

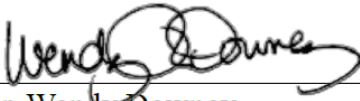
Evaluating the effectiveness of a Heart Failure Management Education Program

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Abstract

Heart Failure is associated with multiple hospitalizations causing significant healthcare burden and poor quality of life. Recurrent hospitalization of heart failure (HF) patients indicates the complex management of HF patients, including coordinated care, resources, and knowledge of self-management at home after hospital discharge. Integrated approaches, including medication reconciliation, patient education, and follow-up post-discharge calls, are essential interventions to improve HF patients' ability to manage symptoms, to reduce hospital readmission rates, and to enhance the quality of life (QOL). As the key educators for patients, nurses are at the forefront to educate patients while they are hospitalized. Hence, nurses should possess optimum knowledge of HF management to prepare patients to manage their symptoms safely and adequately at home. The purpose of this project was to evaluate if an HF education program, targeted towards nurses working on acute inpatient units, will improve their knowledge of HF for enhanced patient education in a local acute care hospital. A single group pretest-posttest study was conducted, and 28 acute care nurses participated. The Nurses' Knowledge of Heart Failure Education Principles Survey (Albert et al., 2002) was given to subjects before and after a heart failure educational session. Significant improvement was found between the mean pre-test (78%) and post-test (89%) scores ($p < .001$). There was no statistically significant association between HF knowledge scores and level of education, nursing experience, hospital unit, or certification. The study concludes that attending an HF educational program improved knowledge on HF self-care principles in nurses.

Keywords: *Heart failure, readmission, quasi-experimental, quality of life, 30-day readmission*

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DEDICATION

I would like to dedicate this final project to my loving husband, Sathian Pinchappan, whose constant support and encouragement helped me stay focused on the success of this Doctor of Nursing Practice Project. Thank you for staying by my side and for keeping me strong always. I also want to dedicate this work to my children: Santhosh, Sneha, Sapna, and Sona Moothedan, without whose love and tolerance I could not have succeeded. You were always there to cheer me up when Mommy felt down or stressed. Also, I cannot forget my parents, George and Omana Mangalan, whose love, encouragement, and prayers kept me going through this long journey. Pappa and Amma, you taught me the value of hard work and inspired me to strive for excellence every time; it truly pays off.

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TABLE OF CONTENTS

	Page
Abstract.....	2
Dedication.....	4
Acknowledgments.....	5
Table of Contents.....	6
List of Tables or Figures.....	8
Chapter 1. Introduction	9
Significance to Nursing	10
Theoretical Framework.....	11
Research Questions.....	12
Definition of Key Terms and Variables.....	12
Summary	13
Chapter 2. Review of Literature	14
HF patient self-management behaviors and ability of self-care.....	16
Nurse-led patient education and its effects.....	16
Nurses’ knowledge in delivering HF education	17
Effect of educational interventions on nurses’ knowledge of HF self-care principles...	18
Summary.....	19
Chapter 3. Methods.....	21
Study Design	21
Study Sample.....	21
Inclusion and exclusion criteria.....	21
Study Instruments.....	21
Study intervention.....	23
Protection of Human Subjects.....	23
Data Analysis.....	25
Chapter 4. Results.....	27
Sample Characteristics.....	27
Research Question Hypothesis Statement	30
Chapter 5. Discussion.....	33

Relationship of Findings to Prior Research.....	33
Evaluation of the Theoretical Model.....	41
Limitations.....	42
Implications for Future Research.....	43
Implications for Practice.....	44
Conclusion.....	45
References	47
Appendices	53
Appendix A: IRB Approval From Novant Health.....	53
Appendix B: Approval from Radford University.....	54
Appendix C: Informed Consent Form.....	55
Appendix D: Email invitation.....	56
Appendix E: Information Flyer.....	57
Appendix F: Nurse Education PowerPoint Slides.....	58
Appendix G: Study Instrument and approval to use by Cleveland Clinic	62
Appendix H: Demographic Questionnaire.....	64

LIST OF TABLES and FIGURES

Figure 1: Literature Review Results.....	15
Table 1: Demographic Characteristics of the Sample	28
Table 2: NKHFEP Scores of Nurses in Pre-test and Post-test	30
Table 3: ANOVA Table for Knowledge Test Scores and Department of Work	31
Table 4: Mean Knowledge Levels Among Nurses with and without Certification	31
Table 5: T-test for Equality of Means	32

Chapter 1

Introduction

Heart failure (HF) is a chronic, complex condition that requires lifelong management. According to the American Heart Association, approximately 6.2 million people in the United States had HF between 2013-2016. The incidence is projected to increase to eight million people by 2030 (Virani et al., 2020). Heart failure has become a significant burden not only for the patients and their caregivers but also to the healthcare system due to the patients' complex symptoms, frequent hospitalizations, poor prognosis, and decreased quality of life. The estimated cost of HF in 2012 was \$30.7 billion and is predicted to reach \$69.7 billion, a 127% increase, by 2030 (Jackson et al., 2018). The healthcare burden of the disease rises even further when these patients are readmitted with the same problems shortly after discharge from the hospital.

In response to the increased readmission rates and rising healthcare costs of heart failure, payment structure changes have been undertaken to reduce readmissions. The Hospital Readmission Reduction Program (HRRP) came from the Affordable Care Act in 2012 (Medicare, 2018) in which the Centers for Medicare and Medicaid Services (CMS) began charging fines to hospitals with higher rates of 30-day readmissions on targeted health issues like HF. To comply with this new legislation and reduce costs by preventing readmissions, hospitals implemented new programs, such as including transitional care, medication reconciliation, patient education, and follow-up post-discharge calls.

Patient education is a vital part of heart failure management in conjunction with pharmacological management. Adequate knowledge about heart failure, its symptoms, and management can help patients improve medication compliance, practice self-care activities at home, and avoid exacerbations of the condition. Thus, effective patient education is essential

in assisting HF patients in successfully managing the disease

Nurses, serving as the primary caregivers, spend a significant time with their patients during the hospital stay, and thus act as the primary educators for their assigned patients. With nurses in this key role, patients can be educated, empowered, and motivated to take control of their health, thus bringing positive patient outcomes in the HF population. Hence, acute care nurses must have a thorough understanding of heart failure concepts, management goals, and patient education topics, including self-care principles, to adequately provide evidence-based care and educate patients to achieve self-efficacy in managing symptoms. The self-management of HF needs adequate knowledge in the five core areas of HF management concepts, which are diet, exercise, fluid/weight monitoring, symptom monitoring, and medications (Albert et al., 2002). These five core concepts are called “Heart failure self-care principles.” This project aims to educate nurses on heart failure self-care principles to improve their knowledge for enhanced patient education in a local acute care hospital.

Significance to Nursing

Nurses play a significant role in the multidisciplinary team approach in inpatient hospital settings and act as the cornerstone in the discharge planning of the patients. The discharge planning for inpatients includes the identification of patient needs, assessing and monitoring their status, setting goals for the patient, planning, implementing, coordinating, and evaluating the patient progress (Hayajneh et al., 2020). Patient education about their medical condition and its management is also an important factor in the discharge planning of the patients, as it helps patients self-manage their symptoms of chronic conditions like heart failure at home. As the primary educators for patients, nurses’ knowledge of the disease conditions and their management is critical to identifying treatment outcomes and changes in

patient status, providing patient education, and promoting positive patient outcomes.

Studies show that many nurses do not possess the necessary understanding of HF discharge teaching and self-care principles (Anderson et al., 2018). Without adequate knowledge or understanding, they are not well equipped to provide HF patient education. Various studies have found evidence for the effectiveness of nurse-led HF patient education in reducing 30-day readmissions and all-cause mortality (Baptiste et al., 2016; Cui et al., 2019; Nair et al., 2020; Rice et al., 2018; Son et al., 2020). Hence, addressing and improving nurses' knowledge about HF discharge planning is necessary for the discharge planning process to be effective.

Theoretical Framework

Joanne Duffy's "Quality-Caring Model" (QCM; 2003) served as a theoretical framework for this study. The QCM posits that there is a correlation between nursing and quality health outcomes. As per QCM, the role of nurses is to develop and maintain caring relationships with the patient to bring a feeling of "being cared for." Caring professionals, including nurses, should acquire knowledge of caring factors and skills. Professional a nurse's responsibilities in this model include understanding the uniqueness of the patient and family that may influence their health status, engaging in activities that promote personal and professional development, incorporating current evidence-based practices in the care, and improving the work environment using caring relationships (Duffy & Hoskins, 2003). Active involvement in acquiring knowledge through various activities like research, educational advancement, or improvement activities helps nurses know better about themselves, patients, the community, and the health systems. This newly acquired knowledge can be used in practice, resulting in increased quality and excellence (Duffy, 2009). When patients feel "cared for," the health outcomes improve.

Educating nurses on HF self-care principles aligns with the intermediate outcome of the

QCM, which is to engage in caring relationships so that self and others feel “cared for.” (Duffy, 2009). Attending nursing educational sessions to improve knowledge and using this knowledge in providing better care, anticipating the needs of the patients, and providing effective education can improve the quality of care. Thus, this project aligns with the last concept of QCM, which is “self-advancing care systems” (Duffy, 2018). According to Duffy, “Self-advancing care systems” develop when the health care team members share and complement each other with their unique knowledge and skills, leading to the advancement of the healthcare system in providing quality care.

