THE EFFECT OF THE HEART FAILURE NURSE NAVIGATOR ON 30-DAY HOSPITAL READMISSIONS OF OLDER ADULTS

by

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This dissertation was prepared under the direction of the candidate's dissertation advisor, Dr. Debra Hain, the Christine E. Lynn College of Nursing, and has been approved by the members of her supervisory committee. It was submitted to the faculty of the Christine E. Lynn College of Nursing and was accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

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Across the US, 22% of Medicare patients hospitalized with a diagnosis of heart failure (HF) will be readmitted within 30-days of discharge. There is no one cost-effective process identified to help patients transition home and maintain their own self-care. The aim of this study is to compare readmission rates, HF knowledge, self-care, and quality of life for patients who transition home from the hospital under the care of a Heart Failure Nurse Navigator (HFNN) with patients who receive usual care.

The HFNN is a home health RN with specialized training in HF care. The HFNN visited intervention group (IG) participants once in the hospital, followed by weekly home visits for one month. Control group (CG) participants received usual care, consisting of discharge teaching by their primary nurse and follow-up with their primary care provider (PCP) or cardiologist.

Using a sequential mixed methods research design, this experimental randomized controlled trial measured HF knowledge, HF self-care, and HF quality of life (QOL) at enrollment and one month after discharge. Hospital readmissions and/or ED visits were tracked in both groups. IG participants were interviewed using semi-structured questions, findings of which were analyzed using conventional content analysis.

There were fewer all-cause hospital readmissions in the IG (3 of 19) than the CG (6 of 21.) CG participants were 2.2 times more likely to be readmitted than the IG participants. [x(1)=.935, p=.334 O.R.=2.2219]. Due to limited enrollment, these results were underpowered and not statistically significant. There was improvement in HF knowledge (p=.06) and HF self-care maintenance (p=.07), approaching significance. HF self-care maintenance improved in both groups, although the IG was not significantly better (p=.48). There was significant improvement in the IG for HF confidence (p=.002) and HF QOL (p<.001).

The qualitative findings revealed two main categories from the IG: (1) personal clarification of patient education, especially related to diet, exercise, and medications and (2) feelings of support, reassurance, and safety. The HFNN may be one role to meet the triple aim of improving patient quality care and health outcomes at a reduced cost, especially in areas where a comprehensive HF management program is not available.

DEDICATION

This work is dedicated to my parents, Bob and Fran McGuire, who always told me I could accomplish anything, as long as I was willing to work hard; to my cousin Dr. Rita Hammer, who first encouraged me to consider graduate school; and to John Leavitt, my husband, technical advisor, and walking thesaurus, who deserves the “h” in the PhD for all the times I asked, “Honey, can you help me?” And he did.

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CHAPTER 1: BACKGROUND

Introduction`

Heart failure (HF) is the fastest growing cardiovascular disorder in the United States, reaching epidemic proportions. Currently, about 5.7 million people have been diagnosed with HF and this number is predicted to increase to more than eight million by 2030 with about 870,00 new diagnoses each year (Heidenreich et al., 2014; Fergenbaum, Bermingham, Krahn, Alter, & Demers, 2015; Mozaffarian et al., 2015). Heart failure is the most common reason for hospitalization among older adults accounting for over one million hospital admissions annually and amounting to 5% to 10% of all hospital admissions. Almost one-quarter of patients discharged with a primary or secondary diagnosis of HF are readmitted to the hospital within 30 days, and half of these patients are readmitted within six months. Readmission within 30-days results in a 20 percent increase in morbidity and mortality (Albert, 2016; Mozaffarian et al., 2015; www.medicare.gov/hospitalcompare). In addition, HF readmissions are a financial burden for health care systems, consuming a large portion of the more than $30 billion annual cost of the disease, as well as a physical and financial hardship to patients and their families (Greene et al., 2015). Although research studies exploring strategies to reduce 30-day readmissions have demonstrated promising results, no one solution has been recognized as the most effective. This may be due to the fact that there are many reasons for 30-day readmissions, which include ineffective transitions as the person moves from the hospital to home.

Care transitions and unplanned readmissions have been in the forefront of health policy discussions since 2009 when a study of over 11 million Medicare beneficiaries revealed that almost 20% were readmitted within 30 days of discharge. Gaps in care during transitions have led to costly and sometimes life-threatening hospital 30-day readmissions. This landmark study estimated the cost of unplanned 30-day readmissions to be over $17 billion (Jencks, Williams, & Coleman, 2009). In response to poor health outcomes of unplanned readmissions, measuring and reducing 30-day readmissions has become an important element of the Affordable Care Act and the financial repercussions are significant.

The Affordable Care Act and Readmission Reduction

Under the traditional Medicare fee-for-service payment program, hospitals had no economic incentive to reduce readmissions. Section 3025 of the Affordable Care Act (ACA) established the Hospital Readmissions Reduction Program (HRRP), designed to align payments with outcomes. The HRRP required the Centers for Medicare and Medicaid (CMS) to penalize hospitals for excessive risk-standardized 30-day readmission rates (Joynt & Jha, 2012). Since 2012, publicly reported 30-day hospital readmission rates have been calculated into the value-based purchasing formula, and a portion of CMS reimbursement is held back for any hospital out of compliance (Sherer, Crane, & Abel, 2011). Penalties can be as high as 3% of all Medicare monies, incentivizing hospitals to reduce HF 30-day readmission rates. CMS is focused on the Triple Aim of quality health care, which is (a) to improve the patient's experience of care, (b) improve the health of populations, and (c) decrease cost. Any interventions designed to reduce HF readmissions must include considerations of the financial advantages and repercussions to health care organizations. Transitional care coordination is one strategy that has been proposed to organize health services and information to best meet patient's needs over time. This may improve outcomes, decrease costs and facilitate collaboration among those professionals caring for patients during the continuum of care (Camicia et al., 2013). Care transition is a time-limited interaction to ensure continuity of care from one setting of care to another, such as the transition from hospital to home (Naylor et al., 2011)

Recognizing ineffective transitions as a major risk factor for 30-day readmission, several researchers have focused their interventions on improving this process. Some transitional care programs have demonstrated improved outcomes and cost savings, but all have had limitations (Coleman et al., 2004; Naylor et al., 2004). HF experts agree that "What is critically needed is an evidence base that clearly identifies the best processes of care, especially in the transition from hospital to home." (Yancy et al., 2013, p. 1522) There is clearly a gap in knowledge regarding the best intervention processes. The overall purpose of the Heart Failure Nurse Navigator study was to test a transitional care intervention and provide that needed evidence.

Phenomenon of Interest

This randomized controlled trial examined the effect of a Heart Failure Nurse Navigator (HFNN) on 30-day hospital readmissions, HF knowledge, HF self-care and HF quality of life. The HFNN is a registered nurse who has experience in home health as well as advanced training in the pathophysiology of and care of patients with HF. It was hypothesized that the HFNN role could be an effective intervention that could contribute to the body of knowledge of care transitions in older adults with HF. The next section of this chapter will discuss the challenging components of the transition process in this population.

Care Transitions and Readmissions

The transition from hospital to home can be a vulnerable time, as patients adjust to the responsibility for their own care. Older adults with HF may experience increased fatigue, shortness of breath, lower extremity edema, and fluid overload. Significant lifestyle changes are required for people to manage this disease, as well as knowledge of how to respond to worsening symptoms. Coordination of post-hospital care is an essential tool to reduce 30-day readmission rates associated with gaps in care transitions (Jencks, Williams, & Coleman, 2009; Hernandez et al., 2010).

Many isolated, targeted studies have addressed gaps in care, but no specific transition plan of care has demonstrated effectiveness across many populations of older adults with HF. A telephone survey of 100 U. S. hospitals revealed no consistent processes for inpatient HF care, patient and family education, discharge and care transitions, or quality improvement methods (Kociol et al., 2012). There are many factors in the transition process that influence the risk for unplanned 30-day hospital readmissions, including inconsistent and untimely discharge teaching of self-care, lack of early provider follow-up, communication deficits between providers, medication discrepancies, and poor health literacy.

Inconsistent Discharge Teaching of Self-Care

The day of discharge should not be an end point, but a transition from care in the hospital to care in the community (Hines, Yu, & Randall, 2010). The Joint Commission (TJC) established six standard discharge instruction topics to supply the recommended knowledge for patients with HF: diet, exercise, medications, weight monitoring, managing worsening symptoms, and follow-up appointments. Consistent and timely communication of discharge instructions to patients and families may be difficult due to the stress of the illness and hospitalization alone. Older adults may have difficulty remembering and implementing detailed discharge instructions about care, medication, and diet at this time (Hain, Tappen, Diaz, & Ouslander, 2012a). Moreover, although discharge teaching should begin at admission, in the acute-care hospital environment this often occurs just before the patient goes home, if at all. In a study of 118 nurses in three hospitals, almost 60% reported spending less than 15 minutes on HF discharge teaching (Albert et al., 2015)

The result of discharge teaching should be that the patient understands how to care for him/herself at home. Older adults are expected to learn how to monitor and interpret symptoms, set priorities, and make decisions about their care. This self-care process should begin in the hospital and seamlessly continue through the transition home (Riegel et al, 2004, 2009). Self-care in HF is a decision-making process in which people make the choice to engage in behaviors that maintain physiological stability and manage symptoms as they occur (Riegel, 2009). Self-care in HF is most effective when supported by clinicians who can guide persons on how to live with this complex, chronic illness. Self-care in people with HF is a three-fold process of maintaining a stable condition, managing worsening symptoms, and feeling confident in making these decisions. Knowledge, skill, and experience help to influence self-care outcomes (Riegel & Dickson, 2008). However, people often face challenges successfully engaging in self-care behaviors post-hospitalization.

In a cross-sectional, correlational study of adults (*N*=195) treated for decompensated HF in the Emergency Department (ED), individuals were found to have poor adherence to standard HF self-care activities in the two weeks prior to ED admission. Measured by surveys of HF illness beliefs and self-care adherence, it was determined that the study participants had inaccurate HF beliefs regarding fluid intake and the purpose of their medications. Chart review revealed the reasons for HF decompensation leading to the ED admission. There was an inverse relationship between accuracy of HF beliefs and adherence to self-care activities two weeks before going to the ED. However, those who had someone to confide in were more likely to adhere to self-care behaviors as compared to those who lacked this benefit (p =0.03). Empowering individuals to participate in self-care behaviors along with reinforcement may have a substantial impact on adherence. This study provided valuable information on the importance of coaching and teaching individuals about HF self-care, although there were limitations that decreased generalizability. Those limitations included measurement by the survey method, which depended upon accurate responses from patients, and medical record review where precise documentation by staff and data collection by abstractors was required. This is not the strongest study design. The sample was also younger (mean age 64.8 years) and there were more non-Caucasians (61%) than other multi-site registries, so findings may not apply to hospitals with different demographic characteristics (Albert et al., 2014). An important recommendation from the authors was that discharge education should include consideration of illness beliefs.

A lack of understanding of discharge education was also evident in a prospective cohort study (*N*=145) of patients discharged with a primary diagnosis of decompensated HF. In this study, only 14 participants (10%) understood all six topics, as measured by a survey designed by the investigators. The investigators consulted an expert in health literacy to develop a concise survey that would accurately reflect the patient's understanding of discharge instructions. This "understanding survey" contained multiple-choice questions covering six mandatory Joint Commission topics, as well as instructions for patients to list their medications and physician appointments. The survey was administered immediately after the nurse read the standardized discharge instructions, including a medication list and follow-up appointments. It was administered in English and Spanish, and while it was initially noted that those who understood all six topics were less likely to be readmitted, after controlling for educational level and English as a primary language, significance was lost ($p = < .05$). An unexpected finding was that even though patients were holding the written medication lists and could have just read them, the medical language and multiple papers were too confusing and difficult to be used as resources. The relatively small sample size and newly developed instrument were limitations of this study (Regalbuto, Maurer, Chapel, Mendez, & Shaffer, 2014).

The gap in comprehension of discharge teaching was also illustrated in a prospective, observational cohort study of adult participants (N=395), aged 65 and older, discharged home with the diagnosis of acute coronary syndrome, HF, or pneumonia (Horwitz et al., 2013). Patients received printed discharge information, including diagnosis, medications, appointments, and symptoms to monitor. The nurse reviewed these instructions with patients prior to discharge. In a telephone interview within one week of discharge, less than 60% could accurately describe their diagnosis. Only 33% of the population had a follow-up physician appointment before discharge, and of those, only 44% could recall any details of that appointment. These studies support the need for a change in the process for delivery of discharge education in older adults with HF.

Lack of Early Provider Follow-Up

In an observational study of Medicare beneficiaries discharged to home with a diagnosis of HF (*N* = 30,136), the relationship between early physician follow-up (within 7 days) and readmission within 30 days was examined, using data from HF clinical registries. The early-follow-up rates of 225 hospitals participating in HF registries were ranked and assigned to quartiles. Patients discharged from hospitals in the lowest quartile for early follow-up had the highest rate of 30-day readmissions. Discharge from hospitals in which more patients received early follow-up was independently associated with lower 30-day readmission rates. The study revealed a great variation in outpatient follow-up care and a need for consistent transitional care. Investigators suggested adding a performance measure that patients see a cardiologist within 7 days of discharge. Limitations of this study included that participants were not randomized, nor was socioeconomic status data available. Since it was an observational study and the data were obtained from clinical registries, it did not contain home health care or other disease management information. If these additional programs were effective, it would be more difficult to detect any direct association between early physician follow-up and decreased 30-day readmissions (Hernandez, et al., 2010). Despite these limitations, this study demonstrates that follow-up is important to prevent hospital readmissions.

Many of these hospital readmissions originate with an unplanned visit to the Emergency Department (ED). Early physician follow-up was also noted to be a factor in preventing ED visits for patients with HF. Patients who do not have timely physician follow-up are more likely to use the Emergency Department (ED) when their symptoms worsen and are also more likely to require hospital admission. Eighty percent of HF hospitalizations originate with an ED visit (Pang, Levy, & Shah, 2013.)

Communication Deficits Between Providers

Deficits in communication of patient information upon transfer may affect patient care. Discharge summaries from hospitalists to primary care providers (PCPs) are essential for continuity of care. A systematic review of 73 observational studies investigating how patient information transferred to other providers at discharge revealed that only 3% of PCPs were involved in discharge planning. Only 14.5% of patients had hospitalist discharge summaries sent to their PCP within one week of discharge. Even when sent, the discharge summaries lacked essential information, for example, no primary diagnosis (17%), no discharge medication list (21%), and missing diagnostic test results (38%). Despite the presumed advantages of the electronic medical record (EMR), the authors discovered the summaries were more likely to reach the PCPs if hard copies were printed and given to the patient at discharge. This communication failure has implications for post-hospital care and physician follow-up (Kripalani, LeFevre, Phillips, Williams, Basaviah, & Baker, 2007).

In a study of 1078 patients over six U.S. academic medical centers, communication between hospitalists and PCPs was somewhat better. Direct communication occurred between the physicians for 23% of the patients, and discharge summaries were available within two weeks of discharge for 42% of the patients. Although no relationship was demonstrated between communication and patient outcomes, it was noted that there was much room for improvement (Bell et al., 2008).

Medication Discrepancies

Discrepancies in the medication list given at discharge and the medications patients already have in their home may cause confusion or error. Many times older adults have medications changed or discontinued, or new medications are prescribed.

Having to make an adjustment to accommodate to something that is different than usual can be challenging for older adults post-hospitalization (Hain et al., 2012). In a secondary analysis of medical records collected during a randomized controlled trial (RCT), 59% of patients had at least one medication discrepancy, 76% of these being high-risk medications. Vague phrases, such as “take as directed” were confusing to both patients and family caregivers, as well as post-hospital clinicians. Additionally, in this study, 53% of patients had an incomplete discharge summary, and 49% had only partial discharge instructions (Foust, Naylor, Bixby, Ratcliffe, 2012).

These communication barriers are at the provider and system level, but there are also patient-level barriers to accurate medication adherence. Patients may have a cognitive impairment that complicates medication self-management. In a pilot study of 396 patients from a community hospital, the participants who agreed to a home visit (*n* = 103) provided revealing data. The Mini-Cog screening assessment was abnormal in more than 60% of home visit patients. On an initial telephone interview, 87% of patients denied any difficulty with medications, but on home visit, 52% were found to have one or more medication discrepancies (Hain, Tappen, Diaz, & Ouslander, 2012a). Medication nonadherence was also noted in a population of 10 patients with HF and their caregivers. Over half of the patients reported forgetting to take their medications due to distraction, being away from home, or feeling well enough to skip them (Aggarwal, Pender, Mosca, & Mochari-Greenberger, 2015.)

Poor Health Literacy

Health literacy is defined as the basic reading and numerical skills needed for a person to function and make decisions in the health care environment (Safeer & Keenan, 2005). Health literacy is an important component of meaningful discharge teaching and ensuring self-care; however, according to the National Assessment of Adult Literacy, 14 percent of adults (30 million people) have “below basic” health literacy. These adults were more likely to be without health insurance and classify their overall health as poor (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993). Clinical guidelines for HF self-care include the aforementioned medication management, symptom monitoring, diet and fluid restriction, and regular exercise. Although delivery of this information before discharge may be documented, assessing the patient’s true depth of understanding may be difficult. An individual’s health literacy capacity is influenced by the educational level and is affected by culture, language, and different health settings (Ratzan & Parker, 2000).

Patients or caregivers with low health literacy may not be able to understand medication labels or educational materials. They may not remember verbal instructions or be able to make follow-up appointments. A systematic review of 23 studies revealed an average of 39% of participants with low health literacy. Predictors of low health literacy included not completing high school and decreased cognitive function. Multiple studies suggested a positive correlation between health literacy and HF knowledge but did not support a correlation with HF self-care. Adopting strategies to bridge the communication gap for patients with low health literacy are recommended implications for nursing practice (Catija, Catija, & Han, 2015).

Other Behavioral Factors

Behavioral factors, such as depression and anxiety, cognitive impairment, and a history of substance abuse were found to be associated with 30-day HF readmissions. A sample of 84 patients hospitalized with HF was recruited, tested, and readmission data collected. Although patients with psychiatric history and delirium were excluded from the study, 20% displayed moderate depression and 54% displayed moderate-severe cognitive impairment. Proactive treatment of these conditions may reduce symptoms and increase patient self-care at home. A limitation of this study is that patients were not followed for possible readmission to other facilities, and these readmissions may have been missed (Ketterer, Draus, McCord, Mossallam, & Hudson, 2014).

In a retrospective cohort study of 250 patients (*n* =125 readmitted / 125 not readmitted), a medical record review of randomly selected patients (49% male, 49% female, 60% Caucasian and 38% black) examined comorbidities. Results indicated that renal insufficiency (HR 1.7; *p* = .003), atrial fibrillation (HR 1.6; *p* =.005), and coronary artery disease (HR 1.5; *p* = .04) were associated with readmission, while measures of cardiac function (EF and BNP), age, and gender were not. The combination of medications to treat these comorbidities (beta blockers, aldosterone antagonists, and ACEIs or ARBs) were also significant predictors (OR 0.20; *p* = 0.0001) of readmission (Sherer et al., 2011).

Readmission and Length of Stay

Another piece of the readmission puzzle is length of hospital stay, although study results have been inconsistent. Data from the *Get With The Guidelines – Heart Failure Registry* linked to Medicare claims concluded length of stay was poorly correlated with 30-day readmission rates (Kociol et al., 2013). In a retrospective cohort study of almost 20,000 patients (>18 years) hospitalized with HF, shorter length of stay (3-4 days) was not associated with hospital readmissions, but longer length of stay (5-10 days) increased 30-day readmission risk by 17% (Reynolds et al., 2015). Although in some studies, if patients were discharged too soon before they were physically ready to go home, they returned to the hospital within a short time. Patients with acute HF typically presented with fluid overload, however, 50% were discharged with little or no weight loss and persistent symptoms, indicating euvolemia was not accomplished (Gheorghiade, Filippatos, De Luca, & Burnett, 2006). Patients with heart failure rarely have fluid volume and medications optimized during the index (first HF admission) hospital stay (Albert, 2016).

In a retrospective study of over 47,000 patients treated for HF, the relationship between length of stay during index hospitalization and readmission was examined. A longer length of stay (one extra day) was associated with a modestly lower probability (1%-8%) of hospital readmission within seven and thirty days. The number of comorbid conditions was also associated with increased readmission probability. No information on the HF severity, the quality of the discharge process or follow-up care was considered, which was a limitation of this study (Carey & Lin, 2014).

Summary

Care transitions and hospital readmissions among older adults with HF are influenced by many factors. In this HFNN study, factors such as health literacy, cognitive impairment, and depression were measured as confounding variables on all participants at enrollment but were not measured as outcomes. Length of index hospital stay was also calculated, but not measured as an outcome.

Other factors, such as inconsistent and untimely discharge teaching of self-care, lack of early provider follow-up, communication deficits between providers, and medication discrepancies are issues that may be influenced by the support and intervention of a Heart Failure Nurse Navigator (HFNN). Although the RN navigator role has not been fully investigated among older adults with HF, it has demonstrated improvement in health outcomes among individuals with other health conditions, as will now be explored.

History and Definition of the Nurse Navigator Role

Over the last 40 years, nurses have filled various professional positions to examine patient care efficiency and coordination. In the 1970’s and 1980’s, insurers hired nurses to review medical records after discharge for appropriate utilization of hospital services. This utilization review role was transformed into utilization management as charts were scrutinized while the patient was still in the hospital, to identify delays in treatment or discharge. In the 1990’s, the case management role was created to work with the health care team to decrease these delays, connect patients to resources, and make certain that care was safe, effective, and patient-centered. Nurses working in the case manager role were tasked to expedite communication, education, and transfer to the next phase of care (Shockney, 2010).

Dr. Harold Freeman, past president of the American Cancer Society, first used the term, “patient navigation” to describe an intervention to assist patients with cancer to overcome barriers to diagnosis and treatment. Freeman saw the navigator role as a method to decrease health care disparities and educate and encourage medically underserved women to be screened for breast cancer. The original program at Harlem Hospital Center, a public hospital in New York City, resulted in reduced mortality in this underserved minority community. The combined interventions of free or low-cost breast screening and patient navigation to eliminate barriers to timely care increased breast cancer survival rates from 39% to 70% (Freeman, 2004). The Harlem Patient Navigator Program served as the model for legislation to ensure care coordination, the Patient Navigator Outreach and Chronic Disease Prevention Act of 2005. This legislation provided funding for continued patient navigation programs (Freeman, 2006).

Over the last 20 years, nurses have been instrumental in the development of the role of the professional patient navigator, most notably in the field of oncology. The Oncology Nursing Society defines patient navigation as the "individualized assistance offered to patients, families, and caregivers to help overcome health care system barriers and facilitate timely access to quality health and psychosocial care" (The Oncology Nursing Society et al. [ONS], 2010, p. 251). The navigator role has been compared to that of a case manager, assisting the patient to follow medical protocols and schedule appointments. Case management does not necessarily include connectedness and relationship (Fillion et al., 2009), whereas the addition of nursing to this role involves nurturing a caring relationship between the patient and the nurse (Boykin & Schoenofer, 2001).

The navigator role is actually more comprehensive, with a focus on empowering the patient and family, identifying unmet needs, and providing a personal connection to help patients fit the plan of care into their daily lives (Doll, 2007). Patient education is a key role and responsibility, from prevention to survivorship (Shockney, 2016).

The title of “patient navigator” can sometimes be confusing. Professional patient navigation may be accomplished by registered nurses (RNs), although some social workers and RN case managers are also called patient navigators (Fillion et al., 2009). There are also many programs using “lay navigation.” These are non-professional patient advocates who have completed a training program of usually three months or less. Freeman’s original patient navigators were non-professional members of the community, and many of these programs continue today (Harold P. Freeman Patient Navigation Institute, 2017). These professional and non-professional navigators are often studied together, further muddying the definition and delineation of the role. A national survey of 1116 self-identified patient navigators revealed that lay navigators are more likely to be located in high poverty areas and nurse navigators are more likely to be located in low-poverty areas. Although factors associated with the dissemination of the navigators were not explored in this study, it was noted that lay navigators serve an important role in medically underserved areas (Hedlund et al., 2014). It is also more likely that the lay navigator role is focused on coordination of care and access to services, rather than on actual care delivery. (Manderson, McMurray, Piriano, & Stolee, 2011). Although Freeman's original goal for patient navigation was to remove barriers created by poverty, chronic disease now requires such complex management that navigation can benefit any patient, regardless of income and/or education level. Strong clinical skills, knowledge of resources within the healthcare system, and the ability to connect and communicate make the nurse navigator the ideal role to coordinate chronic care transitions (Hennessey & Suter, 2011).

A program utilizing nurse navigators may include advocacy, education, problem solving, and support. Navigators help coordinate patient care, connect patients and caregivers with resources, and help them understand the health care system (Fillion et al., 2009). Professional navigators, such as social workers and registered nurses, facilitate the processes of care and provide the highest level of service and support for patients (Gilbert, Lankshear, Hughes, Burkoski, & Sawka, 2011).

Nurse Navigation Applied to Other Health Challenges

The NN role was initially utilized in breast cancer care but has been broadened to assist patients with many types of cancer (Thygesen, Pederson, Kragstrup, Wagner, & Mogrensen, 2012; Swanson & Koch, 2010; May, Woldhuis, Taylor, & McCahill, 2014). Oncology nurse navigators have increased minority participation in breast cancer clinical trials with education, emotional support, system navigation, and advocacy (Holmes, Major, Lyonga, Alleyne & Clayton, 2011). High-risk obstetric patients benefitted from NN follow-up, support, and care coordination (Langheld, 2012). NNs were effective in relieving anxiety and stress in the outpatient diagnostic imaging department by providing procedure-specific education, as well as coordinating multi-step visits for treatment (Brown, 2012). Roles that would fit the definition of nurse navigator, involving one-on-one management of patients with specific chronic conditions, have been documented in both the United States and England (Metcalfe, 2005).

In northern Australia, two nurse navigators cared for 1763 patients from 2003 to 2010. All patients discharged with HF received a telephone call within one week of discharge. Patients at risk received a home visit by the HF nurse. All patients were offered group rehabilitation and to be seen in the outpatient HF clinic for ongoing monitoring. Patient knowledge and management of HF were increased, and hospital re-admissions were decreased (Candlish & Staniford, 2010), further supporting the role of the nurse navigator as a way to improve transitions from care in the hospital to self-care at home.

Problem Statement

Evidence-based strategies to reduce 30-day heart failure readmissions have been inconclusive; there is a need to study the role of the heart failure nurse navigator as a comprehensive response to the problem of care transitions. It will also be important to understand the perceptions of the patients who experience care from a HF nurse navigator, in order to inform future research and practice initiatives.

Research Questions and Hypotheses

1. In older adults (≥65) with a diagnosis of heart failure who transition from hospital to home, what is the effect of care by a Heart Failure Nurse Navigator on 30-day hospital readmissions, compared with those who receive usual care?

Hypothesis 1: Older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have fewer 30-day unplanned hospital readmissions and/or urgent ED visits at one-month post hospital discharge.

2. In older adults (≥65) with a diagnosis of heart failure who transition from hospital to home, what is the effect of care by a Heart Failure Nurse Navigator on knowledge about managing HF and the ability to engage in self-care behaviors, compared to those who receive usual care?

Hypothesis 2: Older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have a significant increase in HF knowledge and ability to engage in self-care behaviors at one-month post hospital discharge.

3. In older adults (≥65) with a diagnosis of heart failure who transition from hospital to home, what is the effect of care by a Heart Failure Nurse Navigator on HF quality of life compared to those who receive usual care?

Hypothesis 3: Older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have a significant increase in HF quality of life at one-month post hospital discharge.

4. What are the perceptions of older adults (≥65) with a diagnosis of heart failure who transition from hospital to home regarding care received from a Heart Failure Nurse Navigator?

Theoretical Framework: Transitions

The goal for patients moving from hospital to home is to have an effective transition, in which the patients understand how to care for themselves. Understanding this transition process helps nurses interact uniquely with each patient. Meleis' middle-range Theory of Experiencing Transitions (2000) will provide the theoretical framework to explore the effectiveness of the HF Nurse Navigator on health outcomes of older adults discharged home from the hospital. Meleis identifies the concept of patient vulnerability during changes in health status. The meanings of the transition to each individual, the process during the transition, and the outcome indicators for transition effectiveness can help nurses understand each patient's unique experience. Humans attach meaning to health and illness situations and it is necessary for the nurse to understand the personal and environmental conditions that help or hinder the transition. Some of these conditions are the level of preparation and knowledge, cultural beliefs, and socioeconomic status of the patient.

Transitions occur over time and aspects of this process can indicate movement toward health or vulnerability. These process responses include a feeling of connection and interaction with family and caregivers, familiarity with location, and confidence in coping with the change in health status. Indicators of outcome include a mastery of skills or behaviors to manage the situation and an acceptance of a fluid identity in the transition. Within this study, the type of transition studied was the health/illness transition and the pattern of transition was sequential. The properties, transition conditions and patterns of response were applied to this model of transitional experience (Meleis et al., 2000, Figure 1).

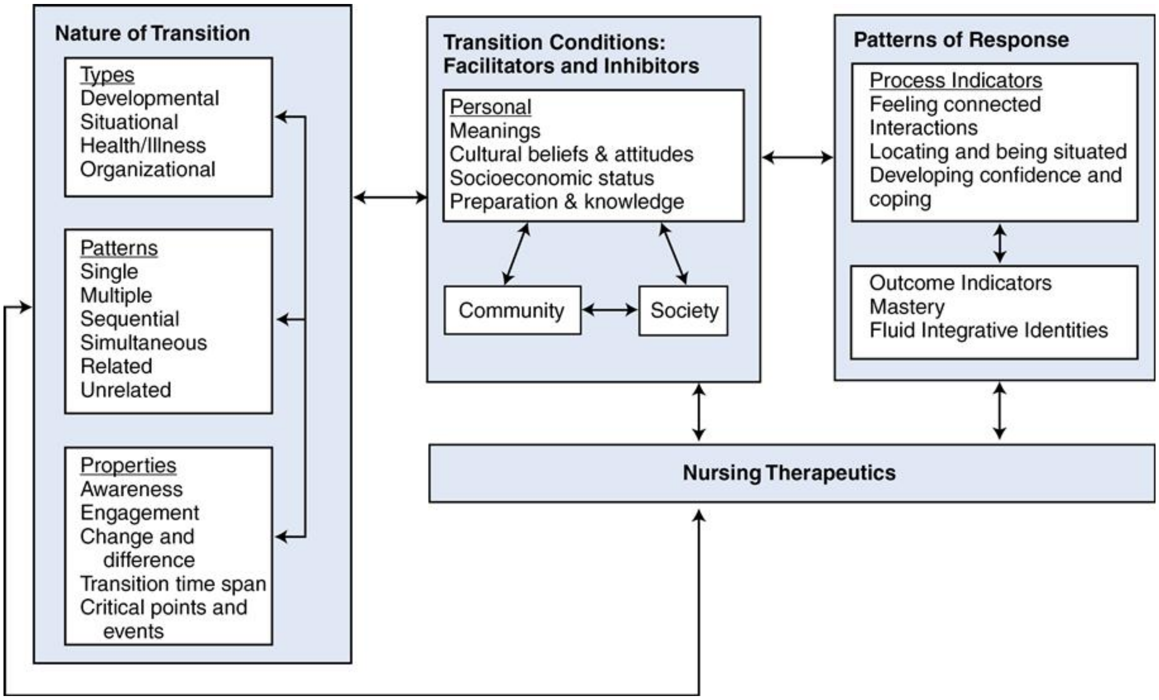


Figure 1. Theory of Experiencing Transitions (Meleis et al., 2000).

The HFNN is a registered nurse with experience in home health nursing and advanced education in the care of patients with HF. The HFNN can be a familiar connection to assist the patient in the transition from care in the hospital to care in the community. The HFNN can enhance discharge teaching, ensure follow-up appointments are kept and help the patient and family with a medication management system that is individualized for their needs. The HFNN can get to know each patient as a person, see the home environment, and explore what matters most. Understanding each patient's unique experiences may facilitate the mastery and application of knowledge and skill patients need to avoid hospital readmission.

A Caring Lens

Due to the importance of the importance of the nurse-patient relationship in the transition process, Meleis' theory will be viewed through the conceptual frame of Boykin & Schoenofer's Theory of Nursing as Caring (2001). Each episode in the transition process can be understood as a nursing situation, where the calls for nursing are answered within the context of a shared lived experience between the nurse and the nursed. These calls are answered with knowledge, honesty, intention, and openness to caring. The intentional and authentic presence of the nurse is vital to the personal connection and relationship facilitating the transition period. This presence allows the nurse to enter the patient's world and discover what is most important to that individual (Boykin & Schoenofer, 2001).

The importance of an enhanced personal relationship with the patient has been recognized by organizations such as the Institute for Healthcare Improvement (IHI, 2017). In order to improve understanding of the comprehensive needs and goals of patients, the IHI encourages clinicians to ask "What matters to you?" as well as "What is the matter?" The answers to these questions can increase awareness of important issues that may be overlooked and this knowledge can help create customized plans of care. Forming deep, personal, understanding relationships can make a positive impact on partnering with patients to enhance quality healthcare and improve outcomes. These caring concepts were integral to the HFNN intervention.

Definition of Terms

Heart Failure: a disease of the heart muscle, rendering it either too weak to pump blood (systolic HF, also called HF with reduced ejection fraction, or impaired left ventricular function), or too stiff to fill with blood (diastolic HF, also called HF with preserved ejection fraction, or preserved left ventricular function), both conditions causing decreased cardiac output and decreased organ perfusion.

NYHA: The New York Heart Association Functional Classification, which places patients in categories I (best) – IV (worst), based on physical activity limitations

Decompensated heart failure: worsening symptoms, including shortness of breath, edema, and fatigue.

Admission: initial (index) hospitalization, with a primary or secondary diagnosis of HF

Readmission: unplanned admission to the hospital, for any cause, within 30 days of previous discharge.

Usual Care (UC): UC will consist of discharge from the hospital with instructions to make follow-up appointment with primary care provider (PCP) or cardiologist, and the discharge teaching provided by the staff RN. This discharge teaching includes the six areas mandated by the Joint Commission (diet, exercise, weight monitoring, worsening symptoms, and follow-up appointments.)

Transitions of Care: a broad range of time-limited services for continuity of care across health care settings to avoid preventable poor outcomes (Naylor et al., 2011)

Summary

HF is a growing health care concern, both from the perspectives of the patient and the health care delivery system. Older adults with HF who are discharged from the hospital to home are at greater risk for 30-day readmission and/or urgent medical visits. The Affordable Care Act imposes financial penalties on hospitals with unacceptable 30-day readmission rates. The transition from hospital to home has many potential pitfalls. Inconsistent and untimely discharge teaching, lack of provider follow-up, medication discrepancies, and provider communication deficits are just a few of the many gaps in transitional care that can interfere with patient's successful self-care at home. These issues, along with increased risk of morbidity and mortality associated with rehospitalization, support the need for research exploring interventions aimed at reducing 30-day readmissions. Using principles of transitional theory, the HFNN may be able to bridge this gap and reduce readmissions of patients with HF.

CHAPTER 2: LITERATURE REVIEW

Introduction

Heart failure (HF), a common condition among older adults, requires individuals to engage in self-care activities such as medication management, diet and weight monitoring, exercise, giving attention to worsening symptoms, and knowing when to contact a health care provider (HCP). This can be challenging for many individuals, but even more difficult after being discharged from the hospital to home, when the burden of managing the disease is even higher (Horwitz et al., 2013). The complexity of adapting to new dietary and medication regimens, as well as the desire to return to their familiar dietary and lifestyle patterns (which may have contributed to their index hospitalization), increases the risk of 30-day hospital readmissions. The Heart Failure Nurse Navigator (HFNN) may assist with the transition from care in the hospital to incorporate a new self-care regimen at home.

The following is a review of the literature to provide a synthesis of evidence related to transitions of care from hospital to home in older adults with HF, to identify which study components were helpful, and to identify gaps in evidence that the HFNN could address. Using the words heart failure, nurse navigator, navigation, care transitions, heart failure clinic, discharge education, and telemonitoring, literature from 2004-present was reviewed, from PubMed, CINAHL, and SearchWise. In some circumstances, pertinent articles were located using ancestry search of an original article. The initial discussion will also focus on current guidelines for management of HF.

The most recent (2013) Guidelines for Management of HF by the American College of Cardiology Foundation (ACCF) and the American Heart Association (AHA) recommend a combination of lifestyle modification and medication. In this practice guideline, the ACCF/AHA notes the pressing need for evidence for best practices in transitioning of patients with HF from hospital to home (Yancy et al., 2013). The 2016 European Society of Cardiology (ESC) recommends early discharge planning and early post-discharge follow-up (Ponikowski et al, 2016). The literature review considered these very important guideline recommendations and how they are translated into transitions of care. This review was structured according to the mode of intervention, beginning with the most basic transition preparation: discharge education.

