

Spring 2019

Effects of Teach-Back Method of Education on Knowledge of Heart Failure Self-Care Management and Post-Discharge Knowledge Retention

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Awuah-Asamoah, A. (2019). Effects of Teach-Back Method of Education on Knowledge of Heart Failure Self-Care Management and Post-Discharge Knowledge Retention., (). Retrieved from https://hsrc.himmelfarb.gwu.edu/son_dnp/51

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KNOWLEDGE

Effects of Teach-Back Method of Education on Knowledge of Heart Failure Self-Care
Management and Post-Discharge Knowledge Retention

Presented to the Faculty of the School of Nursing

The George Washington University

In partial fulfillment of the
requirements for the degree of
Doctor of Nursing Practice

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Spring, 2019

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Abstract

Background: Approximately forty to eighty percent of patient education is immediately forgotten, and about fifty percent of retained information is inaccurate; knowledge is an essential bridge between patient teaching, comprehension and knowledge retention by using the teach-back method (Farris, 2015; Rouse et al., 2016; Stamp et al., 2014).

Objectives: The purpose of this study was to compare teach-back education method versus standard education and care, on knowledge of heart failure (HF) self-care management at discharge and retention of knowledge at three to ten days post discharge.

Methods: A non-probability convenience sampling of 22 HF patients, 65 years and older, over a 6-month period was used. The intervention group received HF education using teach-back, plus standard care and HF handbook. The control group received the standard care plus HF handbook. The study intervention was measured using the Dutch HF Knowledge Scale (DHFKS), the European HF Self-care and Behavior scale (EHFScB-9) and teach-back questionnaire, during the hospital stay and follow up telephone calls, three to ten days post discharge.

Results: The pre-discharge teach-back knowledge retention was statistically significant between groups ($t(20) = 2.28, p = 0.03$). Post teach-back intervention, EHFScB-9 and DHFKS scores were demonstrated as moderate effect size and deemed clinically significant.

Conclusions: The findings from this study were encouraging to support the effect of teach-back technique on knowledge retention and self-care of HF. Further research study with a larger sample will be needed to evaluate teach-back education on HF knowledge and patient outcomes.

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Background

Heart failure (HF) is a progressive and incurable disease which is responsible for about 50 percent deaths within 5 years of the diagnosis; greater than 5 million people living in the United States are affected by HF, and the prevalence is expected to increase by greater than 8 million diagnosis between the years 2012-2030 (Benjamin et al., 2017; Centers for Disease Control and Prevention, 2016; National Heart, Lung and Blood Institute [NHLBI], 2015). HF is also one of the most costly diagnoses in the United States, with an annual healthcare cost estimated at \$30.7 billion in 2012 and projected to increase to \$69.7 billion by the year 2030 (Benjamin et al., 2017; CDC, 2016). The NHLBI reported the direct cost of cardiovascular disease on healthcare, at \$167.4 billion, and \$119.2 billion in indirect costs of mortality (Rakhshan et al., 2015; Stamp et al., 2014).

Although HF is incurable, lifestyle modifications and medical management have shown to improve quality of life and health outcomes (NHLBI, 2015). Patient knowledge is important and foundational in empowering self-care behaviors following hospital discharge and combined with nurse-led education delivered over time, patient knowledge leads to improved early recognition and treatment of heart failure symptoms (Stamp et al., 2014). Patient education has proven to be effective in improving HF knowledge, self-care behaviors and patient health outcomes, however many research protocols fail to recognize education as a specific intervention

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in HF management (Boyde et al., 2018). One measure to improve patient knowledge and assess knowledge retention is by using the teach-back method (Porter et al., 2016).

The teach-back method is a technique used to assess message delivery and a strategy for ensuring intervention comprehension by individuals at all health literacy levels and encourages the active participation of patients with health-care professionals (Dinh et al., 2018; Porter et al., 2016). The teach-back education method is also confirmed by studies as an adaptable and participant-accepted health literacy technique that can be used to reinforce both knowledge and behavior-specific skills (Porter et al., 2016). Research proves that the teach-back method is an effective technique in improving patient outcomes and overcoming potential barriers (Dantic, 2014). A study by Dantic, in COPD patients, provided evidence to support the use of the teach-back education method as an effective nursing intervention in teaching self-management using inhaler devices in COPD patients; this supports the prediction that the teach-back method of education will be suitable in diverse health settings and disease management (Dantic, 2014).

Problem Statement

Heart Failure (HF) is the leading cause of hospitalization in adults ages 65 years and older (Huynh et al., 2018). The community hospital in the mid-Atlantic USA, currently does not have a well-defined education pathway or specific discharge plan to improve self-care of patients admitted to the hospital with HF exacerbation. Studies show that patient education is critical in the care of heart failure patients, and nurse led HF education at the time of hospital discharge results in improved patient knowledge (Konmuri et al., 2012).

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Purpose

The purpose of this study was to compare teach-back education method versus standard education and care on knowledge of heart failure self-care management at discharge and retention of knowledge at three to ten days post discharge.

Specific Aims

1. To compare the teach-back method of teaching versus the standard care of HF on heart failure self-care management.
2. To evaluate the effect of the teach-back method of teaching on heart failure knowledge retention.

Research Questions

Specific research questions to achieve the study objectives/aims were as follows:

1. What is the effect of the teach back method of education on heart failure knowledge retention as compared to the standard care?
2. Is the teach-back method effective in improving patient knowledge of self-management, as compared to knowledge gains from the standard method of education?
3. For the intervention group, is there knowledge improvement from pre-intervention to pre-discharge?

Hypothesis

The teach-back method of education is significant in improving heart failure knowledge on self-

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care management and knowledge retention in the intervention group, as compared to the control group receiving standard education.

Significance

This study originated from a clinical trigger and the desire to improve patient health outcomes, as the community hospital currently does not have an education pathway or specific discharge plan for HF patients. Heart failure is progressive, and its prevalence is estimated to increase by 46 percent between the years 2012 through 2030 (CDC, 2016; NHLBI, 2015; Benjamin et al., 2017). Hospitalizations, due to HF, remains high despite advancement in technology and evidence - based practice (White et al., 2013).