Research Questions

The research questions for this study were:

1. In acute care nurses, does an educational program on heart failure management improve acute care nurses’ knowledge on heart failure self-care principles as compared to their current knowledge level?

The hypotheses for the question in the study are as follows:

- Null hypothesis (H0): Providing education on heart failure management to acute care nurses will not improve their current knowledge of heart failure self-care principles.
 - The alternative hypothesis (H1): Providing education on heart failure management to acute care nurses will improve their knowledge of heart failure self-care principles.
2. What are the differences among nurses in the knowledge level of heart failure self-care principles who receive heart failure management education?

Definition of Key Terms and Variables

Heart Failure is a complex syndrome of cardiac dysfunction that impairs the heart’s ability to move blood effectively in and out of the ventricles, causing ventricular dilatation and

hypertrophy (Howlett, 2020). The most common symptoms of HF include dyspnea, fatigue, fluid retention, and edema. HF is associated with intermittent exacerbations of symptoms, frequent emergency room visits, hospitalizations, readmissions, and a gradual decline in the patients' functional status.

30-day HF Readmission is the consecutive admission of an HF patient to any hospital for any cause except for planned treatments within 30 days of discharge from a previous HF-related admission (CMS, 2020).

HF Patient Education is individualized to each patient based on the Core Measures established by the Joint Commission and AHA/AHCC (Casimir et al., 2013). The Joint Commission standards require that HF patient education should address areas including diet, exercise, daily weight checks, symptom monitoring, medications, and follow-up appointments (Regalbuto et al., 2014).

HF Self-care is the routine set of behaviors performed by individuals with heart failure to manage the symptoms and control disease progression (Herber et al., 2018). It consists of lifestyle changes and adhering to self-management activities, including daily weight monitoring, regular exercise, compliance with medications, following dietary restrictions like low-sodium intake, fluid restrictions, symptom monitoring, and awareness of the worsening symptoms.

Summary

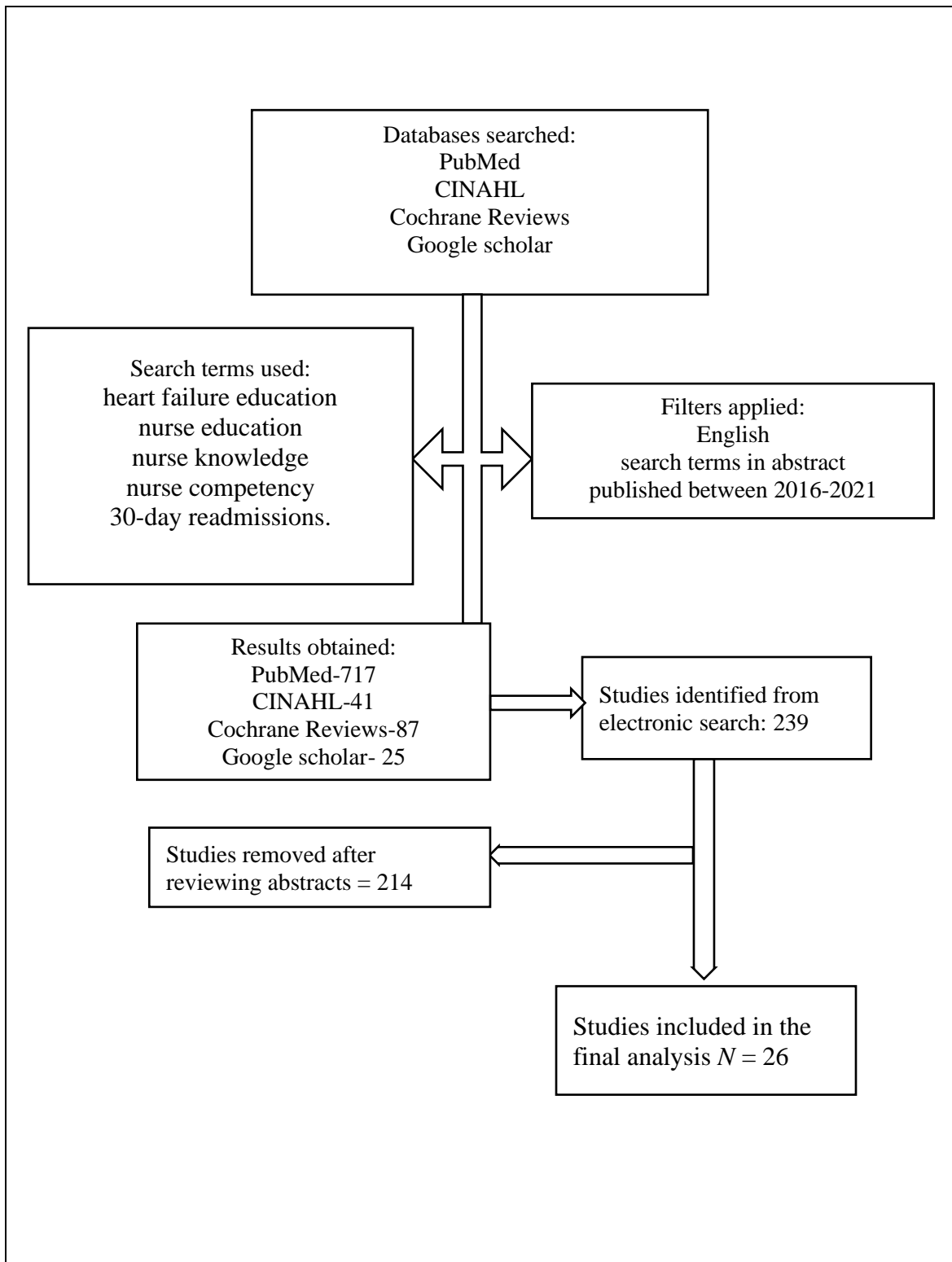
Nurses play a crucial role in providing adequate education to the patients to equip them with the ability and confidence to heart failure appropriately and to live a quality life. Due to their influential role in educating patients, it is important to examine nurses' knowledge of HF patient education concepts

Chapter 2

Review of the Literature

A comprehensive literature search was performed to identify studies related to this topic. The online databases PubMed, CINAHL, Google scholar, and Cochrane reviews were searched for the following keywords: *heart failure education, nurse education, nurse knowledge, nurse competency, and 30-day readmissions*. To obtain the current and recent literature, the search time frame was set to articles in the last five years, 2016- 2021. For easy interpretation and applicability, the search was limited only to the English language.

PubMed, CINAHL, Cochrane reviews, and Google scholar produced 718, 42, 87, and 25 results, respectively. Of these 870 results, 631 studies that were not relevant to the topic and duplicates were removed initially. The abstracts of the remaining 240 studies were screened carefully. The inclusion criteria were: i) studies that explored HF patient self-management behaviors and ability of self-care, ii) studies that explored the effects of nurse-led patient education for heart failure patients, iii) studies that explored nurses' knowledge or competency in HF education, and iv) studies that explored the influence of education on the knowledge of self-care Principles. The articles then were categorized under the four criteria according to their focus of study. Twenty-six studies were identified as relevant and supporting this project after applying the inclusion criteria and removing unpublished dissertations (see Figure 1).

Figure 1*Literature Review Results*

HF patient self-management behaviors and ability of self-care

The complex demands of heart failure symptom management and the chronicity of the condition can often overwhelm HF patients and affect their ability to manage the disease at home. Sousa and Santos (2019) found that the complex treatment regimen and the long-term nature of the disease can cause pose difficulty for HF patients to manage the disease. These patients often struggle to make appropriate decisions with mild to moderate HF symptoms, like worsening edema, while they are aware to seek urgent medical care for acute symptom changes (Xu et al., 2018). Nurses realize that many patients are overwhelmed, uncertain, and have conflicting feelings about their condition of heart failure (Davisson & Swanson, 2020). Patients can also be overwhelmed with the amount of education they receive (Ekong et al., (2016). The teach-back method is effective in ensuring that patients understand and retain the information received.

Improvement in the patient's knowledge about heart failure and related symptoms can help them self-monitor and take necessary action. Improved understanding of HF increased patients' confidence in self-care, which in turn improved self-management of the symptoms (Chuang et al., 2019). These studies indicated the need for effective education for HF patients about HF and its symptom management to improve the ability to care for and manage symptoms at home.