Discharge Education Only

Discharge education is mandated by The Joint Commission for all patients hospitalized with a diagnosis of HF. A frequently cited randomized controlled trial (RCT) of 223 participants with systolic HF demonstrated the benefits of a 1-hour, one-on-one teaching session with a nurse educator at hospital discharge. Teaching content provided to the intervention group (IG, *n* = 107) included the basic principles and causes of HF, as well as medication teaching and rationale for the treatment plan. Fluid and dietary restrictions related to self-care activities were presented, as well as the importance of daily weights and what to do if symptoms worsen. The control group (CG, *n* = 116) received usual care (UC), which was defined as the same information as the intervention group received in written form. The CG may have received additional discharge education from hospital staff, but this was not captured in data collection. Telephone follow-up was done at 30, 90, and 180 days post-discharge, utilizing scripted questionnaires regarding hospital admissions, medications, and quality of life (as measured by the Minnesota Living with Heart Failure Questionnaire.)

The combined end point of death or rehospitalization occurred in 64% of control and 47% of intervention patients during the 180-day follow-up period. Intervention group patients were also more likely to follow self-care instructions regarding daily weight, dietary sodium, and smoking cessation. Quality of life (QOL) also demonstrated a modest, but significant improvement in the intervention group compared to the control. At the 30-day follow-up time point, MLHF scores were lower (improved) in the IG (38±22) compared with the CG (45±25, $p = .049$), but IG scores were initially better than the CG, and the changes from baseline did not actually differ in each group (Koelling, Johnson, Cody, & Aaronson, 2005). There were several limitations to this study: only patients with systolic HF were included, so the education effect on patients with preserved left ventricular function is not known; and the long-term duration of the effect of the education was unclear, as follow-up ended at 180 days. Additionally, the nurse conducting the telephone follow-up was not blinded to the random patient assignment, although calls were scripted so all participants were asked the same questions. (Koelling, et al., 2005).

In a later RCT ($n = 265$), this same one-hour educational intervention was given to an IG to test for improvement in participants' HF knowledge. The principal investigator of the original study was one of the authors in the study conducted five years later. The CG received the standard discharge process, components of which were not specified. A HF knowledge questionnaire (HFKQ) was administered prior to and at three months after the educational intervention. The IG demonstrated significantly higher HF knowledge scores than those in the CG (1.59 vs. 0.36; p = 0.007). Patients who were rehospitalized in the 180-day follow-up period had significantly lower HFKQ scores (9.46 vs. 10.91 out of a possible 15; *p* = 0.005). These deficits in HF knowledge were strongly associated with readmission within 180 days (Kommuri, Damodaran, & Koelling, 2010).

Although one-hour discharge education has shown promise, most nurses do not have a full hour to spend with each patient being discharged. A study of 118 nurses from three different hospitals revealed that almost 20% of nurses spent less than five minutes on heart failure specific discharge teaching, and over 50% spent less than 15 minutes. (Albert et al., 2015, Albert, 2016). The hectic pace of an acute-care hospital environment often does not allow time for the necessary comprehensive HF specific discharge teaching. This can have a negative impact on a patient's ability to incorporate discharge instructions into everyday living. Time is one important factor in discharge teaching, however, the HF knowledge level of the person providing the teaching is also a crucial component.

The role of a specialized HF nurse was one component of a literature review of HF discharge education. This review summarized studies focusing on discharge education in general, and HF discharge education in particular (Vreeland, Rea, & Montgomery, 2011). One conclusion was that RNs who specialized in HF and were more knowledgeable in HF self-care had a greater impact than staff RNs. Care by this specialized RN also resulted in greater patient satisfaction than care by a multidisciplinary team. In one study (*N* = 51), a questionnaire administered to patients 12 months after discharge compared responses to teaching from a specialized nurse to teaching from a multidisciplinary team of health care professionals. In the group receiving information from the specialized nurse, 83% reported that they were highly satisfied. In the group receiving information from the multidisciplinary team, only 50% reported being highly satisfied (Smith et al., 2005). Optimum program recommendations included structured one-on-one education with family present, lasting one to two hours, with the possible addition of multimedia instruction. The authors noted that although diet is one of the six topics required for discharge education by The Joint Commission, it was often a lower learning priority for patients, which is surprising considering the importance of diet in our culture. It is not known if patient outcomes may have improved if their individual learning priorities, such as specific diets, were addressed first in discharge education. This supports the need for studies to determine what is most important to each individual so HF-specific patient-directed education may be customized. In addition to discharge teaching in the hospital, some programs provided one or more telephone calls to patients after discharge.

Discharge Education with Telephone Follow-up

Many studies have used telephone communication to follow-up with participants after they return home, investigating the effect of one or more telephone calls to patients in addition to discharge teaching. In a RCT of 137 adults (age 18 or older) hospitalized with a primary diagnosis of HF, volunteer pre-med students were trained to provide one hour of discharge education. Topics covered in the intervention group (IG, *n* = 70) included diagnosis, medications, follow-up appointment information, salt and fluid restrictions, and weight monitoring. The control group (CG, *n* = 67) received usual care (UC), consisting of nurse-led discharge instructions, lasting 10 to 15 minutes. After discharge, the volunteers called the IG participants within one to two days and asked specific questions about their status and self-care. They also reinforced all the points covered during discharge education. Weekly phone calls followed for one month and patients were referred to their own primary care physician (PCP) if they were not feeling well (short of breath, weight gain, swelling, chest pain, increased fatigue), or to call 911 if acutely ill. Follow-up calls were made by whichever volunteer was scheduled to work that day, so there was no personal continuity of care for the discharge visit or follow-up calls (Personal email with J. F. Heitner, M.D., April 4, 2015). Thirty-day readmissions were less in the IG (7%) compared to the CG (19%). This study took place in a large urban setting in the northeast, where there was no shortage of motivated and qualified volunteer pre-med students. One limitation in generalizing these results would be proximity to an academic medical center; non-academic centers may not have the student population to support this type of program (Sales et al., 2013). Unlike this study where students make the calls, telephone follow-up is often initiated by nurses, as reported in the following quality improvement project.

A discharge education quality improvement initiative was the result of collaboration between a cardiac nurse navigator, a cardiac nurse educator, and the nursing informatics department of the hospital. Noting that patients with HF were not being weighed consistently while hospitalized and that this was not reinforced in their discharge education, a hospital-wide project was initiated by the nurse navigator, educator and nursing informaticist. Nursing informatics created an electronic alert to remind nursing staff to weigh patients daily if they had a HF diagnosis and this led to an electronic HF discharge plan. The cardiac nurse educator and nurse navigator then collaborated to educate patients before discharge. The education was reinforced with a telephone call 48-72 hours after discharge. HF readmission rates decreased from 24% in 2011 to 18% in 2012 (Taylor, 2014). Although these findings were part of a quality improvement project, they demonstrate the importance of collaboration with health care providers and the post-discharge follow-up.

Structured Telephone Support and Telemonitoring

Structured telephone support is a system of communication to assess patients' health status and encourage self-care behaviors at regular intervals. Structured telephone support uses only simple telephone technology to collect data and provide post-discharge education and support (Inglis et al., 2015). Evidence supports that contacting patients by telephone and asking questions about their breathing, activity tolerance, and medications is one method to identify heart failure decompensation and provide an opportunity to recommend treatment and avoid unplanned hospital readmission.

Telemonitoring (TM) is a chronic disease management strategy using technology to obtain health information from patients in another location (Inglis et al., 2015). TM utilizes electronic (digital/broadband/satellite/wireless, or blue-tooth) transmission of physiological data. These data may include patient weight, vital signs, electrocardiograms, and/or automated responses regarding HF self-care. The use of telemonitoring to detect heart failure decompensation may provide an opportunity for early treatment and avoid hospital readmission for high-risk patients.

In a systematic review and meta-analysis of structured telephone support or non-invasive home telemonitoring, 41 peer-reviewed RCTs were evaluated (Inglis et al., 2015). Structured telephone support was examined in 25 studies with a total of 9332 participants. Telemonitoring was evaluated in 18 studies, with a total of 3860 participants. None of these patients had home visits or clinic follow-up; the telephone calls or non-invasive telemonitoring were their only post hospital intervention.

Primary outcomes studied included all-cause mortality, and all-cause and HF-related hospitalizations. Data were presented as risk ratios (RRs) with 95% confidence intervals (CI). Risk ratio (or relative risk) is the ratio of the risk of an event in two groups. Risk ratio describes the risk of the event occurring with the use of the experimental intervention as compared with the control group. Risk ratio is obtained by dividing the incidence of the event in the experimental group by the incidence of the event in the control group. A number of less than one suggests the intervention reduced the risk of the event. RRs closer to one suggest a lesser difference in risk of the event between the two groups. In this meta-analysis, data from reviewed studies were pooled and outcomes of control or intervention groups were compared and reported according to RR.

All structured telephone support interventions were initiated by a health care professional (not necessarily a nurse) and delivered to a community-dwelling patient with HF after hospital discharge. Telephone support demonstrated reductions in all-cause mortality (RR 0.87) and in HF-related hospitalizations (RR 0.85). Non-invasive telemonitoring demonstrated reductions in all-cause mortality (RR 0.80) and HF related hospitalizations (RR 0.71). Neither structured telephone support or telemonitoring demonstrated a reduction in all-cause hospitalizations (RR 0.95). Discussion suggested that these follow-up strategies might be useful in mortality reduction if implemented when patients are unstable or newly diagnosed and have a greater need for education and support. A major limitation of this analysis was the variability of interventions in the studies included in the review, making outcome findings difficult to compare, which may not be the case in a single RCT (Inglis et al., 2015).

An editorial in response to this meta-analysis cautioned that telemonitoring alone may provide false reassurance resulting in adverse events, such as decompensation from medication or dietary non-compliance, which may not be measured electronically (Casas, Kwong, & Ebrahim, 2010). This supports the benefit of a personal connection to the patient; numbers alone may not reveal the self-care status of the whole person.

Telephone Support Alone

One study of telephone support alone was the DIAL study (Randomized Trial of Phone Intervention in Chronic Heart Failure), consisting of direct telephone calls by a nurse to patients with stable HF. The DIAL study demonstrated decreased readmissions and decreased mortality at one and three years. In this RCT of 1518 patients, the IG received an educational booklet and telephone calls every 14 days for at least four calls. After those eight weeks, telephone contact frequency was then adjusted according to patient need; some patients were doing well, while others needed more education and support. The goals were to improve dietary and treatment compliance, encourage exercise and symptom monitoring, and to help patients understand when to call the cardiologist if symptoms worsened. CG patients continued treatment with their cardiologist but did not receive the telephone calls or educational booklet. The primary endpoint in the original study was death or readmission at 180 days and one year. The RR for death was 0.63 at 180 days and 0.75 at one year (95% CI).   Readmissions for HF at 180 days were 16.8% in the IG and 22.3% in the CG (RRR: 29%, 95% CI, p<0.01). A follow-up at three years demonstrated a sustained clinical benefit, with the IG having a 29% readmission rate at three years and the CG having a 35.1% readmission rate at three-years (RR: 0.72, 95% CI, $p<.01$). The investigators reported that the increased follow-up and education promoted patient self-monitoring, as well as adherence with the prescribed regimen, which allowed for early treatment when needed (Ferrante et al., 2010). Several other studies investigated following patients after discharge with remote telemonitoring alone.

Electronic Telemonitoring Alone

A multicenter RCT of 1653 patients recently hospitalized for HF compared telemonitoring to usual care for the primary endpoint of all-cause readmission or death within 180 days after discharge. All patients received written educational materials and a scale for daily weights if they didn't have one. Intervention patients received instruction on how to make the daily call and answer questions using a touch-tone telephone. The automated telephone-based voice-response system necessitated a patient response, and daily information was collected about weight and symptoms in the intervention group ($n = 826$). Any significant answers were reported to the staff for documentation and management. The primary endpoint of all-cause hospitalization or death at 180 days demonstrated no statistically significant difference between the IG (52.3%) and the CG (51.5%) ($p<.05$). One of the problems was the utility of this type of strategy. Fourteen percent of IG patients never used the system and more than half were only using it three times weekly. At the end of the six-month intervention, only 55% of patients were using the system, however, the reason for this high percentage was not reported; one could speculate possible participant burden. There was no direct contact with a nurse or other provider during monitoring unless a problem indicated management was needed, which may have limited participant engagement (Chaudhry et al., 2011). These findings support the need for personal contact during the immediate discharge period, which has been shown to be effective in other studies. There is yet a more sophisticated type of telemonitoring found in the use of implanted or applied physiologic devices.

Physiologic Device Telemonitoring

Physiologic device telemonitoring is another method used to oversee patients after hospital discharge. Internal or external device telemonitoring was explored as an assessment tool in concert with a comprehensive care plan that included personal contact. These results must still be interpreted by a health care provider, and any treatment instructions communicated to the patient. There are several promising devices available for tracking patient's fluid status in the home. Pulmonary artery pressures can be wirelessly monitored with the dime-sized, percutaneously implanted CardioMEMS® sensor device. The sensor detects increases in pulmonary artery pressure days to weeks before weight or blood pressure changes, or symptoms of fluid overload occur, allowing patients to receive earlier diuretic or vasodilator therapy adjustments (Abraham et al., 2011, Adamson et al., 2014).

Wireless physiologic fluid monitoring is also available to patients who have received implanted coronary resynchronization therapy devices (bi-ventricular internal cardioverter/defibrillators). Intrathoracic electrical impedance from the lead wire in the heart to the generator in the upper chest can be measured daily at home and transmitted to a central location, usually a HF clinic or electrophysiology practitioner office. Since electricity travels through fluid with less impedance than through air, a decrease in impedance indicates an increase in intrathoracic fluid, days to weeks before patients experience symptoms. This measure allows practitioners to address fluid overload sooner, and hopefully prevent an ED visit or hospital admission (Perego, 2008; Whellan et al., 2010).

Implanted device monitoring is not the only way to monitor fluid status. External device monitoring also plays an important role, as not all patients with HF will qualify for implanted devices. The MUSE (multi-sensor) is a noninvasive external monitoring patch that measures physiologic signals, such as heart and respiratory rate, activity, posture, and body impedance. A multi parameter algorithm combining these data with age, gender, height, and weight had a sensitivity of 65%, specificity of 90%, and a false positive rate of 0.7 events per patient year. These devices have demonstrated efficacy in predicting an acute decompensated HF event (Anand et al., 2011, 2012). The SwellFit™ wearable ankle sensor is an external device that records data indicating ankle edema, a physical symptom (albeit it a late symptom) of worsening HF (Kim, Iravantchi, Gajos, & Grosz, B., 2017).

All internal and external telemonitoring devices are tools used for day-to-day assessment of patients with HF; again, a health care professional is needed to interpret the data and provide feedback to the patient. Detection of parameters that may indicate decompensation can be used to help avoid hospital readmissions, but not every patient has access to these programs and/or devices. Patients may not meet the physiologic parameters mandated by CMS for reimbursement of the device cost and others may not live in a geographic area where the external devices are available. Even when available, evidence indicates that the most sophisticated data collection techniques must still be paired with personal communication with the patient regarding results and treatment recommendations. Visiting the patient in the home environment is another way that helps establish these relationships, increase communication, and identify and decrease barriers to HF self-care.

Discharge Education and Home Visits

Many studies have demonstrated decreased 30 to 90-day readmissions if the intervention included a visit to the patient's home. A RCT of 282 patients discharged with HF and at high risk for hospital readmission showed promising results over the 90-day follow-up. This nurse-directed multidisciplinary intervention included HF education by a specialized cardiovascular nurse, dietary assessment and teaching by a registered dietitian, discharge planning by social service, and a medication analysis by a geriatric cardiologist. The IG received this multidisciplinary education prior to discharge. The IG also received home care, with additional home visits and telephone calls from the multidisciplinary team. The CG received standard care and treatment from their primary care provider (PCP.)

Over 90 days, 29% of the IG and 42% of the CG had at least one hospital readmission. In the IG, there were 24 readmissions for HF, compared with 54 in the CG. And although both groups showed improvement in quality of life in four subscales measuring dyspnea, fatigue, emotional function, and environmental mastery, the IG demonstrated a significantly greater increase than the CG (22.1±20.8 vs. 11.3±16.4, p = 0.001). One limitation in this study was that although over 1300 patients met inclusion criteria, only 282 (22%) were randomized. This group had a median age of 79 years, most had hypertension and moderate functional impairment, as well as a normal ejection fraction. Characteristics of the randomized cohort may affect generalizability of the study results. Another limitation was that having the multidisciplinary team made it difficult to determine which elements (nursing education and follow-up, dietary education, social service planning, or medication consultation) of the intervention were most important in reducing readmissions and improving quality of life. This may be a consideration for future studies when deciding which members of the multidisciplinary team should be included. Although this study is dated, it is notable in its support for the principles of comprehensive guideline-directed post-hospital follow-up, which has not changed significantly. (Rich et al., 1995; Hassan, 2016, Jonkman et.al. 2016).

The effect of multidisciplinary home visits on readmissions of patients with HF has been the focus of other studies. A RCT (*N* = 97) conducted in Australia implemented an intervention with a nurse and a pharmacist for one structured home visit 7 to 14 days after discharge. The intervention consisted of a physical exam and a review of knowledge of and adherence to the treatment plan, and an assessment of social support. The nurse coordinated the patient's management and provided a link to physicians as needed. The role of the pharmacist was not described, although it can be assumed it entailed medication reconciliation and education. The researchers from this study conducted a second study (*N* = 200) utilizing a trained cardiac nurse without the pharmacist to cover the same topics. Results of both studies were merged and demonstrated a significant decrease in hospitalizations (CG: 29%, IG: 17%, *p*=.05) and increased survival over a median of 4.2 years (IG 40 months survival vs. CG 22 months survival, *p*=.05) A pivotal role in both studies was the nurse, who coordinated care by connecting the patient to appropriate health care resources when needed. There was no significant difference in the results with or without the pharmacist, which supports the comprehensive role of nurses in transitional care of patients with HF, especially when considering the cost effectiveness of the interventions (Stewart & Horowitz, 2002).

In a small evidence-based project, the *Heart Failure Self-care to Success* program, the researchers evaluated a sample of 18 participants, 65 years and older, with a diagnosis of HF. Advanced-practice nurses (APNs) in the Midwestern U.S. used measures of cognitive and functional status to identify patients with the motivation and ability to perform self-care activities. The APNs delivered the self-care content and educational materials to the patients during an initial home visit and continued to visit and stay in contact for six months. The average number of HF hospital admissions in a six-month period before the program was 1.39 (SD 1.539). None of the study participants were readmitted for HF during the six-month program intervention. Following the completion of the project, paired t-tests revealed significant improvement in pre and post-test scores of HF self-care maintenance (5.737, 95% CI: 25.5-11.7), management (4.95, 95% CI: 54.6-15.3), and confidence (6.96, 95% CI: 43.1-23.0). While this was not a research project, it does provide findings that can be used in designing real-world programs. Although the cost of this program was not defined, it can be assumed that care by an APN would be greater than traditional RN home health care (Bryant & Gaspar, 2014).

One of the most notable studies of transitional care of patients with HF involved the use of APNs at six Philadelphia hospitals to provide discharge education and home visits (Naylor et al., 2004; Vedel & Khanassov, 2015). A RCT (*N* = 239, CG=121, IG=118) of older adults admitted with heart failure had a proactive protocol; the APNs visited the patient in the hospital within 24 hours of admission, and then daily until discharge during the index hospitalization. The APNs then saw the patients in the home within 24 hours of discharge, followed by weekly visits for a month, and then bimonthly for two more months, and were then available by telephone seven days per week (8 am to 8 pm on weekdays, 8 am to noon on weekends.) The participating APNs had a two-month training program on early recognition and guideline-directed treatment of acute HF episodes, educational and behavioral strategies for home care, with access to the multidisciplinary teaching team members for consultation as appropriate. This teaching team was comprised of a geropsychiatric clinical nurse specialist, pharmacist, nutritionist, social worker, physical therapist, and board-certified cardiologist specializing in heart failure. Participants were followed at regular intervals, and at one year, fewer IG patients were rehospitalized than CG patients (47.5% vs. 61.2%, $p = .01$). The investigators stressed the importance of the continuity of care provided by the same APN, who visited the patient daily in the hospital, coordinated the patient's hospital discharge plan and was able to address the complex needs of patients with a average of six comorbidities. The direct costs of this APN intervention were higher ($115,856) than that of routine home visit care ($64,531). The cost was attributed to the higher APN salaries, as well as the interdisciplinary HF experts utilized in the extensive pre-intervention training of the APNs. Although this was an effective intervention to decrease readmissions, the cost is almost prohibitive in today's health care environment.

Even more cost prohibitive was the use of a Transitionalist, a board-certified family medicine physician with specialized training in HF management who visited patients at home. A retrospective case study chart review of 73 participants enrolled in the Heart Failure Transitional Care Program evaluated hospital admission frequency before and after the program. This study was unique in that the Transitionalist physician made the home visits, surveyed the food in the participant's pantry for sodium content, called each participant one to five times weekly, and was available to them 24/7 via his cell phone. The investigators noted that the Transitionalist built trust with the patients by meeting them in the hospital prior to discharge and then seeing them within 72 hours of discharge. Trust and relationship may be an essential aspect of care that has not been studied. The Transitionalist also provided “patient-specific HF management education to identify ways to break frequent readmission cycles” (p. 340). HF readmissions within 30 days decreased from 26% to 4.1% ($p < 0.001$) and all-cause readmissions decreased from 28.8% to 8.2% ($p =0.002$). The authors report that the labor-intensive task of managing all telephone calls over 90 days may not be practical for most physicians. Another limitation is that although the Transitionalist was a salaried employee of the hospital, an in-depth cost analysis was not completed, so the true cost of the program is unknown. However, considering the salary difference between a nurse and a physician, it can be speculated that although this may be promising intervention, it is not practical in a real-world setting. (Ota, Beutler, Gerkin, Weiss, & Loli, 2013)

While it may not be cost-effective for a physician to make home visits, the ability to adjust medications during home visit assessment was an advantage noted in a RCT conducted in England. In a study of 165 participants admitted with HF, planned home visits and telephone contact by nurses were provided to the IG for up to a year after discharge. The nurse intervention for the IG (n = 84) was education about HF and treatment, monitoring of fluid status and lab results, and instruction in self-care and early symptom recognition. The nurses in this study could adjust medication (diuretics, ACE inhibitors and digoxin, within predefined limits) without medical consultation. The planned home visits decreased in frequency and were supplemented by telephone contact as needed. The CG (*n* = 81) was managed as usual by the admitting physician and by the general practitioner after discharge. Although there was no demonstrated difference in survival at one year (death rates 30% IG, 31% CG, *p* = .81) there was a significant difference in readmissions for HF at one year. Readmissions for worsening heart failure were 62 percent less for the patients receiving the nurse intervention as compared to those receiving usual care (14% IG, 32% CG, *p* = .004; 95% CI, 0.38 [0.19 to 0.76]). The authors suggest the home visit is an essential element to reduce readmissions because it provides regular and personal contact to educate patients, review treatment, and the ability to engage in self-care (Blue et al., 2001). Although dated, this study is significant in that it included physician-approved medication protocols that nurses could adjust based on patient symptoms and assessment, making this a cost-effective intervention.

Self-care Interventions

Most interventional studies to promote self-care use either an educational program alone or an educational program with support after the patient transitions home. Outcome measures can vary from readmissions to self-care knowledge, abilities, behaviors and quality of life. In all of the following studies, nurses provided the education and intervention.

A RCT of 179 participants admitted to the hospital with severe HF (NYHA III or IV), examined the effect of nursing education and support received in the hospital and then after discharge at home. The IG received four visits in the hospital, one telephone call within a week of discharge, and one home visit. Educational topics included sodium restriction, fluid balance, and recognition of worsening symptoms. Patients could call the nurse before the home visit if they had any problems or questions; after the visit, patients were instructed to call their physician or go to the ED. The CG received usual care, which was education about medication and lifestyle provided by the physician or nurse, depending on their individual insight or expertise. Usual care did not include the structured educational program, telephone calls or home visit. Patients were evaluated post-intervention for their self-care abilities, behaviors, and quality of life (QOL). Although self-care abilities did not demonstrate a change, self-care behaviors at one and three months did demonstrate a change. Compliance with 19 possible self-care behaviors was higher in the IG at one and three months (12.2 vs. 10.6, t=2.9, $p<0.05$). At baseline, average self-care behavior compliance score was nine out of possible 19 items. At one month after discharge, IG scores increased to 14 of 19, and the CG scored 12 of 19 (t = 3.8, p = .001), and at three months, IG scores were 12.2 of 19, and CG scores were 10.6 of 19 (t = 2.9, p = .05.) The effect of the intervention on QOL was limited, although the authors noted that in patients who are severely ill (NYHA III or IV), QOL may be difficult to conceptualize and may not improve. The authors also noted that any efforts to improve QOL must be tailored to the individual needs of each patient, especially in the areas of psychosocial adjustment and improving functional status (Jaarsma, et al., 2000). Although hospital readmission was not a measured outcome in this study, the self-care abilities and QOL results are important to consider. Including only one home visit may not have been sufficient to evaluate how the patient was coping with HF in the home environment. Other educational and self-care needs may only be revealed by repeated visits to the patient's home. Many different types of home HF educational materials may be provided for the patients after discharge.

A pilot study in Australia (Boyde et al., 2012) tested a specialized HF educational manual and DVD using a convenience sample of 38 participants enrolled in a HF management program. Measured outcomes were HF knowledge and self-care behaviors. Participants in a focus group viewed a DVD that demonstrated self-care activities through role-modeling in seven scenes, then each participant took the DVD and educational manual home. Participants were instructed by the study nurse to focus on one section of the manual each week (about HF, symptoms, self-care, medicines, diet, physical activity, feelings, and outlook) and review the multiple-choice questions and answers for each section. Participants self-reported their completion of the learning activities in the manual and returned for a final session after eight weeks. This one-group pre-post design tested changes in HF knowledge and self-care after the eight-week intervention.

Reading comprehension was important to evaluate since the participants were using the self-study manual at home. A valid and reliable measure of health literacy and healthcare reading comprehension is the Test of Functional Health Literacy in Adults, Short version (S-TOFHLA). S-TOFHLA average raw scores were 22.2 ± 14.55 with 36.8% of the participants having inadequate/marginal health literacy. Eight of the twelve patients aged 75 or older had inadequate/marginal health literacy. Although this is not an outcome measure, it is a key factor associated with poor self-care and increased hospital admissions (Dennison et al., 2011). The role-modeling portrayed in the DVD was helpful in both HF knowledge and HF self-care for the 21% of patients with low health literacy. HF knowledge was assessed by the Dutch Heart Failure Knowledge Scale (DHFKS).

The mean difference between the pre- and post-test knowledge scores was 1.61 ± 2.2 (95% CI, 0.866 to 2.344, $p = 0.007$). Self-care was assessed by the Self-Care of Heart Failure Index (SCHFI). The difference between the pre- and post-test score means for the three subscales of self-care was maintenance 5.88 ± 15.72 (95% CI, 0.710 to 11.043); management 16.56 ± 22.48 (95% CI, 8.456 to 24.669); and confidence 6.58 ± 20.14 (95% CI, 0.037 to 13.21).

A limitation of this one-group, pre-post study was that improvement in knowledge and self-care may have been due to other sources or even usual care. A second limitation is that viewing the DVD in the home environment may have helped increase the HF knowledge and promote behavior change, but that change may not be sustainable over time. In part, this may be due to the challenges of incorporating self-care into day-to-day living. Of note, there were no personal home visits in this intervention.

Another study examining HF self-care in the home focused on family support. The variability of family involvement related to self-care was investigated in patients with HF. The authors of a RCT conducted in Massachusetts randomized 117 dyads to usual care (UC), family education (FE), or family partnership (FP) groups. The UC group received only written materials. The FE group received the written materials plus two educational sessions with a nurse and dietitian, and a telephone call at four months. The FP group received all of the above, plus two sessions on how to support each other’s roles, problem-solve, and promote confidence in managing HF. The FP participants significantly improved confidence scores for medication and dietary adherence as measured by the Perceived Confidence Scale, a seven-point Likert scale (72% pre/90.6% post; $p=0.05$; ES=0.24. Cronbach’s alpha for medication confidence was 0.93 and for diet 0.95). Those identified as having greater family functioning had higher confidence for medication adherence. Level of family functioning was identified as an important element in confidence and motivation for HF self-care, and understanding overall family situations may provide insight for further HF education and counseling. Limitations of this study included participant attrition, which reduced power of findings at eight months, and the selection of only one other family member for dyad participation. Although evaluating one family member may not have revealed the entire family context, the authors felt it was important to speak to the person most involved in the care of the patient. Regardless of who is doing the intervention, committed family involvement in the home is crucial (Stamp et al, 2015). This study supports the critical role of family/caregiver involvement in the home, which is also one of the goals of the HFNN intervention.

While family involvement is an important component of HF self-care, patients may still have difficulty incorporating these behaviors into everyday life. Providing education and self-care instruction may not result in compliance. The Atlanta Cardiomyopathy Consortium examined adherence to eight specific self-care recommendations in a prospective cohort study of 308 adult (≥18 years) participants in HF clinics from three university-affiliated hospitals. Nurses provided self-care education at the HF clinic initially and at subsequent appointments; nurses did not make home visits. Participants also watched a self-care video with their family members and received printed written instructions at the initial visit. Participants were followed every six months for two years. Participants self-reported adherence to self-care instructions was measured using a 0-5 Likert scale on the Medical Outcomes Study Specific

Adherence Scale (MOS-SAS) for each of eight areas: exercise, alcohol, medications, smoking, weight, diet, and symptoms. The MOS-SAS is an 8-item questionnaire that has demonstrated adequate validity and reliability in measuring adherence in HF. Scores of four (most of the time) or five (all of the time) were combined and considered adherent for each question, defining "good adherence" as at least 80 percent overall. Less than 10 percent of participants scored well in all areas. The only correlations to good adherence were age and education level. The best scores were in adherence to medication instructions and symptom monitoring, and the lowest scores were for exercise. Good adherence was associated with decreased hospitalizations (all-cause 87.8 vs. 107.6; P=0.018; HF 29.6 vs. 43.8; $p = 0.007$), as well as improved overall health status. One limitation of this study was that patient adherence was measured only by self-report. Self-care often involves changing patient behaviors, and the authors suggest that future research should include the development of patient skills along with family involvement and support (Marti et al., 2012). This study was based in a comprehensive HF management clinic, and although not available to all populations, it is a significant method of post-discharge follow-up and will now be explored.

The Heart Failure Clinic

HF clinics grew out of disease management programs in the 1990's as a response to increasing readmissions and the poor prognosis associated with this diagnosis (Jaarsma & Stromberg, 2014). The purpose of a HF clinic is to provide a continuum of care in the outpatient setting, managing both acute and chronic HF (Kim & Han, 2013). This has been demonstrated to be an effective management strategy, but not always available or feasible for every patient.

The Heart Failure Society of America released a consensus statement regarding recommendations for outpatient HF clinics. This statement outlined the components of a HF clinic in the following domains: disease management, functional assessment, quality of life, medications, devices, nutrition, follow-up, and advanced planning. The goals of a HF clinic are to reduce mortality and readmissions and improve patient's quality of life (Hauptman et al., 2008)

Many published studies and reviews worldwide have concluded that nurse-directed HF clinics can help reduce readmissions and emergency room visits for both men and women. The focus of this evidence was on optimizing medical therapy, patient and caregiver education, and promotion of self-care (Gustafsson & Arnold, 2004; Ducharme, Doyon, White, Rouleau, & Brophy, 2005; Feldman et al., 2011; Thomas, et al., 2013). In a correlational, descriptive study of 80 participants at a nurse-managed HF clinic, subjects completed a quality of life measure, using the SF-12 survey. The SF-12 survey is a short form developed for the Medical Outcomes Study (MOS), a multi-year study of patients with chronic diseases. The SF-12 was demonstrated to be a robust and adequate substitute for the longer 36-item quality of life measure (Melville, Lari, Brown, Young, & Gray, 2003). Data collected at baseline, six, and twelve months indicated a quality of life benefit from the disease management program offered at the HF clinic. The small sample size and lack of randomization limited generalization. (Travis, Hardin, Benton, Austin, & Norris, 2012)

Unfortunately, there are many areas in which HF clinics are geographically unavailable to patients. The WHICH trial (“Which Heart failure Intervention is most Cost-effective & consumer friendly in reducing Hospital care”) was a unique study comparing management of HF in a clinic or in the home. Both approaches were nurse-led and multidisciplinary. In this multicenter RCT of 280 participants hospitalized with HF in Australia, the same components of care (discharge planning and education, optimum medication strategies, exercise and diet) were provided; the difference was the delivery location (*n*=140 each in the HF Clinic or HF Home care group). Although there was no difference in all-cause death or hospitalization during 12 to 18 month follow-up, the home participants were hospitalized for fewer days (average 4 days vs. 6 days; -35%; $p = 0.003$), which helped decrease health care costs ($AU 3.93 million vs. $AU 5.53 million (Stewart et al, 2012). This may suggest that care in the patient's home environment promotes improved self-care.

Putting it all Together: Systematic Reviews of Transitional Care Interventions

A systematic review and meta-analysis of 47 transitional care intervention RCTs was sponsored by the Agency for Healthcare Research and Quality (AHRQ). Interventions such as home visits, structured telephone support, telemonitoring, outpatient HF clinics, and patient education programs (either before and/or after discharge) were grouped and analyzed. Two reviewers independently selected RCTs to compare efficacy and harms of transitional care interventions occurring within six months of index hospitalization. Most trials compared transitional care interventions with usual care, defined as “standard discharge instructions” or follow-up with outpatient provider as usual. In the majority of studies, home visits (RR 0.75, 95% CI) and HF clinics (RR 0.70, 95% CI) led to reduced all-cause readmissions in the six months after index hospitalization. Structured telephone support reduced HF readmissions (RR 0.74, 95% CI) but there was insufficient evidence for a reduction in all-cause readmissions.

All three interventions reduced mortality. Neither telemonitoring, nor primarily educational support reduced readmission or mortality. A limitation was that few studies reported 30-day readmissions; most reported this data at 3-6 months after discharge. (Feltner, et al., 2014) This analysis again suggests the human connection, whether in person or on the telephone, is an important element in reducing hospital readmissions for HF.

One of the most comprehensive reviews of evidence-based strategies to reduce HF readmissions examined nine RCTs, six systematic reviews, and four observational studies, many of which have been mentioned in this paper. The authors asserted that there are many factors influencing HF readmissions. Those include lack of patient self-care, inadequate discharge preparation, provider miscommunication, and delayed discharge follow-up. The authors also observed that despite the best evidence-based interventions, several gaps remain between evidence, policy, and practice.   Discharge education in the hospital, immediate follow-up with a provider and a smooth transition home were seen as the most effective interventions. Noted limitations in the literature reviewed included the wide variety of disease management interventions and personnel, making generalizability difficult. In the outpatient setting, the best comprehensive approach included in-person contact with clinicians, close telephone follow-up, and self-care education and support (Kim & Han, 2013), once again, supporting the need for personal contact.

An integrative review of 20 transitional care programs for patients with heart failure synthesized results for readmissions, cost-effectiveness, and patient-reported quality of life. Inpatient education by nursing staff, care coordination of outpatient services including home and office visits, and structured telephone calls were included interventions. Studies were rated as high-intensity interventions if the patient encounters occurred at least once per week. Studies that had significant success in reducing readmissions included “intensive, tailored multidisciplinary nurse-led inpatient education and home care within 72 hours after discharge.” (Stamp, Machado, & Allen, 2014, p. 143). Six of the 20 studies reviewed measured the effect of a transitional care intervention on quality of life, and five of the six demonstrated improvement. The review suggested a relationship between self-care and control of chronic HF symptoms, which can greatly affect quality of life. The review further suggested that home visits alone or home visits combined with telephone contact may be the most effective transition strategy, but more research is needed to link sustainable programs with cost reduction (Stamp et al., 2014). The HFNN study incorporated these successful components but provided the home health RN with knowledge and tools to address areas usually covered by the other disciplines (pharmacists, dietitians, case management), to decrease cost without negatively impacting outcomes.

In a comprehensive systematic review of RCTs specifically investigating self-management programs, 19 studies were included. Patient education was the main component of self-management in all the included studies, reviewing signs and symptoms, lifestyle changes, and adherence to treatment recommendations. Although the findings in these various studies did not always achieve statistical significance, there was a generally positive effect on all cause and HF readmissions, a decrease in mortality, and an improved quality of life. The authors noted, "methodological shortcomings which impaired validation of the effectiveness of self-management programs." (p. 313). Some of these shortcomings were a lack of uniformity of self-management content and a lack of blinding. Variable self-management content made the comparisons challenging; each program had many components and it was difficult to link outcomes to single interventions. Blinding can be difficult in self-management interventions, as both the patient and caregiver know they are receiving the treatment. This can lead to outcome measures having an overestimated effect. The authors recommend future self-care studies in specific populations, such as cognitive impairment, psychological disease or multiple comorbidities. Participants in this study all had between one and five comorbidities, with most patients having two or three. (Ditewig, Blok, Havers, Veenendaal, 2010). Comparatively, the study population of older adults with HF frequently have diabetes, renal insufficiency, COPD, and/or other comorbidities, suggesting them as an appropriate group to receive teaching on self-care strategies.