The HF cost burden on healthcare, which is estimated at \$30.7 million, was the driving factor for the implementation of Medicare reimbursement policies for hospitals (Berbethon et al., 2016). The federal government initiative which was designed to reduce cost and prevent avoidable hospitalization, has influenced efforts by health systems to improve health outcomes through initiatives that improve patient knowledge and self-care by ensuring appropriate discharge planning and transition to the community, with services such as home health care, telemonitoring and timely outpatient follow up with primary care providers (Di Palo et al., 2017). Telemonitoring, which falls under telehealth, allows the delivery of health-related information using communication technology (Riley et al., 2012).

The use of the teach-back method to deliver evidence-based heart failure teaching as per guidelines by the American College of Cardiology/American Heart Association (ACC/AHA), was important in improving patient outcomes, HF knowledge and discharge planning at the

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community hospital. The literature search provided favorable evidence to support the effectiveness of HF education and the usefulness of the teach-back method as a teaching tool to measure knowledge retention (Rouse et al., 2016). It is anticipated that the success of this initiative will influence and eventually change the practice guidelines and discharge planning for heart failure through the healthcare system.

Literature Review

The literature search for this study was completed between November 2017 through February 2019. PubMed, CINAHL and Scopus search databases were reviewed for articles with high level evidence to support research questions. Medical Subject Headings (MESH) terms “heart failure” and “patient readmission” was combined with Boolean operators “AND” and “OR”. Additional keywords “teach-back” and “heart failure education”, “hospitalization”, “knowledge” and “self-care” were searched to generate specific research articles evaluating the effect of teach back method on heart failure self-care management. A manual search for articles by references was also used to identify additional appropriate articles. The filters applied were English, humans, publication year 2010-2019 and Age 65+. Guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), was used to provide research evidence that is based on established rigor and thorough communication of comprehensive results (Gates & March 2016). The expertise of a research librarian at the George Washington University Himmelfarb library was also solicited for this search.

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The inclusion criteria for this study was random design studies, pre and post-test, prospective cohort studies, quality improvement studies, English speaking adults ages 65+ years with a diagnosis of acute, acute on chronic or chronic heart failure and studies about nurse-led heart failure education. The exclusion criteria included dissertations or thesis papers, studies on adults residing in skilled facilities and adults with cognitive impairment. For this project, cognitive impairment was defined as adults with a diagnosis of dementia or Alzheimer's, traumatic brain injury, memory loss, developmental delay or mental retardation, and any adult admitted with altered mental status or encephalopathy documented in their medical records.

The articles selected for this study included studies by Vesterlund et al., 2015, Peter et al., 2015, Dinh et al., 2016 and Haney & Shepherd, 2014. A fifth study by Bates et al., which provided disease-specific education using teach-back from a patient educator, as well as scheduling cardiology follow-up appointments prior to discharge, demonstrated the effectiveness of using teach back education and showed favorable patient outcomes (Bates et al., 2014). Although the study interventions were for post Coronary Artery Bypass Graft (CABG), the study was also appropriate for HF patients. A hospital educational study of 23 high risk HF patients, using 60 minute teach-back education sessions on heart failure self-management with recognition of signs and symptoms, and follow up telephone calls from the HF nurse practitioner within 72 hours, then weekly, showed improvement with patient self-management of HF, such as changes with dietary habits and weight monitoring (Haney & Shepherd, 2014). Furthermore, in a systematic review by Dinh et al., on ten different studies examining the evidence of using the teach-back method in health education to improve self-management and adherence for patients

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with chronic diseases, the findings showed a positive trend with improved self-management that subsequently led to reduction in hospital utilization, although the outcomes were inconsistent (2016). Vesterlund et al., in their study using an integrated plan of care in a quality improvement project, which used 6 interventions including teach-back methodology, improved discharge planning, HF education and follow up phone call to patients within 48 hours post-discharge, showed an improvement in patient care and clinical outcomes; the teach-back method also improved the quality of discharge teaching (Vesterlund et al., 2015).

The teach-back method, endorsed by the Agency for Healthcare Research and Quality (AHRQ), National Quality Forum (NQF), the Joint Commission and the Institute for Healthcare Improvement (IHI) is an effective evidence-based method that confirms patient comprehension, thereby improving adherence to HF management and subsequently reducing hospitalization (Caplin & Saunders, 2015 & White et al., 2013). A quality improvement study by Peter et al., providing core-measure education to HF patients using teach-back questions and comparing HF patients who received teach-back to those who did not, showed successful improvement in patient knowledge and comprehension of their disease through the teach-back education process (Peter et al., 2015). The evidence and findings from the study supported teach-back as an essential tool in patient education, as it ensured better understanding and compliance by patients and their caregivers, to post-discharge self-care (Peter et al., 2015). Further studies, including review of four dated studies, showed that direct face-to-face HF education provided by specially trained nurses, ranging from 45 minutes to 1 hour prior to discharge, in addition to follow up visits in the clinic or by telephone, was effective in improving HF specific knowledge, clinical

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outcomes and self-care adherence in patients with HF (Koelling et al., 2005; Konmuri et al., 2012; Krumholz et al., 2002; Rouse et al., 2016; Sezgin et al., 2017 & Strömberg et al., 2003).

Additionally, studies by Bahri et al., who also studied the effectiveness of teach-back method in improving self-care activities, confirmed the teach-back method of education as an effective strategy for clinicians to evaluate patient comprehension and allows for immediate clarification of any misconception about the teaching provided (2018). The study findings demonstrated the effectiveness of the teach-back method of education in improving self-care activities (Bahri et al., 2018). Likewise, Mollazadeh and Maslakpak evaluated the effect of teach-back training on self-management in kidney transplant recipients and showed satisfactory evidence of significant increase in self-management scores in the intervention group versus the control group, after implementation of teach back teaching (Mollazadeh & Maslakpak, 2018). The study was a clinical trial study with convenient sampling of 84 kidney transplant recipients, randomly assigned to intervention and control groups, with the intervention group receiving education content with teach back training in 5 sessions of 60 minutes education (Mollazadeh & Maslakpak, 2018).

Evaluating patient knowledge retention using the teach-back method is an easy and minimal cost intervention that can be easily incorporated into daily nursing teaching and interventions; patient understanding can be a good predictor of compliance with self-care practices at home (Dinh et al., 2018; Peter et al., 2015). In 2002, the Joint Commission on Accreditation of Health Care Organizations started the HF-1 initiative, which is a standard for discharge instructions and requires teaching to address 6 specific areas related to HF

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management: activity level, dietary restrictions, discharge medications, weight monitoring, follow-up appointments and instructions to follow for worsening symptoms (Regalbuto et al., 2014).