Nurse-led patient education and its effects

Effective HF patient education can lead to a reduction in 30-day readmissions in HF patients. In two randomized control studies, approaches that included nurse-led education for adult HF patients resulted in reduced readmissions (Cui et al., 2019; Rice et al., 2018). The 30-day HF readmissions can be reduced in half after ensuring that nurse-led patient education is

provided to all HF patients and follow-up appointments with a primary care provider or cardiologist were scheduled before discharge from the hospital (Nair et al., 2020). The patient education in this study included worsening symptoms of heart failure, lifestyle modifications needed, medication compliance, and keeping up with the follow-up appointments as scheduled. HF patient education is an integral part of heart failure management as improving HF knowledge improves HF patients' self-care behaviors (Baptiste et al., 2016) and self-care skills (Bader et al., 2018; Huesken et al., 2021; Hwang et al., 2020; Iqbal et al., 2020; Mathew & Thukha, 2018; Rahmani et al., 2020). Baptiste et al. (2016) also found evidence that as self-care behaviors improved after HF patient education, the 30-day readmission rates also decreased. In addition to reducing readmissions and their risk, a nurse-led HF patient education also may decrease all-cause mortality (Son et al., 2020). Improvement in function, quality of life, and reduced costs are also positive results of nurse-led HF education (Rice et al., 2018).

Awoke et al. (2019) found that nurse-led HF patient education and follow-up phone calls improved HF patients' self-care and confidence. However, 30-day readmission rates were not affected. Hence, developing HF patient education programs to improve patient awareness and self-care behaviors can empower patients to perform self-care management effectively.

The complex nature of HF self-care requires effective patient education. Unfortunately, patients do not often receive adequate education regarding heart failure (Albert, 2016). Thorough education and reinforcement are needed to improve patient outcomes.

Nurses' knowledge in delivering heart failure education

While nurses are at the front line in educating patients, few studies have explored whether nurses are prepared for the task. In exploring the nursing factors related to heart failure readmissions in hospitals, Jun and Faulkner (2018) found that nurses' knowledge of HF is an

essential factor affecting HF readmissions. They suggested that routine or periodic updates and continuing education can improve nurses' knowledge and provide effective HF patient care and education.

Nurses often do not possess enough knowledge of the latest evidence of HF management and self-care (Ekong et al., 2016). Similar results were found by Dalfó-Pibernat et al. (2020) after using the Nurses' Knowledge of Heart Failure Educational Principles Survey (NKHFEP). Only 16.7 % of those surveyed had adequate HF knowledge. The authors also noted that only nurses with an advanced educational degree or who previously attended a specialized HF education session scored high in five self-care principles of HF, including diet, liquids/weight, symptom exacerbation, medication, and activity.

While nurses know HF basics and its symptoms, they lack adequate knowledge about specific areas, such as comparing and assessing weights or notifying the providers about asymptomatic low blood pressure (Jankowska-Polanska et al., 2017). Even though nurses understand the HF basics and management, their understanding of HF self-management principles is often inadequate (Albert, 2016). There are also gaps in knowledge and practice, including a lack of confidence in interpreting test results, following guidelines and treatment monitoring, and providing patient education about HF medications, self-care, advanced care planning, prognosis, and psychological health (Howlett et al., 2017).

Effect of educational interventions on nurses' knowledge of HF self-care principles

Sundel and Ea (2018) conducted a pre-and post-test study, which included a 20-minute educational intervention on HF topics including pathophysiology, symptoms, diagnosis, medications, and self-care principles to 40 staff nurses. The post-test using NKHFEP showed improvement in nurses' HF knowledge at a statistically significant level of $p < 0.5$. Bader et al.

(2018) noted that HF education for nurses increased their knowledge of HF management and self-care principles. There was also a significant increase in patient knowledge. Evidence was also found that providing HF education to nurses increased their knowledge level and increased the nurses' documentation of education in patients' medical records (Mattina et al., 2021).

In another study by Ekong et al. (2016), two 90 minute sessions were provided for 33 nurses, which included the five core aspects of HF management and strategies to utilize the teach-back method. The survey conducted by the researcher using the NKHFEP questionnaire showed a notable increase in the knowledge level between the pre-test and post-test scores ($t(26) = 3.035, p = 0.006$). The study had incorporated an educational session with key concepts of HF management and the teach-back method. Apart from using the NKHFEP questionnaire, the study design also included a role-play for nurses 30 days after the educational intervention to evaluate the teach-back method. The nurses were given clinical scenarios to reinforce the concepts and engage them in applying the teach-back method (Ekong et al., 2016). Even though the study results showed improved scores of HF knowledge after education, the study exposed several knowledge gaps in nurses about HF self-care principles like previous studies. The study suggested that nurses may lack adequate knowledge for educating HF self-care principles to patients and may lack effective patient teaching skills.

Summary

The literature review indicated a need for adequate and effective HF patient education to improve patient self-care abilities. As nurses are the primary educators for their patients, they should be comfortable and knowledgeable about the HF concepts and self-care principles to deliver effective patient education (Albert, 2016). The American Association of Heart Failure Nurses emphasizes in their position statement that all nurses should be knowledgeable and

remain updated on the advances in HF care and should translate these findings into patient care (Stamp et al., 2018). To provide optimal and quality care, nurses should possess adequate knowledge of the specific disease condition and management strategies. Interventions like educational sessions and regular continuing education can enhance nurses' knowledge and help them stay updated on the current practice guidelines. Increased knowledge and understanding of HF management concepts and rationales enables nurses to provide better education to HF patients. Improved patient education improves self-care activities, enhances the quality of life, and reduces 30-day readmission rates.

Chapter 3

Methods

Study Design

The project was a quasi-experimental, one-group, pre-test post-test study. This design was chosen as it helps identify the changes in knowledge after the intervention. It was conducted as a quality improvement project to improve the knowledge level of nurses regarding HF management and self-care principles. The specific knowledge gaps in nurses in this area can also be identified using this study design.

Study Sample

Registered nurses who provide direct patient care in two inpatient units, the medical-surgical telemetry unit and the critical care unit of a 60-bed acute care hospital, were recruited as a convenient sample. All direct care nurses on these units were recruited for the study, irrespective of their employment status (full-time, part-time, or hourly wage nurses). Float pool nurses (CSSO tier 1 and tier 2) who work in these units were also included. The CSSO tier 1 nurses float to critical care and medical-surgical telemetry units of the medical center, while CSSO tier 2 nurses float to all the acute care units but will not take care of critical care patients.

Inclusion and exclusion criteria

The inclusion criteria considered were all bedside nurses who provide direct patient care to the inpatients in the two acute care settings, the medical-surgical telemetry unit and the critical care unit. Exclusion criteria included nurses who hold positions other than providing direct patient care, such as case managers, clinical educators, department managers, administrators, or clinical coordinators, were excluded from the study.

Study Instruments

Albert et al.'s (2002) Nurses' Knowledge of Heart Failure Education Principles Survey (NKHFEP) was the primary instrument used in this study. NKHFEP is a 20-item questionnaire to measure the nurses' knowledge in five HF core self-care principles, including dietary considerations, exercise, medication, fluid restriction, weight management, and worsening signs/symptoms. The face validity and content validity of this tool were tested with HF educators and expert nurses in HF (Albert et al., 2002). According to the instrument developers, a score of 87.5 is considered adequate knowledge in the self-care principles and hence used as an acceptable or true score (Albert et al., 2002). A score of 100% is attainable. The test-retest reliability of this survey tool was confirmed to be 100% by the instrument developers. As the survey tool comprises different questions that measure several HF topics, Cronbach's alpha is inappropriate for this instrument, so internal consistency was not measured.

The NKHFEP survey uses 20 dichotomously scored questions with true/ false or yes/no questions to measure nurses' knowledge on specific HF topics (See Appendix G). These questions explore knowledge in five core areas of HF self-care: diet, exercise, fluid/weight monitoring, monitoring worsening symptoms, and medications (Albert et al., 2002). The project survey also included four demographic questions developed by the investigator to identify the nurses' level of education and certification, area of work, and years of experience (See Appendix H). The demographic data was collected to identify the factors that influence the knowledge level of the study participants.

The survey instrument was uploaded to Microsoft Forms, and the QR code to access the survey was projected on the screen at the beginning of the educational session. After the participants finished the survey (pre-survey), the educational session was started. Afterwards, the post-survey QR code was projected on the screen so that the participants could complete the

post-survey.

Study intervention

To recruit subjects, flyers were posted on the two units to inform the staff about the upcoming research study a few weeks before implementing the project (See Appendix E). Email reminders were sent to the subject pool a week prior. On the day of the project implementation, all of the potential subjects received another email which included an invitation to the project, the educational zoom meeting, and a copy of the informed consent (See Appendix C).

The educational intervention was a 30-minute session via Zoom using power point slides (See Appendix F). The content of the program was based on the current American Heart Association/American/Heart Failure Society of America and Joint Commission guidelines. In addition to the five core areas of HF self-care, including diet, exercise, fluid/weight monitoring, symptom monitoring, and medications, information on the HF basics of pathophysiology, types, symptoms, and management were also provided. The teach-back method, care plan, and education documentation in the patient's medical records were also discussed in the educational session. The educational program was developed according to the institution's standards and policies regarding HF patient teaching.

After the educational program, the post-survey QR code was displayed on the screen for participants to complete the post-survey. The participants were required to record their Novant ID on the pre- and post-survey so that the researcher could link the participants' survey results. The study was closed in an hour after the educational session. A separate thank you email was sent to all the participants after the education.

Protection of Human Subjects

The nursing research committee of the Novant Health system approved the research topic

and agreed to guide the implementation of the study. The Institutional Review Board (IRB) of both Novant Health System and Radford University granted approval of the study implementation (See Appendix A and B). Permission was secured from the respective unit department managers to implement the project with educational sessions and surveys. The department managers agreed on the need for the project and offered the necessary support during the initial discussion.

