). Toolkits can range from a simple one-sided paper on basic principles of HF to more in-depth brochures with examples of worsening symptoms and low sodium foods. It was found that there is a 76% increased risk of mortality within one year of HF patients’ discharge due to inadequate education from nurses (Layton, 2019). Nurses must know the warning signs of HF exacerbation and decompensation to educate patients on when to seek medical care. Nurses can learn more about HF and, in turn, deliver proper discharge education to patients. It is vital that nurses give patients information on medications, diet, exercise, self-care behaviors, and the importance of complying with the HF treatment regimen (Bader et al., 2018). If patients understand more about their disease and how to prevent exacerbations, they will have better outcomes (Layton, 2019). But first, nurses must be educated to provide accurate and complete HF discharge information. This type of nursing education can be delivered via PowerPoint at an in-service or online and through toolkits that can be duplicated.
Problem Statement

It is important for nurses to understand the disease process of HF and appropriate self-care behaviors for patients following discharge. However, nurses commonly lack knowledge regarding the pathophysiology, disease management, and medication side effects that are universal to HF patients. Nurse-driven education on HF self-management activities is insufficient (Cui et al., 2019).

Purpose of the Project/Aims

The purpose of the project is to assess whether an educational session on HF management and associated self-care activities improves cardiac nurses' knowledge of HF principles. The goal is to improve nurses’ knowledge of HF and enhance discharge education. The clinical question to be addressed is, “Does an educational in-service increase HF knowledge of nurses?” The aims of the project include:

1. Assess cardiac nurses' baseline knowledge of HF and associated management strategies.
2. Deliver a standardized educational session on the basic principles of HF and associated management strategies to a sample of cardiac nurses.
3. Examine whether HF management knowledge scores increase following an education intervention.
4. Develop and distribute an educational toolkit containing information on HF principles and management to cardiac nurses that can be used in discharge teaching.

Review of Literature

Three main themes examining the importance of adequate nurse delivered HF education includes 1) instruction in proper self-care for patients; 2) nurse knowledge levels; and 3) issues of health illiteracy. This literature review was created by searching the FSU library database,
PubMed, and CINHAL for articles published within the last five years containing the key terms “heart failure,” “nursing education,” and “education.” Approximately 30 abstracts were reviewed along with 19 full text articles. The articles include randomized control trials, mixed methods, quantitative studies, and qualitative studies. The results indicated the need for greater education for all parties and that increasing the health literacy of nurses would be beneficial.

Self-care in Heart Failure

The situation-specific theory of HF self-care was revised to include three processes (Riegel et al., 2016). These processes include maintenance, symptom perception, and management. Self-care in HF maintains physiologic stability, aids in the perceptions of symptoms, and guides the management of symptoms (Riegel et al., 2016). Maintenance in HF capitalizes on adhering to treatment and healthy behaviors. These include taking prescribed medications, exercising, and following the appropriate diet (Riegel et al., 2016). Symptom perception involves knowing when there is an exacerbation of symptoms, what symptoms are normal to HF, and what indicates worsening illness. Lastly, management is reacting to symptom perception (Riegel et al., 2016). This may include taking a medication to control symptoms, adjusting diet further, or making an appointment with a physician. When patients can properly participate in HF self-care, their outcomes are improved, both reported (symptom management) and clinically (hospitalizations) (Riegel et al., 2016). Since it is a lifelong, chronic disease, psychological sequelae are common in HF patients. Therefore, treatment of HF should aim to relieve more than physiological symptoms (Sun et al., 2019); treatment and education should also strive to improve the patients’ quality of life and prevent disease progression. Self-care is integral to achieving optimal health in HF patients, so discharge education delivered by nurses must include the principles of self-care.
Recent research illustrates the value of personalized discharge education for HF patients. In a randomized controlled study examining hospitalized HF patients ($n = 50$), those in the intervention group received individualized health education, while those in the control group received usual care. The intervention consisted of a research team formulating an individualized in-hospital education plan that included information on HF pathophysiology, treatment plan, exercise, nutrition, and medication guidance (Sun et al., 2019). Patients in the interventional program were asked to develop a concept of self-care behaviors. Baseline data was collected on both groups and then again at three- and six-months post discharge. A six-minute walking distance, self-care of heart failure index, and 36-item health survey (SF-36) were used to evaluate patient outcomes. Findings in this study showed that the six-minute walking distance was longer in the intervention than the control group three and six months after discharge (Sun et al., 2019). The total SF-36 scores were initially the same for both groups; however, the self-care maintenance, management, and confidence scores, as well as the behavior scores of the intervention group improved at three- and six-months post discharge (Sun et al., 2019). Self-care is essential to improvement of outcomes in patients with HF. Patient-individualized education during hospitalization and post discharge can enhance patients’ self-care and improve their outcomes (Sun et al., 2019).

Certain interventions may also be effective in improving HF self-care. Jiang et al. (2018) investigated self-care theories and the effects of psychological interventions, such as motivational interviews and cognitive behavioral therapy, on the outcomes of HF patients, including the patients’ self-care, anxiety, and depression. CINAHL, Cochrane, PubMed, and other databases were searched and systematically reviewed. Twenty-nine articles with 25 studies and 3,837 participants were included in the systematic review (Jiang et al., 2018). Six of the nine
studies demonstrated a positive effect post intervention in self-care (Jiang et al., 2018). The instruments used included the Self-Care of HF Index, the European HF Self-Care Behavioral Scale, and the Self-Management of HF Scale (Jiang et al., 2018). Motivational interviewing was found to improve patients’ self-care confidence (Jiang et al., 2018). Nurses are crucial to patient education and self-management. The holistic role of nursing encourages nurses to not only target physical aspects of HF, but also the psychological impacts that affect patient’s ability to perform self-care (Jiang et al., 2018).