The many components for effective transitional programs were evidenced in a recent systematic review of existing transitional-care models to reduce heart failure readmissions (Albert, 2016). Some of the strategies include planning for discharge, utilizing a team approach, clear transition documentation, medication clarity, social support, and management of worsening symptoms. Spending time with the patient to gauge their understanding and needs was an important first step in self-care engagement. Future research recommendations included further examination of these components (both singly and bundled) to determine best practices.

Chronic Illness Transitions Programs

There have been studies evaluating transitional care programs for other chronic illnesses, and some have demonstrated success. Although not specific to HF, some of these studies will be reviewed here, as components of their protocols may be applicable to this investigation.

The Care Transitions Intervention (CTI) is a four-week program of visits and telephone calls with a transition coach (a nurse, social worker, or trained volunteer) to assist patients in the four “pillars” of medication self-management, use of a patient-centered health record, making and keeping primary care provider (PCP) appointments, and knowledge of “red flags” indicating worsening condition and how to respond. The transition coach collaborates with the patient and other providers to facilitate communication and encourage self-care (Coleman et al., 2004, p. 1818).

The experiences of 32 participants with chronic illness with a nurse as a Transition Coach (the Care Transitions Intervention) were the subject of a qualitative descriptive design study (Parry, Kramer, & Coleman, 2006). Patients that had participated in the CTI were invited to participate in a one-hour individual or focus group interview 30 to 45 days after the intervention was completed. The intervention consisted of a nurse interacting with the patients during the index hospital visit, one home visit within 72 hours, and three follow-up phone calls to support patient understanding/action in each of the four pillars. Patients were asked about their specific experiences with the CTI as well as more broad open-ended questions. Interview responses indicated that the coach’s caring rapport and interest were as important as their knowledge and competence. Over half of respondents specifically mentioned that face-to-face contact increased their confidence to ask questions and share concerns. Patients relayed that the continuity and direction at each stage of the care transition increased their self-management knowledge and application, and this was related to the perception of a caring relationship between the patient and coach.

Another program utilizing a nurse in a role similar to a navigator is the REengineered Discharge Program or Project RED. This project contains a program of interdisciplinary discharge services designed to decrease emergency department (ED) visits and hospitalizations within 30 days of discharge. In an RCT of 749 hospitalized adult participants, the intervention group (IG, *n*=373) met with a nurse discharge advocate for individualized disease-specific discharge instructions, medication reconciliation confirmation, and to make a follow-up physician appointment. An after-hospital care plan was created for each patient and reviewed using teach-back technique. Patients were telephoned by a clinical pharmacist 2 to 4 days after discharge to reinforce the medication plan. The patient was asked to bring their medications to the telephone to review and address any problems. The usual care group (UC, *n* = 376) received a primary care physician appointment but no further intervention. Hospitalization utilization events (combined within 30-day ED visits and readmissions) were significantly reduced (IG=31 percent, UC=45 percent, *p* = .009). In the IG, 80 participants had 116 hospital utilizations and in the UC group, 99 participants had 166 hospital utilizations. Limitations included that it was a single-center study with limited research staff enrolling only two or three patients each weekday, so not all potentially eligible patients could be enrolled. Additionally, data on PCP follow-up and hospital visits to other facilities relied on self-report of participants (Jack et al., 2009).

One model of interdisciplinary team care for older adults with numerous comorbidities is the Guided Care Program (Boult et al, 2011). This comprehensive plan includes tools for geriatric physical assessment, evidence-based planning, case management, transitional care, and caregiver support. A guided care nurse assesses patients with multiple, chronic conditions, creates an electronic medical information communication tool called a “Care Guide”, and coordinates all aspects of the patient’s care. This model is an application of the patient-centered medical home, a collaborative multidisciplinary team that cares for a prescribed group of patients. In this study, an insurance claims-predictive model identified 850 older adults who were at high risk for using health-care services. This group was followed for six to eight months in a cluster RCT (*n*=446 IG, *n*=404 CG). RNs who had completed a Guided Care course collaborated with two to five physicians and followed 50 to 60 patients each on an outpatient basis over eight months. Intervention group care included one home visit for a comprehensive home assessment, use of an evidence-based care guide, a patient/family action plan, monthly monitoring, assistance with transitions of care, and education and motivation for self-management. Coaching using motivational interviewing identified patient preferences and encouraged healthy behaviors (Boyd et al., 2007). Control group patients received usual care from their primary care provider. Despite the comprehensive resources devoted to this intervention, the only significant difference between the IG and CG was a 29.7% reduction in home health care episodes in the IG guided care group. Limitations noted by the authors included possible selection bias, which promoted greater participation by healthier persons, and concerns that the 20-month follow-up may have been too short to detect medium to long-term effects of the intervention, such as vascular complications of diabetes. There was also concern that in maintaining a 50 to 60-person caseload and providing only one home visit, a meaningful personal relationship with the nurse and patient may not have been possible.

Project BOOST (Better Outcomes for Older adults through Safe Transitions) is a quality improvement program initiated by the Society of Hospital Medicine in 2008. Using tools to assess patient knowledge and deliver discharge education, a multidisciplinary team sought to decrease length of stay, reduce 30-day readmission rates and improve patient satisfaction, as measured by Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. Toolkits were available for common chronic disease diagnoses. These included a readmission risk assessment and a structured discharge process including teach-back technique and scheduled follow-up appointments. Eleven hospitals used Project BOOST recommended tools and were advised by an external quality improvement physician mentor. This semi-controlled pre-post study demonstrated a 2% decrease in readmissions (14.7% pre vs. 12% post 12 months later [$p = 0.010$]). Patient satisfaction was not reported (Hansen et al., 2013, Askren-Gonzalez & Frater, 2012). Home visits were not part of this project, and although the structured discharge process was commendable, it is not a substitute for assessing the patient in the home environment.

The State Action on Avoidable Rehospitalizations (STAAR) Program, a multi-state quality improvement initiative of the Institute for Healthcare Improvement aspires to reduce readmissions, improve care quality, and coordinate care between providers and care locations. Working with many different organizations, there are tools provided to assess post discharge needs, improve patient education, provider communication, and follow-up care. The STAAR program intends to bridge the gaps when patients transition through different care settings (Boutwell, Jencks, Neilsen, & Rutherford, 2009). Both the BOOST and STAAR programs include multidisciplinary teams with roles suitable for nurse navigators and case managers.

The American College of Cardiology and the Institute for Healthcare Improvement offers several quality improvement programs for institutions designed to improve transitions from hospital to home for patients with HF and decrease the risk of federal readmission penalties. Hospital to Home (cvquality.acc.org) advocates "See you in 7," to assure timely physician follow-up, "Mind your Meds," for medication understanding and adherence, and "Signs & Symptoms," so patients know what to do if their symptoms worsen. Cox, Cunningham, and DiSalvo (2011) adapted this strategy with an interprofessional discharge teaching plan piloted for 56 patients. HF symptom recognition was taught by a nurse, home medications were reviewed by a pharmacist, a dietitian gave tips on sodium and fluid restrictions, and a case manager interviewed patients to identify and resolve barriers to discharge plan. The institution's readmission rate for the previous 3 years was 26.1%; for the pilot group, it was reduced to 14.2% (p = .03). Home visits were not part of this initiative, so patients' assimilation of the educational information in their home environment was not assessed. The main limitation was the small population; the authors recommend future research to confirm preliminary results, making this an important area on which to focus research efforts.

Summary

In this chapter, studies investigating different modalities of HF care were presented, along with their significance in reducing hospital admissions and improving self-care and quality of life. Discharge education was consistently helpful, especially when initiated during the course of the hospital stay.   Also important was personal contact with the patient within 24 to 72 hours after discharge. There were many approaches to follow-up after that point. Regular telephone contact was helpful, but automated-response telemonitoring was not. Multidisciplinary post-discharge care by pharmacists and nurses in the home, or in outpatient HF clinics was noted to be an effective intervention to decrease readmissions. Yet registered nurses alone were able to effectively communicate the medication education content without any change in readmission outcome. Family, caregiver, and/or significant other involvement was an important component of any successful education and transition plan. Wireless physiologic monitoring can provide fluid status information to practitioners before patients have symptoms, allowing practitioners to address the problem early and avoid an ED visit or hospital admission; unfortunately, cost and/or availability prohibits many patients access to either the devices or the monitoring.

The most consistently beneficial intervention was the regular and personal contact of the home visit, as noted in individual RCTs as well as systematic reviews and meta-analyses. The theoretical basis for the home visit intervention can be found in caring science, in which the nurse comes to know the person seeking nursing as a caring person Boykin & Schoenofer, 2001). Any actions by the nurse are intended to nurture this caring relationship. Initiating the home-visit relationship while the patient was still in the hospital, and retaining the same nurse for each visit to provide continuity of care was discussed as a way to build trust between the patient and the nurse and gain insight into patient needs. In some of the studies, the visits were made by an APN or a physician.

Cost is a serious consideration when choosing the appropriate health care provider to carry out the transitional care of HF discharge education and home visits.

HF is increasing in prevalence and continues to be one of the most frequent reasons for hospital readmissions. The European Society of Cardiology identified early rehospitalization prevention strategies as a continued gap in evidence to be addressed in future clinical research (Ponikowski et al, 2016). Although many research studies and quality improvement projects have demonstrated effective interventions, the lack of a comprehensive pathway of transitional care, one that is successful across multiple economic and demographic populations, cost effective, practical, and sustainable has yet to be established.

The HFNN may be the answer. The HFNN can fill all these roles, beginning discharge teaching in the hospital, contacting the patient within 24 hours, visiting the patient in the home within 24 to 72 hours, and observing in-person how the patient and caregiver is implementing the plan of care once they are home. Experienced home health nurses are already comfortable caring for patients in their home environment. Their assessment and intervention skillset can be enhanced with additional education in the pathophysiology of and care for patients with HF. The HFNN can assure follow-up physician appointments are made and kept, can clarify and monitor medication issues, refer to community resources as needed, provide HF self-care education and monitoring on an individual basis, and most importantly, empower that patient to reach the goal of self-care. The HFNN is the person behind the plan, the primary resource and contact for patients facing a prescribed lifestyle change, and the one to establish a supportive, caring relationship, remove the barriers, and smooth the path for a successful transition home.

In this RCT, the effect of the HFNN on hospital readmissions, HF knowledge, HF self-care, and HF quality of life will be studied. Additionally, the perceptions of the patients who receive the HFNN intervention will be analyzed to further delineate the role and inform future research.

CHAPTER 3: METHODS

Introduction

Older adults with heart failure have a high risk for 30-day hospital readmission as they transition from the hospital to home, despite implementation of multiple modalities aimed at improving care transitions. It was hypothesized a Heart Failure Nurse Navigator (HHNN) would be an effective intervention to address the gap in supporting evidence aimed at decreasing 30-day hospital readmissions and urgent ED visits. The HFNN provided education and support with the goal of increasing participants' knowledge regarding management of HF and the ability to engage in self-care activities. It is speculated that if older adults engage in self-care of HF, they may be less likely to experience worsening of heart failure, less likely to need urgent medical care or hospital readmission, and have improved quality of life.

The purpose of this mixed methods study was to explore the effect of the Heart Failure Nurse Navigator (HFNN) caring for older adults with heart failure transitioning from the hospital to home on knowledge regarding management of HF and the ability to engage in self-care strategies, and the effect on 30-day hospital readmissions and quality of life. In addition, to inform future studies and practice changes, the qualitative aspect of the study was to evaluate the perceptions of older adults who received care from the HFNN. This study was approved by the hospital's research committee and the FAU IRB.

Research Design

Mixed methods is a research design which includes collecting and analyzing data from both quantitative and qualitative sources, for the purpose of gaining a better understanding of the research question. Examining data from multiple perspectives and from both numerical and narrative analysis may lead to conclusions that are complementary or confirmatory. In this design, quantitative and qualitative data “mix” and integrate, providing a more robust analysis (Ivankova, Creswell, & Stick, 2006).

The philosophies underlying quantitative and qualitative research design are quite different. The underlying philosophical assumption in quantitative research is positivism, based on scientific methods and verification of conclusions by experimental testing. Conclusions are reached by deduction, which infers that particular instances follow a general premise. The underlying philosophical assumption in qualitative research is constructivism, based on individual experiences and observations. Conclusions are reached by induction, which infers a general conclusion from particular instances. Since these two methods are philosophically disparate, care must be taken regarding inferences and conclusions based on data from each. (Newman, Newman & Newman, 2010)

The decision in a mixed methods design is how to best utilize the strengths of each method for different yet coordinated purposes within the project. Prioritizing which method will be principal and which will be complementary and how to sequence them depends on how the research questions can best be answered. In this study, the primary research question involved measurable quantitative data such as answers to a Likert scale survey, or number of days from discharge to readmission. The principal quantitative portion was followed by qualitative data collected to help evaluate and interpret the results of the intervention (sequential Quan ➔ Qual design). The principal method was quantitative, with the qualitative interview findings adding resonant observations to the empiric data. The participants who received the intervention were identified for qualitative follow-up interviews. In mixed methods design, the qualitative findings may also elaborate, explain, or confirm the quantitative results. The quantitative findings in this study also helped to inform the content of the interview discussions. The data were then interpreted together with the hope that the qualitative findings yielded an enriched understanding of the quantitative data (Plano Clark & Ivankova, 2016).

In this sequential mixed methods study, the quantitative component was a two-group randomized controlled trial (RCT) with the intervention group (IG) receiving transitional care by the HFNN plus usual care, and the control group (CG) receiving usual care only. Usual care (UC) consisted of transition from the hospital to home with discharge instructions for those with heart failure, delivered by the hospital RN, including information regarding follow-up appointments with primary care provider (PCP) or cardiologist. These discharge instructions also included education integrating the six areas mandated by the Joint Commission for HF (diet, exercise, medications, weight monitoring, worsening symptoms, and follow-up appointments.) Due to staffing constraints and individual accountability, the length of time spent on UC discharge education and the method of delivery varied between participants. Although not ideal in terms of research design, it is the reality of patient discharge preparation, and one of the reasons this study was undertaken.

The second component of this mixed methods design was a qualitative interview with the individuals who received the intervention. This was planned as a series of focus groups to evaluate perceptions of HFNN intervention and ways to improve the HFNN program. This data was collected from participants after the intervention was completed. Although two different focus groups were planned, the participants were unable to attend, so instead the participants responded to semi-structured questions via a telephone interview after the intervention was completed. It was hoped that the findings would reveal important insights into what the participants felt was beneficial after receiving the intervention, and what was not so helpful, allowing the HFNN role to be revised accordingly.

Four home health registered nurses volunteered to be HFNNs and attended six hours of training. In most cases, each HFNN made the initial visit to the patient in the hospital. For four patients, when study enrollment occurred on discharge day, the HFNN was unable to personally visit before discharge. Those patients received a telephone call from the HFNN prior to discharge. All patients were visited at home within 72 hours of discharge, with most being seen within 24 hours of discharge. This was followed by weekly home visits for a total of one month (see Measurement Timeline, Appendix A).

Dependent variable (Outcome): Knowledge regarding management of heart failure, ability to engage in HF self-care behavior, heart failure quality of life, and readmissions within 30-days of hospital discharge

Independent variable (Intervention): Transitional care by HF Nurse Navigator

Confounding variables: Depression, health literacy, functional status and readmission risk

*Initial Instruments i*nclude:

- *Mini-Cog* to assess cognitive impairment for inclusion/exclusion.

- *Demographic information sheet* (DIS) to define the characteristics of the population
- *Geriatric Depression Scale* (GDS) to assess for signs of depression pre and post intervention.
- *Lawton Instrumental Activities of Daily Living Scale* to assess functional status
- *Newest Vital Sign* (NVS) to evaluate health literacy.
- Center for Outcomes Research & Evaluation *(CORE) Readmission Risk Calculator* for readmission risk stratification based on history and comorbidities.

Outcome Instruments include:

- *Dutch HF Knowledge Scale* (DHFKS) to evaluate baseline HF knowledge pre and post intervention.
- *Self-care of HF Index* (SCHFI) to measure HF self-care maintenance, management, and confidence pre and post intervention.
- *Minnesota Living with HF Questionnaire* (MLHFQ) to measure the quality of life pre and post intervention.

Setting and Sample

The setting for this study was a single-site 400-bed, not-for-profit hospital in southeast Florida. From a population of hospitalized older adults 65 and older, with a primary or secondary diagnosis of HF, the plan was for a sample of 76 participants (sig .05; power 80; odds ratio 2.12) to be randomized into the IG or CG. Due to recruitment challenges and the possible influence of a larger competing study with the same population, the sample was limited to 40 participants. The selected population was identified by a daily report generated by the Quality Management department of the hospital. This report lists potential participants who have HF as an admitting diagnosis, as well as other indicators of HF (elevated pro-BNP, radiology reports, diuretic use). Charge nurses on each patient care unit received these reports daily and used them to identify potential participants who meet inclusion criteria. The investigator, who is a clinical educator at this site, also reviewed these daily reports and collaborated with the charge or primary nurse to determine if the patient met inclusion criteria.

Once potential participants were identified, the charge nurse or primary nurse provided the patient and family with a Fact Sheet (Appendix D) about the study that included frequently asked questions. The Fact Sheet informed the potential participants that their inpatient nursing care would not be affected by their decision not to participate and that they could withdraw at any time. If the individual was interested in learning more about the study, the charge nurse or primary nurse notified the investigator.

The investigator met with each potential participant prior to discharge. All potential participants were screened for cognitive impairment using the Mini-Cog to determine inclusion. The Mini-Cog is a screening tool for cognitive impairment and dementia. It is a 3-item word-learning and recall task (score 0-3), with a simple clock-drawing task (score 0-2) as a distractor before the word recall. A total score of 3-5 is negative for dementia, although requiring a score of 4-5 may increase detection of mild cognitive impairment (Ismail, Rajji, & Shulman, 2010). In a cross-sectional comparison of the Mini-Cog to the Mini-Mental State Examination (MMSE) in a sample of 371 heterogeneous older adults, both instruments correctly identified cognitive impairment. The Mini-Cog had a sensitivity of 76% and a specificity of 89%, and an interrater reliability of 95% (Borson, Scanlan, & Watanabe, 2005). To be included in this study, patients and/or caregivers had at least a score of ≥ 3 on a five-point scale for the Mini-Cog exam.

The investigator obtained informed consent if the participant met inclusion criteria (Appendix B). Any conditions that may have interfered with the participant's ability to engage in self-care activities excluded the participant from the study, such as (but not limited to) the following

- Unable or unwilling to provide informed consent
- Prior stroke with residual cognitive impairment or traumatic brain injury
- Inability to participate in pre/post testing: (Inability to communicate verbally, non-English-speaking, severe and uncorrected hearing loss, or diagnosis of dementia.)

Once informed consent was obtained, pre-intervention data collection began prior to discharge. Participants #01 through #40 were then randomly assigned to the IG or CG, using a table of random digits. Neither the participant nor the members of the study team (investigator and HFNNs) were aware of the participant's group assignment until after randomization.

Preparation of the HFNN

The HFNNs were chosen from a pool of home health nurses employed by the hospital. The HFNNs had an interest in cardiac nursing and at least two years of experience in home health nursing. The rationale for the home health experience requirement is that assessing a person in his or her own home calls for a specific skill set, communication style, and comfort level in varied environments. The experience requirement of two years was selected based on Benner's (1984) description of clinical competency, i.e. that efficient, coordinated care demonstrating clinical competence in a particular situation takes two to three years to develop.

The HFNNs were trained in the study protocol and use of instruments, as well as a baseline curriculum in nursing care of older adults with heart failure over the course of three 2-hour sessions. The training incorporated the Certified Heart Failure Nursing Core Curriculum (Appendix C) and included a 20-question exam after the class, to validate knowledge. The investigator conducting this study had regular telephone and in-person meetings with the HFNNs, which involved discussions about the care of individuals with heart failure.

Compensation for the hourly wages of the HFNNs was coordinated through the hospital's department of Population Health and provided by the hospital's foundation. One of the goals of the hospital's community health needs assessment was to decrease Emergency Department (ED) visits. Since most of the unplanned readmissions for HF originate with an ED visit, this goal was well aligned with the topic of this research. Meticulous records of each patient visit were maintained; time and travel was paid according to the usual rates for the home health nurses.

Instrumentation

Several valid and reliable tools were used in this study (Appendix E). Demographic information was collected during the initial contact in the hospital. The EMR was the source of medical history, medication reconciliation, and plan of care. Baseline instruments included measurement of confounding variables of depression, health literacy, and readmission risk (will be described later). The Dutch Heart Failure Knowledge Scale, the Self-care of Heart Failure Index, and the Minnesota Living with

Heart Failure Quality of life Questionnaire were all completed at baseline before hospital discharge by the investigator. Intervention group participants completed the same instruments at one-month post discharge during the fourth home visit with the HFNN. Control group participants received the instruments by mail one-month post discharge, along with a short questionnaire regarding possible ED visits/rehospitalization.

Measurement: Confounding Variables

Newest Vital Sign: Health Literacy

Health literacy is the ability of patients to understand and process health information, allowing them to make appropriate health decisions. Participants with limited health literacy are at higher risk for poor health outcomes (Powers, Trinh, & Bosworth, 2010). Health literacy is a confounding variable that may influence the ability of the participant with HF to incorporate appropriate self-care activities into their daily life at home.

The Newest Vital Sign (NVS) is a screening tool to identify participants at risk for low health literacy. It is a six-question multiple-choice exam in which participants answer questions about a nutrition label from a pint of ice cream. A score of 4 to 6 almost always indicates health literacy is adequate, with 100% sensitivity and 64% specificity. Cronbach’s alpha = 0.76 in English (Mancuso, 2009). The NVS was administered to all potential participants; those with a score below 4 would be considered to have limited health literacy, but would not be excluded from the study. These results would be considered in the analysis to determine if the lower scores possibly influenced the outcome.

The Geriatric Depression Scale (GDS-15)

The covariant of depression affects one in six older adults treated in medical practices and an even higher percentage of those who are hospitalized. Many medical problems may be related to or intensified by a depressive disorder. The Geriatric Depression Scale is a 30-item (or shorter 15-item) self-report survey designed to identify depression in older adults. Answers are yes/no, and questions purposely omit physical complaints, to separate somatic from psychological symptoms (Leaver, 2012). The original 30-item scale was found to have a sensitivity of 84%, correctly classifying a person as depressed when he/she *was* depressed, and a specificity of 95%, which means it correctly did *not* classify a person as depressed when he/she was *not* depressed (Montorio & Izal, 1996). The shorter 15-item scale is not only less burdensome for a patient who is ill but has been found to be an effective screening tool for those participants who are cognitively intact. On the GDS-15, a score of greater than five points suggests depression (and a follow-up interview should be scheduled,) and a score of 10 or more almost always indicates depression (Burke, Roccaforte, & Wengel, 1991). Both the IG and the CG were given the GDS-15 before the intervention. The primary care physician would have been notified by the investigator if the participant had a score greater than five on the assessment, and was not currently being treated for depression.

CORE Readmission Risk Stratification

The severity of each participant’s condition was considered using a risk stratification tool, the CORE readmission risk calculator from the Yale New Haven Hospital (Center for Outcomes Research and Evaluation (CORE), 2012). Although the severity of HF and comorbidities may be quite diverse among the participants, calculating each participant's readmission risk may provide clarity when interpreting data on hospital readmissions. If a correlation between risk and actual readmissions was demonstrated, this tool may be used in the future to identify patients who need more urgent transitional follow-up to prevent hospital readmission.

Measurement: Outcomes

Knowledge: The Dutch Heart Failure Knowledge Scale

One important facet of the HFNN role is patient education. It is essential that older adults have knowledge about disease management, although this alone will not change behavior. Identifying the pre- and post-level HF knowledge in the IG and CG patients may help demonstrate that participants had the knowledge to engage in self-care activities. Understanding the underlying mechanism of HF and the treatment plan, both pharmacological and non-pharmacological, is important for participants to incorporate that plan into their lives after discharge. Symptom recognition and what to do if condition worsens are vital information that may help patients identify ways to avoid hospital readmissions.

The Dutch Heart Failure Knowledge Scale (DHFKS) is a simply written 15-item, multiple-choice assessment that is valid and reliable. Initial content validity was assessed by 10 HF specialist nurses, and Cronbach's alpha was 0.62. The DHFKS is able to discriminate between patients with and without education and counseling (van der Wal, Jaarsma, Moser, & van Veldhuisen, 2005). This assessment was completed by both the IG and the CG before the intervention and repeated at about one month after discharge.

Ability to Engage in Self-Care: The Self-care of Heart Failure Index

Having knowledge about HF is only helpful if the participants are able to apply that knowledge to their own self-care. The Self-care of Heart Failure Index (SCHFI) is a 22-item scale measuring HF self-care maintenance, self-care management, and self-care confidence. Self-care maintenance involves activities like following a low-salt diet, exercising, and having a system to correctly take prescribed medications. It is the result of a choice to live a healthy lifestyle, follow the treatment plan, and monitor symptoms. Self-care management involves recognizing any worsening symptoms and the deliberate actions taken to address those symptoms. Self-care confidence, while not a part of the self-care process, assesses the patient’s level of confidence in his or her ability to maintain and manage HF. Self-care confidence is an important factor influencing the effectiveness of the self-care process. Improving self-care confidence may increase the likelihood that the patient will engage in self-care management (Riegel, Lee, Dickson, & Carlson, 2009).

The original version of the SCHFI was a 65-item instrument with six subscales, measuring the ability of patients to evaluate HF signs and symptoms and take appropriate actions. Internal consistency ranged from 0.79-0.92 on each of the subscales (Riegel, Carlson, & Glaser, 2000.) The tool was revised several times, and on version 6.0, coefficient a was 0.553 and 0.597 on the Self-care Maintenance and Management scales, respectively and on the Confidence scale, coefficient a was 0.827. Concurrent validity was tested by comparing scores on the European HF Self-care Behaviour Scale with the Self-care Maintenance scale scores. The scoring on these scales is reversed, so they were negatively related ($r = -0.65$, $p < .001$), i.e., in the

SCHFI, higher scores indicate better self-care, while on the European scale, higher scores indicate worse self-care (Jaarsma et al., 2013). Construct validity was tested using confirmatory factor analysis, checking that the individual items loaded on the appropriate scale. Model fit, describing how well the statistical measure fits the set of observations, was adequate (x^2 = 356.92, CFI = .726, NFI = .554, RMSEA = .07) (Riegel et al., 2009).

The latest version of the SCHFI (version 6.2) is a 22-item 4-point self-report scale measuring HF self-care maintenance, self-care management, and self-care confidence. Each scale score yields a score from 0-100 and scores of 70 or greater suggest adequate self-care. This version was tested on 659 Italian participants with heart failure using exploratory factor analysis followed by confirmatory factor analysis in each sub-sample. Construct validity of individual scales demonstrated excellent fit (maintenance: CFI = .92, RMSEA = .05; management: CFI = .95, RMSEA = .07; confidence: CFI = .99, RMSEA = .02.) Contrasting groups validity, internal consistency, and test-retest reliability all had favorable results. This study indicated that the SCHFI 6.2 is valid and reliable for use in clinical practice and research (Vellone et al., 2013). The most recent version of the SCHIFI (v. 6.2) was administered to both the IG and the CG before the intervention and repeated at about one month after discharge.

Quality of Life: The Minnesota Living with Heart Failure Questionnaire

The Minnesota Living with Heart Failure Questionnaire (MLHFQ) measures the impact of HF on the daily life. Health-related quality of life (QOL) measures the presence and severity of symptoms, and how these are experienced by an individual.

Health-related QOL is related to mortality and readmissions, making it an important variable to be assessed. The HFNN, in assisting the participant to incorporate the treatment plan into his or her own life, may affect QOL in a positive way.

Although no single tool can completely assess the subjective and broad life experiences of all participants with HF, the MLHFQ has been shown to be valid and reliable. In an examination of the assessment's psychometric properties, data from 638 patients with HF were examined. Cronbach's alpha ranged from 0.85 to 0.91, indicating adequate internal consistency (Heo, Moser, Riegel, Hall, & Chrisman, 2005). The MLHFQ was given to the IG and CG before the intervention and repeated at about one month after discharge.

30-day Readmission

Readmissions were defined as unplanned hospital admissions as inpatient or observation status for any reason within one month of index (i.e. initial) hospitalization. Emergency department (ED) visits were defined as unplanned visits to an emergency room for any reason within one month of discharge post index hospitalization. ED visits that did not result in an inpatient hospital admission or an observation stay were recorded. Planned admissions or readmissions were not counted as readmissions for participants who were scheduled for a non-emergency surgical procedure or revision of a surgical procedure, blood transfusion or chemotherapy (Ouslander & Maslow, 2012). The frequency of readmissions and ED visits were recorded. The number of days between the index admission and the first hospital readmission or ED visit was calculated.

Cost/Benefit

Although an analysis of the potential cost savings of this intervention was not an original research question, it became apparent that these numbers are crucial to evaluating its overall benefit to health care organizations. Based on the readmission results reported later in this paper, a general summary of the intervention costs and the potential readmission savings over time was provided.

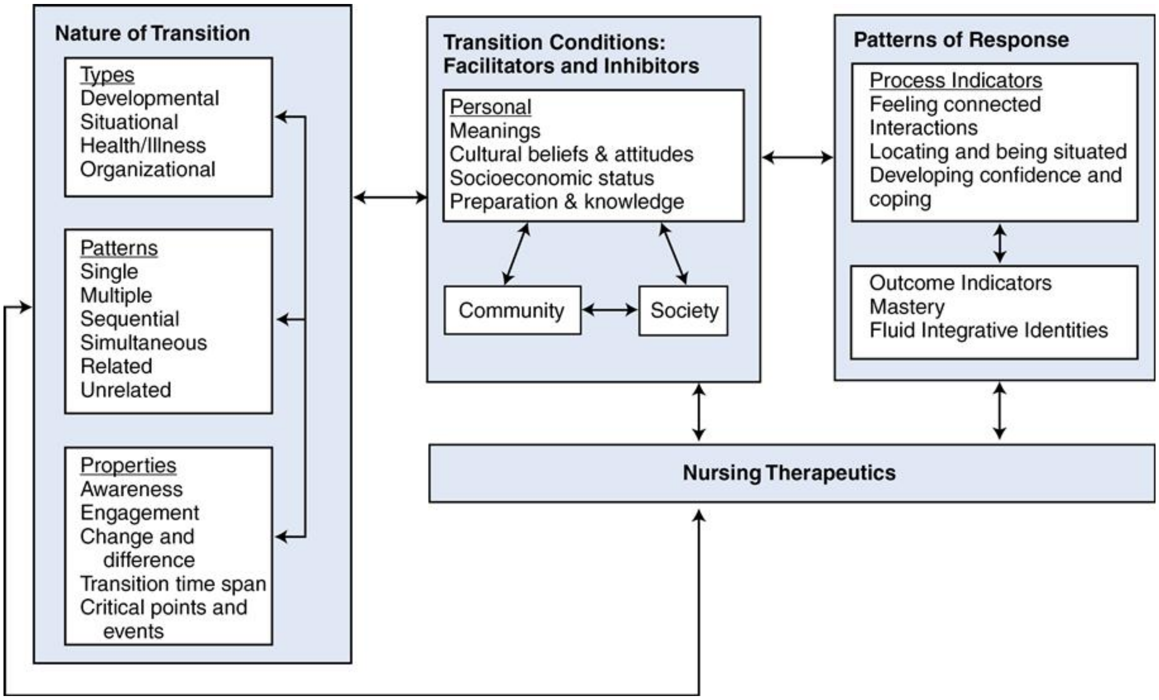


Figure 2. Theory of Experiencing Transitions (Meleis et al., 2000).

Theoretical Application

In this study, Meleis' theory of experiencing transitions (Figure 2) provided the theoretical framework for the intervention through the lens of Boykin & Schoenofer's theory of nursing as caring. The nature of the transition was assumed to be Health/Illness, and because the patients were transitioning from the hospital to home, the pattern was assumed to be sequential. Within this framework, the patient's calls for nursing, the interventions of the HFNN, and responses of the intervention patients were considered and evaluated. The application of this theory will be further discussed in Chapter 5.

The HFNN Intervention

Participants included in the IG were contacted by the HFNN in the hospital prior to discharge. Most intervention participants met their HFNN in the hospital and were given the resource "A Guide to Living with Heart Failure" (Appendix F). In the few cases when discharge was imminent and the HFNN could not get to the hospital, the HFNN called the participant in the hospital to schedule the first home visit, and the investigator provided the HF booklet before discharge. The first home visit usually occurred within 24 hours of discharge. If this visit could not be scheduled within 24 hours, the HFNN made a scripted telephone call (Appendix G) within 24 hours and visited the participant within 72 hours of discharge. Participants were visited at home once per week for the first 30 days after discharge. Participants were asked to notify the HFNN for any care needed for worsening symptoms, whether at the MD office, ED, or hospital admission (even if not at the study site hospital). Participants were informed that if the HFNN identified worsening symptoms, they would encourage the participant to contact participant's medical provider. Participants were asked each week if they contacted their health care provider for any symptoms.

On the first and each successive home visit, the HFNN assessed how the patient was assimilating the HF discharge instructions into his or her life and the home environment was examined. The Joint Commission mandated educational topics are medications, diet, exercise, weight monitoring, worsening symptoms, and follow-up appointments. The teaching plan included a review of each of these areas using the HF patient education booklet, and participant understanding was assessed by teach-back. Teach-back is a method to evaluate understanding by asking patients to tell the provider, in their own words, what is important to remember about a particular topic. Teach-back allows the HFNN to confirm that the patients are able to follow specific instructions. The Agency for Healthcare Research and Quality recommends the "Chunk and Check" method, which provides small segments of information at a time for patients to teach-back to the provider (AHRQ, 2015). This was the weekly practice during the HFNN home visits.

Medications: The HFNN assessed prescribed and over-the-counter medications that the participant was taking. Medication reconciliation (discharge medications compared to what participant was taking) was performed at the start of the intervention. The HFNN then evaluated medication management on a weekly basis, noting any discrepancy from what was prescribed and what the participant was taking, as well as any adverse events requiring further evaluation and notification of health care provider. There was ongoing participant/caregiver education about medications to treat heart failure, including dose, frequency, reason for taking, and adverse events. Teach-back was used to assess understanding of information.

Diet: The HFNN evaluated knowledge regarding diet for people with heart failure and taught the participant/caregiver about appropriate heart failure diet such as reduced sodium, and if prescribed, fluid restrictions. In addition, the HFNN assessed the kitchen environment such as cooking facilities, working refrigerator, pantry, and fresh food vs. canned/frozen food and availability of transportation to obtain food

Weight monitoring: Participants were educated regarding fluid status and what it means to be “euvolemic” (language was at a 5th-grade level). The HFNN reviewed the electronic medical record to assess fluid status before discharge to determine prescribed diuresis goal if any. Participants were educated on how to monitor fluid intake and stay within prescribed amount. In addition, the HFNN determined if there was a working scale in the house and evaluated knowledge regarding obtaining weights. If the participant needed a scale, the HFNN was available to assist in choosing one within the participant’s budget. If lack of knowledge was identified the HFNN educated the participant/caregiver and used teach-back to evaluate understanding.

Exercise: Activity level and capacity for exercise was assessed. An individualized mutually agreed upon exercise/activity plan was established. Consideration of exercise tolerance and other medical conditions was incorporated into the plan.

Worsening symptoms: The HFNN evaluated any symptoms related to heart failure and educated the participant about symptoms that could occur. The HFNN encouraged the participant to notify the health care provider if symptoms were identified. In addition, if technologies to monitor fluid status and provide emergency interventions (Internal Cardioverter/Defibrillator or CardioMEMS), were present, the HFNN could evaluate the participant’s knowledge regarding these devices and identify teaching moments to assure proper use.

Follow-up appointment: The HFNN assessed the participant's knowledge regarding follow-up visits and if needed, assisted the participant in scheduling the follow-up appointment as written in discharge instructions. In addition, the HFNN determined if the participant had transportation to the medical office and return home. If transportation was not available, the home health social worker would have suggested transportation options available through community agencies.

General: The HFNN evaluated need for community resources and other referrals (Meals on Wheels and other services available through County Community Services) and could assist with making connections while teaching the participant/caregiver how to navigate through the process. The home health case manager was an available resource for the HFNN.

At the last scheduled home visit, the DHFKS, the SCHFI, and the MLWHFQ were readministered. At this visit, the HFNN discussed timing of future focus groups and ask if they would be willing to participate. Participants were telephoned by the investigator and asked the most convenient days/times for focus groups to meet. Participants were invited and notified of focus group meeting dates/times by mail and telephone. Fidelity to the study protocol was assessed by the investigator, who accompanied the HFNN on random home visits.