As the meeting was open to all the nurses in the unit, including nonparticipants, the attendees' participation was anonymous. As the educational session was conducted immediately after the unit staff meeting, several employees of the departments, including nursing assistants, attended the educational sessions even though they were not study participants and did not do the survey. The unit managers, assistant managers also attended the educational program as non-survey participants. The participants used their alpha-numeric employee ID on the surveys, to which the researcher does not have access to identify the participants. Once the researcher paired the pre and post-test scores, the ID numbers were removed from the data. No other identification information was asked in the survey, and thus the anonymity of the study participants is maintained. The researcher kept the completed survey data in a computer secured with passwords that were only accessible to the researcher.

The informed consent (See Appendix C) was sent to all recruited nurses by email on the day of the study, along with the invitation and zoom meeting links (See Appendix D) to access the meeting. All nursing staff acknowledged the reception of informed consent at the beginning of the educational session. The researcher reread the informed consent before the educational session began, and all questions about the study were answered. Attendees of the educational session were notified that taking the survey is an automatic consent to participate in the research

study, and the participation is voluntary.

There were no anticipated risks for participants of this study. The participants were not placed in any position of physical, emotional, or financial adverse effects from this survey. The participants may benefit from improved HF knowledge, enhanced patient education skills, and increased awareness of the facility policies on patient education and documentation.

Data Analysis

The raw data obtained were reviewed for completeness, legibility, and missing values. There was only one random missing data point. The missing data was deleted using a listwise deletion pattern (Polit & Beck, 2017). The data was then coded, the variables were labeled, and uploaded into the Statistical Package for the Social Sciences (SPSS) version 24.0. A frequency distribution analysis was conducted to examine the presence of outliers. No outliers were found in the data set as per the analysis. Data transformation was performed on all variables, including the test scores.

The initial data analysis step was to describe the sample characteristics and test the hypotheses for this study, whether an educational intervention to acute care nurses on HF self-care principles will improve their knowledge level. A significance level of 0.01 was accepted to control the risk of a Type 1 error (Polit & Beck, 2017). This significance level was used due to the small number of sample subjects.

The demographic characteristics of the study sample were described and explained using descriptive analysis. Paired t-test scores were used to compare pre and post-test mean scores. The effect size of the sample was also determined using the paired t-test. Spearman's rho was used to identify the differences in knowledge among those with various levels of education, and Pearson's correlation was performed to determine the relationship between knowledge and years

of nursing experience. Analysis of variance (ANOVA) was conducted to analyze the knowledge differences among those in the two inpatient units as well as those with specialty nursing certification.

Chapter 4

Results

Sample Characteristics

The study sample initially consisted of a convenience sample of 29 participants. The participants were all adult nurses who possessed an active RN license and were working as acute care inpatient nurses at Novant Health UVA Haymarket Hospital. Even though 29 participants took the presurvey and educational session, one did not take the post-survey. Hence, the data from the remaining 28 participants were used in the analysis.

The sample characteristics of educational level, years of experience, department of work, and the possession of specialty nursing certifications can be found in Table 1. Most of the nurses in the study had a bachelor's degree (75%), while 14% had an Associate degree, and 11% held a Master's degree in nursing. Only 11% of the participants held specialty nursing certifications. The study participants were from four different departments of the Medical Center, including the critical care unit (25%), medical-surgical telemetry unit (29%), float pool (CSSO) tier 1 (25%), and float pool (CSSO) tier 2 (21%). Finally, 78% of the participating nurses had more than five years of experience, with 50% having more than 15 years. Only one participant (4%) had less than one year of nursing practice experience.

Table 1*Demographic Characteristics of the Sample*

Demographic Characteristic	Category	Total (%) (n = 28)
Educational attainment	Associates degree	4 (14%)
	Bachelor's degree	21 (75%)
	Graduate degree	3 (11%)
Certifications	No certification	25 (89%)
	Holds specialty certification	3 (11%)
Department of work	Med-surg telemetry unit	8 (29%)
	Critical care unit	7 (25%)
	Float pool tier1	7 (25%)
	Float pool tier2	6 (21%)
Years of experience	Less than 1 year	1 (4%)
	1-4 years	5 (18%)
	5-9 years	4 (14%)
	10-14 years	4 (14%)
	15 years or more	14 (50%)

The pre and post-test mean scores were compared with a paired *t*-test to determine the effect size of the sample. The results showed that the effect size was large at 0.857, which means the number of study participants (N=28) was adequate for the analysis. The descriptive statistics

results showed that the mean score for HF knowledge on the presurvey was 78%. One participant obtained the highest possible score of 100% on the presurvey. Only six participants (21%) scored above the accepted score of 87.5% in the presurvey.

All participants answered one question correctly in the pretest, which refers to whether the patient should check daily weights even after the symptoms are resolved. Twenty-five participants (89%) answered the same ten questions correctly. These questions were regarding weight monitoring, fluid intake, salt restriction, and worsening symptoms of shortness of breath and edema.

The most incorrectly answered question on the presurvey (89% incorrect) was related to whether the patient should notify the health care provider with an asymptomatic blood pressure of 80/56. The second-most incorrectly answered question (82% incorrect) was whether to notify their healthcare provider with dizziness which disappears within 5 minutes. Also worth noting is the question regarding comparing the daily patient weight to dry weight or the previous day's weight. Most of the participants (57%) answered it incorrectly, which indicated that they were not aware that the patient's daily weight should be compared to their dry weight.

The mean scores of the post-survey increased from 78% to 89% (See Table 2). Out of the 28 survey participants, 16 scored above 87.5%. Nine participants scored 100% on the post-survey, an increase from only one on the presurvey. All participants answered nine questions correctly. The participants' scores improved on all the twenty questions except two questions: to identify worsening symptoms when the patient uses more pillows for easy breathing when lying down and to notify the provider of an asymptomatic weight gain. Both questions showed a decrease of about 10% in the scores from pre-test to post-test.

Table 2*NKHFEP Scores of Nurses in Pre-test and Post-test*

Survey	Mean	Standard Deviation
Pre-test	77.68	11.096
Post-test	89.46	10.214

Research Question Hypothesis Statement

As an initial step to analysis, the assumption of normal distribution of the scores was tested. The skew and kurtosis levels estimated were .758 and -.012, respectively. The scores were normally distributed as the skew and kurtosis values were lower than the maximum allowable value of $<2/$ and $<9/$ respectively (Polit & Beck, 2017). The hypothesis question was tested with a paired sample t-test: whether an HF educational program improves nurses' knowledge of HF self-care principles. Changes in the dependent variable, knowledge, were compared using the pre and post-test scores. There were significant differences between the means (M) of the pretest (M=77.68, SD=11.09) and posttest (M= 89.46, SD=10.21) scores; $t(27) = -4.53, p < .001$. The results are statistically significant, and hence, the null hypothesis of providing education on HF self-care education principles to acute care nurses does not improve their current knowledge level is rejected. The improvement is also demonstrated by the increase of 11.79 in the mean differences between the test scores.

The second research question was to identify the differences between nurses' demographic characteristics and their knowledge of HF self-care principles. The mean test score of pretest and posttest was calculated (84%) and compared with the demographic characteristics measured to answer this research question. Only a weak positive correlation between education

and the HF self-care knowledge was found, $r_s(26) = .04$, $p = .855$, but the correlation is not statistically significant. A nonsignificant, moderate negative correlation $r(26) = -.05$, $p = .803$ was found between the mean knowledge scores and years of nursing experience. There were no statistically significant differences in knowledge scores among nurses working in the four departments [$F(3, 24) = .93$, $p = .442$] at the $p < .01$ level (See Table 3).

Table 3

ANOVA Table for Knowledge Test Scores and Department of Work

Source of Variance	Sum of Squares	df	F	p
Between groups	186.644	3	.930	.442
Within groups	1606.213	24		
Total	1792.857	27		

Note. $p > .442$. No significance noted.

No significant differences were identified in HF knowledge between nurses without certification ($M = 84$, $SD = 8.17$) and nurses with certification when equal variances are assumed ($M = 80$, $SD = 8.66$); at $t(26) = .798$, $p = .216$ (See Tables 4 & 5).

Table 4

Mean Knowledge Levels Among Nurses with and without Certification

Certification	N	Mean	SD
No	25	84	8.165
Yes	3	80	8.66

Table 5*T-test for Equality of Means*

	<i>t</i>	<i>df</i>	<i>p</i>
Equal variances assumed	.798	26	.216
Equal variances not assumed	.760	2.447	.257

Note. Equal variances are assumed.