When patients effectively participate in HF self-care, their clinical outcomes are improved (Currie et al., 2015). However, HF self-care can be complex and often overwhelming for patients. Patients must be educated on HF self-care, to adequately care for themselves. A study by Currie et al. (2015) searched healthcare databases to find studies indicating HF self-care need. Twenty-four studies that examined patient-healthcare practitioner relationships and HF self-care were included (Currie et al., 2015). A total of 699 patients, 42 caregivers, and 21 healthcare professionals were in the 24 studies (Currie et al., 2015). The studies reported the impact of healthcare professionals on self-care and patient outcomes (Currie et al., 2015). This included effective communication by healthcare professionals to patients regarding self-care encouraged patient adherence, while a lack of communication increased adverse outcomes due to improper patient HF self-care (Currie et al., 2015). HF interventions should involve relationships with healthcare providers to provide support for patients and provide individualized HF education (Currie et al., 2015).

**Health Literacy**

Health literacy is a person’s ability to process and understand health information to make health decisions (Fabbri et al., 2020). Raines and Dickey (2019) assessed the lack of education
among adults hospitalized with HF by identifying the patients’ self-care behaviors and knowledge levels. A descriptive, cross-section design, using a sample of 42 hospitalized patients with HF measured self-care and knowledge levels using the Self Care of Heart Failure Index V.6.2 and the Japanese Heart Failure Knowledge Scale (Raines & Dickey, 2019). They found that lower patient knowledge levels resulted in increased readmissions (Raines & Dickey, 2019). The results also showed that patients had difficulty using their knowledge to improve their self-care. Nurses should assess patients’ knowledge and understanding of HF prior to discharge. Since everyone learns differently, discharge education should be tailored to the individual. Rural patients, for example, often face a greater knowledge gap due to health illiteracy; these factors should be addressed by nurses when discharging HF patients. When nurses present the proper education to patients being discharged, those patients are more likely to be compliant and successful with discharge education.

Sodium restrictions and medication compliance are important self-care behaviors in patients with HF (Wu et al., 2017). It is important for patients to be knowledgeable in HF self-care to have the best outcomes. Health literacy reduces hospitalizations and death in patients with HF (Wu et al., 2017). Wu et al. (2017) performed a secondary data analysis of a randomized control trial in patients with HF. Patients and one family member were included in the parent study (n = 113 pairs) (Wu et al., 2017). Health literacy was measured using the Rapid Estimate of Adult Literacy in Medicine (Wu et al., 2017). The knowledge level of HF was measured using the Atlanta Heart Failure Knowledge Test, self-reported sodium intake, and medication adherence were also examined. Differences in HF knowledge, medication adherence, and sodium intake were assessed between low health literacy and high health literacy groups (Wu et al., 2017). These groups were divided based on scores of the Rapid Estimate of Adult
Literacy in Medicine. Patients with low health literacy had lower HF knowledge, as did family members (Wu et al., 2017). These patients also had lower medication adherence, along with higher urinary sodium levels when compared with patients with high health literacy (Wu et al., 2017). Health literacy of patients can negatively impact their knowledge of HF and self-care when inadequate. Nurses and other healthcare providers should assess patients and family member’s health literacy and adjust their education accordingly (Wu et al., 2017).

Health literacy is essential to patients with chronic conditions including HF (Fabbri et al., 2020). In a systematic review by Fabbri et al. (2020), 15 studies were included that measured health literacy using the Short Test of Functional health Literacy in Adults, Short Assessment of Health Literacy for Spanish adults, and the Brief Health Literacy Screen. Most studies divided patients into adequate and inadequate health literacy. The outcomes being observed in the studies were death, hospitalizations, and ED visits among HF patients (Fabbri et al., 2020). Of the studies, there were 9,171 patients, with 2,207 being considered inadequate in health literacy. Of the five studies examining mortality rates among inadequate health literacy, there was an association between mortality and poor health literacy (Fabbri et al., 2020). Eight studies were observed for an association between hospitalization and inadequate health literacy, demonstrating a 20% increase in risk of hospitalization among patients with inadequate health literacy (Fabbri et al., 2020). Finally, four studies were reviewed for an association between inadequate health literacy and ED visits. There is a 15% or more increased risk of ED visits in those with lower health literacy levels (Fabbri et al., 2020). Evaluating patients’ health literacy and implementing self-care education reduces readmissions and improves patient outcomes (Fabbri et al., 2020).
Educating Nurses

Bader et al. (2018) evaluated nurses’ HF knowledge and the effectiveness of nurse-driven education in 131 nurses and 30 HF patients. To do so, they utilized two surveys assessing the knowledge of nurses at a cardiac center in Kuwait. Between the initial survey and follow-up survey, the nurses educated themselves on HF self-care, such as salt and fluid restriction, daily weight, and warning symptoms to report (Bader et al., 2018). After the education and follow-up survey, 22 patients (compared to the original 12) did not have any readmissions, and their activity tolerance had increased (Bader et al., 2018). Approximately 40% of the nurses who participated were cardiac care unit nurses, and 90% had more than five years of clinical experience. Overall, HF outcomes are better when nurses are educated appropriately (Bader et al., 2018).