In another on-going study by Dinh et al., researchers are using a prospective single site cluster randomized controlled trial testing to assess the effectiveness of a protocol for a nurse-led intervention using teach-back method to teach self-care in adult patients with HF (2018). The study's goal is to improve nursing and healthcare professionals care of patients with chronic diseases and with self-care at home, once discharged from the hospital; the researchers support the European Society of Cardiology Guidelines for the treatment of HF, which recommends patient teaching on recognition of HF symptoms, with emphasis on medication adherence and healthy lifestyle modification (Dinh et al., 2018).

Finally, another intervention that has proven to improve patient outcomes, is follow up phone calls after hospital discharge. A pretest-posttest experimental study by Brandon et al., evaluating the effectiveness of an advanced-practice-nurse (APN)-led telephone intervention, including bi-weekly telephone interactions between patients and an APN, showed improved quality of life in participants with New York Heart Association (NYHA) HF classification level I or II (Brandon et al., 2009). Adequate heart failure knowledge, combined with nurse-led education over time, was successful in improving patients' ability to recognize and treat early symptoms of heart failure exacerbation and subsequently reduce hospital encounters and hospital cost (Stamp et al., 2014).

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Theoretical Framework

Evidence based practice (EBP) is a problem-solving approach to clinical decision making and incorporates evidence from well-designed studies; it improves quality of care, patient outcomes and controls the cost of healthcare (Brown, 2014). There are several EBP models available to help nurses track progress and implement evidence into practice (Brown, 2014). The Iowa Model of Evidence-Based Practice, which is a model designed by a team of nurses from the University of Iowa Hospitals and Clinics, and the College of Nursing, was used for this initiative; the model promotes quality care, while implementing research, successful strategies and incorporating evidence (Buckwalter et al., 2017; Doody & Doody, 2011). It uses a step-by-step guide to clinical decision making and implementation based on research findings, and promotes excellence in healthcare (Brown, 2014; Buckwalter et al., 2017). The model was selected for this pilot study due to the ease in use and understanding (Brown, 2014).

The first step of the Iowa Model is selection of the study topic. This heart failure education initiative has a problem-focus that warrants the implementation of an evidence-based intervention (Brown, 2014). Heart failure (HF) related hospital readmissions is a clinical problem and a priority at the Community hospital. HF education and discharge teaching contribute to improved patient care (Doody & Doody, 2011). Once priority was determined, the next step was team formation. This included all interested stakeholders and with evidence-based guidelines (Doody & Doody, 2011). Team formation was necessary to engage patients and the nursing staff in utilizing research, promoting knowledge and growth, while improving clinical standards (Marshall, 2006). Team selection was done cautiously to incorporate inter-professional

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involvement and skill sets needed for planning, conducting and project implementation (Buckwalter et al., 2017).

The team included the Principal Investigator (Doctor of Nursing Practice (DNP) Project Advisor), the DNP student (Nurse Practitioner Researcher), clinicians and the nurses on the specified telemetry units. Using specialized registered nurses instead of community nurses, pharmacists or multidisciplinary care is proven to show favorable outcomes in patient mortality and readmissions (Albert et al., 2015). Once the team was formed, brainstorming to identify resources, assembling, critiquing and synthesizing research was necessary to determine relevance of the research (Buckwalter et al., 2017; Doody & Doody, 2011). Once determined that evidence was enough, the next step was designing and piloting the practice change, including developing an implementation plan to determine best strategies (Buckwalter et al., 2017). The implementation phase consisted of four main stages: creating awareness and interest; building knowledge and commitment; promoting action and adoption; pursuing integration and sustained use (Stewart, 2017).

The evidence-based practice interventions, based on HF guidelines by the American Heart Association (American Heart Association, 2017), and the research findings gathered for this pilot study was used as guidelines in improving patient outcomes. It is the expectation that final findings from this study will improve clinical practice and discharge education for heart failure knowledge as outlined by the American College of Cardiology/American Heart Association (ACC/AHA).

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Identifying and defining variables

The variables for the study included the demographics of the sample population, clinical characteristics, the independent variables and dependent variables. The theoretical and operational definitions as well as levels of measurement was recorded. (Table 1- Identification and definition of the variables).

Methodology

Research Design

The study used a quantitative research design with non-probability convenience sampling of patients admitted to the Internal Medicine services at the community hospital, with a diagnosis of acute heart failure, acute on chronic heart failure or chronic heart failure, from September 2018 through February 2019. The quantitative research design was selected because it allowed the researcher to understand the influence of the variables on the outcome (Creswell, 2014). This design was appropriate in addressing the research aims and research questions for this study.

Study Population/Sample Size/Recruitment

The target population for this study included English speaking adults of all ethnicity and gender, ages 65 years and older, admitted to the community hospital in the Mid-Atlantic United States, for acute or chronic HF. The medical records were reviewed daily by the DNP student, to identify eligible patients at the Community hospital. Once identified, patients were approached by the DNP student about the study and given the opportunity to consent or decline participation. Patients who consented to participate in the study were compiled in a list, assigning every other

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patient to the intervention group, while alternating with patient assignment to the control group. The control group received the standard care of HF management provided by the Clinicians and staff nurses at the hospital, plus the HF handbook provided by the hospital. The intervention group received the standard care, plus HF education with teach back method, and the HF handbook. Participants from both groups, who consented to phone calls, received follow up telephone calls within three to ten days after discharge from the hospital. Given the limited timeframe of this pilot study, a sample size of 22 heart failure patients were selected for the study.

Setting

The intervention and data collection were on the telemetry units at the 310-bed community hospital in the mid-Atlantic region of the United States, which is affiliated with a well-recognized healthcare system in the community.