Chapter 5

Discussion

Relationship of Findings to Prior Research

This project was intended to evaluate changes in nurses' knowledge of HF self-care principles before and after an HF education session. The pre-test survey scores showed that the overall knowledge of HF self-care principles for discharge education was 78%. This result is considered lower than desirable as the "true or acceptable score" is 87.5% on the survey tool (Albert et al., 2002). This result is consistent with previous studies that identified knowledge gaps in nurses on HF self-care knowledge, including Albert and colleagues (76%), Mahramus and team (65%), and Sanad (69%) (Albert et al., 2002; Dalfó-Pibernat et al., 2020; Ekong et al., 2016; Mahramus et al., 2014; Sanad, 2017). Thus, the pre-test scores point to the insufficient baseline HF knowledge of registered nurse participants in this study. The fact that only 21% of the participants scored at or above the accepted score of 87.5% and the remaining 79% failed to achieve it demonstrates the inadequate knowledge of nurses in the topic is concerning. It is to be noted that the study participants can be considered as a representative sample for the respective departments as they constitute a fraction of the actual number of nursing staff in the study setting.

This study also shed light on the areas of knowledge gap in HF management. As identified in chapter four, the lowest score obtained was for the question of whether the healthcare provider should be notified for asymptomatic low BP of 80/56. Eighty-nine percent of the nurses in the study answered this incorrectly in the pre-test. Only 18% of the participants answered correctly for the question of whether healthcare providers should be notified regarding symptoms of transient dizziness or lightheadedness. The study results are in-line with previous

studies, which also identified knowledge gaps in the same areas were found in earlier studies. (Albert, 2016; Hart et al., 2011; Jankowska-Polanska et al., 2017; Standfuss, 2012). These studies reported that nurses' knowledge was inadequate in areas like contacting providers with asymptomatic hypotension and short-term transient dizziness, comparing daily weights, using potassium-based salt substitutes, and symptom monitoring. Most of the nurses in these studies were ignorant that salt restriction included potassium-based salt substitutes as it can cause high serum potassium levels and renal failure, particularly in patients who are on medications like angiotensin-converting enzyme inhibitors, angiotensin-receptor blockers, or aldosterone inhibitors. The studies suggested that nurses may not possess adequate knowledge to provide effective patient education on heart failure self-management. The current study also showed knowledge deficit in nurses in the same areas, including asymptomatic hypotension (89% incorrect), transient dizziness (82% incorrect), comparing daily weight with dry weight (57% incorrect), intake of potassium-based salt substitutes (43% incorrect).

As Albert et al. (2002) explained in her study results, the knowledge deficit of nurses in this study can also be due to the lack of understanding of the rationales for the daily weight checking and comparing it with the dry weight, avoiding potassium-based salt substitutes, and the nurses' misunderstanding in the pathophysiology and management goals of heart failure. The current study helped identify the participants' learning needs: heart failure pathophysiology, monitoring HF symptoms and notifying the healthcare providers, comparing daily weights, and salt restriction, including potassium-based salt substitutes. Nurses' lack of knowledge and misunderstanding of the HF management goals can lead to unwanted outcomes. Most of the nurses in the study were ignorant that an asymptomatic low BP or transient dizziness does not have to be notified to the physician and is not concerning. Due to this ignorance, they may be

concerned over a patient with hypotension or dizziness and would be calling providers or advising patients to call providers if the BP is low. This may lead to wastage of time and resources, and also may cause provider and patient frustration. Ignorance about the risk of developing high serum potassium levels by using potassium-based salt substitutes can also lead to incorrect patient education or not educating on the topic, which further causes more damage to patients. While all study participants (100%) were aware that daily weight checks are necessary, most (57%) were ignorant about comparing them. This ignorance can lead to inadequate patient education on the topic, which eventually may lead to lack of patient motivation in checking weights and notifying the changes to providers.

Comprehensive patient education is an important aspect in equipping the heart failure patient to develop adequate self-care skills. As nurses play an essential role in educating patients, they should be well knowledgeable in these topics to provide education effectively. The identified topics of knowledge deficit could be used as a good pointer towards the future educational themes for nurses working in the acute care areas of the hospital. Improving nurses' knowledge is essential to provide quality care to the patients and to provide effective patient education. The post-test results were encouraging as the mean test score improved to 89% (an increase of 11.8%). After attending the educational session, the knowledge level improved as demonstrated by the improvement in post-test scores, 57% of participants scored above the accepted score of 87.5%, and nine participants answered all questions correctly (100%). These findings align with studies conducted by Fowler (2012) and Sundel and Ea (2018), which used the pretest-post-test method using NKHFEP tools. Fowler (2012) concluded that nurses' education and communication was effective as 90% of the study participants answered more questions correctly in the post-test after the educational intervention. Likewise, Sundel and Ea

(2018) also found significant improvement ($p < .05$) in nurses' knowledge after an educational intervention on HF self-care principles.

The educational intervention provided information and HF concepts, including the self-care principles. As the present study, these studies also noted significant improvements in nurses' knowledge level after educational sessions. It is noteworthy that the educational intervention for the present study was a 30-minute session on heart failure basics and patient self-care education concepts. The reason for a significant improvement in the knowledge score could be that the nurses could refresh their memory and retain the information provided during the session. The post-test was taken immediately after the educational intervention. So, the study results reflect the knowledge acquired and retained within an hour of the educational intervention. It was not in the scope of the study to find out how long the nurses could retain this knowledge. Conducting a post-test survey after a few months or even after a year on the same study participants would indicate if the nurses can sustain the knowledge for longer. However, the fact that significant improvement in the knowledge after an educational session suggests the effectiveness of education in improving the nurses' knowledge and the necessity of HF management education to nurses to equip them adequately to provide appropriate patient teaching on the HF self-care. It is worth noting that the present study was carried out in a hospital that offered frequent mandatory online educational sessions and has annual nursing skills and knowledge assessment for all nurses in the system. Even though various cardiac conditions, including arrhythmias, myocardial infarction, and cardiac emergencies, are included in the educational sessions, heart failure is not included as an educational topic. The knowledge deficit of nurses identified in this study indicates the need to include heart failure topics in these educational sessions. Reviewing the content of the routine education provided by the health

system, finding and rectifying deficits in the educational programs, and incorporating revised HF management education to all nurses in the acute care areas is to be considered. This would improve the knowledge level of nurses on this topic and adequately equip them with the knowledge to effectively care for and educate HF patients. The results of the posttest were reassuring as the nurses' knowledge scores improved significantly (11.8%) after a 30-minute educational session and point to the direction that the knowledge deficit can be rectified by providing an adequate education.

The participants in this study had different levels of education, including nursing diploma (14%), undergraduate degree (75%), and graduate degrees (11%). The mean scores of pre and post-test surveys for this study is 84%. Even though not significant, this study found a weak positive correlation between education and HF self-care knowledge. The results suggest that higher nursing education and more nursing practice experience can influence the knowledge of HF self-care principles. Similar results were found by Jankowska-Polanska et al. (2017) where a weak positive correlation ($r = 0.1399$, $p = .05$) was found between the knowledge level and higher educational level. The researchers attribute this weak positive correlation to the attendance of the participants (59%) in cardiac specialty courses, even though most of the study participants were holding an associates diploma. Sundel and Ea (2018) also found that holding a higher educational degree in nursing could positively influence the knowledge, as most of their study participants (54%) had an undergraduate degree in nursing. Similarly, most of the participants in the present study were also baccalaureate nurses (75%), and there were only 14% who had an Associate degree. The presence of a larger number of participants with a baccalaureate level of education in this study could have influenced the results. However, only 11% of the participants had a graduate degree. The smaller number of graduate nurses explains

the nonsignificant correlation. As previous studies suggested and the current study indicates, encouraging nurses to pursue higher education would be beneficial. Further studies with more participants with equal proportions of nurses with various educational levels would provide a more reliable assumption.

The majority of the participants (79%) had five years or more of nursing experience, and 50% had above 15 years of nursing practice experience. Only one study participant had less than one year of experience. This study found a moderate negative correlation between years of experience and HF knowledge. Even though the correlation was not statistically significant, this result was surprising. This result was in contrast to the findings of Delaney et al. (2011) and Sundel and Ea (2018), where nurses with 15 years or more experience had higher knowledge scores than those with lesser years of experience. However, the results were not statistically significant. As Sundel and Ea stated, the positive correlation in their study could be because the study participants were ambulatory nurses who worked with HF patients. Ambulatory nurses would be in contact with the HF patients more often and would be providing patient teaching and monitoring symptoms on an ongoing basis after the acute phase of HF. This could make them more familiar with the HF self-management topics. This could be one reason why those nurses scored higher. The present study was conducted on inpatient acute care nurses in a hospital, and these nurses do not follow up with patients after discharge. However, a study conducted by Jankowska-Polanska et al. (2017) found that self-care knowledge and seniority had a negative association, particularly in family medicine nurses. Similarly, the present study also found a nonsignificant negative correlation with years of experience and 50% of the study participants had an experience of 15 years or more. The rationale for this could be that these nurses have been out of nursing school for so long and might not remember all the details they learned at the

nursing school. They might be relying on outdated knowledge to care for the HF patients.

Periodic education for nurses on the topic is indicated to update current knowledge. Frequent inservices may also help in sustaining this knowledge and refreshing the memory.