In the Shandong Province, China, Cui et al. (2019) conducted a study to assess nurse-led education and its effect on patients’ self-management and clinical outcomes. Ninety-six patients were randomly divided into intervention and control groups (Cui et al., 2019) During their hospitalization, a structured education program was delivered to the intervention group by nurses, while the control group was managed without the structured education. The intervention group were provided with a one-hour educational session by nursing staff after being admitted, while another educational session was provided prior to discharge (Cui et al., 2019). The educational session prior to discharge addressed any questions regarding self-care management, and families were encouraged to attend. Medication adherence, diet modifications, social support, and symptom control were evaluated 12 months after the patients received the education (Cui et al., 2019). The results indicated that these factors were higher in the intervention group than the control group. Additionally, the readmission rates in the control group were almost
double those of the intervention group. Furthermore, the study was completed in a rural area, demonstrating that appropriate education from nurses improves HF patients’ knowledge and self-care when those patients typically lack access to care (Cui et al., 2019).

Several studies have provided significant evidence regarding the importance of nurses’ education on HF in providing proper discharge education. In a Polish study, nurses in a cardiac intensive care unit, non-intensive care hospital unit, and family practice completed the Nurses’ Knowledge of HF Education Principles survey (Jankowska-Polańska et al., 2017). There were 48 cardiac intensive care nurses, 129 non-intensive hospital care nurses, and 50 family practice care nurses. The questionnaire included 20 true/false questions on HF self-maintenance (Jankowska-Polańska et al., 2017). These scores were highest among cardiac intensive care nurses and lowest in family practice nurses. Furthermore, the nurses’ knowledge was associated with their level of education and specialization in cardiac nursing. Jankowska-Polańska et al. (2017) concluded that Polish nurses’ lack of HF knowledge can prevent patients from receiving proper discharge education. Nurses working with patients with HF educate them and their families daily; therefore, it is important for nurses to be knowledgeable on HF self-care (Jankowska-Polańska et al., 2017).

Nurses are patients’ primary teachers in a variety of settings (Sundel & Ea, 2018). A group of 40 nurses in an ambulatory care setting were given a pre- and post-test to determine the effect of teaching on their knowledge of HF self-care (Sundel & Ea, 2018). The nurses attended a 20-minute education session based on their knowledge deficits as determined by the pretest. The education in-service covered the pathophysiology of HF, factors associated with an increased risk of HF, signs and symptoms of HF, self-care principles, diagnostic tests, and HF medications (Sundel & Ea, 2018). They were then given the posttest within 30 days of the
educational session. The Nurses Knowledge of HF Education Principles survey was used to evaluate nurses’ knowledge of HF (Sundel & Ea, 2018). The results revealed that the educational intervention improved the nurses’ HF knowledge. This study was performed in an ambulatory care setting, in contrast to Jankowska-Polańska et al.’s (2017) study, which included intensive care unit and non-intensive care hospital units. However, the conclusion was similar: teaching interventions can improve nurses’ knowledge of HF, resulting in better patient education and reduced readmissions (Sundel & Ea, 2018).

In another study, a quality improvement project was completed to determine if HF education presented to nurses could improve their knowledge and reduce hospital readmissions (Layton, 2019). However, in contrast to the previously mentioned studies, the project was completed in a nursing home. Two nursing homes were used, with the sample of nurses at the intervention facility being 15 and 12 at the control facility (Layton, 2019). The nurses’ knowledge was measured using the Nurses’ Knowledge of HF Education Principles survey before and after the educational intervention. The educational intervention was a Continuing Education course on HF, approved by the Texas Nurses’ Association (Layton, 2019). Nurses who received the educational intervention achieved improved HF knowledge scores compared to the control group. Furthermore, chart reviews were performed, and readmission rates decreased at the intervention facility (Layton, 2019). When nurses’ education on HF improves, they more adequately educate their patients, which reduces readmissions. This in turn, improves patient satisfaction and quality of life, as well as nurses’ job satisfaction (Layton, 2019).

Summary

As demonstrated by this literature review, research on nurses’ HF education and its effects on patient outcomes is lacking. Much of the research has focused either on self-care and
health illiteracy in the community or has been performed in other countries. However, the studies performed in other countries have demonstrated the benefits of properly educating nurses on the basic principles of HF. The Heart Failure Association in Europe has even developed a curriculum for HF nurses (Riley et al., 2016). Some aims of this curriculum include providing knowledge of HF and its management to nurses, providing HF knowledge to nurses who are an essential part of multidisciplinary teams, and supporting the expert clinical knowledge of nurses who become HF specialists in a variety of settings. Other countries have considered adopting this curriculum’s framework as well. While these countries are advancing nursing knowledge on HF and its importance, research must be performed in the United States to ensure nurses are adequately prepared to care for and educate this growing population. This body of literature establishes the importance of HF education for both nurses and patients. Further, proper HF self-care improves the symptomatic and clinical well-being of the patients (Riegel et al., 2016). Nurses are crucial in the provision of information for patients to be successful in recovery. Educational interventions can improve nurses’ HF knowledge, resulting in better patient education and reduced readmissions (Sundel & Ea, 2018).

**Theoretical Framework**

Lewin’s Change Theory guided this DNP project. Lewin’s Change Theory was developed by Kurt Lewin (Petiprin, 2020). The major concepts of this theory include driving forces, restraining forces, and equilibrium. The model in Figure 1 was developed using the concepts of Lewin’s Change Theory. Driving forces cause change to occur because they push the object in the appropriate direction while restraining forces counter the driving forces (Petiprin, 2020). Equilibrium is when the two are equal and no change occurs. The three stages of this nursing theory are unfreezing, change, and refreezing. Unfreezing is finding a new method;
change involves different thoughts, feeling, or behavior; and refreezing is establishing change as the new standard.