Qualitative Data Collection

Participants in the intervention group were invited to attend a focus group. Two separate focus groups were planned after the participants had completed the 30-day intervention. The goal was to have 6-10 members. The investigator planned to moderate the focus groups and each participant was informed that the session would be audio-recorded. Semi-structured questions were planned to assess participant's perception of the HFNN intervention. Although all participants initially agreed to attend a focus group, most were unable to attend for various reasons. These reasons included a death in the family necessitating travel out-of-state, a change in the caregiver’s work schedule, and some just decided it was too much of a burden to return to the hospital for the group meeting.   Although participants were unable to attend as planned, most did agree to participate in a telephone interview. The qualitative data was obtained by asking the semi-structured questions during the telephone interview and writing participant's responses verbatim. Participants were asked about benefits and/or hindrances of the HFNN intervention. They were asked if there was any one area that was most helpful. The questions were phrased to encourage discussion, ie. "Tell me about…”, “Describe…”. (Appendix E)

Data Analysis Overview

Descriptive statistics were used to convey participant characteristics. These include frequencies, standard deviations, and percentages of the demographic characteristics. Pre-post measures of heart failure knowledge, self-care scales, and quality of life were analyzed by repeated measures ANOVA. Hospital readmissions within 30 days were compared between intervention and control groups, using chi-square analysis. Data were analyzed using Statistical Package for Social Sciences (SPSS-23). Qualitative data were transcribed verbatim and considered using conventional content analysis. Interview data was read and reread word for word to identify key thoughts and concepts. These key thoughts and concepts were organized into similar meaningful categories (Hsieh & Shannon, 2005).

Thirty-eight (38) participants were planned for each group for a total of 76 participants between the CG and IG (sig .05; power 80; odds ratio 2.12). Due to recruitment challenges and possible influence of a larger competing study with the same population, the sample was limited to 40 participants. The control group consisted of 21 participants, but one participant expired before the study was concluded. The intervention group consisted of 19 participants but one participant dropped out due to “feeling overwhelmed” by hospitalization and multiple diagnoses.

Human Subjects Protection

Potential participants were not approached by the investigator until they indicated interest in the study after reading the Fact Sheet (given by their Charge or Primary nurse.) Informed Consent was obtained before data collection was started. Consent was completely voluntary and obtained by the investigator, who did not have any involvement in inpatient care of the potential participant. The nature and purpose of the HFNN role was explained, as well as the potential risks of fatigue or possible emotional distress during data collection. Participants were also informed of potential benefits, including increased knowledge of how to manage heart failure and how to care for themselves at home, which, it was hoped, would lead to decreased likelihood of 30-day hospital readmission and improved quality of life. Participants were given the opportunity to ask questions and have them answered by the investigator. Participants were told that they would be free to terminate their participation in the study at any time, without consequence. Enrollment was very slow during the first two months, and the IRB was amended to add a $25 grocery gift card to all participants at the conclusion of their participation.

Participants received a HF focused physical assessment at each home visit. If any abnormalities were assessed, the HFNN encouraged the participants to call the PCP. If any emergent conditions were discovered, participants were prompted to call 911 or give permission for HFNN to call 911.

Participant information was de-identified and participants were assigned a unique number upon consent. Data were entered under this participant number alone. Data were kept confidential and only the HFNN and investigator had knowledge of the identity of each numbered participant. All data from instrument responses and telephone interview transcriptions were stored on a dedicated password-protected computer. djsui

Limitations

Some older adults living with HF may also have moderate to severe cognitive impairment or severe, uncorrected hearing loss that may impede their ability to participate in the intervention, so the decision was made to exclude them. In addition, non-English speaking older adults were excluded. These factors, along with the competing study leading to a small sample size, homogeneous socioeconomic characteristics of the population, and the single-site study limit generalizability of study findings.

Summary

A mixed methods study design was chosen to provide valuable insight on how transitional care provided by the HFNN can lead to increased knowledge and ability to engage in self-care activities with the ultimate goal of reducing 30-day readmission and improving quality of life of older adults with heart failure. This chapter provided information regarding research design, the intervention, and outcome measures.

CHAPTER 4: QUANTITATIVE RESULTS AND QUALITATIVE FINDINGS

Introduction

The purpose of this study was to examine the effect of the Heart Failure Nurse Navigator (HFNN) on patients with heart failure regarding 30-day hospital readmissions, heart failure knowledge, self-care, and quality of life. It further examined the experiences of the intervention participants, what, if any changes were made in their self-care, what was most helpful, and what could be improved. This chapter will present the descriptive characteristics of the sample population, the 30-day readmission occurrences of both groups, and the pre/post results for heart failure knowledge, heart failure self-care, and perceived heart failure quality of life. This chapter will also present a summary of the qualitative findings of the study.

Sample Population

The sample in this study (*n*=40) included Medicare patients between the ages of 66 and 97 (mean 82.7 years with a SD 8.272) years who were admitted to a hospital from December 2015 through May 2016 with either a primary or secondary diagnosis of heart failure and were discharged to home. Participants were randomly assigned to the control (52.5%, *n*=21), or intervention (47.5%, *n*=19) groups. The mean ages of the groups were similar (control 83.3 yrs., intervention 82.1 yrs.). The baseline characteristics of the study patients are shown in Table 1. The two groups were well balanced with respect to most of the demographic and health-related measures.

The participants were 52.5% (*n*=21) male, and 47.5% (*n*=19) female. Most participants (97.5%) were white/non-Hispanic and only one participant (2.5%) was white/Hispanic. The majority of the participants (95%) were at least high school graduates, and 45% were at least college graduates. More than half were currently married and one-third were widowed. Living arrangements varied; 45% lived with a spouse, 37.5% lived alone, and 10% lived with children.

Length of hospital stay varied from 1 to 16 days, with 80% of the participants staying five days or less. Only three participants (7.5%) spent time in the ICU. Most of the participants (65%) had a primary diagnosis of heart failure, while 35% had heart failure as a secondary diagnosis. A prior history of heart failure was noted in 62.5% of participants.

The frequency of depression was measured by the Geriatric Depression Scale (GDS-15). Four participants (10%) had scores suggestive of depression, and one participant (2.5%) had a score indicating depression but was currently being treated. Functional status, measured by the Lawton ADL scale, was high in 70% of participants. Health literacy, measured by the Newest Vital Sign, was adequate in 35 (87.5%) of participants. Five participants had scores suggesting "possibly limited" or "likely limited" health literacy.

One participant in the intervention group (IG) dropped out before discharge, but after the first in-hospital visit by the HFNN. This participant stated she was overwhelmed by her hospital course and many diagnoses and the HFNN visits were too much for her to manage. She was not readmitted but was not considered in the readmission statistics, as she did not have the post-discharge home visits. One participant in the CG was readmitted 19 days after discharge and expired during that hospital stay. He was considered in the readmission statistics, but no follow-up information was obtained.

Table 1

Frequencies of the Categorical Variables by Treatment Group

		Control		Intervention	
Variables	Categories	*N*	%	*N*	%
Gender	Female	10	47.6	9	47.4
	Male	11	52.4	10	52.6
Race/Ethnicity	White/Hispanic	0	0	1	2.5
	White/non-Hisp	21	100	18	97.5
Education level	Some high sch	2	9.5	0	0
	High school gr	5	23.8	4	21.1
	Some college	6	28.6	5	26.3
	College grad	4	19.0	7	36.8
	Master’s	2	9.5	2	10.5
	Doctorate	2	9.5	1	5.3
Marital status	Sgl/never mar	1	4.8	0	0
	Married	12	57.1	9	47.4
	Divorced	2	9.5	3	15.8
	Widowed	6	28.6	7	36.8
Living arrangement	W/spouse	10	47.6	8	42.1
	W/sig oth	1	4.8	0	0
	W/children	2	9.5	2	10.5
	W/ other fam	1	4.8	0	0
	W/friends	1	4.8	0	0
	Alone	6	28.6	9	47.4
LOS (days)	1-3	8	38.1	6	31.6
	4-5	10	47.6	8	42.2
	6-10	2	9.6	3	15.8
	11-20	1	4.8	2	10.5
ICU admission	No	19	90.5	18	94.7
	Yes	2	9.5	1	5.3

(table continues)

Table 1 *(continued)*

		Control		Intervention	
Variables	Categories	*N*	%	*N*	%
HF diagnosis	Primary	12	57.1	13	68.4
	Secondary	9	42.9	6	31.6
Prior history HF	No	9	42.9	6	31.6
	Yes	12	57.1	13	68.4
Depression	No (0-5)	16	76.1	16	84.2
	Suggest (>5)	4	19.0	3	15.8
	Yes (>10)	1	4.8	0	0
Functional status	Low (1-2)	5	23.8	2	10.6
	Mod (4-6)	1	4.8	4	21.0
	High (7-8)	15	71.4	13	68.5
Health literacy	Likely limited (0-1)	2	9.5	0	0
	Poss limited (2-3)	2	9.5	1	5.3
	Adequate (4-6)	17	81.0	18	94.7
Ejection fraction	15%-19%	0	0	2	10.5
	20%-29%	4	19.0	1	5.3
	30%-39%	2	9.5	1	5.3
	40%-49%	2	9.5	3	15.8
	50%-59%	9	42.9	9	47.3
	60%-69%	3	14.3	3	15.8
	70%-79%	1	4.8	0	0

Internal Consistency

Internal consistency of items on all tools was assessed using Cronbach's alpha (α). Internal consistency was assessed for both pre and post-test as factor structures can vary over data collection time points. As can be seen in Table 2, reliability coefficients varied (.402 pretest -.678 post-test for HF Knowledge; .504 pretest – .661 post-test for Self-care Maintenance; .242 pretest -.271posttest for Self-care Management; .693 pretest - .855 post-test for Self-care Confidence; .832 pretest - .926 post-test for HF Quality of Life.).

Table 2

Internal Consistency of Tools Used in Pretest and Posttest

_	Cronbach's α Pretest	Cronbach's α Posttest
DHFKS	.402	.678
SCHFI Maintenance	.504	.661
SCHFI Management	.242	.271
SCHFI Confidence	.693	.855
MLHFQ	.832	.926

Quantitative Results

Research Question One

The first research question was "In older adults (≥65) with a diagnosis of heart failure who transition from hospital to home, what is the effect of care by a Heart Failure Nurse Navigator on 30-day hospital readmissions, compared with those who receive usual care?" This research question was tested by research hypothesis one: **"**Older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have fewer 30-day unplanned hospital readmissions and/or urgent ED visits at one-month post hospital discharge." Chi square analysis was used to test this hypothesis.

Unplanned hospital readmissions were tracked for 30 days after discharge. Six participants in the control group and three participants in the Intervention Group were readmitted (Figure 3). The control group readmissions occurred between eight and twenty-seven days after discharge. The intervention group readmissions occurred between eleven and twenty-seven days after discharge. Most readmissions were HF-related; one participant in each group was readmitted with a non-HF diagnosis.

Participants in the control group were 2.22 times more likely to be readmitted than those participants in the intervention group [x(1)= .935, p = .334. 0.R. = 2.219]. Due to recruitment challenges and limited enrollment, these results were underpowered and not statistically significant.

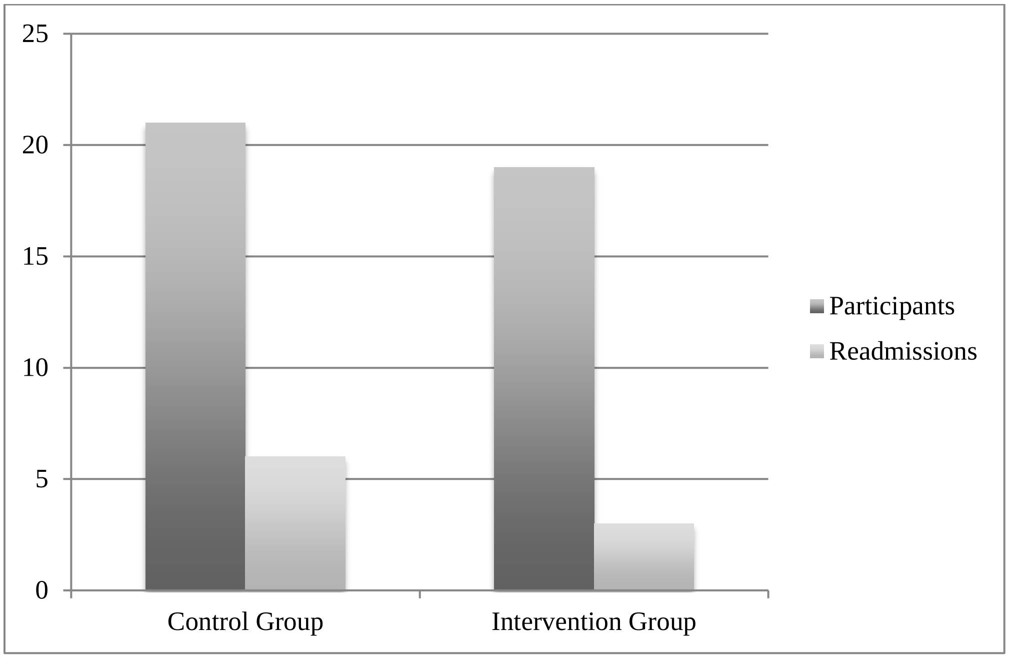


Figure 3. Hospital readmissions within 30 days by treatment group.

Table 3

Days From Discharge to Readmission by Treatment Group

Number of days post-discharge	Control Group	Intervention Group	Total
8	1	0	1
11	0	1	1
13	1	0	1
19	1	0	1
20	0	1	1
21	1	0	1
27	1	1	2
28	1	0	1
Total	6	3	9

Research Question Two

The second research question was “In older adults (≥65) with a diagnosis of heart failure who transition from hospital to home, what is the effect of care by a Heart Failure Nurse Navigator on knowledge about managing HF and the ability to engage in self-care behaviors, compared to those who receive usual care? This research question was tested by research hypothesis two: “Older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have a significant increase in HF knowledge and ability to engage in self-care behaviors at one-month post hospital discharge." The control and intervention groups were both given pre-tests for HF knowledge and self-care and there was no significant difference between the groups at baseline.

Repeated measures analysis of variance (RM-ANOVA) was used on pre- and post-test scores to test each component of this hypothesis (HF knowledge and the three constructs of HF self-care). In RM-ANOVA, the change in participant scores over time is examined as an effect of the intervention as compared with any change in scores we might expect due to individual differences. If scores are increased across a group who all had the same intervention, any variation that can’t be explained by that intervention must be due to random factors. The F-ratio compares the size of the variation in scores due to the intervention with the size of the variation due to random factors. A larger F-ratio indicates the results are likely due to the intervention and not to chance. (Field, 2009).

As can be seen in Table 4, both the control and intervention groups improved in HF Knowledge. The average HF knowledge score in the control group increased from pretest (10.71±2.085) to post-test (11.76 ±1.855). The average HF knowledge score increased in the intervention group from pretest (11.33±1.782) to post-test (13.44±1.542). The intervention group (Table 5) had a greater improvement with the intervention over time, approaching significance (*p* = .056). This is also represented by the graph in Figure 4.

Table 4

Means and Standard Deviations From Pretest To Posttest for HF Knowledge

	Pretest		Posttest	
Dependent variable	M	SD	M	SD
HF Knowledge				
Control	10.71	2.09	11.76	1.86
Intervention	11.33	1.78	13.44	1.54

Table 5

Repeated Measures ANOVA Results for Changes in HF Knowledge Pretest to Posttest

Dependent Variable	F(1,33)	*p*	$ŋ^2$	Power
HF Knowledge over time	24.84	.00	.43	.99
HF Knowledge over time w/ intervention	2.74	.05	. 08	.36

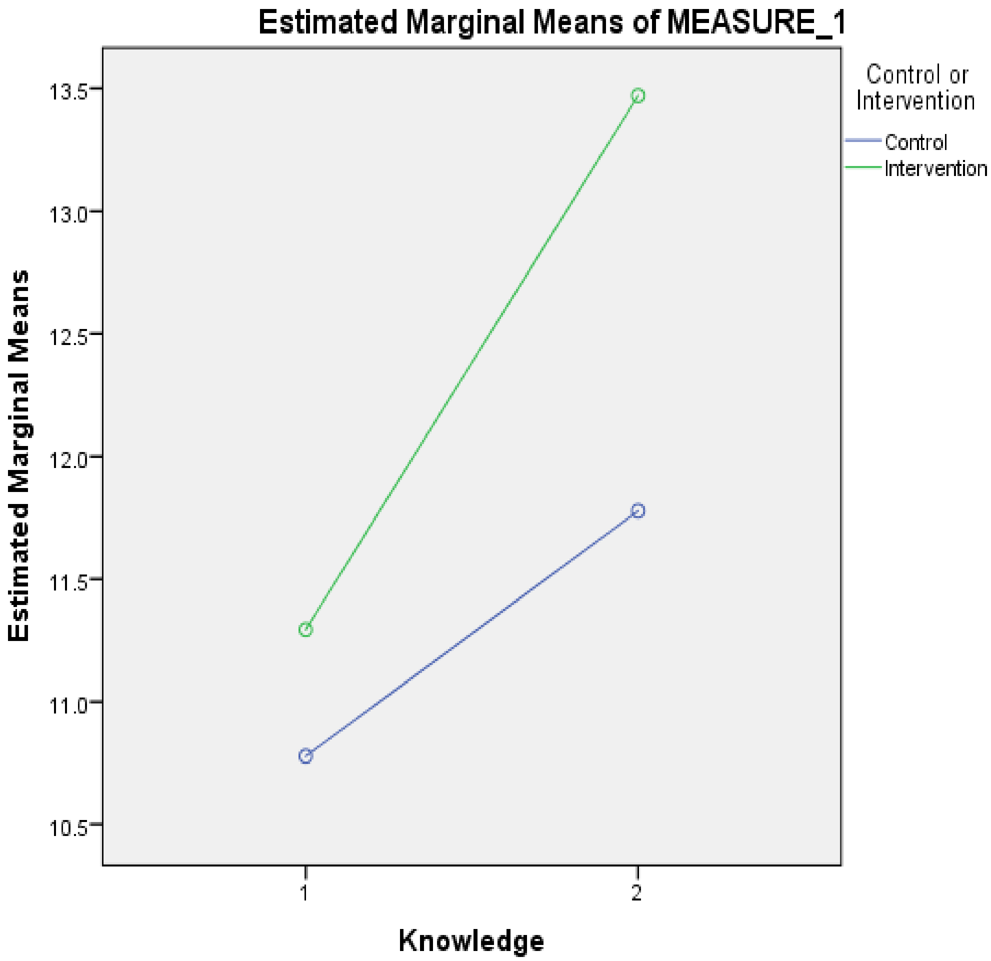


Figure 4. Heart failure knowledge over time by treatment group.

Self-care of HF maintenance also improved in both groups (Tables 6 and 7), but the intervention group had the greater gain over time, approaching significance (p = .07). This is also illustrated by the graph in Figure 5.

Table 6

Means and Standard Deviations From Pretest to Posttest for HF Self-Care Maintenance

Dependent variable	Pretest M	Pretest SD	Posttest M	Posttest SD
HF Self-care maintenance				
Control	61.96	14.72	71.95	17.16
Intervention	60.01	14.99	77.03	14.81

Table 7

Repeated Measures ANOVA Results for Changes in HF Self-Care Maintenance From Pretest to Posttest

Dependent Variable	F(1,33)	p	η^2	Power
HF SC maint. over time	33.68	.00	.51	1.00
HF SC maint. over time w/ intervention	2.27	.07	.06	.31

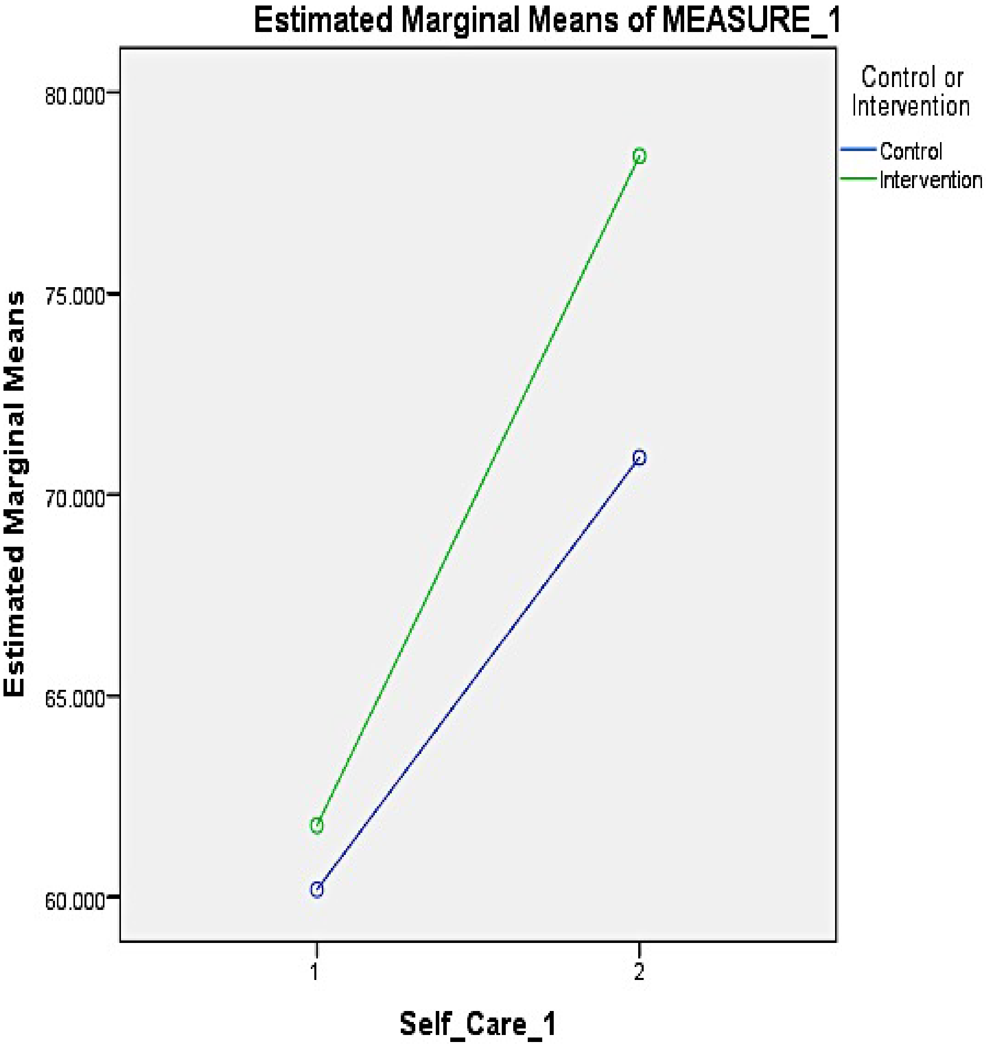


Figure 5. Heart failure self-care maintenance change over time by treatment group.

Self-care of HF management improved in both groups at about the same rate (Tables 8 and 9), with no significant difference noted over time in the intervention group.

These pre/post intervention results for both groups are illustrated by the graph in Figure 6.

Table 8

Means and Standard Deviations From Pretest to Posttest for HF Self-Care Management

Dependent variable	Pretest		Posttest	
	M	SD	M	SD
HF Self-care management				
Control	34.41	17.04	49.12	20.93
Intervention	42.50	13.53	53.14	19.02

Table 9

Repeated Measures ANOVA Results for Changes in HF Self-Care Management Pretest to Posttest

Dependent Variable	F(1,33)	p	η^2	Power
HF SC mgmt. over time	20.92	.00	.39	.99
HF SC mgmt. over time w/ intervention	.002	.48	.00	.05

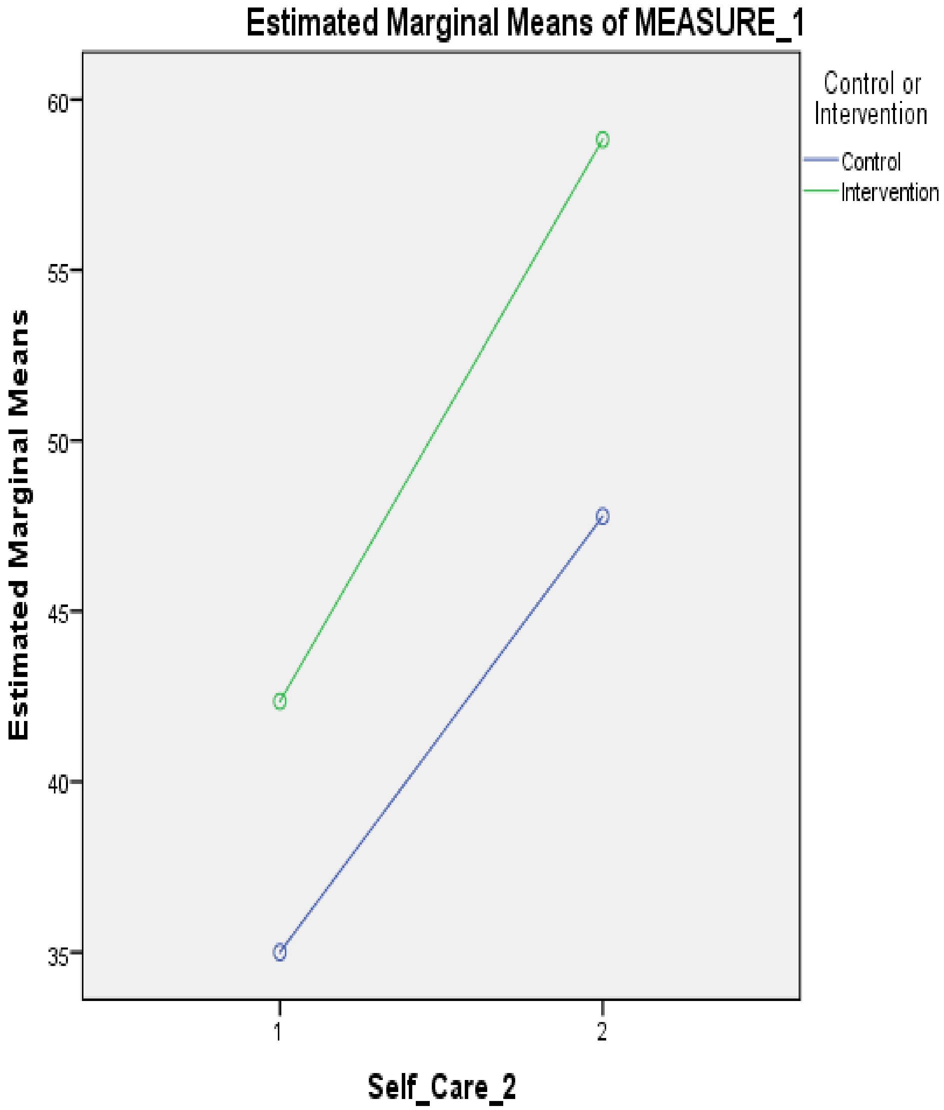


Figure 6. Heart failure self-care management change over time by treatment group.

Self-care of HF confidence was unchanged from pre-test to post-test in the control group (*p* = .002.) However, the intervention group showed significant improvement over time (*p*=.0015) as can be seen in Tables 10 and 11 and by the graph in Figure 7.

Table 10

Means and Standard Deviations From Pretest to Posttest for HF Self-Care Confidence

	Pretest		Posttest	
Dependent variable	M	SD	M	SD
HF Self-care confidence				
Control	62.13	24.48	62.82	23.67
Intervention	56.84	15.32	83.38	15.36

Table 11

Repeated Measures ANOVA Results for Changes in HF Self-Care Confidence Pretest to Posttest

Dependent Variable	F(1,33)	p	η^2	Power
HF SC confidence over time	11.85	.002	.26	.92
HF SC confidence over time w/ intervention	10.69	.002	.25	.89

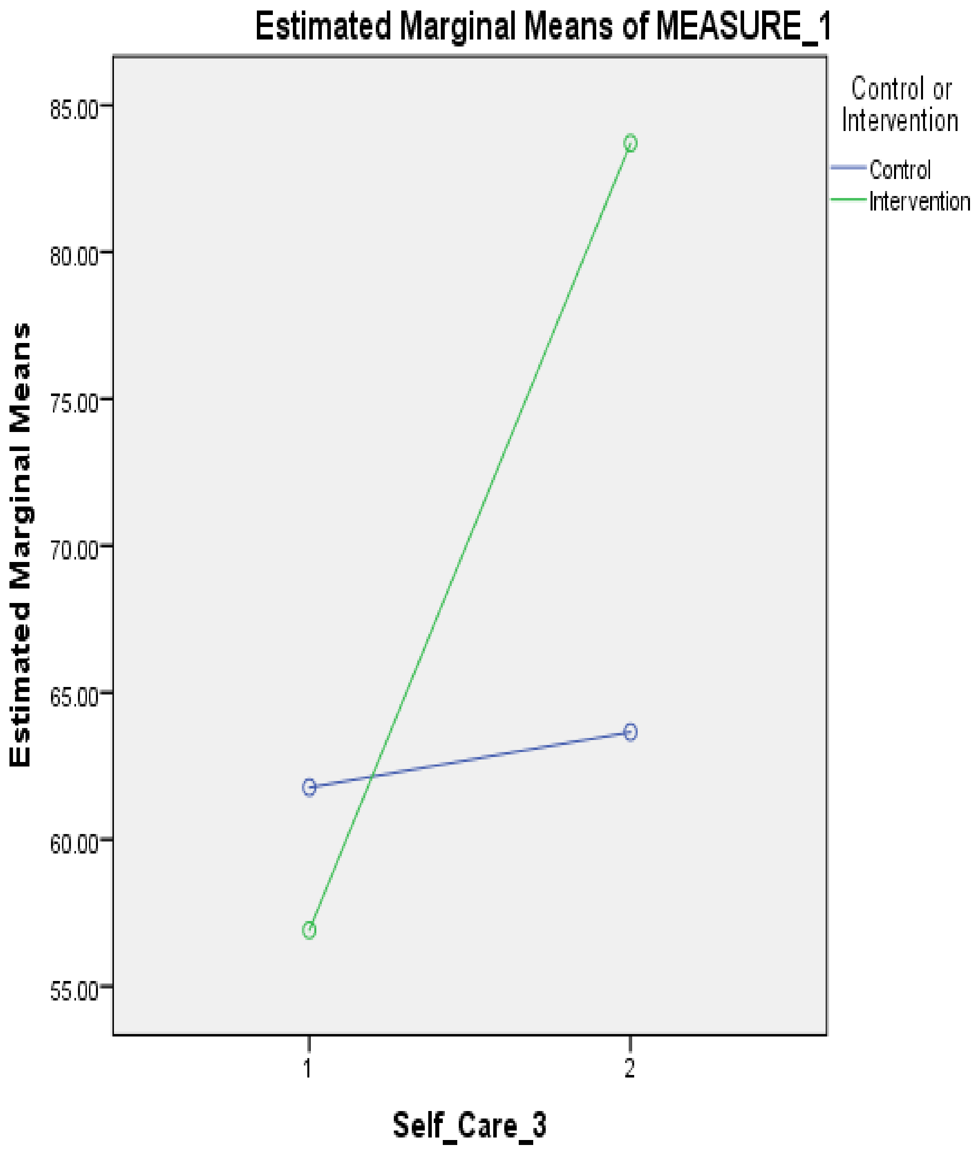


Figure 7. Heart failure self-care confidence change over time by treatment group.

Research Question Three

The third research question was “In older adults (≥65) with a diagnosis of heart failure who transition from hospital to home, what is the effect of care by a Heart Failure Nurse Navigator on HF quality of life compared to those who receive usual care?” This research question was tested by research hypothesis three: “Older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have a significant increase in HF quality of life at one-month post hospital discharge."

Repeated measures ANOVA was used to test this hypothesis as measured by the Minnesota HF Quality of Life (QOL) survey. Lower scores on each item indicate an improvement in quality of life. The QOL pre-test scores for the control group were better (lower) than the QOL pre-test scores of the intervention group. As can be seen in Tables 12 and 13, there was a significantly higher (worse) post-test QOL life score for the control group (*p*=0.013) and a significantly lower score (better) post-test QOL for the intervention group (*p* = <.001). This is also illustrated by the graph in Figure 8.

Table 12

Means and Standard Deviations From Pretest to Posttest for HF Quality of Life

	Pretest		Posttest	
Dependent variable	M	SD	M	SD
HF Quality of Life				
Control	43.12	17.72	55.12	26.66
Intervention	55.39	17.15	28.94	18.08

Table 13

Repeated Measures ANOVA Results for Changes in HF Quality of Life Pretest to Posttest

Dependent Variable	F(1,33)	p	$ŋ^2$	Power
HF QOL over time	6.88	.01	.17	.72
HF QOL over time w/ intervention	38.81	<.001	.54	1.00

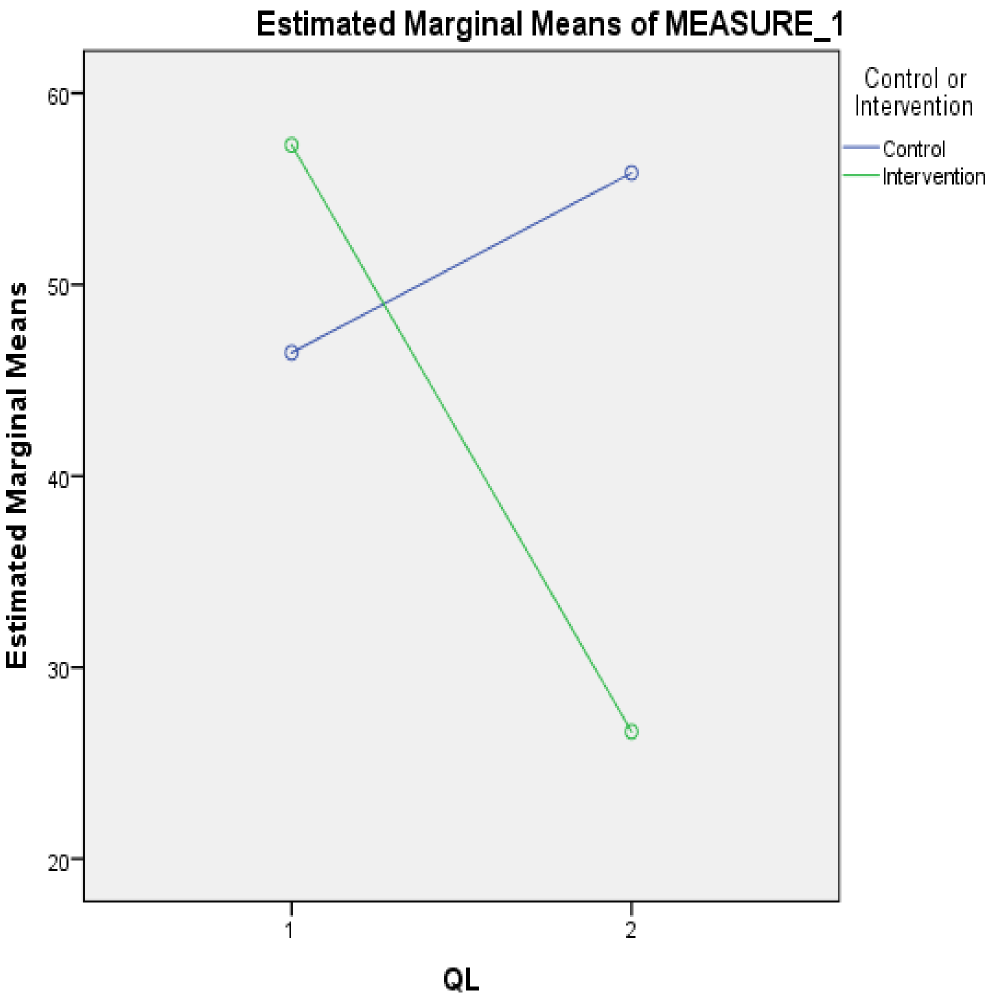


Figure 8. Heart failure quality of life change over time by treatment group.

Qualitative Findings

The qualitative research question was "What are the perceptions of older adults (≥65) with a diagnosis of heart failure who transition from hospital to home regarding care received from a Heart Failure Nurse Navigator?" Of the 19 intervention patients, 14 participated in the follow-up interview. Participants in the intervention group who responded to open-ended interview questions had positive comments about the HFNN personally, the educational information provided, the support, comfort, and reassurance that was provided. The interviews were conducted individually, most over the telephone.

The original study protocol called for intervention participants to participate in focus groups, but due to unforeseen circumstances, they were unable to attend. Findings from individual interviews may have not yielded the rich descriptions that might have been realized in focus group conversations, yet were similar enough that saturation was reached after twelve interviews, with the additional two providing confirmation.

The interview findings were discussed with the individual HFNN nurses who participated, and they were able to confirm that the qualitative data was congruent with their observations of the patients in the study, as well as other patients with HF. These nurses agreed with the observations of the participants, enhancing trustworthiness (Lincoln & Guba,1985). Each HFNN utilized the same tools and followed the same procedure during the intervention period. This chapter will report the subjective findings reported during the interviews conducted with the intervention participants.