There was no correlation found between knowledge scores and the department in which the nurses work. Likewise, Mahramus et al. (2014) also did not find a correlation in this aspect in the study conducted on 150 nurses working in the acute care units of three hospitals. In another study conducted among 227 Polish nurses using the NKHFEP survey tool, Jankowska-Polanska et al. (2017) found lower scores in family practice nurses than acute care nurses, including cardiac intensive and non-intensive unit nurses. Though these results are not relatable to the current study, as the present study only focused on acute care nurses, it is worth noting that the two acute care units in the mentioned study scored similarly on the knowledge levels. It should also be noted that there are not many studies that looked at an association between the inpatient unit of work and the HF knowledge of nurses. The current study was conducted in a small acute care hospital where the study participants often have to float between the units in case of staffing shortages. The patient educational policies stay the same for all the acute care units, and hence HF patient management goals and HF patient education is the same across the units. Identifying differences in the knowledge level in these nurses would have helped determine the nursing departments that needed more education or that need to be focused more while providing HF management education. However, lack of significant correlation between any of the departments [ANOVA $F(3, 24) = .93, p = .442$] and the overall low scores suggest that the department of work is not associated with the nurses' HF knowledge. Education is necessary for nurses working in all the four departments involved in this study.

Jankowska-Polanska et al. (2017) and Sundel and Ea (2018) identified a weak positive correlation between cardiac nursing specialty and knowledge level. However, the current study did not find any correlation between the knowledge level and specialty certifications. Out of the 28 participants in this study, only three (11%) had specialty nursing certification. The remaining 89% did not have any kind of specialty nursing certification. The lower number of study participants with specialty certification could have influenced the study results. Nurses with cardiac nursing certification or heart failure certifications were expected to have higher or sufficient knowledge about HF management and self-management principles as indicated by previous study results of Albert et al (2002) and (Dalfó-Pibernat et al., 2020). It is to be noted that none of the nurses in this study held a cardiac or heart failure certification. Nurses who possess these specialty certifications, including cardiac or heart failure certification, would have received specific training on various cardiac conditions and, therefore, would have acquired more knowledge on cardiac conditions, including heart failure. Further research would be needed with a much larger population, including more nurses with certification, to identify any real association in the knowledge level between nurses holding a specialty certification and those with no special certification.

The results of this study affirm significant knowledge gaps in nurses on HF concepts and self-care principles. Similar to previous studies, this study also significantly improved the knowledge level in post-test after educational interventions. Nurses need to be adequately prepared and educated on providing HF patient education effectively to promote positive health outcomes in HF patients. Interventions including further research, educational programs focusing on HF management, and collecting feedback from nurses and patients on HF education and understanding are all suggested measures to improve knowledge in nurses.

Evaluation of the Theoretical Model

Joanne Duffy's "Quality-Caring Model" (2003) provided a solid theoretical framework for this study. QCM theory affirms that the quality of "caring relationships" demonstrated by nurses influences the health outcomes in patients and their families, other healthcare professionals, and ultimately the healthcare system (Duffy, 2018). Motivation and educational preparation are important factors of nursing care quality along with other factors like staffing, leadership, culture, and work environment. The first element of the model, the structure, constitutes the care provider's education and credentials, resources available, and patient characteristics. To attain a quality caring relationship, the caring professionals, including nurses, should acquire adequate knowledge and skills (Duffy & Hoskins, 2003).

The researcher in this study aligned the educational intervention of the study in line with the QCM's intermediate outcome of engaging in caring relationships with the intention that the nurses and, in turn, the patients would feel cared for. As per the QCM model, nurses are responsible for practicing self-care activities to improve professional knowledge, stay updated on current practice guidelines and integrate this knowledge and evidence-based practice principles in providing quality care to the patients (Duffy, 2018). The educational program in this study was developed based on the current guidelines by the American Heart Association and American College of Cardiology and was implemented to update and improve nurses' knowledge on the current HF management and self-care principles. The opportunity to assess the knowledge using the pre and post-test also served as a tool to measure the current HF knowledge of nurses. The results shed light on nurse' knowledge gap, indicating the need for additional educational programs for practicing nurses and future research opportunities. Strengthening the nurses with education and caring competency is needed to develop caring relationships between nurses and

patients and other healthcare professionals (Duffy, 2018). It is to be noted that this study only measures nurses' knowledge and did not measure the competency of the nurses. Thus, it opens up opportunities for further research to evaluate the competency of nurses in delivering effective education to HF patients. When nurses develop quality caring relationships with patients, they feel "cared for", and health outcomes improve. The knowledge of the healthcare providers is an essential characteristic of caring behaviors in developing a feeling of "being cared for" in the patients (Salinas et al., 2020).

Limitations

This study had some limitations, including a small sample size, a small hospital setting, and a convenience sample. The study participants only represent a small fraction of the study population, so the study may not be generalizable across other locations. The short duration of the study was another limitation. The survey was conducted immediately before and after the educational session. Incorporating more educational sessions at different times might have resulted in increased participation. However, the study was conducted during the COVID-19 pandemic, and restrictions were in effect that limited accessibility. The survey was conducted online, and most participants attended the HF education online rather than in person. The study participants were asked to do the tests independently without using any references. However, the researcher cannot eliminate the possibility that reference materials were used or that answers were discussed while participants completed the tests online. A proctored test would eliminate this possibility in future research studies.

Most participants had turned off their video cameras while attending the education. Hence the researcher could not ensure continuous attention from all the participants all throughout the educational session. Participation in the in-person class could have been

beneficial in getting more attention from the study participants and giving the study subjects more opportunities to participate actively in the discussion session at the end of the educational activity. Increased attention and participation in the discussion or question and answer session after the course might help improve the post-test knowledge scores. Only two nurses asked questions in the discussion session, which was about potassium-based salt substitutes and asymptomatic hypotension.

Implications for Future Research

This study indicates that nurses working in a small acute care hospital in Virginia may not have adequate knowledge of HF self-care principles. The study also identified knowledge deficits and emphasized the need for educational programs to adequately prepare nurses to take care of HF patients and teach patients about HF self-care. Further research is needed to determine the factors that affect the nurse's knowledge and the nurses' ability to sustain the knowledge for more extended periods. Repeated follow-up post-test surveys at various intervals of time could be given to determine whether the knowledge acquired during the initial education session was retained over time (Polit & Beck, 2017). This could determine how often the educational programs should be conducted for the nurses. A more extensive study with more participants to represent the demographic factors analyzed would be beneficial in gaining further information about the factors influencing nurses' knowledge. The study could be extended to more hospitals in the area to get more participants. At least, including the nurses in the nearby hospital run by the same health system would help get more participants within the health system that follow the same protocols and policies. It is to be noted that the float pool nurses who participated in this study work in both of these hospitals as needed.

Another area for future research is conducting studies to identify the most effective mode of delivering nurses' education: whether it should be online self-learning materials, live educational sessions online, or in-person sessions. Offering multiple sessions may be beneficial in getting more study participants. Another consideration is offering the pre-test a few weeks before the educational session. This would help the researcher analyze the pre-test results and identify the knowledge gaps, and these topics would be emphasized in the academic session.

Nurses' competence and confidence/comfort level in providing Hf patient care and education are also of interest as it is needed to provide quality care and effective patient teaching. In addition to having sufficient knowledge, nurses should also possess assessment skills and be comfortable in teaching HF patients (Albert, 2016). "Caring competency" can also improve the caring relationships between nurses and patients and other care team members (Duffy, 2018). Incorporating these measurement variables in future studies would shed some light on this area.

Implications for Practice

Evidence shows that improving nurses' knowledge on HF management is a crucial factor that affects the readmission of HF patients, and nurse-led education for HF patients can reduce hospital readmissions and improve outcomes (Cui et al., 2019; Jun & Faulkner, 2018; Nair et al., 2020; Rice et al., 2018). The result of this study demonstrates that many nurses are not sufficiently knowledgeable on HF self-care, and a 30-minute educational session can significantly improve this knowledge. Implementing strategies, such as nursing education programs, can be challenging to nurse leaders and educators in the hospital setting (Hart et al., 2011), especially when it involves multiple units or departments. Yet nurses must be proficient and skilled in HF management to provide optimal and safe patient care, and HF educational programs should be developed and implemented for nursing staff. As this study's results suggest,

apart from the HF basics like pathophysiology and medical management, educational programs should also focus on self-care strategies, including symptom monitoring, what to do with symptom changes, and follow-up appointments. Further research is needed to determine the retention of this knowledge and whether periodic educational programs are needed more than once a year to maintain the knowledge acquired.

Additionally, nurses should be encouraged to actively improve their knowledge and stay current on evidence-based practice and care (Hart et al., 2011). Developing a heart failure committee and encouraging participation to discuss current guidelines and protocols, hospital HF readmission rates, patient feedback, opportunities, roadblocks, and strategies to improve may be beneficial in this aspect. Encouraging nurses to attend seminars or conferences regarding HF care and promoting research initiatives to identify the results of HF patient education are various ways to help nurses stay up to date on the topic.

Conclusion

Patient education constitutes a vital component of HF management. The complex demands of heart failure self-management can be overwhelming. Hence, these patients must be provided with high-quality care, education, and skills for self-care or self-management. As nurses play the key role of patient educators in inpatient settings, nurses should be knowledgeable and competent in caring for and providing education to heart failure patients. A knowledge deficit can undoubtedly impact the quality of care provided and can affect patient health outcomes.