Intervention

Prior to initiating intervention and data collection, the study proposal was reviewed by The George Washington University Institutional Review Board (IRB) and it was determined to be a quality improvement study that did not require IRB approval prior to data collection. The DNP student reviewed teach-back method ([Always Use Teach-back, 2014](#)), and teaching aide/videos toolkit on teach back method from The Agency for Healthcare Research and Quality, 2010, Health Literacy, 2014 & North Carolina Program for health literacy 2014, prior to intervention and data collection (Ekong et al., 2016). The DNP student informed physician and advance practice provider colleagues, nurse managers and nurses on the designated telemetry

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units about the study and allowed an opportunity for questions. The DNP student then met with both the control and intervention groups and their families (if available), within 48 hours of admission. A baseline patient knowledge on HF was evaluated in the intervention group, using the teach-back questionnaire. The intervention group then received 35 to 40 minutes of direct and interactive HF education using the HF handbook, as per guidelines by the American College of Cardiology/American Heart Association [ACC/AHA] (Yancey et al., 2013), and the Top Ten Things to Know (American Heart Association, 2017). Due to time limitations for this pilot study, the education focus was limited to medication management, activity level, dietary and fluid restriction, weight monitoring, steps to follow for worsening symptoms, and the importance of follow up appointments, as per guidelines by the Joint Commission for HF discharge education (Regalbuto et al., 2015). The patients and families had the opportunity to ask questions throughout the meetings.

At the end of the session, the teach back questionnaire, EHFScB-9 and the DHFKS tools were used to assess knowledge retention. The participants who remained hospitalized past 48hours, received follow up visits from the DNP student, who reviewed highlights from the HF handbook and used the teach back method to re-assess knowledge retention. For participants who responded incorrectly, additional teaching was provided until comprehension was achieved. Both intervention groups received the standard care for HF management at the hospital. For the participants in the control group, the teach back questionnaire, the EHFScB-9 and the DHFKS were used to assess knowledge retention, while the HF handbook was provided for their independent review (Lee et. Al., 2013; Peter et al., 2015 & van der Wal et al., 2005).

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The European Heart Failure Self-care Behavior (EHFScB-9) and the Dutch Heart Failure Knowledge Scale (DHFKS) were useful measurement tools used to measure knowledge retention in both groups. The EHFScB-9 is a nine-point scale that is valid and appropriate to measure self-care with decompensated HF (Lee et al., 2013). Likewise, the DHFKS is useful in assessing general HF knowledge, knowledge of treatment and recognition of signs and symptoms (Boyde et al., 2017). Patients scores for the EHFScB-9 and DHFKS, as well as the correct responses from the teach back questions were recorded in the study database on excel.

Once discharged to home, the DNP student followed up with both groups via telephone within three to ten days and repeated teach back questions as well as the EHFScB-9, to compare post discharge knowledge retention between the intervention group vs the control group who received standard care. Patients in the intervention group, who incorrectly answered teach back questions again received additional education until understanding was achieved (White, 2013). During the follow up telephone call, the DNP student also confirmed that patients had scheduled appointments with their primary care providers (PCP). Finally, to ensure that the intervention was implemented as planned, the DNP student maintained email correspondence with the Principal Investigator to address any gaps or limitations.

Instrumentation/Measurements

Patient data for this study was obtained from the hospital's electronic medical records system, Epic, and transferred to a secure excel spreadsheet. The Epic software system is a privately-owned software system, founded in 1979, and used by Clinicians to store the electronic

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records of about 190 million patients (Klasko, 2016). Data imported from the electronic health records (EHR) included demographic variables; age, gender, ethnicity, type of HF, ejection fraction, date of admission, medical record number and telephone number. The DNP student recorded data on an excel spreadsheet and analyzed the data using IBM SPSS. A separate code book was created to save patients' name, telephone number and study number, to link data and study. This allowed the DNP student to track any readmissions and obtain phone numbers for telephone follow up.

The teach-back training ensured reliability of teaching methods. The primary outcome of this study was to improve HF knowledge of self-care management (diet/fluid restriction, medication management, weight monitoring, early recognition and management of worsening HF symptoms). To test for reliability and validity of the teach back method, the DNP student used the nine-item European HF Self-care Behavior Scale (EHFScB-9). The EHFScB-9 scale is a valid and reliable measure of HF self-care among adults with decompensated HF (Lee et al., 2013). The European Heart Failure Self-care Behavior Scale, developed as a 12-item scale over a decade ago, is a valid, reliable and practical 12 item measure of HF self-care behaviors, which has been translated and validated in various nations (Lee et al., 2013). The scale, which was further shortened to nine items (EHFScB-9) in 2009, is rated by five responses with options ranging from 1 (completely agree) to 5 (I don't agree at all); scores on the EHFScB-9 range from 9 to 45, with the lower score suggesting better self-care (Lee et al., 2013). The EHFScB-9 also has a four-item subscale "consulting behavior" that acknowledges patient's confirmation of contacting their primary providers with symptoms and is on a scale ranging from 4 to 20 (Lee et al., 2013). The study supported validity and reliability of the scale, with a sample of 200 adults

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with symptomatic HF, from the United States; the coefficient α was 0.85. (Lee et al., 2013).

The secondary outcome for this pilot study was to improve knowledge, as demonstrated by knowledge retention with the teach back method. The reliability and validity of knowledge was assessed using the Dutch Heart Failure Knowledge Scale (DHFKS). The DHFKS is a 15-item multi-choice questionnaire used to assess general HF knowledge, knowledge of treatment and the recognition of signs and symptoms (Boyde et al., 2017). The 15 multiple-choice questions consists of items concerning general HF knowledge (4 items), HF treatment (6 items on diet, fluid restriction and activity) and symptoms and the recognition of symptoms (5 items); questions on the scale were generated from knowledge used in HF clinics in Sweden, knowledge test of the Netherlands Heart Foundation and important self-care concepts by the European Heart Failure Self-care Behaviour Scale (van der Wal et al., 2005). Patients can choose from three options for each question on the self-administered scale, with only one option being the correct answer; there is a minimum score of 0 (no knowledge) and a maximum score of 15 points (optimal knowledge) (van der Wal et al., 2005). van der Wal et al., tested face, content and construct validity using the DHFKS to test HF patients in 19 hospitals in the Netherlands; the researchers could determine HF patients with high and low level of HF knowledge, with Cronbach's α of the scale in the population (n = 902) at 0.62 (van der Wal et al., 2005). There was enough evidence to support the validity and reliability of the Dutch HF knowledge scale to be used in clinical practice to measure HF knowledge (2005).