Conventional content analysis utilizes direct information from the participant's own perspectives. Qualitative data were transcribed verbatim, and read and reread word for word to identify key thoughts and concepts. Revisiting the data time and again was a way to recheck emerging concepts, enhancing truth value and credibility (Noble & Smith, 2015). To enhance auditability, the transcriptions were shared with the co-investigator, and consensus was reached regarding classification of the comments. These resultant key thoughts and concepts were organized into similar meaningful categories. The two main categories that emerged from the qualitative data were (1) personal clarification of patient education, especially related to diet, exercise, and medications, and (2) feelings of support, reassurance, and safety.

The HFNN provided a programmed instruction built around the Guide to Living with Heart Failure booklet. Beginning in the hospital and continuing through each home visit, a total of six topics were covered. Each HFNN adhered to the teaching plan but was also free to spend more or less time on particular topics, according to the needs of the patient. Diet and sodium content of foods was a frequent topic of conversation. Some of the comments related to dietary education were:

- *"I really liked that RF knew that cheap Indian food was my downfall, and she looked for information on the internet on salt content of different Indian dishes and other spices to use – that was above and beyond." (#4)*
- *"I changed how I eat and I have felt better. I have not felt short of breath." (#10)*
- *"I knew about salt, but it was good for mom to hear about that from someone else. She is doing better with that." (#16's daughter)*
- *"Health, sodium, exercise. She aroused my attention to things I already know – it makes me retain and abide by it." (#20)*
- *"I've completely changed my lifestyle in terms of exercise and what I eat. She was wonderful – did I just luck out with her or are they all that good?" (#25)*

The HFNN also performed a physical assessment on each patient at each visit, which was very reassuring to the participants. It was helpful for them to know that there was nothing concerning or alarming in that assessment. The established relationship made it possible for the HFNN to intersperse patient education, physical assessment, and reassurance. The following are comments related to support and reassurance:

- *"She was very comforting, very calm, and calming. She made it all seem do-able." (#10)*

- *"There is so much information – it is confusing and she cleared it all up – very comforting (#10's daughter)*
- *"I felt very confident at the end of our 4 weeks together. I felt I could control this and it was not going to control me. I can lie flat for the first time in 1½ years. (#21)*
- *"It made me feel so much safer. Knowing she was coming made me feel secure. You feel so vulnerable when you go home – walking on eggs. This heart failure makes you want to be checked out all the time and BS was so comforting…When I had my stent, I felt vulnerable as well, but there was nothing like this offered to me." (#25)*

The teaching booklet was a helpful resource to reinforce the patient education about HF. Several of the patients noted that the HFNN helped them understand more about their physical condition. Following are comments related to teaching about HF pathophysiology:

- *"She was very informative – she had this book and took her time going through it with me. She spoke in layman's terms – anyone could understand what she was talking about." (#29)*
- *"It was illuminating. I had never heard the term heart failure. The information, the conversations were very good." (#33)*

Medication adherence as previously noted is a concern in patients transitioning home. Understanding what they are taking, what the medications are for, any cautions or side effects was very helpful to the patients. Implementing a medication management system is an integral component of a successful transition. Some of the comments from the intervention participants follow:

- *“When I first got home, I was confused about the medications. I called her and she answered my questions – it was very comforting and calmed me down.” (#10)*
- *“The most important thing BS did for me was to go over all my pills – so many – she spent an hour and a half. She helped me put them into one very large pillbox so I could know which I should take four times a day, which could be taken together, and which counteracted each other. I must have 25 or 26 different pills. It was so hard for me before she helped me.” (#21)*

Nurses and physicians do not consistently provide the discharge information and support needed for a successful transition to home (Albert et al., 2015). Often, patients are unclear about self-care activities, such as weight monitoring, diet and exercise, and medications. Each patient’s home environment is different. Each patient’s support structure is different. One patient’s daughter summarized her impressions of the HFNN in the following comments:

- *"When you are in the hospital, there is so much going on, it's hard to tune into a lot of information. It's very busy and distracting. Your concerns in the hospital are different than once you get home. There is a real need for this program. Things can get real bad real fast. (#16's daughter)*

Cost/Benefit Analysis

Although the question of cost was not directly included in this study, it must be a consideration when any change in practice is suggested. The initial cost of training the HFNN was approximately $200. Based on an average home health RN hourly rate of

$34, the cost of each visit and materials is itemized below. After the initial training of the HFNN, the entire program for each patient enrolled would cost the organization an additional $200.

Table 14

Cost of the HFNN Intervention

Item	Amount
HFNN Training (6 hours) ONE-TIME COST	$204.00
In-hospital visit (30-60 minutes)	$ 17.00 - $ 34.00
First home visit (60-90 minutes)	$ 34.00 - $ 51.00
3 subsequent home visits (60 minutes)	$102.00
Heart Failure Patient Teaching Book	$ 6.36
Mileage ($0.54/mile: 10-15 miles/visit x 4)	$ 21.60 - $32.40
Total each pt. including one-time training hours	$385.23 - $429.76 (average $407.50)
Total each pt. after cost of training hours	$181.23 - $225.76 (average $203.50)

In this present study, 16% of the intervention group was readmitted and 29% of the control group was readmitted. Participants in the control group were 2.22 times more likely to be readmitted than those participants in the intervention group [x(1)= .935, p = .334. 0.R. = 2.219]. The average cost of one HF readmission varies from $8000.00 to $10,000.00 (Truven Health Analytics, 2016). Although these results were underpowered and not statistically significant, even a modest readmission reduction may result in significant savings for the organization. The implications of these data will be further discussed in Chapter 5.

Summary

This chapter reported the quantitative results and qualitative findings collected in the HFNN. The demographics and baseline characteristics of the intervention and control groups were well balanced. This was followed by the internal consistency of the quantitative tools used in the pre and post assessment. The reliability of the readmission data was reported and although results were not statistically significant, there were fewer readmissions in the intervention group. Heart failure knowledge, measured by the Dutch Heart Failure Knowledge Scale, improved in the intervention group, approaching significance. Individual constructs of HF self-care, as measured by the Self-care of Heart Failure Index demonstrated improvements between groups as well as across time in the intervention group, with self-care maintenance approaching significance and self-care confidence improving significantly. Heart failure quality of life, as measured by the Minnesota Living with Heart Failure Questionnaire, demonstrated significant improvement over time in the intervention group and a decline in the control group. Qualitative findings included positive comments about patient education clarification, and feelings of support, reassurance, and safety.

CHAPTER 5: DISCUSSION

Introduction

The final chapter is comprised of three sections. The first section (Overview) provides a brief summary of the study problem, purpose and method. The second section (Discussion) considers the major findings in relation to the research hypotheses. The third section (Conclusion) includes the study limitations, implications for future nursing research and practice, and a summation.

Overview

Heart failure (HF) is the fastest growing cardiovascular disorder in the United States. There are currently about 5.7 million people diagnosed, with 870,000 new diagnoses each year. About half of these people will die within five years and the only cure is a heart transplant (Mozaffarian et al., 2015). HF is the most common reason for hospitalization among older adults, and the number one diagnosis for 30-day hospital readmissions in Medicare patients. Almost 25 percent of Medicare patients with a HF diagnosis are readmitted to the hospital within 30 days of discharge (www.medicare.gov/hospitalcompare). Patients who are readmitted within 30 days have a higher mortality rate at 6-month follow-up and these readmissions also present formidable financial challenges to health care organizations (Tung et al., 2016).

There are many reasons for hospital readmissions and research studies exploring strategies to reduce them have not identified any single effective solution. Inpatient care for HF has been standardized, owing largely to the Center for Medicare and Medicaid

Services (CMS) core measures mandating consistent evidence-based treatment. It is when patients leave the hospital that care becomes variable and uncertain. The transition from hospital to home has been identified as a vulnerable time when patients must assume responsibility for their own care, adjust to medication and lifestyle changes, and may or may not have adequate support at home. Some organizations have comprehensive disease management programs that successfully cover this transitional period, but in many geographic areas these programs are not available and patients are often left to their own devices. Coordination of post-hospital care is an essential tool to reduce 30-day readmission rates associated with gaps in care transitions (Jencks, Williams, & Coleman, 2009; Hernandez et al., 2010). Many isolated, targeted studies have addressed gaps in transitional care, but no specific plan has demonstrated effectiveness across many populations of older adults with HF. Therefore, further research is needed to identify the best practice interventions to reduce hospital readmissions and urgent ED visits.

The findings of this randomized, controlled trial that examined the effect of a transitional care intervention for older adults provided by a Heart Failure Nurse Navigator (HFNN) are promising. All-cause hospital readmissions within 30 days, HF knowledge, HF self-care, and HF quality of life all showed improvement, some statistically significant. Data emerged from quantitative analysis and qualitative interviews that have both research and clinical implications for the HFNN role.

Meleis' middle range Theory of Experiencing Transitions as seen through the lens of Boykin & Schoenofer's Nursing as Caring provided the theoretical framework for this intervention (Figure 1). Incorporated in the sequential health/illness transition, the

HFNN intervention included a teaching plan to provide knowledge necessary to prepare for change and equip the participant for self-care. The progressive teaching plan provided an awareness of the condition of HF. Acceptance of the HFNN to enter the home suggested an engagement to learn on the part of the participant. The response to each individual intervention revealed the willingness of the participant to change and adapt. The time span of the intervention was four weeks (28-30 days.) The critical points and events included the index admission, the discharge preparation, the physician follow-up and the HFNN weekly visits.

As the caring relationship developed, the HFNN determined what was most important to the patient and family. Facilitators included assessing the cultural beliefs and attitudes of the patient and family, and preparing them with a knowledge base. The educational booklet and personal teaching provided that individualized knowledge base. Socioeconomic status was stable in the majority of the participants.

Overall patterns of response to transitions included feelings of connectedness with the HFNN as expressed in the qualitative findings. These feelings were expressed during each of the home visits, which occurred in the patient's home environment, their most comfortable location. This shared, lived experience between the HFNN and the patient was an opportunity to communicate caring within a meaningful and authentic relationship. The perceptions of connection of the participants with the HFNN were confirmed during the post-intervention interviews. The development of confidence and coping was measured by the post-intervention SCHFI. Mastery was assessed using the HF knowledge and self-care tools. Transition from hospital to home often requires patients to incorporate new knowledge and change behavior patterns, which can affect their self-concept. Fluid integrative identities refer to the self-concept of the patient after the transition (Meleis et al., 2000). It is hoped that the authentic presence and relational communication between the HFNN and the patient might have enhanced their identification as a whole person experiencing the health challenge of HF. The perceptions of the participants as reflected in the qualitative findings indicated that educational clarification was extremely helpful to their confidence and coping.

The qualitative data supports that the relationship that the HFNN achieved with each participant most likely contributed to feelings of connectedness, and also provided an awareness of each participant's unique history, cultural beliefs and socioeconomic status. These relational and educational features of the HFNN role helped many of the participants learn the skills needed to master the health challenge of HF (see Figure 9).

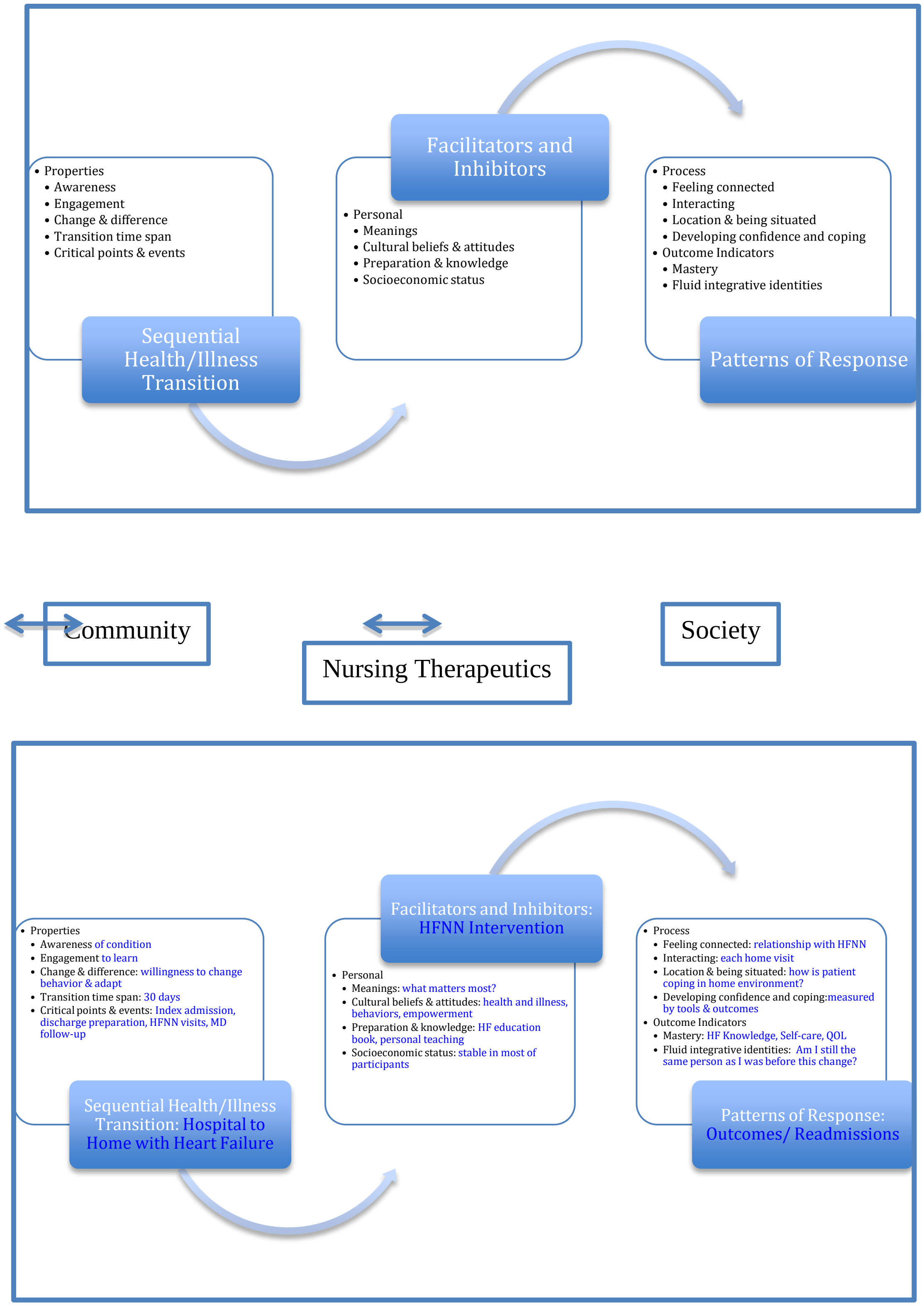


Figure 9. Model of the Theory of Experiencing Transitions (Meleis et al., 2000) as applied to the HFNN Intervention.

In this study, a random sample of 40 older adults hospitalized with a primary or secondary diagnosis of HF was recruited from a 400-bed private, not-for-profit hospital in southeast Florida. Participants who met inclusion criteria and were being discharged to home were randomly assigned to the control group for usual care or the intervention group for usual care plus the HFNN intervention. The HFNN intervention included one visit in the hospital and four home visits over 30 days after discharge and included an educational book and a progressive teaching plan.

Chi-square analysis compared the categorical variables between the two groups and determined no significant difference at baseline. Chi-square was also used to measure the difference in readmissions between the control and intervention groups. Repeated measures analysis of variance (RM-ANOVA) were used to determine the differences of pre/post test scores between control and intervention groups for measures of HF knowledge, HF self-care, and HF quality of life. The next part of this chapter will provide a discussion of the quantitative results.

Quantitative results

Several of the measured outcomes improved either significantly or were approaching significance. The following is a discussion of findings related to each hypothesis.

Readmissions

Hypothesis one stated that older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have fewer 30-day unplanned hospital readmissions and/or urgent ED visits at one-month post hospital discharge. The control group was 2.2 times more likely than the intervention group to be readmitted to the hospital within 30 days. The results were encouraging, but due to a small sample size, study results were underpowered. Although there were only half as many readmissions in the intervention group compared to the control group, these results were not statistically significant and hypothesis one was rejected. It is speculated that a larger sample size may have demonstrated statistical significance. Regardless, is important to note any decrease in readmissions.

The intervention group had fewer hospital readmissions compared with the control group, as seen in other studies. One important component of the HFNN intervention was the face-to-face relational interaction between the health care provider and the patient, which has demonstrated decreased hospital readmissions in other studies (Rich et al., 1995; Blue et al, 2001; Koelling et al., 2005; Naylor et al., 2004, 2011). That relationship may be one component leading to decreased hospital readmissions. Face-to-face interactions demonstrating authentic presence provide the opportunity for the HFNN to understand what is most important to each patient (Boykin & Schoenofer, 2001). Another crucial component is seeing the patient in the home environment, which is the only way to truly assess how the successfully the discharge instructions are being implemented. A recent review of interventions to prevent readmissions indicated that the challenges patients may face after discharge must be assessed before the patient even leaves the hospital (Ziadeian & Fonarow, 2016). The authors also suggest that transitional care programs should include some type of weekly contact, which may be a telephone call and/or a home visit.

Weekly patient contact is one strategy recommended in an integrative literature review of 20 research studies evaluating HF transitional care programs (Stamp et al.

2014). Programs that had weekly visits were rated as high-intensity interventions, and all included at least one visit in the hospital along with an educational plan. The programs reviewed were evaluated on the outcomes of readmission reduction, quality of life (QOL), and cost. The timing of readmission outcomes ranged from 30 days to 18 months. Findings indicated that there is a continued gap in research on this topic, but the most successful programs included intensive, nurse-led inpatient and home care education with follow-up within 72 hours of hospital discharge. These program recommendations describe the model of the HFNN program tested in this study; the only difference was that the inpatient education was less robust. This aspect of the role could be modified for future studies, providing more time for inpatient education as well as for the relationship between the HFNN and the patient to deepen. Joining the patient during this health challenge and coming to know the patient as a unique person is the beginning of living within a relationship grounded in caring. Having a dedicated individual to identify appropriate patients could lead to earlier contact and more opportunities to educate the patients prior to discharge. The reason for the readmission and the number of days post-discharge are also important considerations.

In the HFNN study, most readmissions were HF-related; one participant in each group was readmitted with a non-HF diagnosis. An unexpected result was that the readmissions in both groups occurred later than reported in the literature; no participants were readmitted within the first seven days after hospital discharge. The control group readmissions occurred between eight and twenty-seven days after discharge. The intervention group readmissions occurred between eleven and twenty-seven days after discharge. Many studies reported the most vulnerable time for patients was in the first week after discharge. In a recent retrospective cohort study of over 450,000 patients hospitalized with a diagnosis of HF, it was noted that the highest readmission risk occurred on day four (Krumholtz et al., 2016).

In the HFNN study, the readmissions occurring later may be due to the homogeneity of the participants regarding access to primary care providers; they may have had follow-up appointments earlier than in other studies. This higher level of standard usual care may be the reason that readmissions did not occur in the first week after hospital discharge. Support at home was evaluated and in this study, there was no correlation between participants who lived alone and hospital readmission, whether in the intervention or control group. There may also have been other unknown variables that influenced these results, including socioeconomic level. There is a multitude of factors that may influence the 30-day readmission risk and may be worth exploring in future research.

It is not only important to consider patient-related factors, but also reimbursement issues tied to unplanned 30-day readmissions. The 30-day CMS readmission penalties are a compelling reason to follow the progress of patients for four weeks after discharge, making it essential to implement interventions during this time. That interval has also been shown to be an effective period of time for patient and family educational understanding and compliance. The follow-up time period of four weeks after discharge was very successful in an interdisciplinary HF transitional care model at Carolinas Medical Center. In that program, the patient and family came to the clinic each week to meet with an advanced practice nurse, a certified HF nurse, a social worker, a pharmacist, and a dietitian. Hospital readmissions for those who participated were less than eight percent. It should be noted that a significant number of patients refused to participate due to distance, transportation, or comorbidity management; these patients were referred to a center with telemedicine capabilities (Monza, Harris, & Shaw, 2015). Although it has been effective strategy for several disciplines to coordinate care for an individual patient, in absence of such an integrated team approach, it is possible for the RN with specialized HF training to provide the information needed for each patient.

Knowledge and Self-Care

Hypothesis two stated that older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have a significant increase in HF knowledge and ability to engage in self-care behaviors at one-month post hospital discharge. Each participant in both the control and intervention groups was given a survey for measures of HF knowledge and self-care during pre-test and at four weeks post-discharge. Results were compared between the intervention and control groups as well as within each group over time.

In this HFNN study, there was a progressive delivery of HF-specific information, accompanied by an educational booklet for reinforcement. During the hospital visit, the HFNN reviewed each patient's specific type of HF, along with the ejection fraction, explaining the pathophysiology with both words and pictures. Common symptoms and their causes were reviewed and each medication was explained. Other topics covered over the next four home visits were how to check a pulse, dietary sodium, fluid and daily weight, exercise, and when to call the health care provider. These topics are the basic HF knowledge patients need to successfully transition home, but many patients are discharged without it (Albert et al., 2015).

Knowledge deficit continues to be a problem in many patients hospitalized with HF. This was exemplified in a recent study of 60 individuals admitted to a hospital with a high-volume disease management program. These patients demonstrated deficits of 58% to 77% in each of the six main discharge education topics (diet & fluids, weight monitoring, exercise, worsening symptoms, medications, and follow-up appointments). All six of these educational topics continue to be required at discharge by The Joint Commission, so they must be included in any HF educational program. Conversely, CMS no longer monitors any HF core measures, although hospitals are still responsible for the outcomes and may incur excess readmission penalties, making discharge teaching an essential aspect of care (Pudloe et al, 2015).

However, discharge teaching information is not completely or consistently delivered to patients in the hospital. A survey of 118 primary nurses about frequency of and comfort in discharge education revealed insufficient time and content for discharge education. In this study, nurses had the lowest comfort level with the topics that might prove most helpful to the patient clinically (medications, dietary changes and exercise/activity). The typical amount of time spent on discharge education was 15 minutes or less (Albert et al., 2015). This is not sufficient time to cover the information needed for a successful transition home.

In this HFNN study, the Dutch Heart Failure Knowledge Scale (DHFKS) was used to measures knowledge of HF pathophysiology and daily care. The pre-test to posttest scores for HF knowledge in the intervention group demonstrated improvement approaching significance (*p* = .06). The comprehensive education that was initiated in the hospital by the HFNN and continued for 4 weeks after discharge may have accounted for the improvement in the intervention group. Knowledge is the first step in HF self-care that may prevent 30-day hospital readmissions. Without knowledge, patients may not be equipped to engage in self-care.

Self-care of HF behaviors were also measured in the hospital and at four weeks post-discharge. The HFNN intervention utilized the Living with Heart Failure booklet to customize self-care instructions for each patient. At the first home visit, the HFNN examined each patients' refrigerator and pantry, discussed lower sodium choices for home and when dining out, identified the "dry" weight of each patient, showed them how to track their weight each day, and when to contact their health care provider. Medication management strategies were implemented and worsening symptoms were discussed over the course of the next four weeks.

Self-care maintenance, self-care management, and self-care confidence were each surveyed separately. Self-care maintenance improved over time in both groups, but the improvement in the intervention group exceeded the control group, approaching significance ($p = .07$). Self-care management improved over time in both groups, but there was no greater gain in the intervention group over the control group. Self-care confidence was dramatically improved over time in the intervention group compared with the control group ($p = .001$).

The Self-care of Heart Failure Index (SCHFI) measured the three separate constructs of self-care: maintenance, management, and confidence, and each of these will be discussed individually. A score of 70 or more on each construct suggests self-care adequacy (Riegel et al., 2009). Self-care maintenance includes activities participants might actually do on a daily basis to prevent worsening symptoms, such as weight monitoring, checking ankles for swelling, eating a low-salt diet, and using a medication management system.

Self-Care Maintenance

In the HFNN study, the improvement in self-care maintenance over time in the intervention group compared to the control group is congruent with other transitional studies utilizing face-to-face support. One such study implemented the Care Transition Intervention, in which a geriatric nurse practitioner with a master training certification in chronic disease self-management was the transition coach. This transition coach met the patient in the hospital, made one home visit and three subsequent telephone calls. Patients in this study improved in self-care maintenance, especially regarding medication understanding and administration (Coleman et al., 2004). Kommuri et al., (2005) measured the effect of only a one-hour education session with a nurse educator prior to discharge. In this study, HF knowledge improved, along with some self-care knowledge. Dietary knowledge did not significantly improve and HF readmissions were not measured. Self-care management was also studied in a qualitative inquiry of patients receiving a transitional care intervention (Parry et al., 2006). In that study, findings indicated that the perception of a caring relationship led to increased patient investment in the program, which enhanced self-management. This personal caring relationship allows the nurse to enter into the patient’s life, coming to know what is most important and meeting those needs.

In another pilot study, 38 participants met with a HF nurse, were given a self-care manual and role-modeling DVD to view in the home, and were re-evaluated eight weeks later. The study findings indicated that a personal relationship at the start of the intervention is helpful to successful self-care maintenance. This home-DVD pilot study provides only foundational data and there is a need for a large-scale clinical trial to enhance external validity (Boyde et al., 2012). Although these results were not generalizable, the findings support the importance of at least one face-to-face meeting with a nurse who can initiate a caring relationship and help the patient to grow in self-care maintenance.

Self-Care Management

The individual construct of self-care management improved over time in both groups, but there was no greater gain in the intervention group. Self-care management involves responding to worsening symptoms such as trouble breathing or ankle swelling by calling a health care provider, reducing intake of sodium or fluid, or taking an extra diuretic pill. Several factors may account for the improvement in both groups. Practice effect or the ability of participants to improve scores due to familiarity with the test (Field, 2009) may have influenced the improvement in scores. Exposure to the HF topics in the testing tools may have increased awareness or curiosity about HF self-care management.

One of the self-care management items tested was the likelihood of the patient taking an extra diuretic if HF symptoms worsened. Most of the participants in both groups were not comfortable taking extra medication without a physician order. This is not surprising since, in most settings, the physician prescribes a set dose of medication, not a symptom-dependent range. If the patient calls the provider, there may be instructions given to take an extra diuretic. The potential effectiveness of this self-care management construct was demonstrated in an RCT of 165 participants (Blue et al., 2001). Home health nurses were given a protocol to adjust diuretics, ACE inhibitors, and digoxin based on assessments made during repeated home visits to patients with HF. Although this intensive study was done before beta-blockers were included in therapeutic guidelines, the intervention participants also had a significant decrease in hospital readmissions at 6 and 12 months. At 12 months, patients in the intervention group had fewer hospital readmission events than the control group (86 vs. 114, *p* = .018). This supports the underutilized option of specially trained home health nurses adjusting diuretics and other medications according to an individualized, physician-ordered protocol.

Self-Care Confidence

The HFNN had a markedly positive effect on the individual construct of HF self-care confidence. This construct measures how confident the participants are in their own ability to keep themselves free of symptoms, follow treatment advice, recognize changes in health status, and respond to these changes. There was a statistically significant improvement over time in the intervention group compared to the control (*p* = .001). The HFNN results were consistent with the previously mentioned Care Transition Intervention (CTI), which utilized a geriatric nurse practitioner with a master training certification in chronic disease self-management as a transition coach. In the CTI, the transition coach met the patient in the hospital, made one home visit and three subsequent telephone calls (Coleman et al., 2004). The HFNN results are also consistent with the results in the Heart Failure Self-care to Success (HFSS) program, although advanced practice nurses were utilized in the role for one-on-one counseling using an educational calendar. The HFSS program reported a significant increase in all three categories of the

SCHFI (*p* = .01), and none of the participants experienced a HF related hospital readmission over six months. Another difference in the HFSS program was that the time interval between each home visit was five weeks and continued for a six month period, as opposed to once weekly for four weeks in the HFNN intervention (Bryant & Gaspar, 2014). This reflects a much greater financial investment than the HFNN intervention, both in the cost of the APNs as well as the extended follow-up period.

Another study utilizing APNs had very different results. In a RCT of 179 participants, self-care education was delivered both pre- and post-discharge. Most patients received an average of four visits in the hospital and one telephone call, but only one home visit. Those patients had no improvement in self-care abilities, and only a modest gain in self-care behavior (Jaarsma et al., 2000). This HFNN study utilized experienced home health registered nurses with additional training in HF, and most of the patient education and support took place in the home. It is interesting that the HFNN was able to produce similar self-care results as studies utilizing advanced practice nurses, and that placing more emphasis on the home visit seems to make a difference in self-care confidence.

A recent randomized three-group pilot study of 64 patients compared usual care with both a telephone intervention and a telephone/home visit intervention. Using the Self Care of HF Index, these patients were evaluated at baseline, five weeks, nine weeks, and thirteen weeks. There was no difference in the two constructs of self-care maintenance and management, but significant effects over time were noted for self-care confidence in the telephone/home-visit intervention group (*p* = .03). This coping partnership strengthened self-care confidence and authors suggested further exploration the dyadic relationship between the patient and the post-discharge support nurse (Graven, Gordon, Bahorski, & Grant Keltner, 2016).

The increased confidence of the patients in the HFNN intervention group might be associated with the relationship built from that personal dyadic relationship. Joining the patient in this health challenge revealed each individual's needs or calls for nursing. Coming to know the patient early in the relationship (before discharge) began their shared caring experience (Boykin & sSchoenofer, 2001). The HFNN met the patient (and frequently met the caregiver) in the hospital, and then visited them in their home environment once each week for four weeks. This allowed the HFNN to observe any particular challenges the patients might encounter in their home environment. These challenges include medication management, food availability or dietary information, transportation issues, or understanding of diagnosis or recommended lifestyle changes, among others. Addressing concerns on an individual basis with a compassionate, caring, and knowledgeable professional who can help formulate self-care solutions may help boost confidence in a person transitioning home with the health challenge of heart failure. The qualitative findings in the intervention participants' group support this possibility. Phrases such as "Knowing she was coming made me feel secure. It made me feel so much safer" and "I felt very confident at the end of our 4 weeks together. I felt I could control this and it was not going to control me" and "She made it all seem do-able" indicate enhanced self-care confidence in this group.

Although several of the elements of hypothesis two (knowledge, self-care maintenance, and self-care confidence) demonstrated positive results in the intervention group, the hypothesis was rejected because the construct of self-care management improvement was not statistically significant.

Quality of Life

Hypothesis three stated that older adults with a diagnosis of heart failure who receive care from a Heart Failure Nurse Navigator as they transition home from the hospital will have a significant increase in HF quality of life (QOL) at one-month post hospital discharge. The Minnesota Living with Heart Failure Questionnaire (MLHFQ) measures important features of physical, emotional, and social dimensions, which are the interrelated effects of HF on an individual's QOL. The MLHFQ uses a 6-point Likert scale of zero to five, with lower scores indicating improved QOL. The results in the intervention group were perhaps the most dramatic findings of this study.

Hypothesis three was not rejected. At baseline, the control group had a better HF QOL (45.5 ± 19.3) than the intervention group (55.4 ± 16.7). The posttest results indicated a significant increase in the intervention group's HF QOL (28.9 ± 18.1), while the control group demonstrated a significant decrease in HF QOL (55.1 ±24.7). This was a unique finding of this study. The intervention group's average score of 55.4 pretest decreased to 28.9 post-test (again, noting lower scores reflect a better QOL), indicating quite a significant change associated with the HFNN intervention. The intervention was comprehensive, covering areas such as diet, daily weight, exercise, worsening symptoms, and follow-up care. Patients who understand their medications, dietary instructions and exercise recommendations may be more likely to feel like they can manage this health challenge, and have a better quality of life. This was supported in many of the qualitative findings indicating patients now felt empowered and in control. The control group's average score of 45.5 pretest increased to 55.1 post-test, indicating a significant worsening of their QOL. This result is concerning and begs increased analysis and concerted action.

In other studies, both the control and intervention groups demonstrated improvement or a generally positive effect on QOL. In a systematic review of HF self-management interventions, eight studies demonstrated improved QOL scores in the intervention group, while six studies demonstrated no significant change. None of these studies demonstrated a simultaneously significant QOL improvement in the intervention group and significant QOL decline in the control group (Ditewig et al., 2010).

A prospective RCT of 282 participants utilized a team approach of a cardiovascular research nurse, a dietitian, a social worker, medication analysis by a geriatric cardiologist, and home visits and calls by hospital home-care staff. Measured by the Chronic Heart Failure Questionnaire, the participants demonstrated improved QOL in both groups, but with significantly more in the intervention group (22.1 ± 20.8 vs. 11.3 ± 16.4, $p = .0001$). Compared to the present HFNN study, this program would be cost prohibitive due to the increased resources needed for the team (Rich et al., 1995). In an integrative review, Stamp et al., (2014) noted that of 20 studies, only six measured QOL, and five of these six (including Rich et al., 1995 as noted above) showed improved QOL. None of these exhibited the significant control group decline in QOL found in the HFNN study.

In a RCT of 223 patients that utilized only a one-hour discharge education session with a nurse educator, QOL changes in scores from baseline to 30 days post-discharge did not differ between the control and intervention groups (15 ± 21 vs. 18 ± 25, p = NS).

The scores were similar between the groups at baseline and both groups improved significantly at 30-day follow-up, without any significant difference between them (Koelling et al., 2005). This study has long been included in reviews because of its effect on HF knowledge scores and hospital readmissions after a relatively limited intervention. Although some outcomes were significantly improved, the importance of patient QOL cannot be overlooked. It may be that the one-hour teaching session gave the patient the tools needed to avoid readmission, but without the benefit of the personal support of the home visit, QOL was not influenced.

In another RCT of 179 patients that included four visits in the hospital, one telephone call, and one home visit, there was no difference in QOL between the control and intervention groups. The QOL items measured were functional capabilities, symptoms, psychosocial adjustment to illness, and overall well being. The expectation was that self-care and QOL would improve simultaneously, but this was not the case. The authors recommended an increased intensity of the educational intervention (i.e. more time, more home visits, or longer duration) as well as individualizing each patient's program to meet their unique and complex needs (Jaarsma et al, 2000).

In a study examining anxiety, depression, and social support on HF prognosis, none of these variables were associated with mortality. However, health-related QOL was negatively impacted by anxiety and other psychological variables. Severe health-related anxiety may predict hospital readmission and routine assessment was recommended as part of comprehensive HF treatment (Volz et al., 2010).

It was not unexpected that the support provided by the HFNN would promote improvement in health-related anxiety and the other dimensions of the QOL measure.

Some of the survey questions refer to physical symptom effects and some refer to the emotional and social effects of HF. Having a knowledgeable professional interested in one’s health and quality of life, and available to teach, answer questions, and provide reassurance would most likely have a positive effect on these issues. The marked increase in QOL among the intervention patients may also be linked to the increase in self-care confidence as previously reported.

It was surprising that the control group’s scores would decline to such a degree; the decrease in QOL for the control group demands attention in future studies. It may be related to declining physical symptoms, lack of self-care resources, or a lack of provider follow-up. Meleis’ Theory of Experiencing Transitions describes a successful transition process to include feeling connected and interacting, being situated in a particular location and developing confidence and coping. Missing any of these process elements could lead to a decreased QOL (Meleis et al., 2000). It may be speculated that if the control group had the support of the HFNN both before and in the four weeks after discharge, their QOL may have also improved.

Overall, the quantitative results of this study demonstrated some positive effects on HF knowledge, HF self-care maintenance, HF self-care confidence, and HF QOL. Readmissions within 30 days were fewer in the intervention group than in the control group. Recruitment challenges limited the sample size than anticipated. This, along with other variables, limited generalizability, which will be discussed later in this chapter.

Discussion of Qualitative Findings

The qualitative research question explored the perceptions of older adults (≥65) with a diagnosis of heart failure who transitioned from hospital to home regarding care coordinated by Heart Failure Nurse Navigator.

The qualitative data obtained from open-ended interview questions with the intervention participants was overwhelmingly affirmative. The fourteen participants in the intervention group who responded to the interview questions had favorable comments about the HFNN personally, and the education, support, comfort, and reassurance each provided. Information offered by the HFNN on dietary changes and options, exercise, medication clarification and management, and reinforcing the written education were all mentioned as benefits of the intervention. The participants were happy to have met the HFNN in the hospital before the first home visit. Without prompting, three of the participants contrasted the care by the HFNN with care by the home health nurse ordered by their primary care provider, stating the HFNN was more helpful and effective than the home health nurse.

Several of the participants stated they felt safer at home and more confident to care for themselves after receiving the HFNN intervention. This supports the quantitative result of increased self-care confidence in the intervention group. Several participants mentioned particular issues that the HFNN noticed and acted upon, issues that may not have been evident without a home visit. These include dietary instruction, such as finding low-sodium Indian food options and providing patient education about other health issues, such as diverticulitis.

Medication management after discharge was noted to be a very helpful intervention of the HFNN. One patient had 26 different pills to take each day (she had several other comorbidities) and the HFNN helped her organize a medication administration box that helped her feel like she was more in control of her home care. Foust et al., (2012) notes that home health nurses are vital to tailor and reinforce patient teaching for safe medication management in the home. Additionally, they can partner with primary care providers to see which medications are actually in the home and assess the patient's clinical response, leading to improved outcomes. This is one of the goals of the HFNN intervention.