The findings of this project demonstrate that a knowledge gap exists in nurses on HF management, and an HF educational session can improve nursing knowledge significantly. As the study's results suggest, providing regular education to nurses on HF concepts and self-care

principles would help them acquire the necessary knowledge to provide effective patient education. Future studies are needed to evaluate the sustainability of this newly acquired knowledge and if continuing nursing education would be required at regular intervals.

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Appendix A**IRB Approval from Novant Health System**

Presbyterian Medical Center

200 Hawthorne Lane
Charlotte, NC 28204

DATE: June 14, 2021
TO: Geni George, BSN, Nursing and Patient Care
FROM: Vickie Zimmer, Director, Presbyterian Healthcare IRB
PROTOCOL TITLE: Evaluating the effectiveness of a heart failure management education program
PROTOCOL NUMBER: 21-1768
APPROVAL PERIOD: Approval Date: June 14, 2021 Expiration Date: June 13, 2022

The Presbyterian Healthcare IRB, operated by Novant Health, has reviewed the protocol entitled: Evaluating the effectiveness of a heart failure management education program. The review of your submission included the items listed below.

Attachments

- NKHF survey
- Demographic Questionnaire for HF project
- PI Assurance
- Informed Consent Survey Form

The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease.

This finding will be documented in the minutes of the July 15, 2021 IRB meeting. A copy of the protocol is maintained by the IRB office. All minutes and proceedings pertinent to this protocol are maintained by the IRB office. The Novant Health IRBs are registered with the Office for Human Research Protections (OHRP) and are in compliance with the requirements of federal regulations 45 CFR 46, 21 CFR 50, 21 CFR 56 and internal policies as revised to date. If you have any questions or need additional information, please contact the IRB office at (336)718-9670 or irb@novanthealth.org.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark Clemens'.

Mark Clemens, PhD
Presbyterian Healthcare IRB Chair

Appendix B

Approval from Radford University

RADFORD UNIVERSITY

Institutional Review Board (IRB) Institutional Authorization Agreement

Name of Institution or Organization Providing IRB Review (Institution/Organization A):

Novant Health
 IRB Registration # 00001899 Federalwide Assurance (FWA) # Not Applicable

Name of Institution Relying on the Designated IRB (Institution B): Radford University

IRB Registration # 00003066 Federalwide Assurance (FWA) # 00004850

The officials signing below agree that Radford University may rely on the designated IRB for review and confirming oversight of its human subjects research described below: (*check one*):

- This agreement applies to all human subjects research covered by Institution B's FWA.
 This agreement is limited to the specific protocol(s):

Name of Research Project: Evaluating the effectiveness of a heart failure management education program

Name of Principal Investigator: Geni George

Sponsor or Funding Agency (*if any*): None

- Other (*please describe*): _____

The review conducted by the designated IRB will meet the human subjects protection requirements of Institution B's OHRP-approved FWA. The IRB at Institution/Organization A will follow written procedures for reporting its findings and actions to appropriate officials at Institution B. Relevant minutes from IRB meetings will be made available to Institution B upon request. Institution B remains responsible for ensuring compliance with the IRB's determinations and with the terms of its OHRP-approved FWA. This document must be kept on file by both parties and provided to OHRP upon request.

Signature of Signatory Official (Institution/Organization A):

DocuSigned by:


 Date: 06/29/2021 | 1:52:12 EDT

Print Full Name: Vickie Zimmer

Institutional Title: Director, IRB

NOTE: The IRB of Institution A may need to be designated on the OHRP-approved FWA for Institution B.

Signature of Signatory Official (Institution B):


 Date: 7/12/21
 Print Full Name: Benjamin D. Caldwell Institutional Title: Institutional Official & Dean of Graduate Studies & Research

Appendix C

Informed Consent Form

Nurses Knowledge of Heart Failure Education Principles Survey

You are being invited to participate in a research study about nursing knowledge on heart failure self-care principles. This research project is being conducted by Geni George, BSN, RN of Radford University as part of a DNP scholarly project. The purpose of this study is to evaluate the effects of a heart failure education program for nurses. It is being conducted at Novant Health UVA Haymarket Medical Center, Virginia. All nurses working on acute care floors (Medical-surgical Telemetry unit and Intensive care unit) have been asked to participate in this study.

There are no known risks if you decide to participate in this research study, nor are there any costs for participating. The information you provide will help me identify the effects of the educational session on the nursing knowledge and trends and/or relationships between knowledge/skill and demographic factors, which may be used to create educational interventions to optimize the heart failure patient education provided by acute care nurses. The direct benefit you may receive from your participation is the information or knowledge you acquire during the educational session. You may also feel more confident to provide patient education to your heart failure patients after attending this educational session.

This survey is anonymous. If you choose to participate, no one will be able to identify you. The unique ID you use for the survey is only used to link the pre survey to the post survey. It will not be shared with anyone. No one will know whether you participated in this study. Nothing you say on the questionnaire will in any way influence your present or future employment with your hospital.

Your participation in this study is voluntary. Participation involves answering the questions as contained in the online survey before and after a short educational session and attending the heart failure education. The survey will take approximately 10-15 minutes to complete. By proceeding to the survey, your consent is automatically assumed.

If you have any questions or concerns about completing the survey or about being in this study, you may contact me at ggeorge1@radford.edu or ggeorge@novanthealth.org.

The Novant Health Institutional Review Board and the Radford University Institutional Review Board have both reviewed my request to conduct this project. If you have any concerns about your rights in this study, please contact Dr. Gloria Walters @ gloriawalters@novanthealth.org.

Appendix D

Email Invitation



● **Geni George** <genigeorge@yahoo.com>

To: DeptDist_128534@novanthealth.org, DeptDist_128514@novanthealth.org



Thu, Aug 12 at 7:54 AM



Good morning team.

This is a gentle reminder for today's heart failure educational meeting at 08:00 and 18:00.

Please join one of them by Zoom.

Please see the link below:

Zoom link for the meetings today:

Join: <https://novanthealth.zoom.us/j/92227699142?pwd=MEw5QkJlckc2NEh4d081VGFSSWI0UT09&from=addon>

Password: 027521

Smartphone one-tap:

US: +16513728299,,92227699142# or +17209289299,,92227699142#

Telephone

US: +1 651 372 8299 or +1 720 928 9299 or +1 971 247 1195 or +1 669 900 6833

Meeting ID: 922 2769 9142

Password: 027521

Thank you all,

Geni

Appendix E
Informational Flyer



Nursing Education Coming Soon...

Topic: Heart Failure Management and Discharge Education

When: Tuesday Aug 12th 09:00 and 18:00 PM

**Where: 3rd Floor Conference Room, HAMC
and via Zoom during Unit Based Council**

Duration: 30 minutes

Who should attend: All Nurses



For more information, Contact:

Julie Russell: jarussell@novanthealth.org


Hilary Woodier: hjwoodier@novanthealth.org

Geni George: ggeorge@novanthealth.org, ggeorge1@radford.edu

Appendix F

Nursing Educational Session - PowerPoint Slides


Heart failure



Heart failure

A complex clinical condition that affects structural or functional ability of the left ventricle to adequately contract or relax. In result, left ventricular filling or ejection is affected. Heart failure occurs due to any structural or functional impairment of ventricular filling or ejection of blood. It usually results in an enlarged heart.

Significance of Heart Failure



- Over 6 million people in the U.S. have heart failure
- More than 650,000 new cases diagnosed each year.
- An estimated \$32 billion is spent each year to treat heart failure.
- Expected rise to almost \$70 billion by 2030.
- 80 percent of those costs are attributed to hospitalizations.
- Quality of life costs: Time, lost wages and work time, lost productivity at home.

Heart Failure Basics

Heart failure develops when there is inadequate systolic or diastolic function, usually due to weakness and/or stiffness of the heart muscles.

- Causing decreased CO and accumulation and congestion of blood in the lungs or other parts of the body.
- Usually affects both right and left sides of the heart. However, one side may be affected more than the other.

Left-sided heart failure (Left ventricular heart failure)

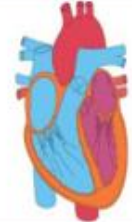
- Blood accumulates in the pulmonary veins and lungs.
- Congestion in the lungs leading to breathing difficulty.

Right-sided heart failure (Right ventricular heart failure)

- Usually caused by left ventricular heart failure.
- Blood accumulates and causes congestion in parts of the body including legs, liver, and abdomen
- Causes peripheral edema and ascites

Heart failure is sometimes known as congestive heart failure as it causes congestion in lungs and tissues.

Normal Heart Physiology Basics



- Right atrium receives blood from different parts of the body.
- This blood moves to right ventricle, and gets pumped out of the heart into the lungs through the pulmonary arteries.
- Left atrium receives the blood from the lungs through the pulmonary veins.
- This blood moves into the left ventricle, and gets pumped out to the body through the aorta

Ejection Fraction: The percentage of blood pumped out of the left ventricle during each contraction. Normal ejection fraction is 50-65%.

Types of Heart Failure

Heart Failure with reduced Ejection Fraction (Systolic Heart Failure)

Weakening and enlargement of the left ventricle leads to poor contraction and inadequate emptying, causing

- Increased diastolic volume and pressure
- Decreased ejection fraction ($\leq 40\%$)
- Predominant causes: myocardial infarction, myocarditis, and dilated cardiomyopathy.