**Figure 1**

*Lewin’s Change Theory (Petiprin, 2020; Shirey, 2013)*

Restraining forces hinder change because they push the patient in the opposite direction (Petiprin, 2020). For example, social determinants of health, health illiteracy, and a lack of self-care/knowledge of HF and self-care are all restraining forces to patients. The lack of knowledge and resources keep the patient hindered from change. Nurses, when properly educated on the basic principles of HF, can be the driving forces for change in patients (Petiprin, 2020). Therefore, it is important for nurses to understand the disease process of HF and appropriate self-care behaviors that patients need to engage in following discharge. Educational toolkits delivered
to nurses improve their knowledge of HF, which in turn, improves patients’ outcomes (Layton, 2019).

Unfreezing has begun because a method, properly educating nurses on basic principles of HF, makes it possible to let go of the old ways of inadequate nurse education (Petiprin, 2020). A problem, nurses’ knowledge on HF, has been identified. The desire is that through this project, others will see the need for change (Shirey, 2013). Lewin’s Change Theory applies through the goal that a new discharge education system for nurses will become a part of practice.

**Methodology and Implementation**

**Design**

The project was a quasi-experimental study using an online educational session and pre- and post-assessment. A toolkit was provided via email in the form of a brochure (Appendix A). The variable evaluated for this project included cardiac nurses’ knowledge of HF. A pre-test was distributed to nurses pre-intervention via an online Qualtrics survey, a PowerPoint educational presentation with voice-over was also emailed, and the nurses were directed to a post-test after watching the educational video.

**Participants**

We recruited a convenience sample of registered nurses (RNs) in the state of Florida, who live in one of four identified zip codes with hospitals that specialize in cardiac care for this study. The nurses’ emails were obtained from the Florida Health Care Practitioner Data Portal. The emails belong to RNs with active and clear licenses in the mentioned zip codes who registered an email for contact. The emails were sent via a CSV file directly uploaded to Qualtrics. The principal investigator never had access to the participants’ emails. Current or previous cardiac or telemetry experience was required to be included in the project. Participants
also must have been English speaking. There were no other exclusions. Out of 6,188 emails
distributed to nurses in four area codes in the state of Florida, 38 nurses responded and 26
correctly used the first initial of their last name and completed both the pre- and post-test. Nurses
were also sent via an attachment the PowerPoint and a brochure to download and utilize as a
resource.

**Setting and resources**

The project was completed via email to nurses in the state of Florida within four zip
codes. The zip codes were 32504, 32819, 32207 and 33607. The cities targeted were Pensacola,
Orlando, Jacksonville, and Tampa, as these cities have major hospitals that specialize in cardiac
care. Resources used include PowerPoint educational presentation with voice-over and Qualtrics
surveys (pre- and post-educational session). Participants could participate anywhere they had
access to their email on file from the Florida Health Care Practitioner Data Portal.

**Instruments**

A demographic survey was administered to the nurses via email to assess gender, age, the
nurses’ educational level, length of nursing career, and length of time on a cardiac unit
(Appendix B). The Atlanta Heart Failure Knowledge Test was used to evaluate the nurses’
knowledge pre- and post-intervention. The test was modified to include 28 questions with
multiple choice and yes/no questions (Appendix C). This knowledge test is open access;
therefore, no permission was needed for using the test. Reilly et al. (2009) completed a study
testing the validity of the Atlanta Heart Failure Knowledge Test in patients and family members.
In this population, the Cronbach alpha scores were .84 for patients and .75 for family members.
The Cronbach alpha score for the Atlanta Heart Failure Knowledge Test was .84.
Procedure

Aim 1 was to assess cardiac nurses' baseline knowledge of HF and associated management strategies. This was accomplished by distributing the Atlanta Heart Failure Knowledge Test to determine a pre intervention score. Aim 2 was to deliver a standardized educational session on the basic principles of HF and associated management strategies to a sample of cardiac nurses. A PowerPoint presentation with voice-over was emailed to nurses in the state of Florida who were willing to participate. The PowerPoint covered basic principles of HF and its management including a brief pathophysiology, medication regimen, side effects, exacerbation symptoms, and daily sodium consumption. Aim 3 was to examine whether HF management knowledge scores increase following an education intervention. The Atlanta Heart Failure Knowledge Test was readministered following the presentation. Aim 4 is to develop and distribute an educational toolkit containing information on HF principles and management to cardiac nurses that can be used in discharge teaching. A toolkit was emailed to the nurses that they can print and duplicate if desired. The toolkit was provided in the form of a brochure that nurses can use when discharging patients and provide to patients being discharged with HF. The toolkit provided information on the pathophysiology of HF, foods to avoid, symptoms of exacerbation, medications, monitoring fluid intake, and when to call the doctor. It instructed patients to take medications as prescribed and gave certain foods that are high in sodium. Each respondent used the first initial of their last name and last four digits of their phone number to ensure anonymity and correlation between pre-and post-test.

Implementation plan

The major tasks involved via a timeline is in a Gantt chart (Appendix D). The clinical question and project approval was completed last fall. The literature review and project proposal
were finished in fall of 2022. IRB approval occurred in summer of 2022. Data collection was completed during the fall of 2022. Finally, the project report and presentation were completed during spring semester of 2023. The project was completed by Erin T. Polk, BSN, RN with the assistance of her major professor Dr. Lucinda J. Graven, PhD, APRN, FAHA, FAAN.

**Human Subject and Informed Consent**

The Florida State University Institutional Review Board (IRB) is an administrative body established to protect the rights and welfare of human research subjects recruited to participate in research activities conducted and affiliated with FSU. At FSU, the appointed University Human Subjects Committee serves as the IRB, and has the authority to approve, require modifications, or disapprove all research activities that fall within its jurisdiction as specified by both the federal regulations and university policy. The FSU IRB staff deemed the proposed project exempt and not research involving human subjects as defined by the Department of Health and Human Services and/or Food and Drug Administration regulations prior to any activities for this project (Appendix E). The protection of the participants’ information is of the utmost importance. Therefore, the surveys were completed anonymously, and participation in the surveys was entirely voluntary. The participants did not receive compensation for participating. Participants used the first initial of their last name and the last four digits of their phone number to ensure anonymity. No harm was posed nor suspected of the participants.