Similar findings of self-care confidence were reported in a qualitative study of 19 patients with HF in Sweden who received home health care from a multidisciplinary team. The interviews focused on the patient's participation in home care and important categories included communication, control in decision-making, self-care, collaboration, trusting relationship, and individualized care. The findings concluded that structured home care can strengthen patient participation, and although the words "self-care confidence" were not used, the categories described by the patients suggested this result (Nasstrom, Idvall, & Stromberg, 2013). The HFNN relationship sometimes went beyond heart failure care and management to unrelated issues in the home.

On one home visit, the HFNN found her patient about to climb a ladder to hang a bird feeder in a back yard tree; she convinced him to let her take over, and he commented: "she did a pretty good job!" Something as simple as help with a household or yard task may make a patient feel better. The relationship between the HFNN and the patients gave the HFNN the comfort level to go beyond just the physical assessment and

HF education and discover what mattered most to that individual. This is another example of the HFNN responding to the patient's individual need or "call for nursing in a way that represents the fullness (wholeness) of the nurse" (Boykin & Schoenofer, 2001, p.18).

Patients who have support in lifestyle changes, understand their disease process and can manage their medications have a smoother transition than those who do not and these patients generally maintain their lifestyle changes (Naylor et al., 2004; Naylor at al., 2011). Most large hospital systems have disease management programs in place and exercise control over physician follow-up protocols, which has promoted consistency in care transitions. For the stand-alone, not-for-profit, or rural organization, the HFNN may be a fiscally realistic role to transition, teach, and monitor patients, and help them develop self-care skills.

Cost/Benefit Analysis

Although this was not a research question in this study, cost must be a consideration when initiating any change in practice. The initial cost of training the HFNN was approximately $200. After the initial training of the HFNN, the additional cost for each patient would be an additional $200 (i.e., the cost of first patient would be $400 and all successive patients cared for by that HFNN would be $200.)

In this HFNN study, 16% of the intervention group was readmitted and 29% of the control group was readmitted. Participants in the control group were 2.22 times more likely to be readmitted than those participants in the intervention group [x(1)= .935, p = .334. 0.R. = 2.219]. Although these data are underpowered and not statistically significant, even a modest readmission reduction could result in significant savings for the organization.

The average cost of a HF readmission varies from $8000.00 to $10,000.00 (Truven Health Analytics, 2016). During Q1 2017, 224 patients with a primary or secondary diagnosis of HF were discharged to home. With a 22% readmission rate, one would expect 49 of these patients to be readmitted, although actual numbers may be far less, as sicker patients might be discharged to other settings such as skilled nursing or assisted living. Even if only half this number (11%: 25 patients) were readmitted from home, the total cost for these readmissions would range from $200,000 - $250,000.

Assuming the HFNN intervention could maintain a 16% readmission rate and followed all 224 patients discharged home with HF from January through March 2017, the organization's cost would be $46,000. If the HFNN intervention reduced readmissions from 22% (49 patients) to 16% (36 patients), it would result in a readmission cost savings of $104,000 - $130,000. Including the cost of the intervention, the quarterly savings would be $58,000 – $84,000. Extrapolated over four quarters, these savings could be $200,000 - $300,000. These projected savings do not include avoiding the CMS readmission penalties of up to 3% of all reimbursements calculated for excess readmission ratio, which could be considerable. This is merely an exemplar; a more detailed cost/benefit analysis is beyond the scope of this inquiry, and in fact, would be a study unto itself.

Study Limitations

There are multiple limitations to this study. This was a small, single-center, randomized controlled trial. Many studies have been done on smaller sample groups and the best processes for transition from hospital to home on a larger population have yet to be determined. Future research is needed to assess the benefits of the HFNN across different ethnic populations and wider geographic areas.

Due to unforeseen circumstances, enrollment was concluded before the desired number of participants was attained. Another project involving discharge teaching and home visits for patients with chronic illness would have potentially overlapped the participants in this study, as well as changed usual care for the control group. It was decided to stop enrolling at 40 participants, just prior to the go-live date of the competing project. The lack of participants influenced statistical significance and limited generalizability; however, if the study was repeated in the future with greater resources for both recruitment and intervention, it may demonstrate significance. Also, this sample consisted of a small group from one geographic location; these results cannot be generalized to other geographic areas. The sample was representative of the relatively homogenous patient population of the study site and therefore may be useful in planning local programs.

Study recruitment was slower than expected during the first two months. One reason for this was that post-discharge care from home health was an initial exclusion. After noting that almost all patients with a HF diagnosis have home health care ordered on discharge, the study protocol was amended to include these patients and recruitment was more active. Due to time and human resource constraints, potential participants were often discharged before any initial contact could be attempted. Additional resources to identify and recruit potential participants would also likely increase participation and should be considered in future research. Personnel costs would be a factor but hopefully would be offset by the reduction in readmissions.

The initial plan for qualitative data collection was to invite the intervention participants back for focus group discussions. The planned setting was a lunch or dinner meeting in the education center at the hospital where they had been admitted. Although all the participants consented to participate in a focus group at enrollment, only three later agreed to attend either of the two planned meetings.   Of those, one had a death in the family, one had a surgical procedure scheduled that day, and one had transportation issues. Most of the intervention group participants agreed to a telephone interview, yielding qualitative data collected from fourteen of the nineteen intervention participants. This data collection modification is a limitation of this study; richer data may have been obtained from an interactive group, exchanging dialogue and freely sharing information.

Nursing Research Implications

Many of the outcomes measured in this study demonstrated significant or near-significant results. Repeating this study over a longer follow-up period or with increased recruitment and HFNN personnel might yield more generalizable conclusions. Successfully involving the primary care provider (PCP) in recruitment should increase participation; if a patient’s PCP makes a recommendation, they might be more likely to enroll. Repeating this study with more participants and in other geographic areas may yield more useful data to support practice initiatives.

Despite a myriad of transitional care studies, no one program has been shown to be effective across a wide variety of populations. Possibly this is a geographic and economic issue; perhaps transitional care interventions should be tailored to what is available in each locale and what makes sense for each population group. Future research may result in a virtual map of differing transitional programs based on the needs and resources in specific geographic areas.

Quality of life (QOL) in patients with heart failure has been associated with hospital readmission. In the present HFNN study, QOL declined in the control participants. Patients who do not have adequate follow-up after hospital discharge may be at risk for poorer QOL and increased readmissions. Future research regarding the components of follow-up care needed to improve QOL in this population is needed.

Qualitative findings suggested that meeting the HFNN in the hospital was the beginning of the caring relationship that continued through the home visits. It is not usual practice for a home health RN to meet the patient until the first visit; the home health agency typically has a hospital-based nurse who provides patient information to the RN in the field. A separate study might assess only the effects of meeting the field home health nurse in the hospital prior to discharge and potential implications for patient satisfaction, readmission outcomes, and other variables.

Lastly, research efforts should be directed toward identifying which patients are at the greatest risk for readmission. Identifying those patients early in their hospitalization could lead to intensive education and support pre-discharge as well as post-discharge home visits. HF readmission risk calculators have not been consistently reliable indicators of actual readmissions and that was also true in the HFNN study. Identifying specific criteria that point to possible readmissions from home, and testing them over time may predict the patients most likely to be readmitted. Concentrating efforts on those with the greatest readmission risk and following them through the continuum of their health challenge may yield helpful results.

Nursing Education Implications

Nursing education provides an important opportunity to equip new members of the profession with transitional care skills. Included in the study of each disease process should be the critical patient teaching points to aid in post-discharge self-care. Even when patient teaching is part of the undergraduate curriculum, it can become lost among more urgent matters when new nurses begin to practice. Time management strategies are essential for all aspects of patient care, but a time allotment for meaningful patient teaching should be stressed.

One way to accomplish the time management goal is to make patient education part of every clinical experience. Students often have fewer patients and more time to spend with each patient, making it easier to develop a caring relationship in a short time. It can start on the day of admission, when the home medication list is recorded. It can continue throughout the hospital stay as pertinent topics arise. A checklist of all the teaching needs for patients with HF can be included in the electronic medical record, so accurate documentation can be maintained. In post-conference, students can report not only on the disease state, pathophysiology and treatment, but what they were able to teach the patient or family that day. Looking ahead to the needs of the patient after discharge should be standard procedure when coming to know and caring for the whole person.

Nursing Practice Implications

The findings of this study may be translated into clinical practice to develop programs in appropriate settings to meet the transitional care needs of patients with HF who do not have access to a comprehensive disease management program. These appropriate settings might include not-for-profit, stand-alone community hospitals, or hospitals in rural settings. This clinical practice model could also be effective within a comprehensive disease management program. The typical HF clinic requires patients to visit a central location. Patients who have difficulty with transportation to the facility may benefit from home visits from a HFNN.

Although the discharge education in accordance with The Joint Commission mandate is prescribed, the assimilation of that education into individual lives is variable. The HFNN can initiate a relationship with patients in the hospital and follow them with home visits to their own unique environment. The home visit is the most effective setting to assess and strengthen patient understanding for everyday living with heart failure.

Summation

There remains a great need for efficient and effective processes for transitional care of patients with HF, with the goal of reducing hospital readmissions. The HFNN is one role that may show promise to meet the triple aim of improving patient quality care and improving patient health outcomes at a reduced cost. Many factors are involved in preventing HF readmissions: HF knowledge, HF self-care, and HF quality of life are some of the most important. The HFNN has the advantage of developing a caring and trusting relationship over time with each patient, as well as visiting the patient (and caregiver) in the home environment. This allows the HFNN to tailor teaching and other interventions to the particular needs of each individual patient and caregiver. This study demonstrated significant gains in the areas of HF self-care confidence and HF quality of life. There were also encouraging results for HF knowledge, HF self-care maintenance, and HF readmissions, although not statistically significant. Continued research on this role may demonstrate its efficiency and effectiveness in appropriate health care settings.

APPENDICES

APPENDIX A

Measurement Timeline

Timeline	Control Group	Intervention Group	Variables
Baseline contact: 4-72 hours prior to discharge (d/c)	DIS Mini Cog NVS GDS-15 CORE DHFKS SCHFI MLHFQ	DIS Mini Cog NVS GDS-15 CORE DHFKS SCHFI MLHFQ	Demographics Cognitive impairment (confound) Health Literacy (confounding) Depression (covariant) Readmission Risk (covariant) HF Knowledge (2nd outcome) HF Self-care (2nd outcome) Quality of Life (2nd outcome)
Visit 1: within 72 hrs. post d/c	N/A	HFNN activities and assessments	
Visit 2: btwn. 6-13 days post d/c	N/A		
Visit 3: btwn 14-20 days post d/c	N/A		
Visit 4: btwn 21-29 days post d/c	N/A		
Visit 5: btwn 30-37 days post d/c	<u>Telephone call</u>: **1**. Request completion of mailed surveys and return. <u>By mail</u>: DHFKS SCHFI MLHFQ **2**.Were they readmitted or visit ED within 30 days?	In person at last visit: **1**. DHFKS SCHFI **2**. Were they readmitted? Did they visit the ED? **3**. MLHFQ	1. Primary outcome is HF Knowledge, Self-care 2. Secondary outcomes are within-30-day readmissions, ED visits, & QOL.

Demographic information sheet (DIS)
Mini-Cog
Newest Vital Sign (NVS)
Geriatric Depression Scale (GDS)

Dutch HF Knowledge Scale (DHFKS)
Self-care of HF Index (SCHFI)
Minnesota Living with HF Questionnaire (MLHFQ)
(CORE) Readmission Risk Calculator

APPENDIX B

Inclusion Criteria

Inclusion criteria	Rationale
1. Adults age 65 and older	CMS focuses on within-30-day hospital readmissions for this age group
2. Primary or secondary diagnosis of HF documented in the medical record (limit to NYHA II-IV, as NYHA I is usually asymptomatic)	Many other chronic conditions have similar signs and symptoms of HF (dyspnea, need for diuretics.)
3. Participant and/or caregiver Mini-Cog score of 3 or greater	The study will assess if the influence of the HFNN increases self-care and HF knowledge. Cognitive impairment will confound this assessment
4. Resides in Palm Beach County for at least 30 days after discharge.	Home Health Care is licensed for Palm Beach County only. Primary outcome measure is within-30-day hospital readmission

APPENDIX C

HFNN Curriculum Outline

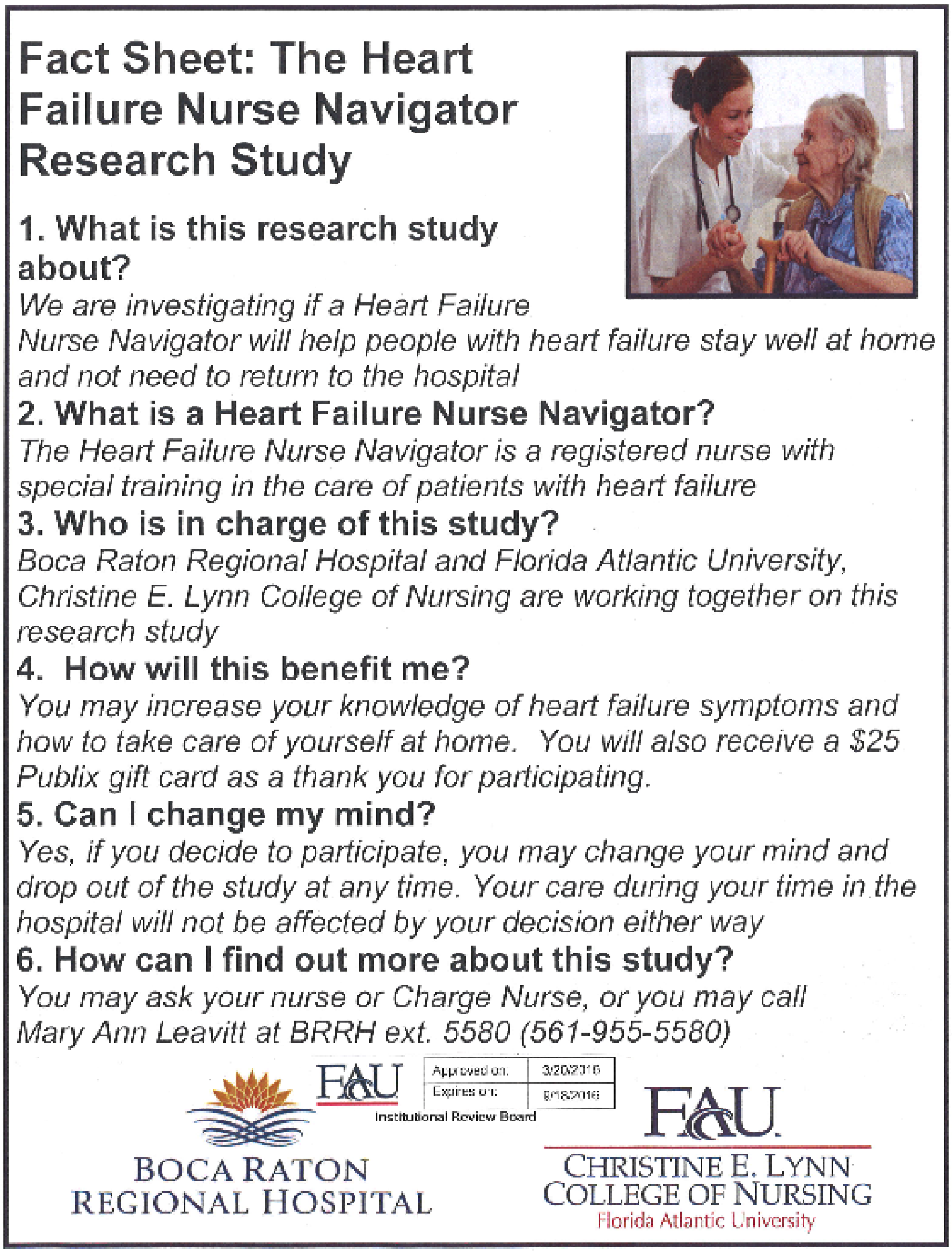
Curriculum Outline (aahfn.org, 2015)
Part 1 - Purpose: To review the pathophysiology of heart failure, how to perform a focused history and physical exam and diagnostic testing for heart failure.
Objectives
1 Describe the pathophysiologic changes that occur in heart failure
2 List the elements of a patient history
3 Explain the components of a cardiac-focused patient assessment
4 Identify appropriate diagnostic tests for a patient with heart failure

Part 2 – Purpose: To explore the pharmacologic and device treatment including transplantation for chronic and advanced heart failure (HF).
Objectives
1 List the recommended medications for treatment of HF.
2 State indications for ICD implant: primary and secondary.
3 Describe the impact that three comorbid conditions have on HF.
4 Describe acute decompensated and advanced HF.

Part 3 – Purpose: To review ethical considerations, palliative care planning, quality improvement and care transitions for heart failure (HF) patients.
Objectives
1 Describe the role of transitional and palliative care in the planning for HF disease management.
2 Demonstrate understanding of the ethical and legal considerations in the HF patient population.
3 Explore quality improvement strategies in HF.

APPENDIX D

Participant Fact Sheet



Fact Sheet: The Heart Failure Nurse Navigator Research Study

1. What is this research study about?

We are investigating if a Heart Failure Nurse Navigator will help people with heart failure stay well at home and not need to return to the hospital

2. What is a Heart Failure Nurse Navigator?

The Heart Failure Nurse Navigator is a registered nurse with special training in the care of patients with heart failure

3. Who is in charge of this study?

Boca Raton Regional Hospital and Florida Atlantic University, Christine E. Lynn College of Nursing are working together on this research study

4. How will this benefit me?

You may increase your knowledge of heart failure symptoms and how to take care of yourself at home. You will also receive a $25 Publix gift card as a thank you for participating.

5. Can I change my mind?

Yes, if you decide to participate, you may change your mind and drop out of the study at any time. Your care during your time in the hospital will not be affected by your decision either way

6. How can I find out more about this study?

You may ask your nurse or Charge Nurse, or you may call Mary Ann Leavitt at BRRH ext. 5580 (561-955-5580)

FAU

Approved on:	3/20/2016
Expires on:	9/18/2016

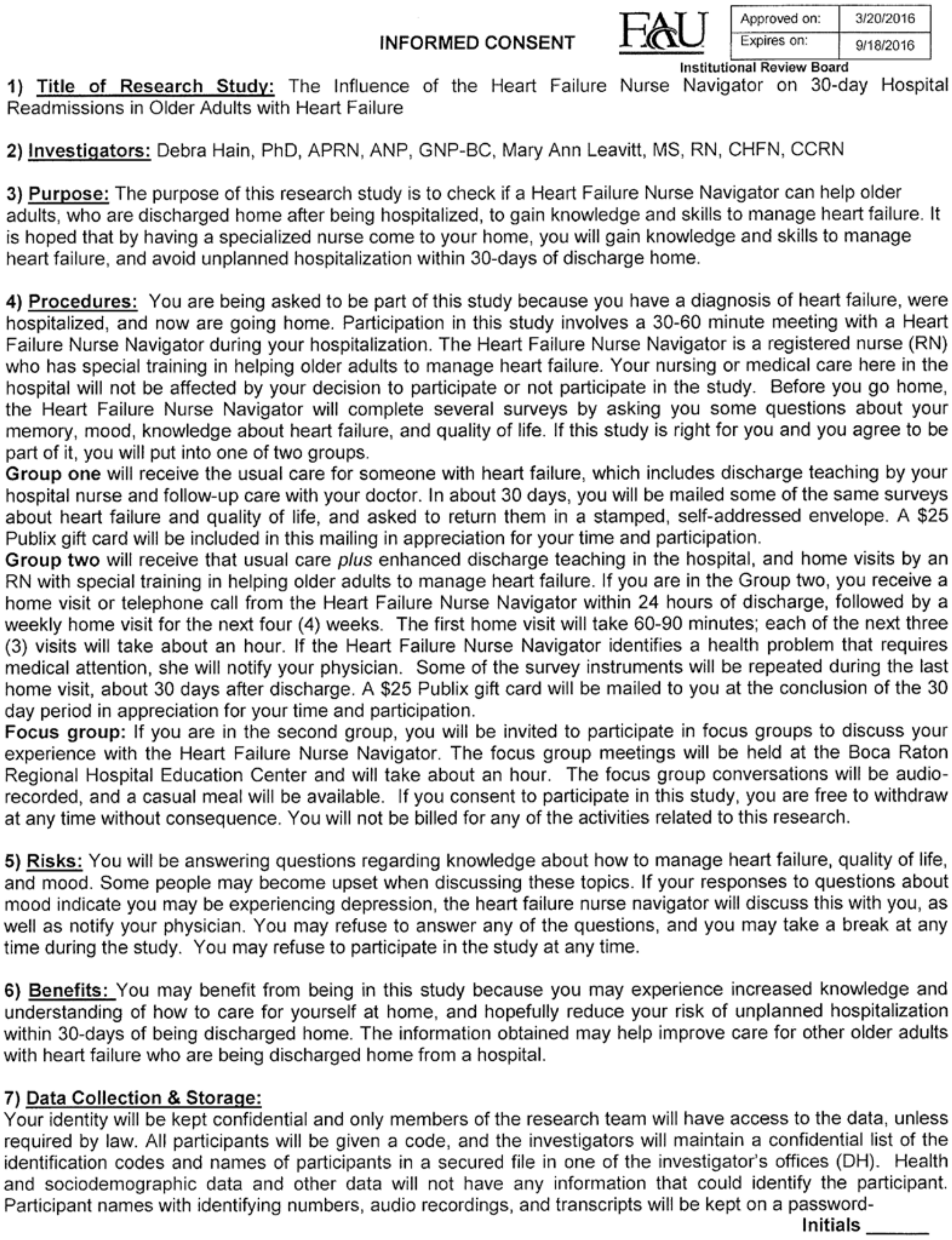
Institutional Review Board

BOCA RATON
REGIONAL HOSPITAL

FAU
CHRISTINE E. LYNN
COLLEGE OF NURSING
Florida Atlantic University

APPENDIX E

Consents and Instruments



Approved on:	3/20/2016
Expires on:	9/18/2016

Institutional Review Board

INFORMED CONSENT

1) Title of Research Study: The Influence of the Heart Failure Nurse Navigator on 30-day Hospital Readmissions in Older Adults with Heart Failure

2) Investigators: Debra Hain, PhD, APRN, ANP, GNP-BC, Mary Ann Leavitt, MS, RN, CHFN, CCRN

3) Purpose: The purpose of this research study is to check if a Heart Failure Nurse Navigator can help older adults, who are discharged home after being hospitalized, to gain knowledge and skills to manage heart failure. It is hoped that by having a specialized nurse come to your home, you will gain knowledge and skills to manage heart failure, and avoid unplanned hospitalization within 30-days of discharge home.

4) Procedures: You are being asked to be part of this study because you have a diagnosis of heart failure, were hospitalized, and now are going home. Participation in this study involves a 30-60 minute meeting with a Heart Failure Nurse Navigator during your hospitalization. The Heart Failure Nurse Navigator is a registered nurse (RN) who has special training in helping older adults to manage heart failure. Your nursing or medical care here in the hospital will not be affected by your decision to participate or not participate in the study. Before you go home, the Heart Failure Nurse Navigator will complete several surveys by asking you some questions about your memory, mood, knowledge about heart failure, and quality of life. If this study is right for you and you agree to be part of it, you will put into one of two groups.

Group one will receive the usual care for someone with heart failure, which includes discharge teaching by your hospital nurse and follow-up care with your doctor. In about 30 days, you will be mailed some of the same surveys about heart failure and quality of life, and asked to return them in a stamped, self-addressed envelope. A $25 Publix gift card will be included in this mailing in appreciation for your time and participation.

Group two will receive that usual care *plus* enhanced discharge teaching in the hospital, and home visits by an RN with special training in helping older adults to manage heart failure. If you are in the Group two, you receive a home visit or telephone call from the Heart Failure Nurse Navigator within 24 hours of discharge, followed by a weekly home visit for the next four (4) weeks. The first home visit will take 60-90 minutes; each of the next three (3) visits will take about an hour. If the Heart Failure Nurse Navigator identifies a health problem that requires medical attention, she will notify your physician. Some of the survey instruments will be repeated during the last home visit, about 30 days after discharge. A $25 Publix gift card will be mailed to you at the conclusion of the 30 day period in appreciation for your time and participation.

Focus group: If you are in the second group, you will be invited to participate in focus groups to discuss your experience with the Heart Failure Nurse Navigator. The focus group meetings will be held at the Boca Raton Regional Hospital Education Center and will take about an hour. The focus group conversations will be audio-recorded, and a casual meal will be available. If you consent to participate in this study, you are free to withdraw at any time without consequence. You will not be billed for any of the activities related to this research.

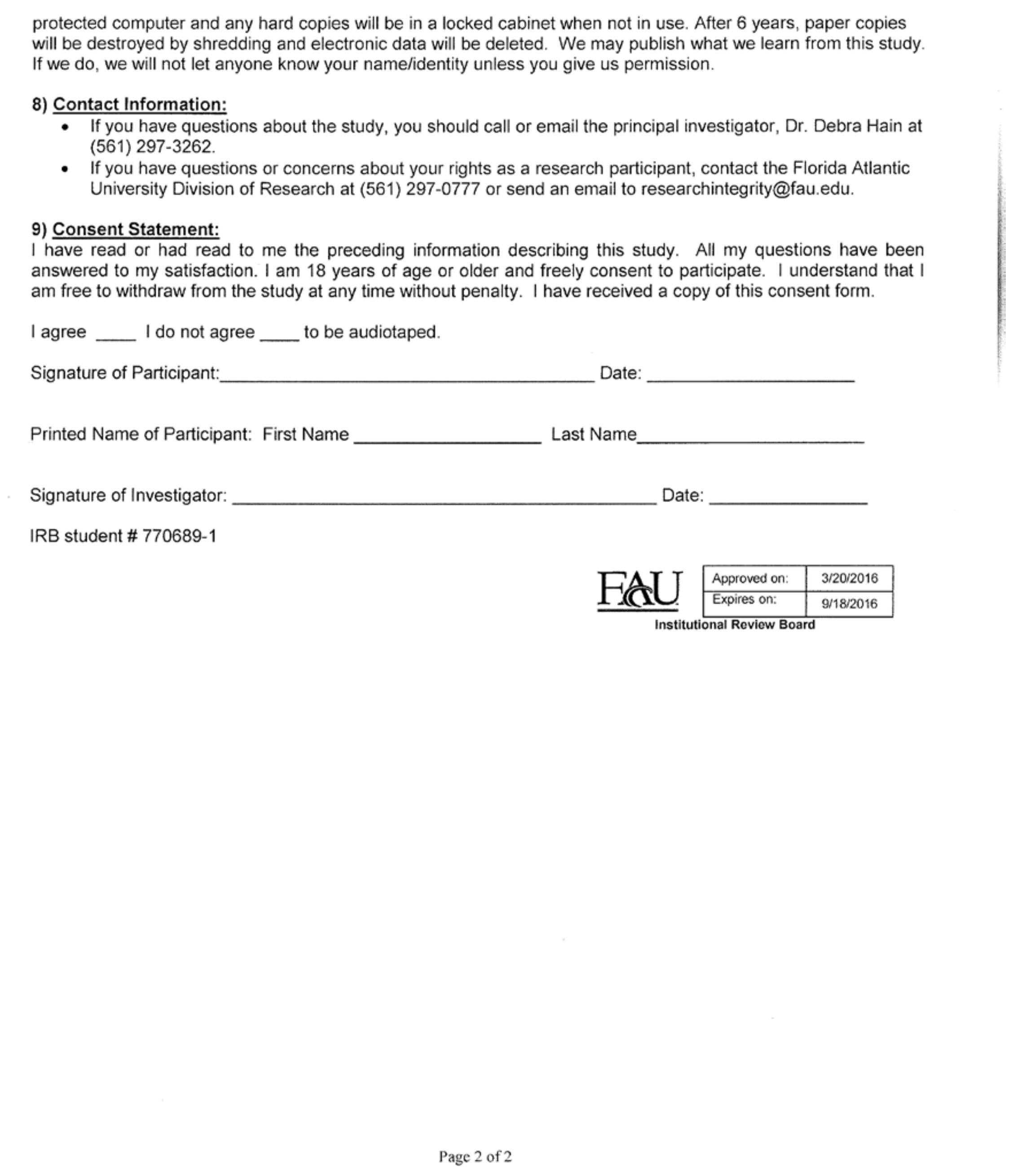
5) Risks: You will be answering questions regarding knowledge about how to manage heart failure, quality of life, and mood. Some people may become upset when discussing these topics. If your responses to questions about mood indicate you may be experiencing depression, the heart failure nurse navigator will discuss this with you, as well as notify your physician. You may refuse to answer any of the questions, and you may take a break at any time during the study. You may refuse to participate in the study at any time.

6) Benefits: You may benefit from being in this study because you may experience increased knowledge and understanding of how to care for yourself at home, and hopefully reduce your risk of unplanned hospitalization within 30-days of being discharged home. The information obtained may help improve care for other older adults with heart failure who are being discharged home from a hospital.

7) Data Collection & Storage:

Your identity will be kept confidential and only members of the research team will have access to the data, unless required by law. All participants will be given a code, and the investigators will maintain a confidential list of the identification codes and names of participants in a secured file in one of the investigator's offices (DH). Health and sociodemographic data and other data will not have any information that could identify the participant. Participant names with identifying numbers, audio recordings, and transcripts will be kept on a password-

Initials ______



protected computer and any hard copies will be in a locked cabinet when not in use. After 6 years, paper copies will be destroyed by shredding and electronic data will be deleted. We may publish what we learn from this study. If we do, we will not let anyone know your name/identity unless you give us permission.

8) Contact Information:

- If you have questions about the study, you should call or email the principal investigator, Dr. Debra Hain at (561) 297-3262.
- If you have questions or concerns about your rights as a research participant, contact the Florida Atlantic University Division of Research at (561) 297-0777 or send an email to researchintegrity@fau.edu.

9) Consent Statement:

I have read or had read to me the preceding information describing this study. All my questions have been answered to my satisfaction. I am 18 years of age or older and freely consent to participate. I understand that I am free to withdraw from the study at any time without penalty. I have received a copy of this consent form.

I agree ____ I do not agree ____ to be audiotaped.

Signature of Participant:____ Date: ______________________

Printed Name of Participant: First Name ____________________ Last Name________________________

Signature of Investigator: ____ Date: ________________

IRB student # 770689-1

FAU Institutional Review Board
Approved on: 3/20/2016
Expires on: 9/18/2016

Page 2 of 2

Date___________ **ID#**_______

Authorization to Use and Disclose Protected Health Information

Who will see your health information?

In this research study, we use and share your health information to the extent authorized (permitted) by you. We know that this information is private. The federal privacy regulations of the Health Insurance Portability & Accountability Act (HIPAA) protect your identifiable health information. If you authorize us to use your information we will protect it as required by the law.

Research at Boca Raton Regional Hospital is conducted jointly with Florida Atlantic University. By signing this form, you are permitting Boca Raton Regional Hospital and Florida Atlantic University to use personal health information collected about you for research purposes. You are also allowing Boca Raton Regional Hospital to share your personal health information with individuals or organizations other than FAU and Boca Raton Regional Hospital who are also involved in the research and listed below.

Who will disclose (share), receive, and/or use your information?

To conduct this research, FAU and the people and organizations below may use or share your information. They may only use and share your information:

- **With the people and organizations on this list;**
- **With you or your personal representative; and**
- **As allowed by law.**

The following groups of people may also be able to see information about you and may use the information to conduct the research:

- The medical staff that takes care of you and those who are part of this research study;
- The designated peer review committees such as FAU Institutional Review Board

Who else can use and share this information?

Anyone listed above may use consultants in this research and for the purpose of this study, may share your information with them. If you have questions about who they are, you should ask the study team. Individuals who receive your health information for this research study may not be required by the HIPAA Privacy Rule to protect it and may share your information with others without your permission. They can only do so if permitted by the laws governing them. For example, the study sponsor may share your information with others. If the sponsor or others share your information, your information may no longer be protected under the HIPAA Privacy Rule.

How will my information be used?

By signing this form, you are giving your permission to use and/or share your health information as described in this document for any and all study/research related purposes. Your authorization to use your health information will not expire unless you revoke it in writing.

As part of this research, FAU may collect, use, and share the following information:

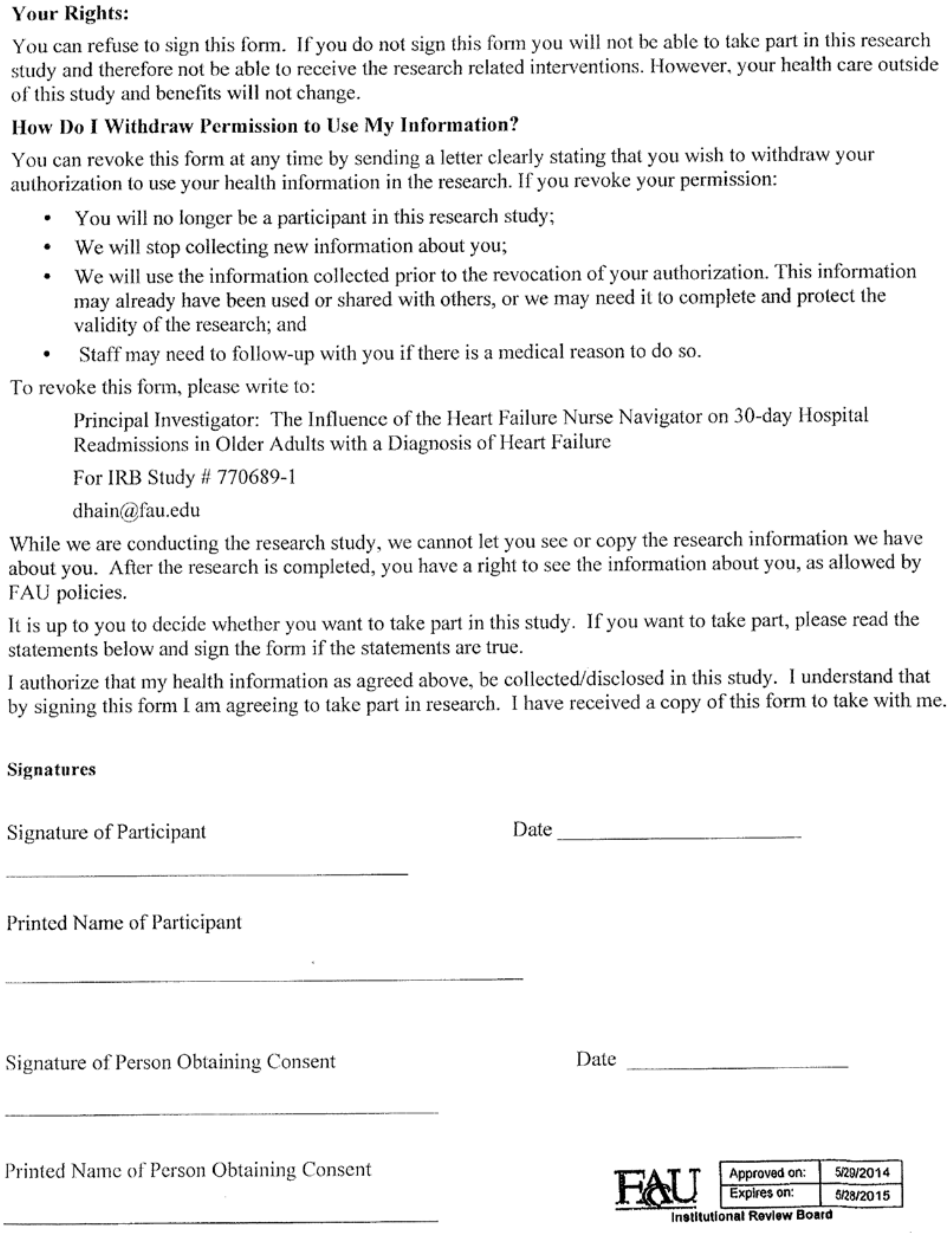
- Your whole research record

You can list any particular information that you do not want us to use or share in the space below. If you list nothing here, we can use and share all of the information listed above for this research but for nothing else.

For the Research Participant (you) to complete:

☐ I am asking FAU and the researchers not to include, use, or share the following health information in this research (if blank, then no information will be excluded): __________________________________

Initials______



Your Rights:

You can refuse to sign this form. If you do not sign this form you will not be able to take part in this research study and therefore not be able to receive the research related interventions. However, your health care outside of this study and benefits will not change.

How Do I Withdraw Permission to Use My Information?

You can revoke this form at any time by sending a letter clearly stating that you wish to withdraw your authorization to use your health information in the research. If you revoke your permission:

- You will no longer be a participant in this research study;
- We will stop collecting new information about you;
- We will use the information collected prior to the revocation of your authorization. This information may already have been used or shared with others, or we may need it to complete and protect the validity of the research; and
- Staff may need to follow-up with you if there is a medical reason to do so.

To revoke this form, please write to:

Principal Investigator: The Influence of the Heart Failure Nurse Navigator on 30-day Hospital Readmissions in Older Adults with a Diagnosis of Heart Failure

For IRB Study # 770689-1

dhain@fau.edu

While we are conducting the research study, we cannot let you see or copy the research information we have about you. After the research is completed, you have a right to see the information about you, as allowed by FAU policies.