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The Dutch HF knowledge scale and the European HF Self-care and Behavior scale was used with both groups to determine effectiveness of the teach back method of teaching versus the standard method. Testing was completed prior to discharge, with the EHFS_{CB}-9 and teach-back questionnaire repeated during follow up telephone calls. Information from the two testing tools were recorded on the excel spreadsheet, on the same day of testing completion.

Data Collection Procedures

The electronic medical records were reviewed daily, via the epic software system, to determine eligible HF patients based on study inclusion criteria. The epic system is a secure software and required a two-step log in process. Eligible patients identified from the electronic health records, and who consented to participate in the study, were assigned study numbers for data recording. The DNP Project advisor was the principal investigator for this study and data collection and analysis was completed by the DNP student. No other data collectors or administrative assistant was assigned for this study. Data (demographics, type of HF, Ejection Fraction [EF], scores from the teach-back questionnaire and the measurement tools) were recorded on the spreadsheet, then later transferred to IBM SPSS for analyses by the DNP student. Patient identifiers including age, name, date of birth or social security number were omitted to protect privacy. Data collected was analyzed at 30 days, 60 days and 90 days.

Data Analysis Plan

Data was directly entered and analyzed by the DNP student, using IBM SPSS statistical software. Once patient identifiers were removed, data accuracy in Excel and the SPSS statistical software was confirmed by a designated Physician Assistant who works at the community

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hospital and has access to the electronic health records. Descriptive statistics were used to evaluate the demographic variables. The study used measures of central tendency, including the mean and median, to understand the distribution of data (Creswell, 2014). Tables were used to describe data, so it was easy to understand. To address the research hypothesis, crosstabulation and chi-square analysis were performed to compare the teach-back knowledge. The Mann-Whitney analysis was also performed to compare the pre-discharge score difference of the EHfScB-9 score and the DHFKS, between the intervention groups respectively. Studies from Lee et al., 2013 and van der Wal et al., 2005 confirmed validity and reliability in using the EHfScB-9 and DHFKS in measuring teach back and knowledge with HF patients.

Post discharge knowledge was assessed during the telephone follow up calls, to determine if the score reflected improvement, unchanged or worse from prior scores while admitted. Reliability testing was also repeated using Cronbach's alpha. The study minimized non-response by randomly selecting participants that met the inclusion criteria. The timing of the measurement tools and questionnaire was structured to avoid participants dropping out of the study due to feeling burnt out or overwhelmed with the study. The DNP student remained consistent with follow up telephone calls three to ten days after discharge, to collect data and minimize risk for error.

Ethical Considerations

An approval from the community hospital and affiliated healthcare system was obtained prior to study initiation. The study proposal was reviewed by the George Washington University IRB and it was determined to be a quality improvement study that did not require IRB approval.

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Participation in this study was voluntary and consent was obtained by the DNP student prior to initiation of this study. The DNP student developed a code book that paired the study number with the patient identifiers to obtain phone numbers for follow up telephone calls. The code book will be deleted thirty days after the DNP project is submitted. The desktop computer used for this study was password protected and required a two-step login to access. The desktop computer was kept in a locked office and all data collected for this study was saved on a flash drive which was kept in a secure cabinet in the office. Once data was analyzed for accuracy all medical record numbers and patient identifiers was deleted, then information was imported to IBM SPSS for analysis.

Results

The sample participants for this pilot study were selected using the inclusion criteria of adults ages 65 years and older, admitted from the community with a diagnosis of HF. A total sample size of (N=22) were recruited for this study, with 45.5% male participants in the Intervention Group (IG) and 54.5% in the Control group (CG), while female participants made up 54.5% of the IG and 45.5% in the CG. 72.7% of the participants were Caucasian and 50% were between the ages 65 -75 years. (Table 1 shows characteristics between the variables).

The descriptive statistics and frequency distribution of the interventions used in this study is presented in Table 2. Among the participants in the intervention group (IG), Only 3 (27. 3%) had scores $\geq 75\%$; after the intervention, 8 (72.7%) had scores $\geq 75\%$. This indicates that 5 of the 8 patients in the IG who previously scored $< 75\%$, scored $\geq 75\%$ after the intervention, prior to discharge. This demonstrated an improved knowledge retention in the IG, post intervention.

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The results also represented a moderate effect size ($\Phi = 0.375$), however, due to the limited sample size, it was not statistically significant, $X^2 = 1.547$, Fisher's exact $p = 0.491$. (Table 3 presents assessment of teach-back on the IG). The mean and standard deviation (std. dev.) of the pre-discharge teach-back scores for the two groups were 1.27(0.47) in the IG and 1.73 (0.47) in the CG. For the EHFScB 9, the pre-discharge scores were 2.45(1.21) in the IG and 2.27 (0.79) in the CG; the pre-discharge DHFKS mean (std. dev.) for the IG were 2.82(0.98) and 2.8 (0.67) for the CG. The post-discharge means and standard deviation for the teach back scores were 0.55(0.69) for the IG and 0.36 (0.51) for the CG. The post-discharge means (standard deviation) for EHFScB-9 was 1.64 (1.96) for the IG and 1.36 (1.91) for the CG.

To address the study hypothesis, we compared the IG and CG on three knowledge measurements after the intervention. First, we performed crosstabulation and chi-square analysis to compare the teach-back knowledge retention between the two groups. The dependent variable was the knowledge retention after the intervention, prior to discharge, measured as $\geq 75\%$ or $< 75\%$. The independent variable was the intervention (Intervention versus Control). (The result is presented in Table 4). Among the participants in the IG, 72.7% had scores $\geq 75\%$, while 27.3% in the CG had scores $\geq 75\%$. This result reflected statistically significant findings, $X^2 = 4.545$, $p = 0.033$, therefore demonstrating significant improvement with knowledge retention following the teach-back intervention.

The second analysis performed was a Mann-Whitney analysis to compare the EHFScB-9 score difference between the pre-discharge assessment of the two intervention groups. This assessment was used to assess patient knowledge on HF self-management and knowledge

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retention. The Mann-Whitney analysis was selected because our dependent variable was measured at ordinal level (25%, 50%, 75% and 100%) as well as the small sample size (Pilot, 2010). The result was statistically non-significant, $p = 0.797$. The crosstabulation table detailing the change in this knowledge score is shown on Table 5.