Heart Failure with preserved ejection fraction (Diastolic heart failure)

Left ventricular myocardium is stiffened and does not relax well after contractions. The ventricles will not fill adequately during the relaxation phase/diastole and therefore less blood will be pumped out of the heart.

- Usually, ejection fraction remain normal ($\geq 50\%$).
- Predominant causes: Hypertension, aortic stenosis, valvular diseases, acute MI, age related

Elevated left atrial pressures can cause pulmonary hypertension and pulmonary congestion.

Causes or Risk Factors



- coronary artery disease
- high blood pressures
- previous heart attack
- Abnormal heart valves
- Heart muscle disease (dilated cardiomyopathy, hypertrophic cardiomyopathy) or inflammation (myocarditis)
- Lifestyle factors
 - Smoking
 - Overweight
 - Diet high in fat and cholesterol
 - Physical inactivity

Signs and symptoms of heart failure

The cardinal symptoms


- Dyspnea
- Fatigue
- Fluid retention

Other symptoms

- Cough
- Exercise intolerance
- Peripheral edema
- Ascites
- Nausea/indigestion
- Confusion
- Dizziness
- Increased heart rate



Diagnostic tests




Diagnosis is initially clinical, supported by

- 12 lead EKG
- Levels of plasma natriuretic peptides
- Chest x-ray
- Echocardiography
- Cardiac catheterization

Management of Heart Failure


Management includes

1. Patient education
2. Lifestyle modification
3. Pharmacological management
 - Diuretics
 - Angiotensin converting enzyme (ACE) inhibitors
 - Angiotensin II receptor blockers
 - Angiotensin receptor-neprilysin inhibitors
 - Beta-blockers
 - Aldosterone antagonists
 - Digitalis glycoside
4. Specialized devices
 - Implantable pacemakers/defibrillators
 - Cardiac resynchronization therapy (CRT) or biventricular pacing
 - Left ventricular assistive device (LVAD)
5. Surgery- Percutaneous coronary intervention, Coronary artery bypass surgery, Valve replacement, Heart transplant



Drug type	Examples	Action
Angiotensin converting enzyme inhibitors (ACE inhibitors)	Lisinopril, enalapril, captopril	Prevent the production of angiotensin II, which causes vasoconstriction. Causes vasodilation and reduces blood pressure, reducing the workload of heart.
Angiotensin II receptor blockers	Losartan, valsartan	Blocks the effects of angiotensin II, and causes vasodilation, reducing blood workload of heart. Preferred in patients who do not tolerate ACEIs.
Angiotensin receptor-neprilysin inhibitors	Sacubitril	Strong drug. Reduces the risk of CV death and hospitalization for HF patients with reduced EF. Reduces the strain of heart by increasing natriuretic peptide effects and relaxing the blood vessels. (Inserts Extraordinary Therapeutic Innovation in Chronic Heart Failure by FDA, 2021)
Beta-blockers	Carvedilol, atenolol, metoprolol	Help slow the heart rate and help reduce blood pressure.
Aldosterone antagonists	Spironolone	Help the body get rid of salt and fluids. Help reduce the work the heart has to do.
Digitalis glycoside	Digoxin	Used to strengthen the heart's pumping action.
Diuretics	Furosemide, bumetanide	Reduce excess fluids and salt. Decrease the buildup of fluid accumulation in tissues. Help reduce the work the heart has to do.
Antiplatelets	Aspirin	Prevent blood clots from forming and blocking blood flow.
Calcium channel blockers	Diltiazem, verapamil, Nifedipine	Help the heart relax. Help control blood pressure and keep the heart from working so hard.
Statins	Atorvastatin	New class of medication that slows the heart rate and reduces blood pressure. It is sometimes prescribed for people for whom beta blockers don't reduce the heart rate enough.

Patient Education



Components of patient education

1. Heart failure basics
2. Signs and symptoms of heart failure
3. Monitoring of symptoms
 - Daily weight monitoring
 - Symptom tracking
4. What to do if symptoms worsen
5. How and why to take medications
6. Making lifestyle changes
7. Medication adherence

Daily weighing

- Weigh at the same time of day every day
- Weigh after urinating and before eating
- Always use the same scale in the same spot
- Write each day's weight down in a log

Symptom tracking

- Track symptoms such as fatigue, SOB, swelling, keep a daily log
- Check blood pressure and heart rate and log these
- Report when symptoms worsen, or new symptoms appear

Lifestyle Modification



Quit smoking and using other tobacco products

- Smoking increases heart rate and BP and robs the body of needed oxygen.
- No form of tobacco is safe.

Restricting Sodium and alcohol intake

- No more than 2000 mg of sodium daily
- Use alcohol sparingly or avoid drinking alcohol

Exercise and staying active

- Moderate exercise daily or Structured cardiac rehabilitation program

Medication adherence

- Take medications exactly as prescribed.
- Take your medication list to all medical appointments.
- Refill medications before they run out.
- Tell your healthcare provider if you have any side effects
- Do not stop taking any medications without talking to the provider


Follow up appointments: Remember to follow up with your provider as scheduled

Get vaccinations such as the shots routinely

Make following the treatment plan a permanent part of your life

Documentation

Document in the patient medical record on the following:



Frequency	Document
1 Daily	Daily weights in the morning
2 Every shift	Intake and out put
	Update care plan
	Patient education- use teach-back method
3 Per occurrence	Provider notification of worsening symptoms

Appendix G

Instrument Approval by Cleveland Clinic



Nurses Knowledge of Heart Failure Education Principles Survey

Healthcare Instrument

Dear Nurse:

The attached survey was designed to assess your education needs related to self-management of heart failure. Specifically, we wish to learn your education needs in instructing patients about taking care of themselves in their homes (either after hospital discharge, or in general).

Please complete the following 20 item **yes (true) / no (false)** survey to help us determine your needs.

Instructions:

Please answer each question by placing an **X** in the yes or no answer box. If you would like more information on the topic in the question, place an **X** in the box to the left of each question marked *Need more Info on Subject?* If you do not know the correct answer, give us your best guess but please answer every question, even if you requested more information.

Need more Info on subject?	Question	Yes (T)	No (F)
<input type="checkbox"/>	1. Patients with heart failure should drink plenty of fluids each day.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	2. As long as no salt is added to foods, there are no dietary restrictions for patients with heart failure.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	3. Coughing and nausea/poor appetite are common symptoms of advanced heart failure.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	4. Patients with heart failure should decrease activity and most forms of active exercise should be avoided.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	5. If the patient gains more than 3 pounds in 48 hours without other heart failure symptoms, they should not be concerned.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	6. Swelling of the abdomen may indicate retention of excess fluid due to worsening heart failure.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	7. If patients take their medications as directed and follow the suggested lifestyle modifications, their heart failure condition will not return.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	8. When patients have aches and pains, aspirin and non-steroidal anti-inflammatory drugs (NSAIDs like ibuprofen) should be recommended.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	9. It is OK to use potassium-based salt substitutes (like No-Salt or Salt Sense) to season food.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	10. If patients feel thirsty, it is OK to remove fluid limits and allow them to drink.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	11. When a patient adds extra pillows at night to relieve shortness of breath, this does not mean that the heart failure condition has worsened.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	12. If a patient wakes up at night with difficulty breathing, and the breathing difficulty is relieved by getting out of bed and moving around, this does not mean that the heart failure condition has worsened.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	13. Lean deli meats are an acceptable food choice as part of the patient's diet.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	14. Once the patient's heart failure symptoms are gone, there is no need for obtaining daily weights.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	15. When assessing weight results, today's weight should be compared with the patient's weight from yesterday, not the patient's ideal or dry weight.	<input type="checkbox"/>	<input type="checkbox"/>

The following 5 statements are signs and symptoms that patients may have. Please mark yes or no to reflect if the patient should notify their heart failure physician of these symptoms:

Need more Info on subject?	Question	Yes	No
<input type="checkbox"/>	16. BP recording of 80/56 without any heart failure symptoms.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	17. Weight gain of 3 pounds in 5 days without symptoms.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	18. Dizziness or lightheadedness when arising that disappears within 5 minutes.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	19. New onset or worsening of fatigue.	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	20. New onset of worsening leg weakness or decreased ability to exercise.	<input type="checkbox"/>	<input type="checkbox"/>

THANK YOU for completing this survey.

Appendix H

Demographic Questionnaire

Directions: please select the best answer to the questions below.

1. Your Novant Health ID# _____

2. What is your highest level of nursing Degree

- Associate degree/RN diploma
- Bachelor's Degree/BSN
- Master's degree
- Doctorate degree

3. Active certification

- PCCN
- CCRN
- MEDSURG-BC
- CMSRN
- No certification

4. On what unit do you work?

- Medical surgical telemetry unit
- ICU
- Float pool/CSSO tier 1
- Float pool/CSSO tier 2

5. How many years have you worked as a Registered Nurse (RN)?

- less than one year
- one year to 5 years
- 5 years to 10 years
- 10 years to 15 years
- More than 15 years