It is up to you to decide whether you want to take part in this study. If you want to take part, please read the statements below and sign the form if the statements are true.

I authorize that my health information as agreed above, be collected/disclosed in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

Signatures

Signature of Participant Date ______________________

____

Printed Name of Participant

____

Signature of Person Obtaining Consent Date ______________________

____

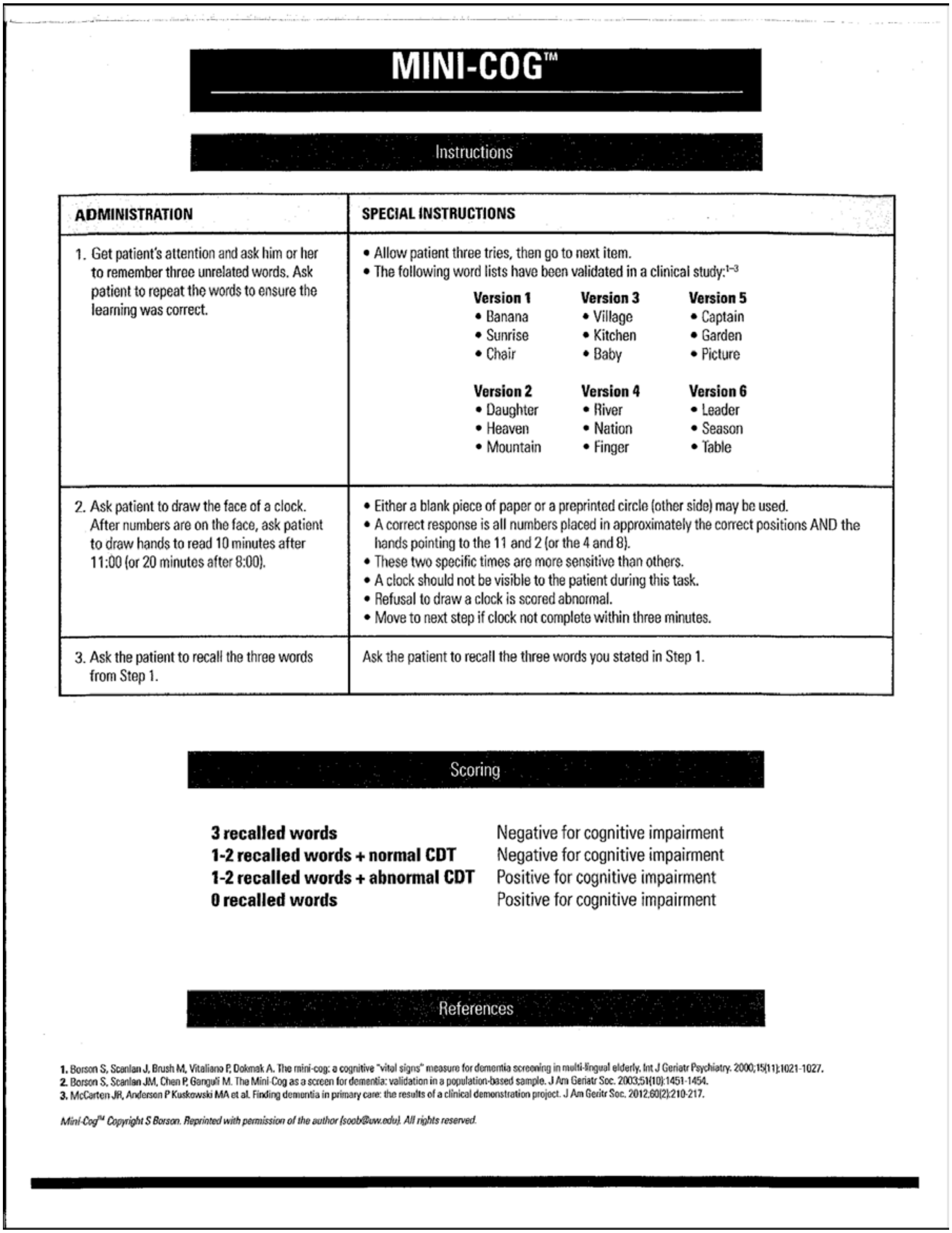
Printed Name of Person Obtaining Consent

____

FAU

Approved on:	5/29/2014
Expires on:	5/28/2015

Institutional Review Board



MINI-COG™

Instructions

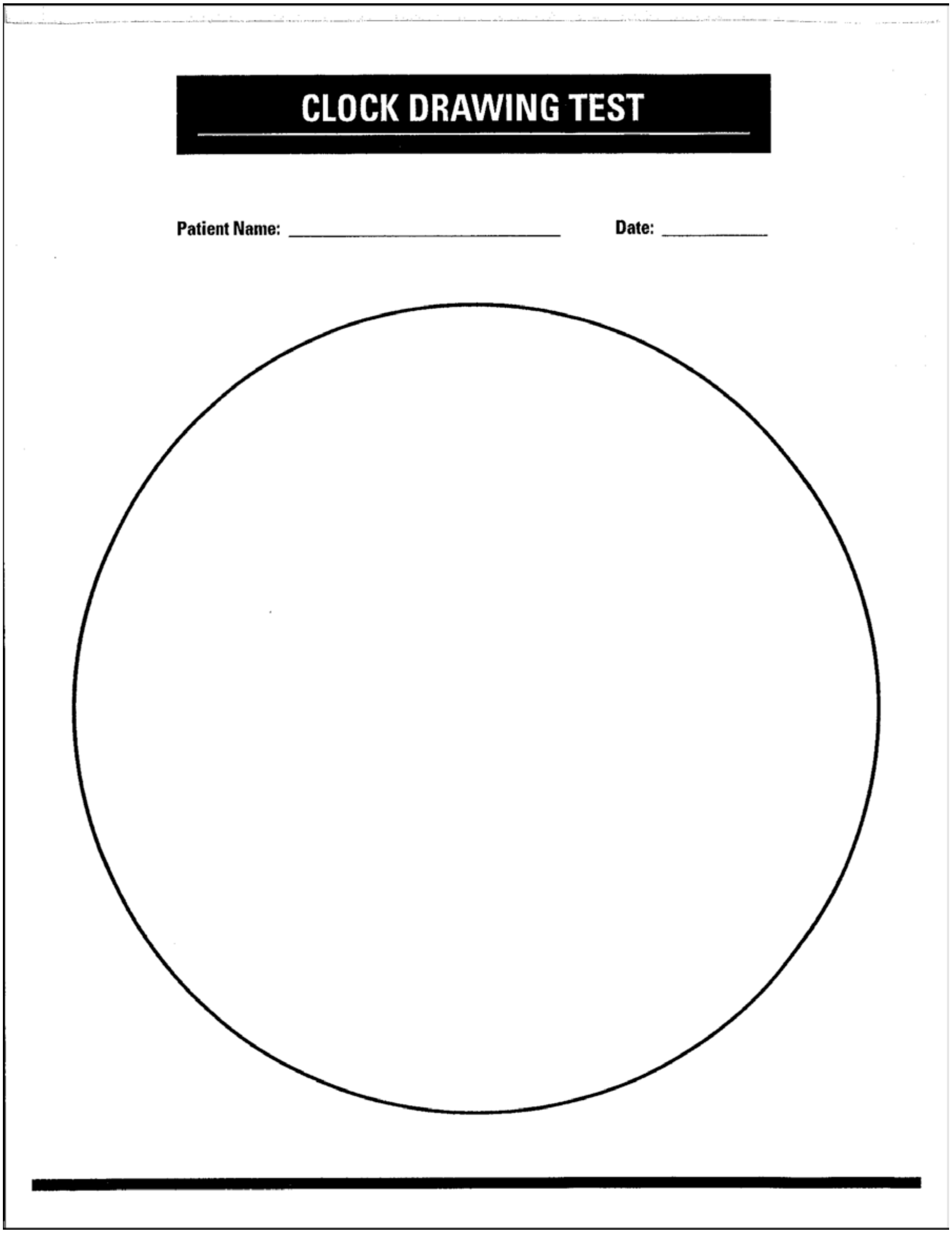
ADMINISTRATION	SPECIAL INSTRUCTIONS
1. Get patient's attention and ask him or her to remember three unrelated words. Ask patient to repeat the words to ensure the learning was correct.	• Allow patient three tries, then go to next item. • The following word lists have been validated in a clinical study:[1–3] **Version 1**: • Banana • Sunrise • Chair **Version 2**: • Daughter • Heaven • Mountain **Version 3**: • Village • Kitchen • Baby **Version 4**: • River • Nation • Finger **Version 5**: • Captain • Garden • Picture **Version 6**: • Leader • Season • Table
2. Ask patient to draw the face of a clock. After numbers are on the face, ask patient to draw hands to read 10 minutes after 11:00 (or 20 minutes after 8:00).	• Either a blank piece of paper or a preprinted circle (other side) may be used. • A correct response is all numbers placed in approximately the correct positions AND the hands pointing to the 11 and 2 (or the 4 and 8). • These two specific times are more sensitive than others. • A clock should not be visible to the patient during this task. • Refusal to draw a clock is scored abnormal. • Move to next step if clock not complete within three minutes.
3. Ask the patient to recall the three words from Step 1.	Ask the patient to recall the three words you stated in Step 1.

Scoring

3 recalled words	Negative for cognitive impairment
1-2 recalled words + normal CDT	Negative for cognitive impairment
1-2 recalled words + abnormal CDT	Positive for cognitive impairment
0 recalled words	Positive for cognitive impairment

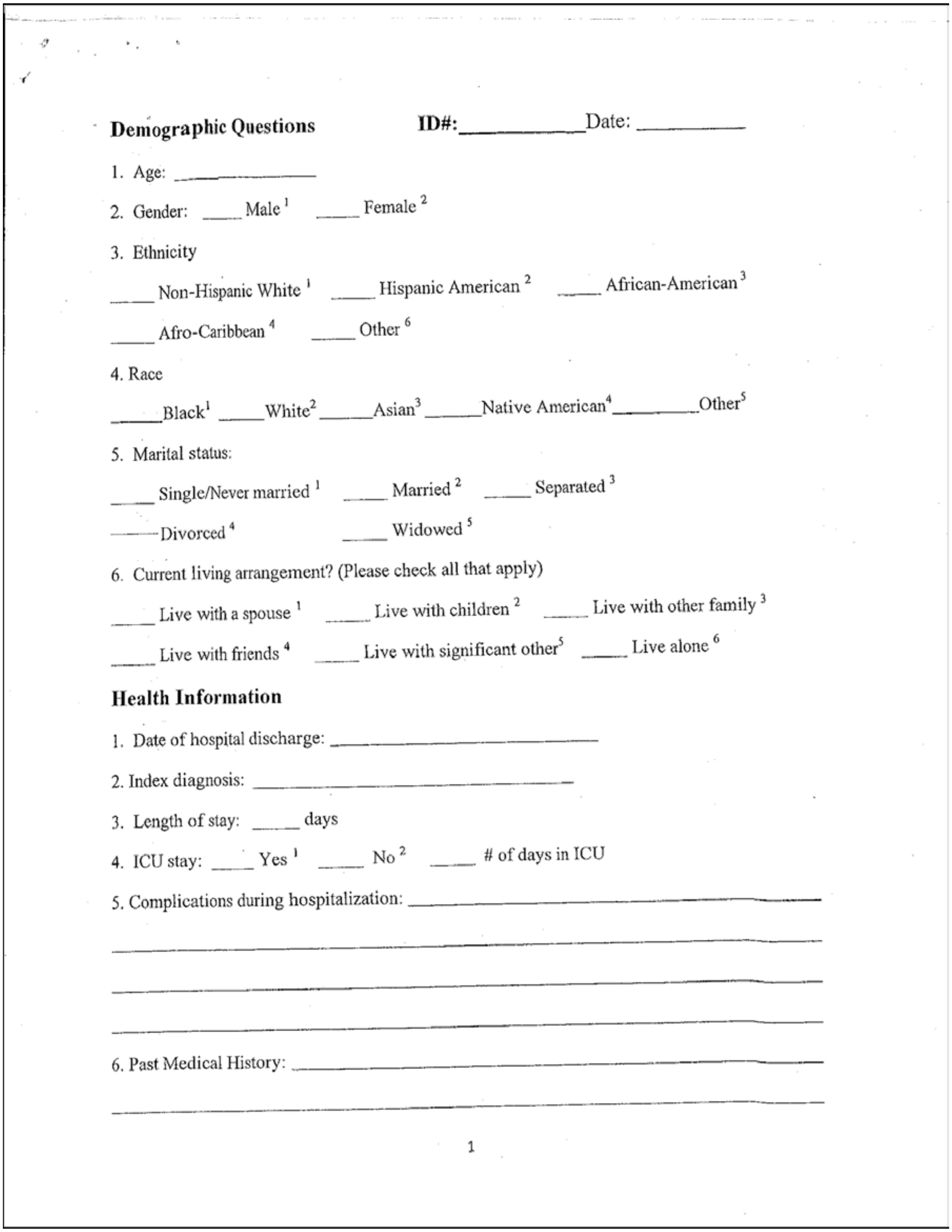
References

1. Borson S, Scanlan J, Brush M, Vitaliano P, Dokmak A. The mini-cog: a cognitive "vital signs" measure for dementia screening in multi-lingual elderly. Int J Geriatr Psychiatry. 2000;15(11):1021-1027.
2. Borson S, Scanlan JM, Chen P, Ganguli M. The Mini-Cog as a screen for dementia: validation in a population-based sample. J Am Geriatr Soc. 2003;51(10):1451-1454.
3. McCarten JR, Anderson P Kuskowski MA et al. Finding dementia in primary care: the results of a clinical demonstration project. J Am Geritr Soc. 2012;60(2):210-217.



CLOCK DRAWING TEST

Patient Name: ______________________________ **Date:** ____________



Demographic Questions **ID#:**__________ Date: __________

1. Age: __________

2. Gender: _____ Male [1] _____ Female [2]

3. Ethnicity

_____ Non-Hispanic White [1] _____ Hispanic American [2] _____ African-American [3]

_____ Afro-Caribbean [4] _____ Other [6]

4. Race

_____Black[1] _____White[2] _____Asian[3] _____Native American[4] _________Other[5]

5. Marital status:

_____ Single/Never married [1] _____ Married [2] _____ Separated [3]

_____ Divorced [4] _____ Widowed [5]

6. Current living arrangement? (Please check all that apply)

_____ Live with a spouse [1] _____ Live with children [2] _____ Live with other family [3]

_____ Live with friends [4] _____ Live with significant other[5] _____ Live alone [6]

Health Information

1. Date of hospital discharge: ______________________

2. Index diagnosis: ______________________

3. Length of stay: _____ days

4. ICU stay: _____ Yes [1] _____ No [2] _____ # of days in ICU

5. Complications during hospitalization: ______________________

____

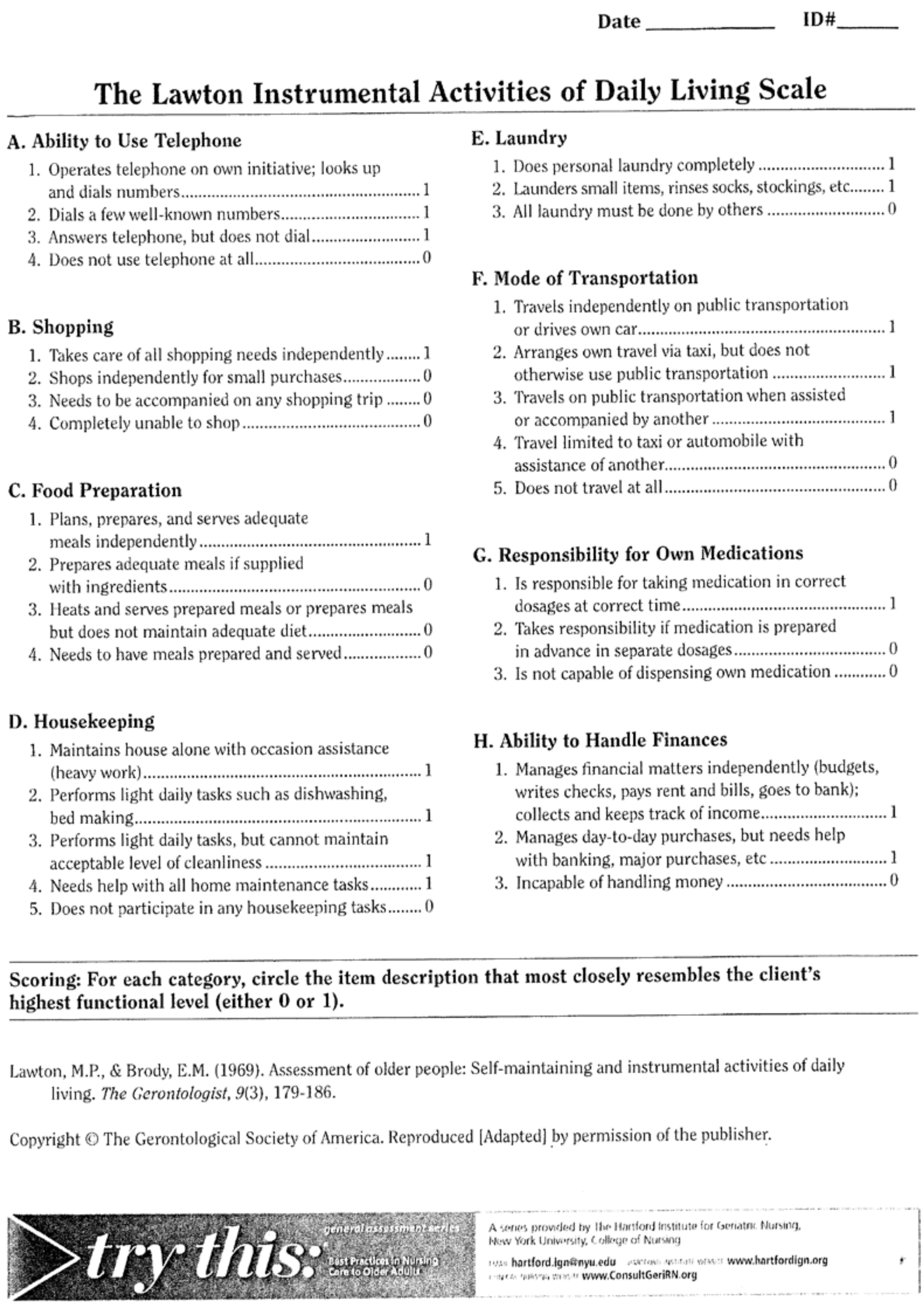
____

____

6. Past Medical History: ______________________

____

1



Date ____________ **ID#**______

The Lawton Instrumental Activities of Daily Living Scale

A. Ability to Use Telephone

1. Operates telephone on own initiative; looks up and dials numbers........ 1
2. Dials a few well-known numbers........ 1
3. Answers telephone, but does not dial........ 1
4. Does not use telephone at all........ 0

B. Shopping

1. Takes care of all shopping needs independently........ 1
2. Shops independently for small purchases........ 0
3. Needs to be accompanied on any shopping trip........ 0
4. Completely unable to shop........ 0

C. Food Preparation

1. Plans, prepares, and serves adequate meals independently........ 1
2. Prepares adequate meals if supplied with ingredients........ 0
3. Heats and serves prepared meals or prepares meals but does not maintain adequate diet........ 0
4. Needs to have meals prepared and served........ 0

D. Housekeeping

1. Maintains house alone with occasion assistance (heavy work)........ 1
2. Performs light daily tasks such as dishwashing, bed making........ 1
3. Performs light daily tasks, but cannot maintain acceptable level of cleanliness........ 1
4. Needs help with all home maintenance tasks........ 1
5. Does not participate in any housekeeping tasks........ 0

E. Laundry

1. Does personal laundry completely........ 1
2. Launders small items, rinses socks, stockings, etc........ 1
3. All laundry must be done by others........ 0

F. Mode of Transportation

1. Travels independently on public transportation or drives own car........ 1
2. Arranges own travel via taxi, but does not otherwise use public transportation........ 1
3. Travels on public transportation when assisted or accompanied by another........ 1
4. Travel limited to taxi or automobile with assistance of another........ 0
5. Does not travel at all........ 0

G. Responsibility for Own Medications

1. Is responsible for taking medication in correct dosages at correct time........ 1
2. Takes responsibility if medication is prepared in advance in separate dosages........ 0
3. Is not capable of dispensing own medication........ 0

H. Ability to Handle Finances

1. Manages financial matters independently (budgets, writes checks, pays rent and bills, goes to bank); collects and keeps track of income........ 1
2. Manages day-to-day purchases, but needs help with banking, major purchases, etc........ 1
3. Incapable of handling money........ 0

Scoring: For each category, circle the item description that most closely resembles the client's highest functional level (either 0 or 1).

Lawton, M.P., & Brody, E.M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist*, *9*(3), 179-186.

try this: general assessment series
Best Practices in Nursing Care to Older Adults
A series provided by The Hartford Institute for Geriatric Nursing, New York University, College of Nursing
hartford.ign@nyu.edu www.hartfordign.org
www.ConsultGeriRN.org

Date ______________ ID#________

The Newest Vital Sign™ answer sheet

1. If you eat the entire container of ice cream, how many calories will you eat?

   ____

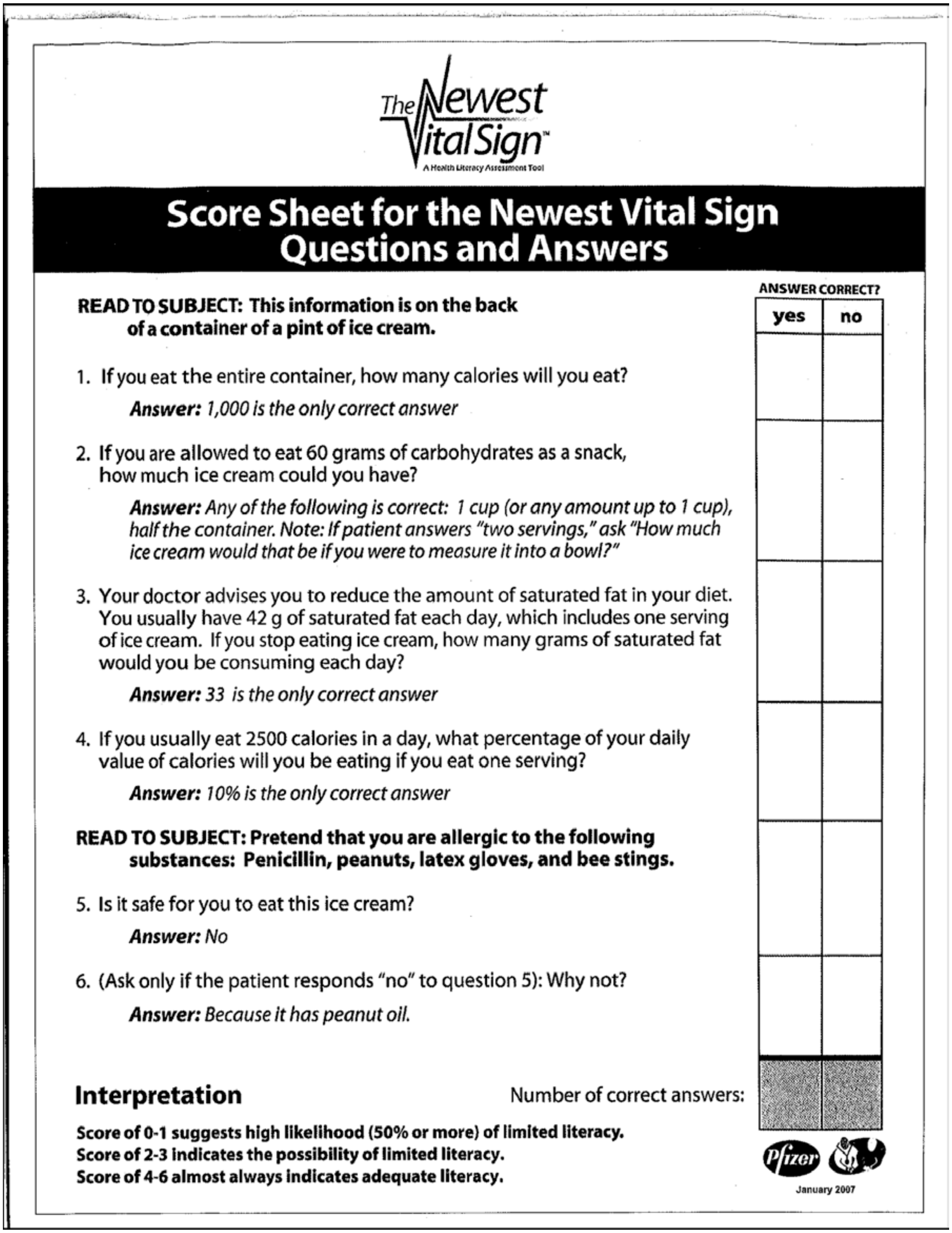
2. If you are allowed to eat 60 grams of carbohydrate as a snack, how much ice cream could you have? ________________________

3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 grams of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day? _________________

4. If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving? _______________%

Pretend you are allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.

5. Is it safe for you to eat this ice cream? ______Yes ______No



The Newest Vital Sign™

A Health Literacy Assessment Tool

Score Sheet for the Newest Vital Sign Questions and Answers

ANSWER CORRECT?

Question	yes	no
1		
2		
3		
4		
5		
6		
Number of correct answers:		

READ TO SUBJECT: This information is on the back of a container of a pint of ice cream.

1. If you eat the entire container, how many calories will you eat?

   Answer: *1,000 is the only correct answer*

2. If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?

   Answer: *Any of the following is correct: 1 cup (or any amount up to 1 cup), half the container. Note: If patient answers "two servings," ask "How much ice cream would that be if you were to measure it into a bowl?"*

3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?

   Answer: *33 is the only correct answer*

4. If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?

   Answer: *10% is the only correct answer*

READ TO SUBJECT: Pretend that you are allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.

5. Is it safe for you to eat this ice cream?

   Answer: *No*

6. (Ask only if the patient responds "no" to question 5): Why not?

   Answer: *Because it has peanut oil.*

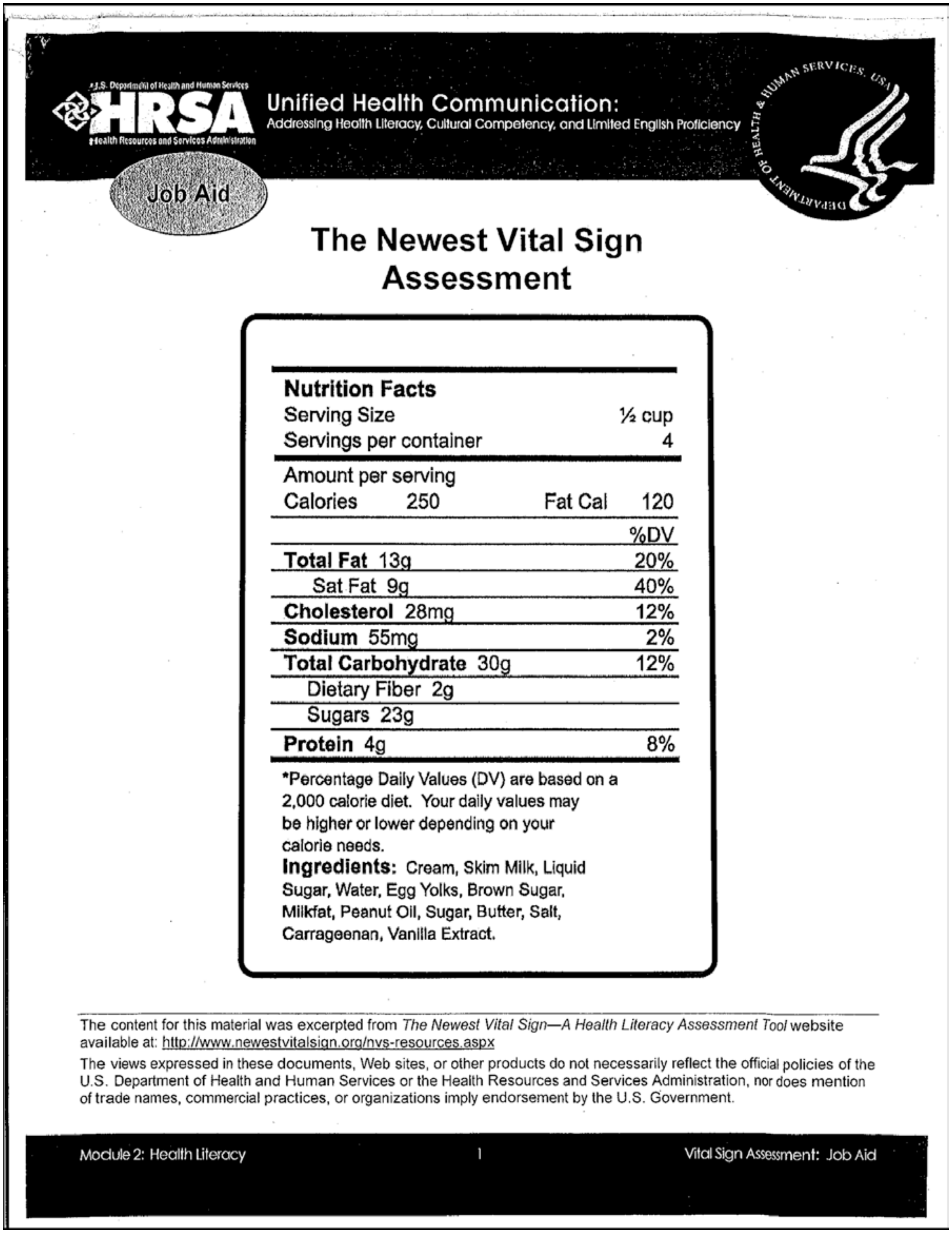
Interpretation

Number of correct answers:

Score of 0-1 suggests high likelihood (50% or more) of limited literacy.
Score of 2-3 indicates the possibility of limited literacy.
Score of 4-6 almost always indicates adequate literacy.

Pfizer

January 2007



U.S. Department of Health and Human Services
HRSA
Health Resources and Services Administration

Unified Health Communication:
Addressing Health Literacy, Cultural Competency, and Limited English Proficiency

Job Aid

The Newest Vital Sign Assessment

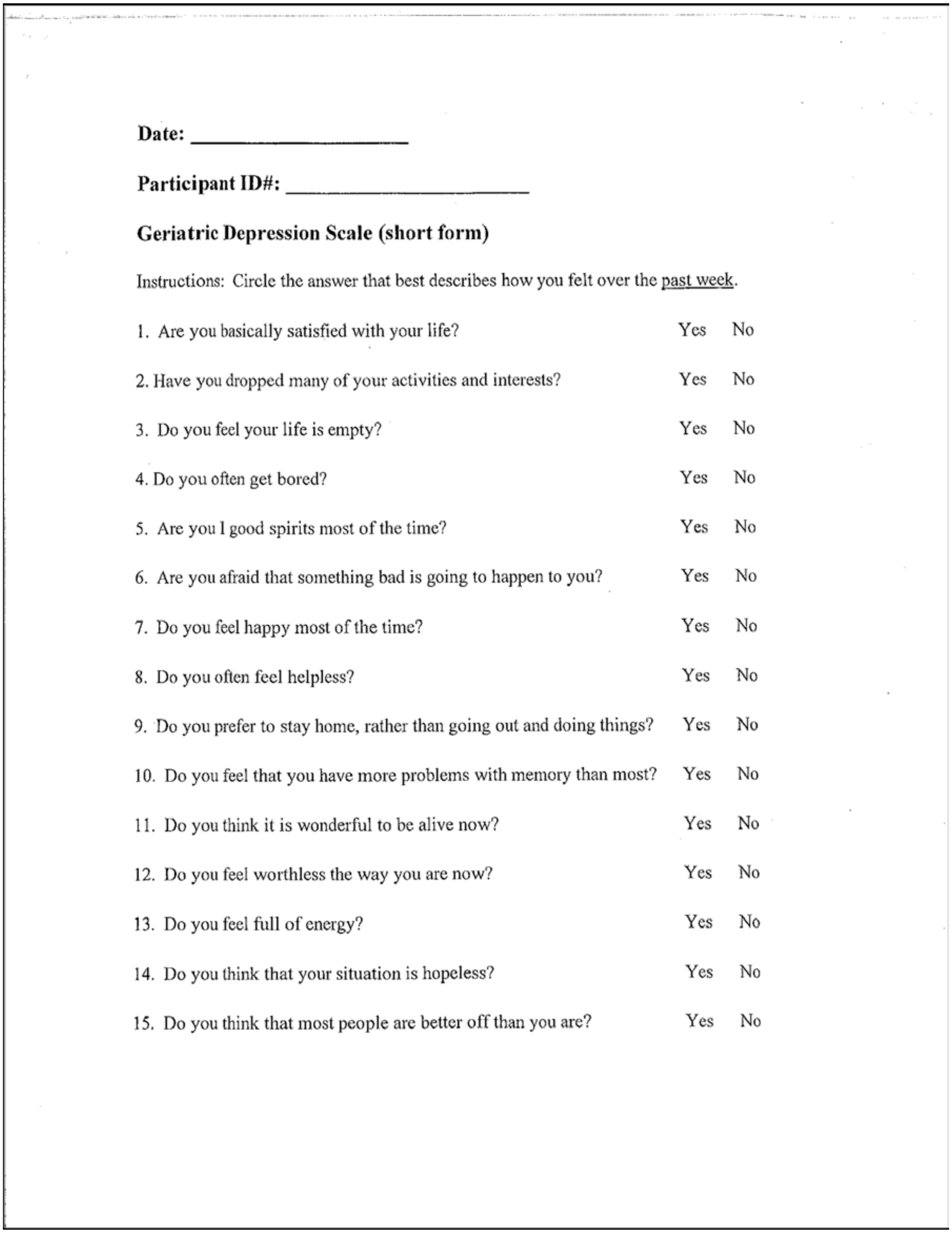
Nutrition Facts

Serving Size	½ cup
Servings per container	4
Amount per serving	
Calories 250	Fat Cal 120
	%DV
Total Fat 13g	20%
Sat Fat 9g	40%
Cholesterol 28mg	12%
Sodium 55mg	2%
Total Carbohydrate 30g	12%
Dietary Fiber 2g	
Sugars 23g	
Protein 4g	8%

*Percentage Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Ingredients: Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

The content for this material was excerpted from *The Newest Vital Sign—A Health Literacy Assessment Tool* website available at: http://www.newestvitalsign.org/nvs-resources.aspx



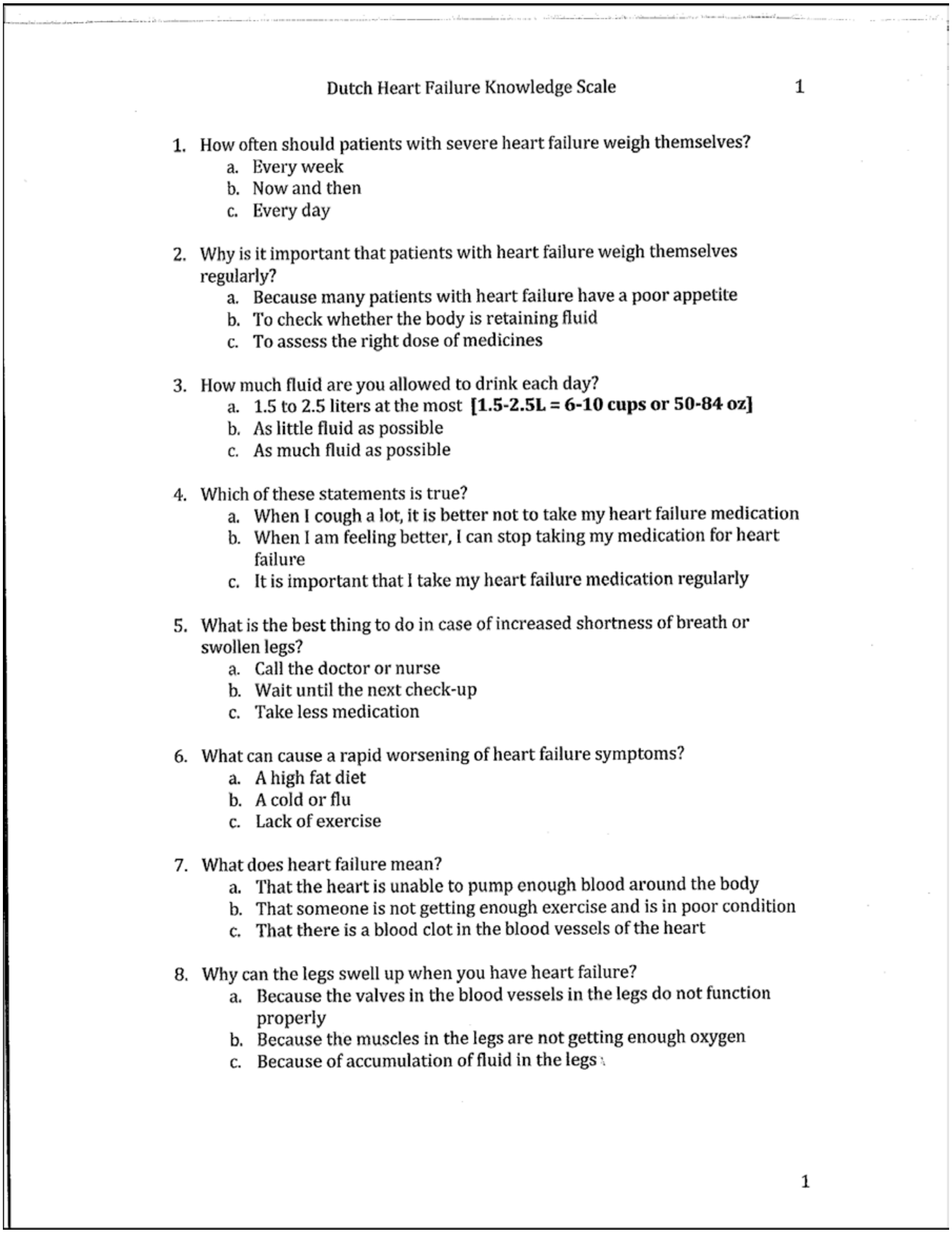
Date: ____________________

Participant ID#: ______________________

Geriatric Depression Scale (short form)

Instructions: Circle the answer that best describes how you felt over the past week.