The third analysis performed also used the Mann-Whitney analysis to compare the score difference between the pre-discharge assessment of the two intervention groups. This assessment was also used to evaluate patient knowledge on HF self-management, and the dependent variable was also measured on an ordinal scale (25%, 50%, 75% and 100%), and with a small sample size. The results are shown on Table 6. It reported statistically non-significant findings, $p = 0.270$. Given that $\Phi = 0.405$, indicating a moderate to large effect size, it is possible that the non-significant report was likely due to the limited sample size.

Discussion

The pilot study, using the teach-back method of education focused on evaluating heart failure knowledge retention and compared the effect on self-care management versus the standard care provided at the community hospital. The study intervention involved direct and detailed HF teach-back education by the DNP student to the intervention group (IG), using the HF handbook provided by the community hospital, guided by recommendations from the American College of Cardiology/ American Heart Association [ACC/AHA]. The control group received a copy of the HF book and the standard care provided by the community hospital while the measurement tools (EHFScB-9 and DHFKS) were assessed with both groups. The sample

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size of 22 was rather small for the pilot study and poor participation with the telephone follow up further limited the study. 59.1% of the total sample did not participate in the telephone follow up.

Despite the limitation, there was statistically significant improvement in the teach-back HF knowledge in the intervention group, with $X^2 = 4.545$, $p = 0.033$. Post teach-back intervention and the two measurement tools (EHFScB-9 and DHFKS) used to assess HF knowledge retention and patient knowledge on HF self-management in the intervention groups showed non-significant results with $p = 0.797$ for the EHFScB-9 scores and $p = 0.270$ for the DHFKS. However, the results demonstrated a moderate to large effect size with (Phi = 0.375; Phi = 0.455; Phi = 0.459; Phi = 0.405) respectively. This suggested that the non-significance was more than likely due to the limited sample size. The findings from this study supported the research study by Peter et al., who also performed a quality improvement study that provided core-measure education to HF patients using teach-back questions, and compared the intervention between two groups, with the results demonstrating successful use of teach back education in improving patient knowledge and comprehension of their disease (Peter et al., 2015).

Study Limitations

The first major limitation with this study was the data collection process and the limited number of participants on the research team. Study intervention and data collection was independently completed by the DNP student with guidance from the primary investigator; however, a larger research team would have allowed the opportunity of recruiting a larger study population and subsequently demonstrated statistically significant results in the scores between

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the two groups. Additionally, there was poor response with the post-discharge telephone follow up. Some participants declined follow up telephone calls and a few others did not respond to multiple phone calls.

Secondly, the setting of the study was a limitation, as the acute ailment of some eligible patients hindered their interest in participating with the study. Other limitations for this study however, were generated by the inclusion criteria. HF is the main indication for hospitalization in adults ages 65 years and older (Huynh et al., 2018). The inclusion criteria, which was limited to this age population, excluded several HF patients who were younger than this group, but would have been ideal candidates for the study. Finally, the inclusion criteria further restricted the study to HF patients living in the community, exempting several patients who were admitted at the community hospital during the time of the study, but were discharged to short term rehab and skilled nursing facilities.

Implications/Recommendations for Practice, Policy and Research

Heart failure (HF) is a progressive and incurable disease which is responsible for about 50 percent deaths in people living with the diagnosis (Benjamin et al., 2017; Centers for Disease Control and Prevention, 2016; National Heart, Lung and Blood Institute [NHLBI], 2015). Patient empowerment through knowledge, is fundamental in improving self-care behaviors after hospital discharge, and nurse-led education delivered over time, has been instrumental in improving early recognition and treatment of HF symptoms (Stamp et al., 2014). However, forty to eighty percent of patient education is immediately forgotten and about fifty percent of retained information is inaccurate (Farris, 2015; Rouse et al., 2016). The teach-back method is an effective education

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method in improving patient health outcomes and is highly recommended for ensuring intervention comprehension at all literacy levels (Dantic, 2014; Porter et al., 2016).

Despite the limitations of this pilot study, there was clinical significance in the outcome of interventions between the two groups. In the recent months since initiating this pilot study, the community hospital has started the transitional nursing navigator program that is assisting with safe discharge planning for patients, from the time of hospital admission until discharge. The transitional nurse navigator (TNN) is meeting with HF patients and using the HF handbook to review teach back education, arrange outpatient follow up with the transitional care center, pharmacy as well as confirming follow up appointments with primary care providers.

Unfortunately, the TNN is unable to meet with all HF patients in the hospital due to the patient volume. The community hospital will benefit from employing a designated Advanced Practice clinician such as a Nurse Practitioner or Physician Assistant who will consult with HF patients, educate on disease process and management, diagnose, order tests and have medication prescription privileges. Advance Practice clinicians are highly skilled and qualified clinicians, and they will work well with the TNN to ensure improved patient health outcomes.

Conclusion

Improving patient knowledge on HF disease and self-care management using the teach back method of education is an important tool for patient empowerment and improving patient outcomes. Further research study with a larger sample size, will be needed to clearly evaluate the effectiveness of dedicated HF education, using teach-back method, on knowledge retention and the subsequent impact on self-care behaviors.

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Appendix A

Table 1: Identifying and defining variables:

VARIABLES	TYPE OF VARIABLE	THEORETICAL DEFINITION	OPERATIONAL DEFINITION	LEVEL OF MEASUREMENT
Patient Study Number	Clinical Characteristics	Specific patient identification number assigned for the study	Specific identification number assigned to patients in the study	Nominal
Patient Age	Demographic	Chronological age in years of the patients	As recorded in Medical Records 1= 65 to 74.9 2 = 75 to 84.9 3 = ≥ 85	Nominal
Patient Gender	Demographic	Patients biological sexual orientation recorded in medical records	1 = Male (M) 2 = Female (F)	Nominal
Race/ Ethnicity	Demographic	Based on ethnical identity recorded in medical records	1 = African American 2 = Caucasian	Nominal
Primary Diagnosis	Clinical Characteristics	Based in ICD-10 codes and types of Heart Failure	1= Diastolic 2 = Systolic 3 = Combined	Nominal
Teach Back Method of education	Independent Variable	Based on clinician teaching method	1)Teach back pre-discharge 1= $\geq 75\%$, 2 = $\leq 75\%$ 2) Teach back post-discharge 1 = $\geq 75\%$, 2 = $\leq 75\%$	Nominal
Heart Failure Pre-discharge intervention scores	Dependent Variable	Based on intervention/ measurement tools	EHFScB 9 scores: 1 = 25%, 2 = 50%, 3 = 75%, 4 = 100% DHFKS scores: 1 = 25% (1-4 scores) 2 = 50% (5-8 scores) 3 = 75 % (9-12 scores) 4 = 100% (13-15 scores)	Nominal