**Data Analysis**

A statistical consultant was utilized to assist with completing the data analyses for this project. Paired sample t-tests and descriptive statistics were used to compare the nurses’ knowledge of HF pre- and post-intervention.
To address the first project aim, a questionnaire, the Atlanta Heart Failure Knowledge Test was distributed to nurses within four area codes in the state of Florida. This was to assess cardiac nurses' baseline knowledge of HF and associated management strategies. The nurses were eligible to participate if they had current or previous experience in cardiac/telemetry units. The data from the survey was analyzed using descriptive statistics. The pretest survey included demographic information such as gender, age, education level, years of nursing experience, and years of cardiac experience. The demographic information was measured nominally. The remaining questions were multiple choice and yes/no, with one correct answer. The participants could also choose the option, “I’m not sure.” The number of correct answers on the pretest were totaled for a minimum score of 20 out of 28 correct answers and maximum score of 28 out of 28 correct answers (Appendix F, Table 1). The average score was 25 out of 28.

Aims 2 and 4 were to deliver a standardized educational session on the basic principles of HF and associated management strategies to a sample of cardiac nurses and develop and distribute an educational toolkit containing information on HF principles and management to cardiac nurses that can be used in discharge teaching. This was done by including a PowerPoint with voice-over link at the end of the presurvey for participants to watch prior to taking the posttest. The PowerPoint and an education toolkit in the form of a brochure were emailed to the nurses as well. The resources could be printed for nurses to use or distribute to patients if desired.

Finally, aim 3 was to examine whether HF management knowledge scores increase following an educational intervention. After watching the educational video, the nurses were redirected to take the posttest. The posttest was also the Atlanta Heart Failure Knowledge Test without the demographic information. The questions were multiple choice and yes/no, with one
correct answer. The participants could choose the option “I’m not sure.” The number of correct answers were totaled for a minimum score of 21 out of 28 correct answers and maximum score of 28 out of 28 correct answers (Appendix F, Table 1). The average score was also 25 out of 28. A paired sample t-test was used to determine if there were statistically significant differences in the total scores between the pre- and post- tests. Five of the 26 responses were excluded from the analysis due to incomplete post-tests.

**Results**

**Demographics**

Out of 6,188 emails distributed to nurses in four area codes in the state of Florida, 38 nurses responded and 26 correctly used the first initial of their last name and completed both the pre- and post-test. Despite the use of reminder and nudge emails being sent out and explicit directions in the introductory email and on the survey, the participation was slightly less than the desired sample goal of 30. There was one male participant and two preferred not to answer (Appendix F, Table 2). All other participants were female ($n = 23; 88.5\%$). The age distribution ranged from 18-70. There were two participants in the 18-30 age group ($n = 2; 7.7\%$), seven in the 31-40 group ($n = 7; 26.9\%$), six in the 41-50 group ($n = 6; 23.1\%$), four in the 51-60 group ($n = 4; 15.4\%$), and seven in the 61-70 age group ($n = 7; 26.9\%$). Most participants chose BSN as their highest level of education ($n = 15; 57.7\%$), and most of the participants have been in nursing for >25 years ($n = 11; 42.3\%$). There was a wide range of years of cardiac/telemetry experience.

**Paired Samples T-test**

There was a statistically significant difference in the total scores between pre ($M = 25.19$, SD = 1.94) to posttest ($M = 25.33$, SD = 1.91), $t(20) = .57$, $p < .001$ (Appendix F, Table 3). The mean
difference in scores was .14 with a 95 percent confidence level ranging from -.38 to .67. This could indicate a change in nurses’ knowledge of HF after an educational intervention.

**Knowledge of Heart Failure**

**Pathophysiology**

The first question on the Atlanta Heart Failure Knowledge Test assesses basic understanding of the pathophysiology of HF. All 26 participants answered this question correctly on the pre- and post-test (Appendix F, Table 4). This likely indicates many nurses have a basic knowledge of the pathophysiology of HF regardless of years of experience as a nurse or in cardiac/telemetry.

**Sodium Consumption**

Multiple questions on the Atlanta Heart Failure Knowledge Test assessed the participants’ knowledge of sodium consumption and foods high in sodium. These included questions 3, 18, 19, 20, 21, 22, and 25. Nearly all participants responded correctly to questions 3, 18, 19, and 20 pre- and post-test. However, 30.8% missed question 21, 15.4% number 22, and 34.6% number 25 on the pretest (Appendix F, Table 5). Post intervention, the incorrect response rate decreased to 19.2% for question 21, 7.7% for question 22, and 11.5% for question 25.

**Medications**

Three questions, number 9, 10, and 11, assessed participants knowledge of HF medications. For question number 9, 46.2% responded incorrectly on the pretest and 53.8% on the posttest (Appendix F, Table 6). For question 10, 19.2% of participants answered incorrectly on the pretest and only 7.7% on the posttest. For number eleven, 7.7% of participants answered incorrectly on both the pre- and post-test.
Discussion

This project intended to assess whether an educational session on HF management and self-care activities improves nurses’ knowledge of HF principles. The expected impact was an improvement of nurse’s knowledge post educational intervention. Based on the paired sample t-test, the null hypothesis was rejected, indicating statistically significant differences in the scores between the pre- and post-tests. This could support the theory that nurses’ knowledge improved after the educational intervention. A study by Sundel & Ea (2018) found similar results. A pre-and post-test design was used, and an educational in-service on HF education was provided to nurses in an ambulatory care setting in between the two tests (Sundel & Ea, 2018). This study was performed in an ambulatory care setting, in contrast to Jankowska-Polańska et al.’s (2017) study, which included intensive care unit and non-intensive care hospital units. This research project titled Assessing the Impact of an Educational Intervention on Nurses’ Knowledge of CHF was completed via email to nurses in the state of Florida. Despite differences in the format of the provided education, the conclusions of each of these studies are similar: teaching interventions can improve nurses’ knowledge of HF, resulting in better patient education and reduced readmission (Sundel & Ea, 2018).

A study by Mignott (2022) found that nurses’ knowledge of chronic kidney disease increased after a four-hour educational seminar. The most significant improvement was shown in nurses’ memory recall (Mignott, 2022). A study on educating nurses and nurse practitioners on diabetes self-management found that four, 30-minute educational sessions increased the nurses’ knowledge (Ikpasaja, 2021). These two studies had longer educational sessions than that of this project on nurses’ knowledge of HF where the intervention was a brief, 5–10-minute PowerPoint
with voiceover. More research is needed to determine if length and number of lessons impact knowledge retainment.

As states in the above results, all 26 participants answered the pathophysiology question correctly on the pre- and post-test. This likely indicates many nurses have a basic knowledge of the pathophysiology of HF. There were variations in the knowledge of sodium consumption and HF medication pre- and post-test. This could indicate that many nurses have the basic knowledge of what HF is and the process behind it, but they lack in further knowledge of the management and self-care activities associated with HF. A study by Chi et al. (2022) assessed nurses’ knowledge of HF self-care via a systematic review. It was found that most nurses lacked knowledge about symptoms of exacerbation and fluid management, but their knowledge increased after attending an educational intervention (Chi et al., 2022). This further demonstrates nurses lack knowledge in HF self-care and management, but their knowledge can be increased through an educational intervention.

**Implications for Practice**

The findings of this HF education study suggest that the educational intervention was successful in increasing nurses’ knowledge of HF principles. With an understanding of the pertinence of proper HF knowledge and self-care, the findings of this project support the implementation of HF educational interventions for all nurses. A toolkit containing information on HF principles and management should be given to cardiac nurses that can be used in discharge teaching. Annual or biannual in-services on HF management could be presented to nurses on cardiac and telemetry units to maintain updated, evidence-based practice, therefore enabling nurses to better educate their patients. By better educating patients, HF outcomes may
be improved. Additional research should ascertain the mode of diffusion and curriculum of this educational intervention to optimize the knowledge gained and HF patient well-being.

Limitations

Limitations of this study include the number of respondents and the accuracy of their responses. As previously discussed, only 26 respondents completed both the pre- and post-test. Of these 26 respondents, five were excluded from the statistical analysis due to incomplete post-tests. There was only one male participant. Increasing the number of responses and achieving more representative demographics, such as surveying more male nurses or expanding the geographic areas of the study, would strengthen the validity of the results. Most of the participants were BSN prepared nurses, which may indicate more advanced knowledge of HF from academic studies as compared to ADN prepared nurses. Approximately half of the participants had been in nursing for more than 25 years. This project did not explore the effect of length of nursing experience on baseline knowledge of HF. The exclusion of nurses’ area of practice in analysis presents another limitation of the study. For example, this research did not explore whether there were variations in HF knowledge among intensive care unit nurses, telemetry nurses, cardiac nurses, medical-surgical nurses, clinic nurses, and others. The discussed limitations present multiple challenges in generalizing the findings of this project to the entire nursing profession, as well as to various nursing specialties.

Conclusion

It has been found that education provided to nurses on HF improves patient outcomes and reduces hospital readmissions (Cui et al., 2019). Not only do patients benefit from increased education, but hospitals also benefit from reduction in HF readmissions (Obiagwu et al., 2018). Nursing is more than treating patients in hospitals. It should be the nurse’s priority to participate
in disease prevention and health promotion in the community care setting (White-Williams et al., 2020). Education is a key component of this task. Treatment and education should also aim to improve the quality of life and prevent disease progression among HF patients (Sun et al., 2019). By teaching patients self-care and psychological treatment, nurses are holistically treating patients and therefore promoting healing. It is desired that through this research and the methodology used, nurses will become more educated on HF and use provided toolkits to educate patients upon discharge. The goal is to improve quality of life, prevent HF exacerbations, decrease mortality, and reduce 30-day readmission rates. As previously mentioned, other countries are advancing in nursing knowledge on HF and its importance. Research must be done in the United States to ensure nurses are adequately prepared to care for and educate this growing population.
References


Literacy and Outcomes Among Patients With Heart Failure. *JACC: Heart Failure, 8*(6), 451–460. [https://doi.org/10.1016/j.jchf.2019.11.007](https://doi.org/10.1016/j.jchf.2019.11.007)


Jaarsma, T., Cameron, J., Riegel, B., & Stromberg, A. (2017). Factors Related to Self-Care in Heart Failure Patients According to the Middle-Range Theory of Self-Care of Chronic Illness: A Literature Update. *Current Heart Failure Reports, 14*(2), 71–77. [https://doi.org/10.1007/s11897-017-0324-1](https://doi.org/10.1007/s11897-017-0324-1)


Appendix A

Heart Failure Discharge Education

What is Heart Failure?
Heart failure is failure of the heart to pump enough blood to meet the body’s demands (Cash et al., 2021).
The heart has four chambers, right atrium, right ventricle, left atrium, and left ventricle. There can be left or right-sided heart failure.