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Heart Failure Post-discharge intervention scores	Dependent Variable	Based on intervention/ measurement tools	EHFScB 9 scores 1 = 25%, 2 = 50%, 3 = 75%, 4 = 100%	Nominal
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Table 2. Characteristics between Variables

VARIABLES	TOTAL SAMPLE	INTERVENTION FREQ. (%)	CONTROL FREQ. (%)
Age Group (years)			
• 65-74.9	11(50%)	6 (54.5%)	5 (45.5%)
• 75-84.9	7 (31.8%)	3 (27.3%)	4 (36.4%)
• ≥ 85	4 (18.2)	2 (18.2%)	2 (18.2%)
Gender			
• Male	11(50%)	5 (45.5%)	6 (54.5%)
• Female	11(50%)	6 (54.5%)	5 (45.5%)
Ethnicity			
• African American	6 (27.3%)	2 (18.2%)	4 (36.4%)
• Caucasian	16 (72.7%)	9 (81.8%)	7 (63.6%)
Diagnosis			
• Diastolic	10 (45.5%)	4 (36.4%)	6 (54.5%)
• Systolic	11(50%)	6 (54.5%)	5 (45.5%)
• Combined	1(4.5%)	1 (9.1%)	0%
Intervention			
• Intervention Group (IG)	11(50%)		
• Control Group (CG)	11(50%)		

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Table 3: Descriptive statistics and frequency distributions among variables

VARIABLES	TOTAL SAMPLE	INTERVENTION FREQ. (%)	CONTROL FREQ. (%)	X ²	P value
Pre-Teach back Intervention (IG)					
1) ≥75%	3(27.3%)	3 (27.3%)			
2) ≤ 75%	8(72.7%)	8 (72.7%)			
Teach back score (Pre-discharge)					
1) ≥75%	11 (50%)	8 (72.7%)	3 (27.3%)	4.55	P = 0.033
2) ≤75%	11 (50%)	3 (27.3%)	8 (72.7%)		
Teach back score (Post-discharge.)					
1) No response	1)13 (59.1%)	1) 6 (54.5%)	1)7 (63.6%)		
2) ≥ 75%	2) 8 (36.4%)	2) 4 (36.4%)	2)4 (36.4%)	1.08	P = 0.584
3) ≤75%	3) 1 (4.5%)	3)1 (9.1%)	3)0 (0.0%)		
EHFScB-9 score (Pre-discharge)					
1) 25%	1) 5 (22.7%)	1)3 (27.3%)	1) 2 (18.2%)		
2) 50%	2) 7 (31.8%)	2)3 (27.3%)	2) 4 (36.4%)	4.63	P = 0.201
3) 75%	3) 7 (31.8%)	3) 2 (18.2%)	3) 5 (45.5%)		
4) 100%	4) 3 (13.6%)	4) 3 (27.3%)	4) 0 (0.0%)		
EHFScB-9 score (Post-discharge)					
1) No response	1)13(59.1%)	1) 6 (54.5%)	1)7 (63.6%)	2.22	P = 0.528
2) 25%	2) 0 (0.0%)	2) 0 (0.0%)	2) 0 (0.0%)		
3) 50%	3)1 (4.5%)	3) 1 (9.1%)	3) 0 (0.0%)		
4) 75%	4)1 (4.5%)	4) 0 (0.0%)	4) 1 (9.1%)		
5) 100%	5)7 (31.8%)	5) 4(36.4%)	5) 3 (27.3%)		
DHFKS score (Pre-discharge)					
1) 25%	1)2 (9.1%)	1)1 (9.1%)	1)1(9.1%)		
2) 50%	2)8 (36.4%)	2) 3 (27.3%)	2) 5 (45.5%)	3.611	P = 0.307
3) 75%	3)9 (40.9%)	3) 4 (36.4%)	3) 5 (45.5%)		
4) 100%	4)3 (13.6%)	4) 3 (27.3%)	4) 0 (0.0%)		

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Table 4: Intervention Group- Pre-teach back intervention, teach back intervention pre-discharge Crosstabulation

			Teach back intervention, pre-discharge		Total
			≥ 75%	≤ 75%	
Pre-Teach back Intervention for IG	≥75%	Count	3	0	3
		% within Pre-teach back intervention for IG	100.0%	0.0%	100.0%
	≤ 75%	Count	5	3	8
		% within Pre-Teach back intervention for IG	62.5%	37.5%	100.0%
Total		Count	8	3	11
		% within Pre-Teach back intervention for IG	72.7%	27.3%	100.0%

$X^2 = 1.547$, Fisher's exact $p = 0.491$ (Not statistically significant). $\Phi = 0.375$, indicating a moderate effect size.

Table 5: Intervention groups: Teach back intervention, pre-discharge Crosstabulation

			Teach back intervention, pre-discharge		Total
			≥ 75%	≤ 75%	
Intervention groups	IG- Intervention Group	Count	8	3	11
		% within intervention groups	72.7 %	27.3 %	100.0%
	CG-Control Group	Count	3	8	11
		% within Pre-Teach back intervention for IG	27.3 %	72.7 %	100.0%

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Total		Count	11	11	22
		% within intervention groups	50.0 %	50.0 %	100.0%

$X^2 = 4.545$, $p = 0.033$ (statistically significant). $\Phi = 0.455$, indicating a moderate to large effect size.