Symptoms of Exacerbation
- Weight gain of more than 3 pounds in one day or more than one pound a day over 3 days (Cash et al., 2021).
- Worsening shortness of breath
- Coughing up blood
- New cough
- Swelling in feet or ankles
- Chest pain
- Heart racing

Foods to Avoid
- High sodium (salt) foods
- Why? Water follows salt, so eating too much sodium can increase the blood pressure causing the heart to work harder. Too much sodium can also cause the body to hold onto more fluid, causing extra weight (Cleveland Clinic, 2022).
- Limit sodium to around 1,500 mg a day, or whatever amount your doctor allows.
- Avoid processed foods (Cash et al., 2021).
- Eat fresh fruits and vegetables rather than canned
- Read the label for sodium amount, even in sports drinks
- Choose low-sodium label options
- Avoid snacks such as crackers, chips, pretzels, cheese, olives, jerky, bacon, deli meats, canned meat, and pickles.
- Limit soy sauce, meat tenderizers, and seasoned salts
- Ketchup and other sauces include a lot of sodium, substitute with garlic.

Medications
You are likely going home on many different medications. Your doctor and/or nurse will discuss the specifics area.
Most importantly, take medication as your doctor prescribed even if feeling better (Cleveland Clinic, 2022).
If you start feeling worse or begin having more symptoms of exacerbation let your doctor know.
Do not stop or change amount of medication without talking to a healthcare provider.
There are apps and ways to get medications cheaper. Let your doctor know if you are having difficulty getting medication.
Keep a copy of the list of medications always with you.
Do not run out! Request refills before medication runs out.

Monitoring Fluid Intake
- Weight daily at the same time, same scale, in same clothing (Cash et al., 2021).
- If your doctor tells you to restrict fluid, check in the kitchen for ways to limit your intake.

When to call the Doctor
If there is a weight gain of more than 3 pounds in one day or more than one pound a day over 3 days (Cash et al., 2021).
If worsening of any of the above symptoms of exacerbation
When medication side effects or changes in behavior
If in doubt, call

References
Appendix B

Demographic Survey

Part 1 Demographics

1.) What is your gender?
   [ ] Male
   [ ] Female
   [ ] Other ______
   [ ] Do not wish to disclose

2.) How old are you?
   [ ] 18-30
   [ ] 31-40
   [ ] 41-50
   [ ] 51-60
   [ ] 61-70
   [ ] > 70

3.) What is your education level?
   [ ] ASN
   [ ] BSN
   [ ] Masters
   [ ] Doctorate

4.) How many years have you been a nurse?
   [ ] 0-5
   [ ] 6-10
   [ ] 11-15
   [ ] 16-25
   [ ] > 25

5.) How many years have you been in cardiology as your specialty? ________
Appendix C

Atlanta Heart Failure Knowledge Test

Part 2: Atlanta Heart Failure Knowledge Test (AHFKT-V2)
We have some questions about heart failure. Select one response for each question. Don't worry if you are not sure of the answers; just do the best you can.

1. Heart failure is a problem in which:
   - a. There is too much blood in the body
   - b. The heart is unable to pump enough blood
   - c. The blood vessels in the heart are clogged
   - d. The heart skips beats

2. Which of the following statements about heart failure is TRUE?
   - a. It can be cured with drugs and other treatments.
   - b. A person with heart failure cannot live a normal life.
   - c. Heart failure cannot be cured but it can be controlled.
   - d. Heart failure means the heart has stopped beating.

People with heart failure can do many things to help themselves. Think about each of these activities and decide if they would be helpful for someone with heart failure.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid salty foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink lots of fluids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drink alcoholic drinks each day to relax</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skip heart failure medicines when they feel better</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Know when to call the doctor or nurse for symptoms of heart failure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. ACE inhibitors (ex. Capoten, Vasotec, Lisinopril, or Zestril) are medicines used to treat heart failure. These drugs help the heart pump stronger by:
   - a. Removing extra fluid and salt from the body
   - b. Causing blood vessels to get smaller
c. Blocking the harmful effects of stress hormones

d. Improving blood counts (reducing anemia)

10. People who have heart failure take diuretics (Lasix, "water pills") so that:

a. Their kidneys will make more urine and pass more water

b. Their heart will beat more steady

c. The blood vessels in their body will widen or relax

d. Their heart will pump stronger

11. People with heart failure who are taking a diuretic ("water pill") need to:

a. Know if they need to take extra potassium with their water pill

b. Take the diuretic after 3-4 pm in the day

c. Not worry about signs and symptoms of dehydration

d. Drink lots of water to replace lost fluid

12. If a person with heart failure gains 2-3 pounds in a few days, this usually means he/she:

a. Is eating too many calories and gaining weight

b. Has extra water in the body

c. Needs to drink more fluid

d. Needs to be getting more exercise to burn calories

13. How often should a person with heart failure weigh themselves?

a. Every day

b. Every week

c. Every month

d. Once in a while

14. The best time of day for persons with heart failure to weigh themselves is:

a. At bedtime
b. Upon awakening in the morning

c. At or around lunchtime

d. When they remember to do it

15. Persons with heart failure should call their doctor if they have which of the following symptoms?

a. Weight gain of 2-5 pounds in 1-2 days

b. Increased swelling of the ankles and/or stomach

c. More shortness of breath

d. All of the above

16. How often should a person with heart failure exercise?

a. Every week

b. Every day

c. Several times a day

d. 2-3 times per week

17. A person with heart failure should stop and rest when doing physical activity if:

a. They feel short of breath or winded

b. They have chest pain or discomfort

c. They feel dizzy or lightheaded

d. All of the above

18. Which is a big source of sodium (salt) in the diet?

a. Processed foods (such as tv dinners)

b. Smoked or cured meats

c. Table salt

d. All of the above

19. Which has the LOWEST amount of sodium (salt)?

a. Fresh fruits
b. Canned vegetables

c. Reduced sodium soup

d. Frozen dinners

20. Which food has the MOST sodium (salt)?

a. Sliced tomato

b. Broiled fish

c. Baked ham

d. Skim milk

21. Which dessert has the LOWEST amount of sodium?

a. Hot fudge sundae

b. Baked apple

c. Low fat instant pudding made with skim milk

d. Chocolate cake made from a mix

22. Select the fast food with the LOWEST amount of sodium.

a. Fried chicken

b. Cheeseburger

c. Baked potato with sour cream and chives

d. Taco salad

23. Some people with heart failure are told by their doctor to limit fluids. Which of the following count as fluids?

a. Water and clear liquids

b. Milk, ice cream, and yogurt

c. Jello, pudding, and soups

d. All of the above

24. If a person with heart failure has a headache or pain, which would be the best medicine to take?
24. Aspirin  
   b. Tylenol (Acetaminophen)  
   c. Advil® or Motrin® (Ibuprofen)  
   d. Anacin Regular Strength or Excedrin  

25. The recommended total daily amount of sodium that persons with heart failure should eat is:  
   a. 3,000 milligrams  
   b. 2,500 milligrams  
   c. 1,500 milligrams  
   d. 500 milligrams  

26. A person with heart failure who is trying to limit their fluids may reduce symptoms of thirst by:  
   a. Chewing gum or sucking hard candy  
   b. Cutting back on their medications  
   c. Drinking small amounts every 30-60 minutes to prevent thirst  
   d. Warming fluids before drinking  

27. If a person with heart failure forgets to take their medicine, they should:  
   a. Take their medicines as usual the next day  
   b. Take the medicines as soon as remembered  
   c. Take double the dose the next day  
   d. Call their doctor immediately  

28. It is important for a person with heart failure to:  
   a. Make sure they get the flu shot every year  
   b. Receive the pneumovax vaccination to prevent pneumonia  
   c. See their heart failure doctor regularly  
   d. All of the above
Appendix D

Figure 2

Gantt Chart
Dear Erin Polk:

On 7/13/2022, the IRB staff reviewed the following submission:

<table>
<thead>
<tr>
<th>Title of Study: Assessing the Impact of an Educational Intervention on Nurses’ Knowledge of CHF</th>
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<tr>
<td>Investigator: Erin Polk</td>
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<tr>
<td>Submission ID: STUDY00003383</td>
</tr>
<tr>
<td>Study ID: STUDY00003383</td>
</tr>
<tr>
<td>Funding: None</td>
</tr>
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<td>IND, IDE, or HDE: None</td>
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Documents Reviewed:
- confirmation of permission to use questionnaire.pdf, Category: Other;
- Polk HF Questionnaire , Category: Survey/Questionnaire;
- Polk_FSU IRB protocol.pdf, Category: IRB Protocol;
- Polk_heart failure brochure .pdf, Category: Other;
- Polk_introductory email .pdf, Category: Recruitment Materials;
- research_guidelines.pdf, Category: Sponsor Attachment;

The IRB staff determined that the proposed activity is not research involving human subjects as defined by DHHS and/or FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human subjects in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking Create Modification / CR within the study.
COVID-19 Information for Research Involving Human Subjects: Note that the U.S. is operating under the national emergency Proclamation 9994 concerning the COVID-19 pandemic and that this national emergency remains in effect until rescinded or terminated by the President of the U.S. (go here for the Proclamation letter). Conditions are dynamic and related policies or guidance evolve accordingly; as applicable, refer to the U.S. Centers for Disease Control and Prevention website specific for universities or refer to our COVID-19 and Human Research Studies web page to learn more about how you should or may protect persons (whether vaccinated or unvaccinated) involved in any of your in-person research activities.

Sincerely,

Office for Human Subjects Protection (OHSP) Florida State University Office of Research 2010 Levy Avenue, Building B Suite 276 Tallahassee, FL 32306-2742

Phone: 850-644-7900
Email: humansubjects@fsu.edu OHSP Web: https://ohsp.fsu.edu
Appendix F

Table 1

**Score of Pre and Posttest**

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<th>Maximum Score</th>
<th>Mean</th>
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<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Posttest</td>
<td>21</td>
<td>28</td>
<td>25</td>
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Table 2

**Participant Demographics**

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<td>Female</td>
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<table>
<thead>
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<td>31-40</td>
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### Table 3

**Paired Samples Test**

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<th>Std. Deviation</th>
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<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
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<tr>
<td>Posttest</td>
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<td>1.91</td>
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<tr>
<td>Posttest-pretest</td>
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<td>.57</td>
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Table 4

Knowledge of Pathophysiology

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<thead>
<tr>
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<tbody>
<tr>
<td>Pretest</td>
<td>26 (100)</td>
</tr>
<tr>
<td>Posttest</td>
<td>26 (100)</td>
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Table 5

Knowledge of Sodium Consumption in Heart Failure

<table>
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<tr>
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<th>Pretest (n) %</th>
<th>Posttest (n) %</th>
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<tr>
<td>Q21</td>
<td>8 (30.8)</td>
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</tr>
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<td>Q22</td>
<td>4 (15.4)</td>
<td>2 (7.7)</td>
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<tr>
<td>Q25</td>
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<td>3 (11.5)</td>
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Table 6

Knowledge of Heart Failure Medications

<table>
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<tr>
<th></th>
<th>Pretest (n) %</th>
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<tbody>
<tr>
<td>Q9</td>
<td>12 (46.2)</td>
<td>14 (53.8)</td>
</tr>
<tr>
<td>Q10</td>
<td>5 (19.2)</td>
<td>2 (7.7)</td>
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<tr>
<td>Q11</td>
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<td>2 (7.7)</td>
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</table>