Table 6: Intervention groups- EHfScB-9 score, pre-discharge Crosstabulation

			EHfScB9 score pre-discharge				Total
			25 %	50 %	75%	100 %	
Intervention groups	IG- Intervention Group	Count	3	3	2	3	11
		% within intervention groups	27.3%	27.3 %	18.2 %	27.3 %	100.0%
	CG- Control Group	Count	2	4	5	0	11
		% within intervention groups	18.2%	36.4 %	45.5%	0.0 %	100.0%
Total		Count	5	7	7	3	22
		% within intervention groups	22.7%	31.8 %	31.8%	13.6 %	100.0%

$p = 0.797$ (not statistically significant). $\Phi = 0.459$, indicating a moderate to large effect size

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Table 7: Intervention groups- DHFKS, pre-discharge Crosstabulation

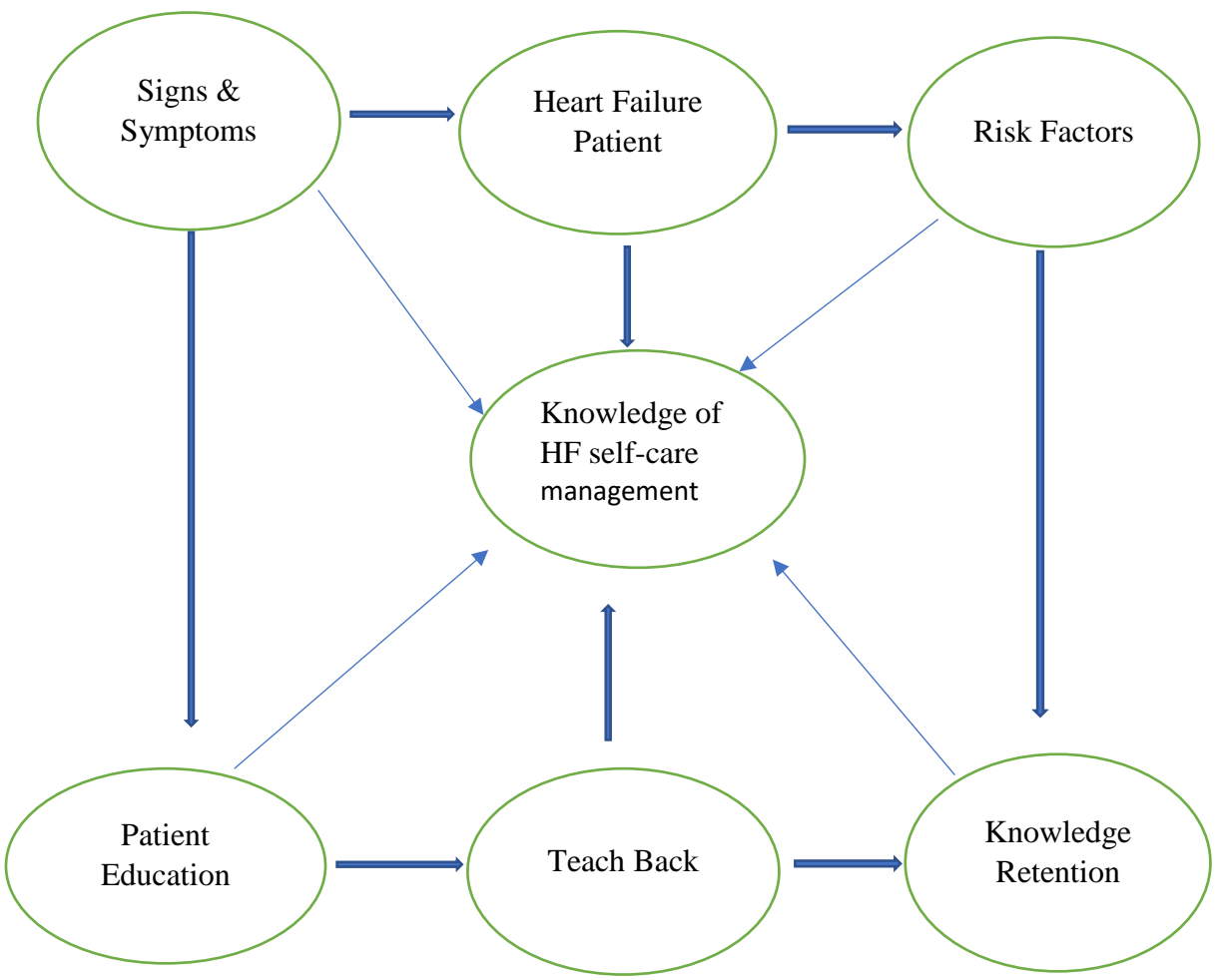
			DHFKS pre-discharge				
			25 %	50 %	75%	100 %	Total
Intervention groups	IG- Intervention Group	Count	1	3	4	3	11
		% within intervention groups	9.1 %	27.3 %	36.4 %	27.3 %	100.0%
	CG- Control Group	Count	1	5	5	0	11
		% within intervention groups	9.1 %	45.5 %	45.5%	0.0 %	100.0%
Total		Count	2	8	9	3	22
		% within intervention groups	9.1 %	36.4 %	40.9 %	13.6 %	100.0%

$p = 0.270$ (not statistically significant). $\Phi = 0.405$, indicating a moderate to large effect size

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Appendix B

Diagram 1: Concept Map:



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Appendix C

Table 8: Data Collection Worksheet

Patient study ID #	Room #	Admission Date (Month/Day/year)	Discharge Date (Month/Day/Year)	Age Cohort 1=65-74.9; 2 = 75-84.9; 3 = ≥ 85	Sex 1 = M; 2 = F	Ethnicity/ Race	Diagnosis 1 = Diastolic; 2 = Systolic; 3 = Combined	Pre-Teach back Int. (IG)	Teach back scores pre -discharge a = > 75%; b = < 75%	Teach back scores post-discharge a => 75%, b = < 75%	EHFScB 9 pre- discharge scores 1 = 25%, 2 = 50% 3 = 75%, 4 = 100%	EHFSc9 post-discharge scores: 1 = 25%, 2 = 50% 3 = 75%, 4 = 100%	DHFKS pre-discharge scores: 1 = 25% (1-4 scores) 2 = 50% (5-8 scores) 3 = 75% (9-12 scores) 4 = 100% (13-15)
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Ethnicity/Race :1=White/Caucasian 2=Black/African-American 3=Hispanic/Latino 4=Asian
5 = Other

Appendix D

Diagram 3: GANTT SCALE

	Jun '18	Jul '18	Aug '18	Sep '18	Oct '18	Nov '18	Dec '18	Jan '19	Feb '19	Mar '19	Apr '19	May '19
IRB Application	■	■										
IRB Exemption			■									
Intervention/data collection				■								
Data Analysis					■	■	■	■	■			
Submit 1 st draft of project paper									■			
Submit Final project										■		
Submit electronic project poster											■	
Submit project to DNP Repository											■	
Submit final DNP project dissemination on Bb												■