1. Are you basically satisfied with your life?	Yes	No
2. Have you dropped many of your activities and interests?	Yes	No
3. Do you feel your life is empty?	Yes	No
4. Do you often get bored?	Yes	No
5. Are you I good spirits most of the time?	Yes	No
6. Are you afraid that something bad is going to happen to you?	Yes	No
7. Do you feel happy most of the time?	Yes	No
8. Do you often feel helpless?	Yes	No
9. Do you prefer to stay home, rather than going out and doing things?	Yes	No
10. Do you feel that you have more problems with memory than most?	Yes	No
11. Do you think it is wonderful to be alive now?	Yes	No
12. Do you feel worthless the way you are now?	Yes	No
13. Do you feel full of energy?	Yes	No
14. Do you think that your situation is hopeless?	Yes	No
15. Do you think that most people are better off than you are?	Yes	No



Dutch Heart Failure Knowledge Scale

1. How often should patients with severe heart failure weigh themselves?
   a. Every week
   b. Now and then
   c. Every day

2. Why is it important that patients with heart failure weigh themselves regularly?
   a. Because many patients with heart failure have a poor appetite
   b. To check whether the body is retaining fluid
   c. To assess the right dose of medicines

3. How much fluid are you allowed to drink each day?
   a. 1.5 to 2.5 liters at the most **[1.5-2.5L = 6-10 cups or 50-84 oz]**
   b. As little fluid as possible
   c. As much fluid as possible

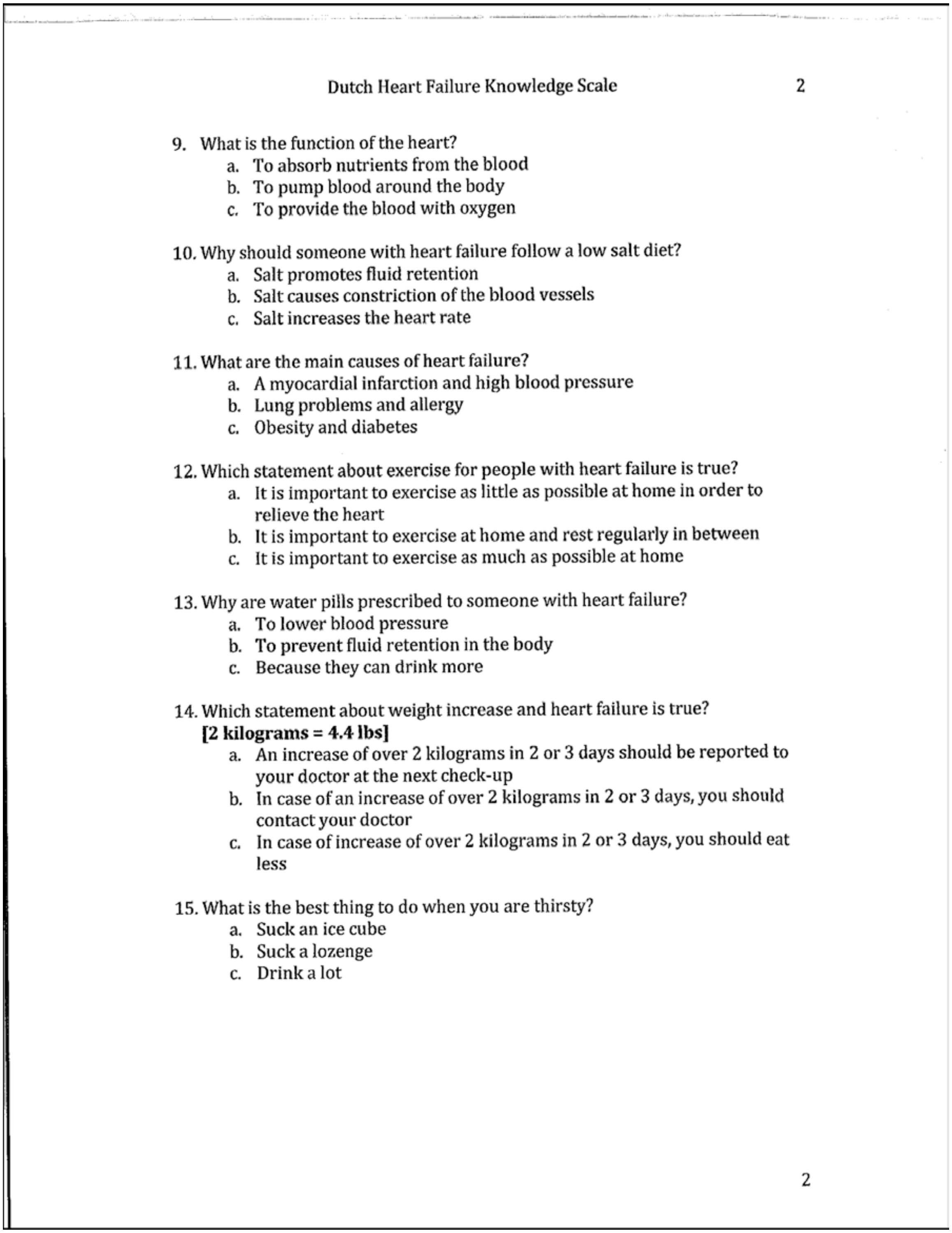
4. Which of these statements is true?
   a. When I cough a lot, it is better not to take my heart failure medication
   b. When I am feeling better, I can stop taking my medication for heart failure
   c. It is important that I take my heart failure medication regularly

5. What is the best thing to do in case of increased shortness of breath or swollen legs?
   a. Call the doctor or nurse
   b. Wait until the next check-up
   c. Take less medication

6. What can cause a rapid worsening of heart failure symptoms?
   a. A high fat diet
   b. A cold or flu
   c. Lack of exercise

7. What does heart failure mean?
   a. That the heart is unable to pump enough blood around the body
   b. That someone is not getting enough exercise and is in poor condition
   c. That there is a blood clot in the blood vessels of the heart

8. Why can the legs swell up when you have heart failure?
   a. Because the valves in the blood vessels in the legs do not function properly
   b. Because the muscles in the legs are not getting enough oxygen
   c. Because of accumulation of fluid in the legs



9. What is the function of the heart?
   a. To absorb nutrients from the blood
   b. To pump blood around the body
   c. To provide the blood with oxygen

10. Why should someone with heart failure follow a low salt diet?
    a. Salt promotes fluid retention
    b. Salt causes constriction of the blood vessels
    c. Salt increases the heart rate

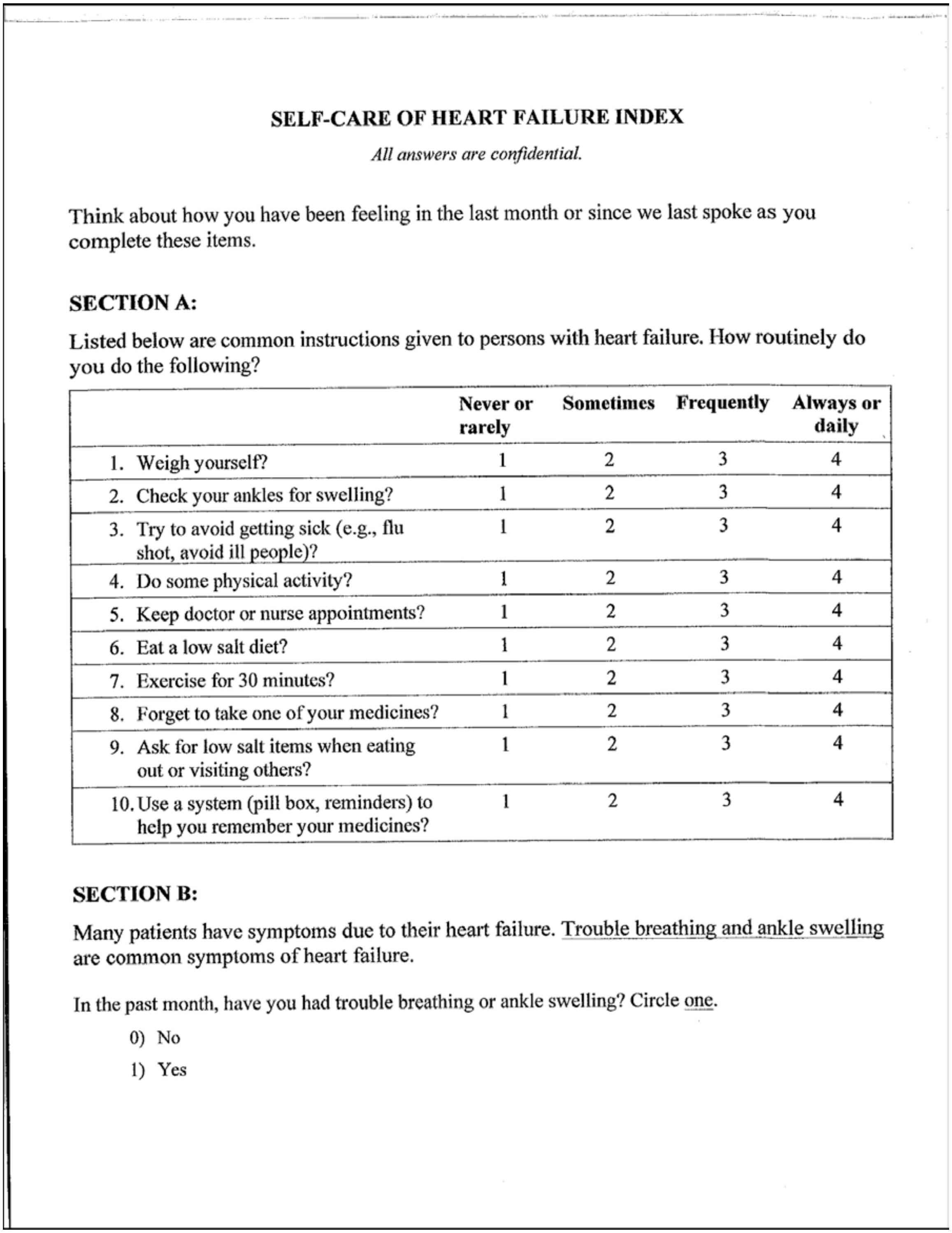
11. What are the main causes of heart failure?
    a. A myocardial infarction and high blood pressure
    b. Lung problems and allergy
    c. Obesity and diabetes

12. Which statement about exercise for people with heart failure is true?
    a. It is important to exercise as little as possible at home in order to relieve the heart
    b. It is important to exercise at home and rest regularly in between
    c. It is important to exercise as much as possible at home

13. Why are water pills prescribed to someone with heart failure?
    a. To lower blood pressure
    b. To prevent fluid retention in the body
    c. Because they can drink more

14. Which statement about weight increase and heart failure is true?
    [2 kilograms = 4.4 lbs]
    a. An increase of over 2 kilograms in 2 or 3 days should be reported to your doctor at the next check-up
    b. In case of an increase of over 2 kilograms in 2 or 3 days, you should contact your doctor
    c. In case of increase of over 2 kilograms in 2 or 3 days, you should eat less

15. What is the best thing to do when you are thirsty?
    a. Suck an ice cube
    b. Suck a lozenge
    c. Drink a lot



SELF-CARE OF HEART FAILURE INDEX

All answers are confidential.

Think about how you have been feeling in the last month or since we last spoke as you complete these items.

SECTION A:

Listed below are common instructions given to persons with heart failure. How routinely do you do the following?

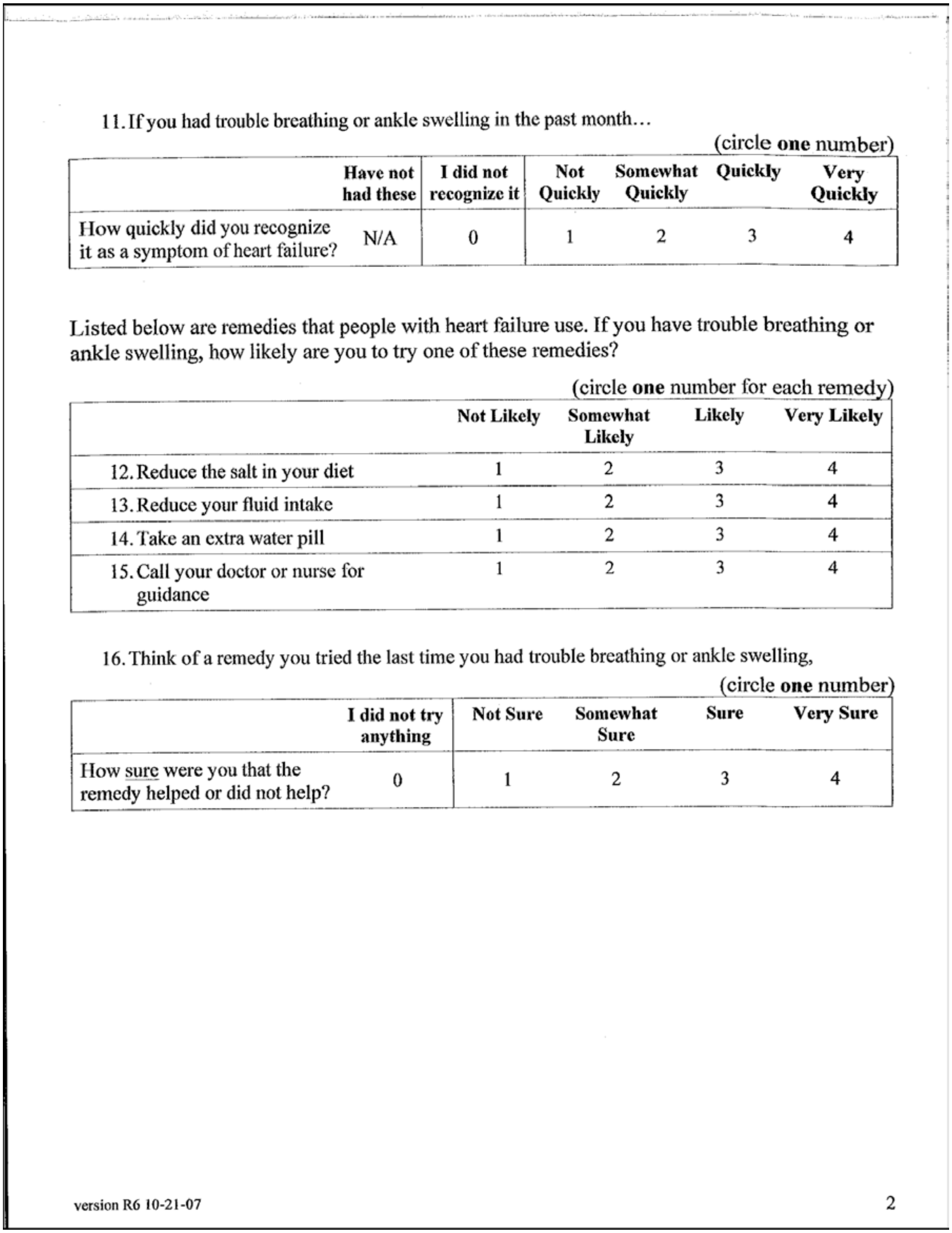
	Never or rarely	Sometimes	Frequently	Always or daily
1. Weigh yourself?	1	2	3	4
2. Check your ankles for swelling?	1	2	3	4
3. Try to avoid getting sick (e.g., flu shot, avoid ill people)?	1	2	3	4
4. Do some physical activity?	1	2	3	4
5. Keep doctor or nurse appointments?	1	2	3	4
6. Eat a low salt diet?	1	2	3	4
7. Exercise for 30 minutes?	1	2	3	4
8. Forget to take one of your medicines?	1	2	3	4
9. Ask for low salt items when eating out or visiting others?	1	2	3	4
10. Use a system (pill box, reminders) to help you remember your medicines?	1	2	3	4

SECTION B:

Many patients have symptoms due to their heart failure. Trouble breathing and ankle swelling are common symptoms of heart failure.

In the past month, have you had trouble breathing or ankle swelling? Circle one.

0) No
1) Yes



11. If you had trouble breathing or ankle swelling in the past month…

(circle **one** number)

	Have not had these	**I did not recognize it**	**Not Quickly**	**Somewhat Quickly**	**Quickly**	**Very Quickly**
How quickly did you recognize it as a symptom of heart failure?	N/A	0	1	2	3	4

Listed below are remedies that people with heart failure use. If you have trouble breathing or ankle swelling, how likely are you to try one of these remedies?

(circle **one** number for each remedy)

	Not Likely	**Somewhat Likely**	**Likely**	**Very Likely**
12. Reduce the salt in your diet	1	2	3	4
13. Reduce your fluid intake	1	2	3	4
14. Take an extra water pill	1	2	3	4
15. Call your doctor or nurse for guidance	1	2	3	4

16. Think of a remedy you tried the last time you had trouble breathing or ankle swelling,

(circle **one** number)

	I did not try anything	**Not Sure**	**Somewhat Sure**	**Sure**	**Very Sure**
How sure were you that the remedy helped or did not help?	0	1	2	3	4

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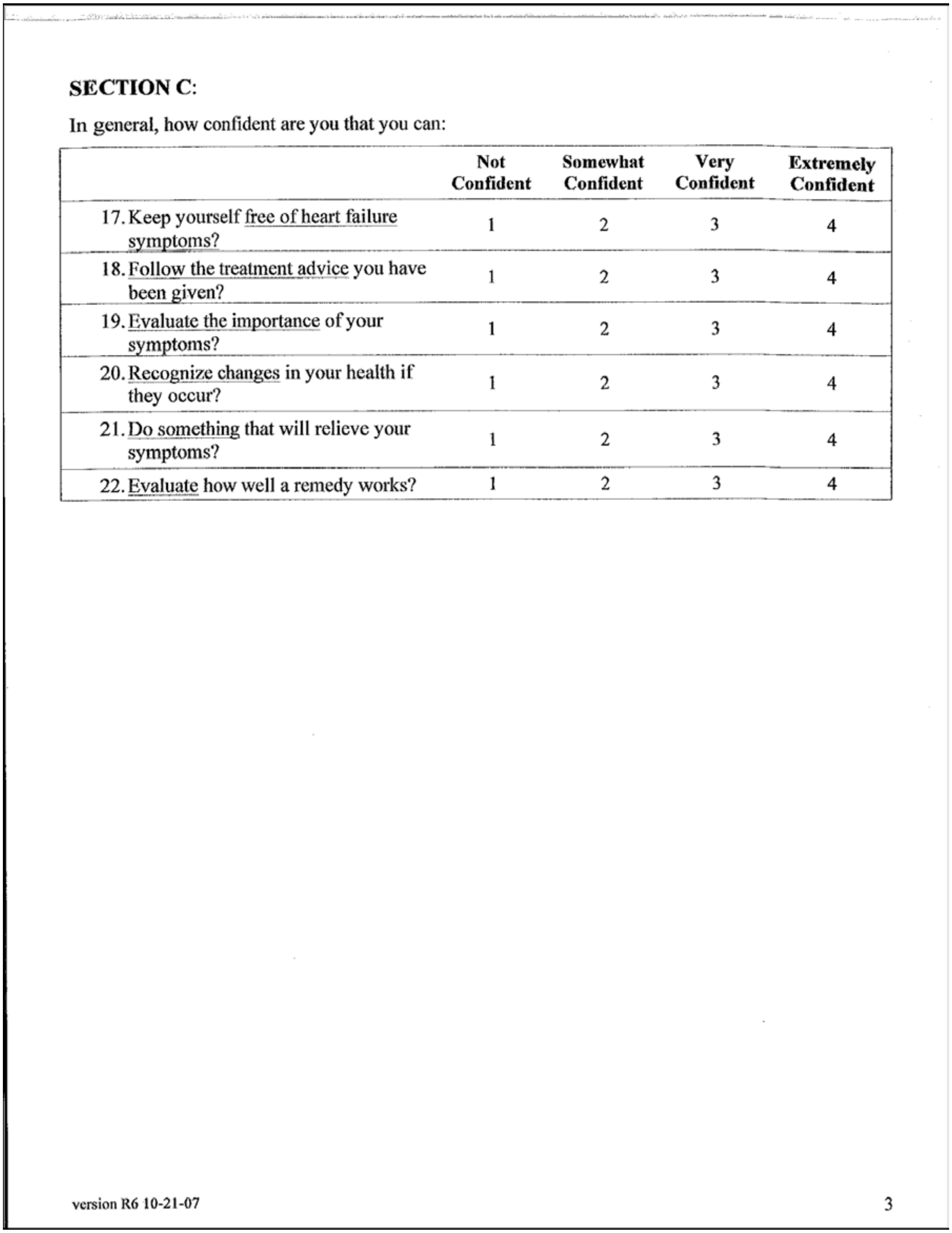
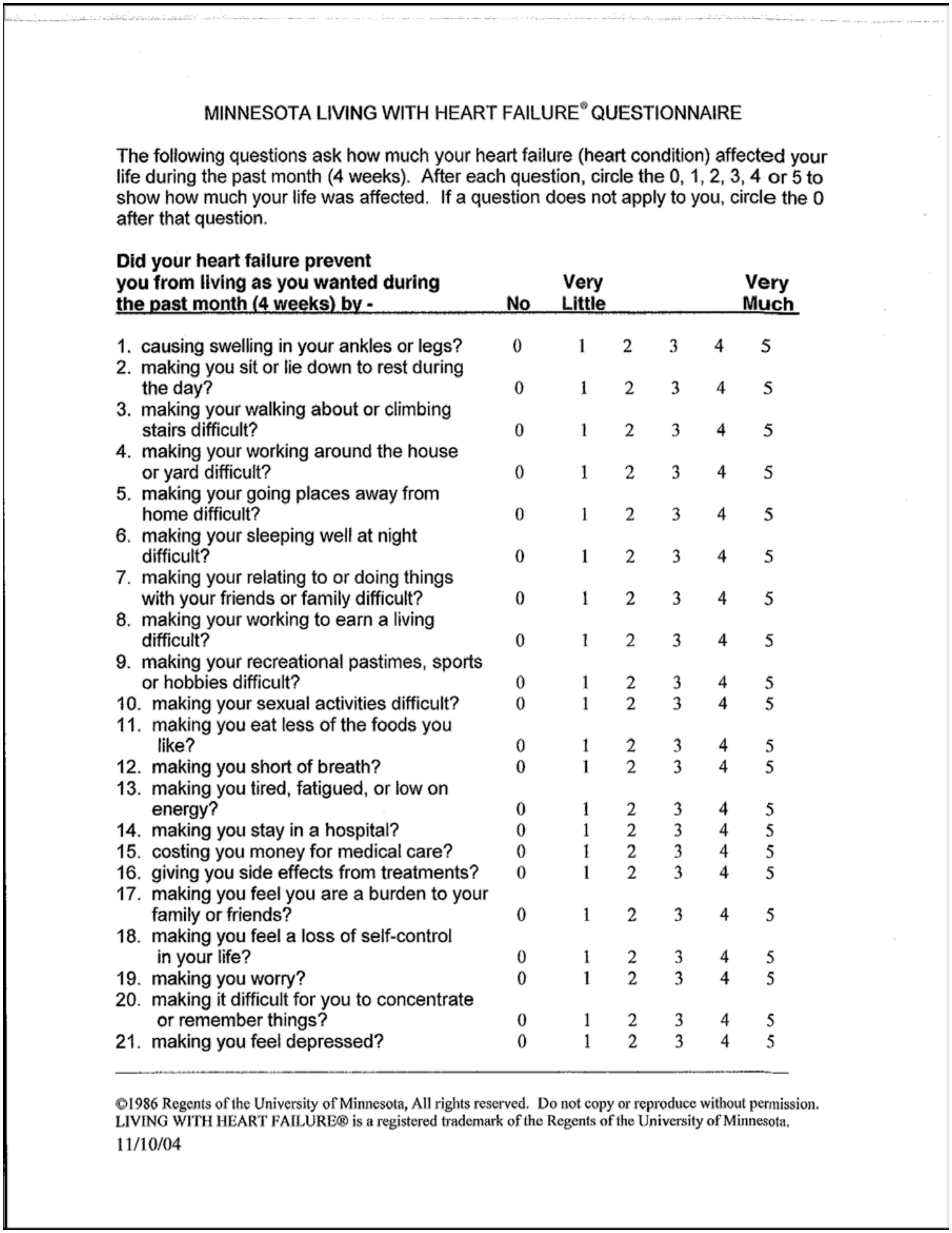


SECTION C:

In general, how confident are you that you can:

	Not Confident	Somewhat Confident	Very Confident	Extremely Confident
17. Keep yourself free of heart failure symptoms?	1	2	3	4
18. Follow the treatment advice you have been given?	1	2	3	4
19. Evaluate the importance of your symptoms?	1	2	3	4
20. Recognize changes in your health if they occur?	1	2	3	4
21. Do something that will relieve your symptoms?	1	2	3	4
22. Evaluate how well a remedy works?	1	2	3	4



MINNESOTA LIVING WITH HEART FAILURE® QUESTIONNAIRE

The following questions ask how much your heart failure (heart condition) affected your life during the past month (4 weeks). After each question, circle the 0, 1, 2, 3, 4 or 5 to show how much your life was affected. If a question does not apply to you, circle the 0 after that question.

Did your heart failure prevent you from living as you wanted during the past month (4 weeks) by -	**No**	**Very Little**				**Very Much**
1. causing swelling in your ankles or legs?	0	1	2	3	4	5
2. making you sit or lie down to rest during the day?	0	1	2	3	4	5
3. making your walking about or climbing stairs difficult?	0	1	2	3	4	5
4. making your working around the house or yard difficult?	0	1	2	3	4	5
5. making your going places away from home difficult?	0	1	2	3	4	5
6. making your sleeping well at night difficult?	0	1	2	3	4	5
7. making your relating to or doing things with your friends or family difficult?	0	1	2	3	4	5
8. making your working to earn a living difficult?	0	1	2	3	4	5
9. making your recreational pastimes, sports or hobbies difficult?	0	1	2	3	4	5
10. making your sexual activities difficult?	0	1	2	3	4	5
11. making you eat less of the foods you like?	0	1	2	3	4	5
12. making you short of breath?	0	1	2	3	4	5
13. making you tired, fatigued, or low on energy?	0	1	2	3	4	5
14. making you stay in a hospital?	0	1	2	3	4	5
15. costing you money for medical care?	0	1	2	3	4	5
16. giving you side effects from treatments?	0	1	2	3	4	5
17. making you feel you are a burden to your family or friends?	0	1	2	3	4	5
18. making you feel a loss of self-control in your life?	0	1	2	3	4	5
19. making you worry?	0	1	2	3	4	5
20. making it difficult for you to concentrate or remember things?	0	1	2	3	4	5
21. making you feel depressed?	0	1	2	3	4	5

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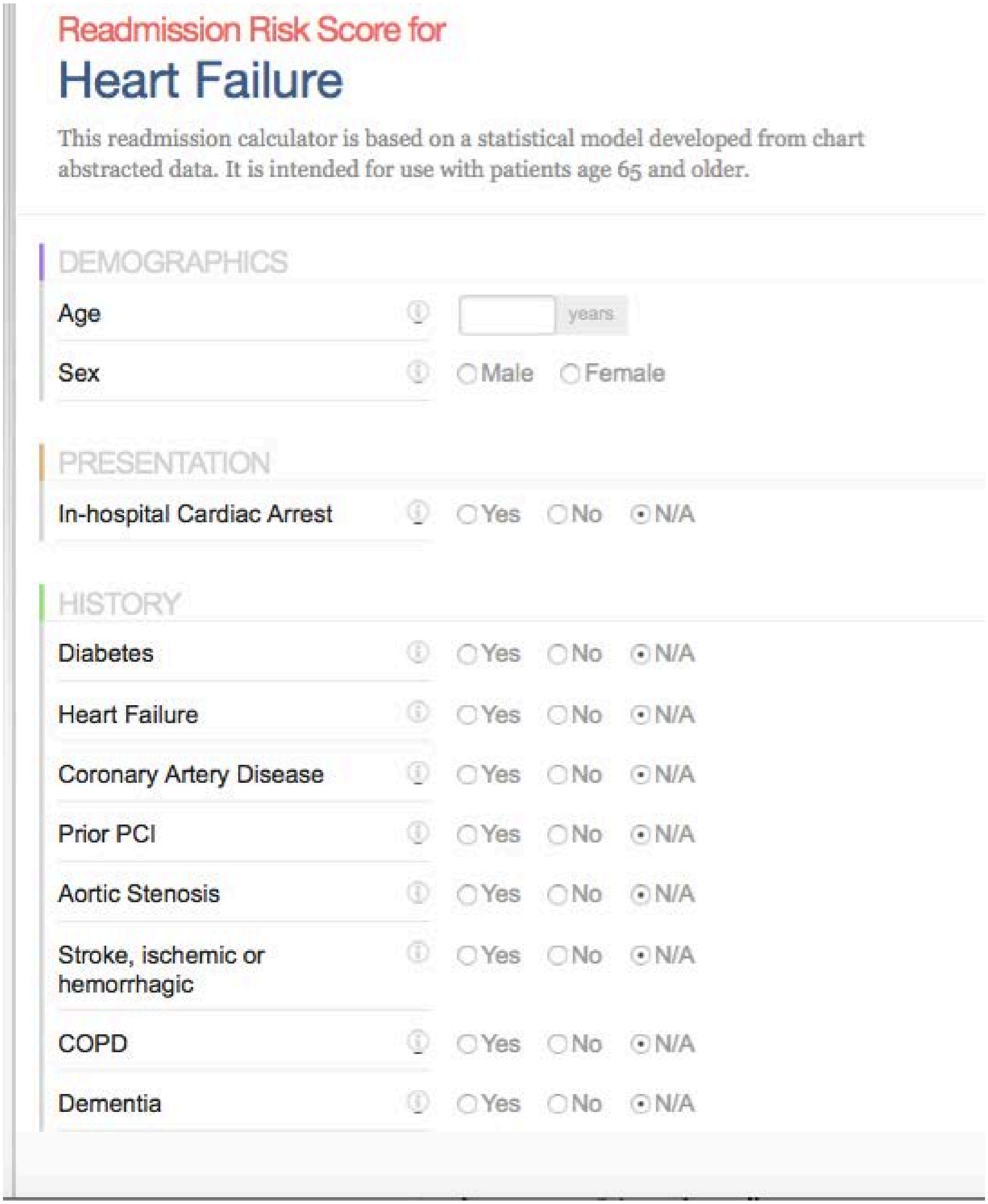


Readmission Risk Score for

Heart Failure

This readmission calculator is based on a statistical model developed from chart abstracted data. It is intended for use with patients age 65 and older.

DEMOGRAPHICS

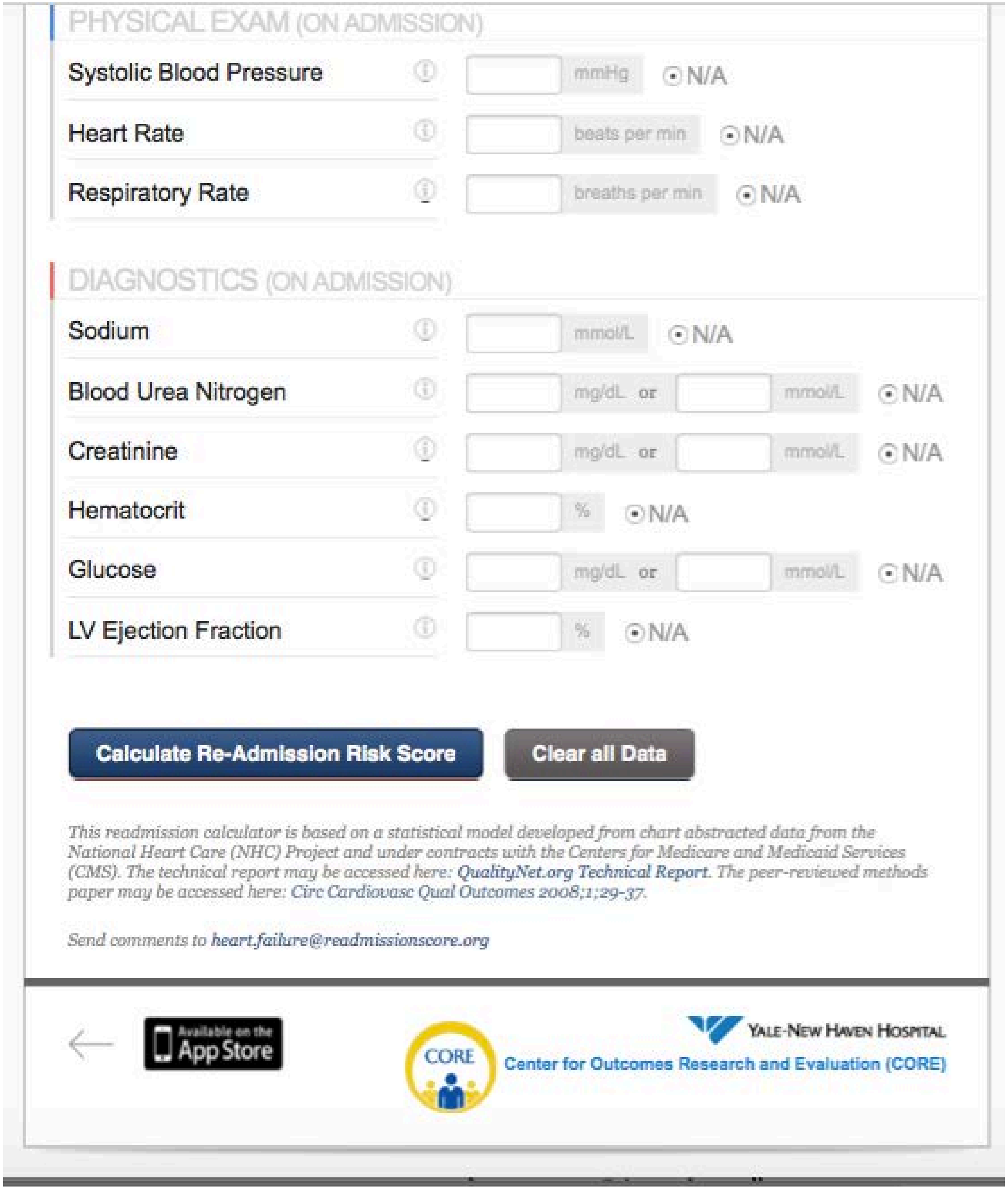
Age	☐ years
Sex	○ Male ○ Female

PRESENTATION

In-hospital Cardiac Arrest	○ Yes ○ No ● N/A

HISTORY

Diabetes	○ Yes ○ No ● N/A
Heart Failure	○ Yes ○ No ● N/A
Coronary Artery Disease	○ Yes ○ No ● N/A
Prior PCI	○ Yes ○ No ● N/A
Aortic Stenosis	○ Yes ○ No ● N/A
Stroke, ischemic or hemorrhagic	○ Yes ○ No ● N/A
COPD	○ Yes ○ No ● N/A
Dementia	○ Yes ○ No ● N/A



Systolic Blood Pressure mmHg ● N/A

Heart Rate beats per min ● N/A

Respiratory Rate breaths per min ● N/A

Sodium mmol/L ● N/A

Blood Urea Nitrogen mg/dL or mmol/L ● N/A

Creatinine mg/dL or mmol/L ● N/A

Hematocrit % ● N/A

Glucose mg/dL or mmol/L ● N/A

LV Ejection Fraction % ● N/A

This readmission calculator is based on a statistical model developed from chart abstracted data from the National Heart Care (NHC) Project and under contracts with the Centers for Medicare and Medicaid Services (CMS). The technical report may be accessed here: QualityNet.org Technical Report. The peer-reviewed methods paper may be accessed here: Circ Cardiovasc Qual Outcomes 2008;1;29-37.

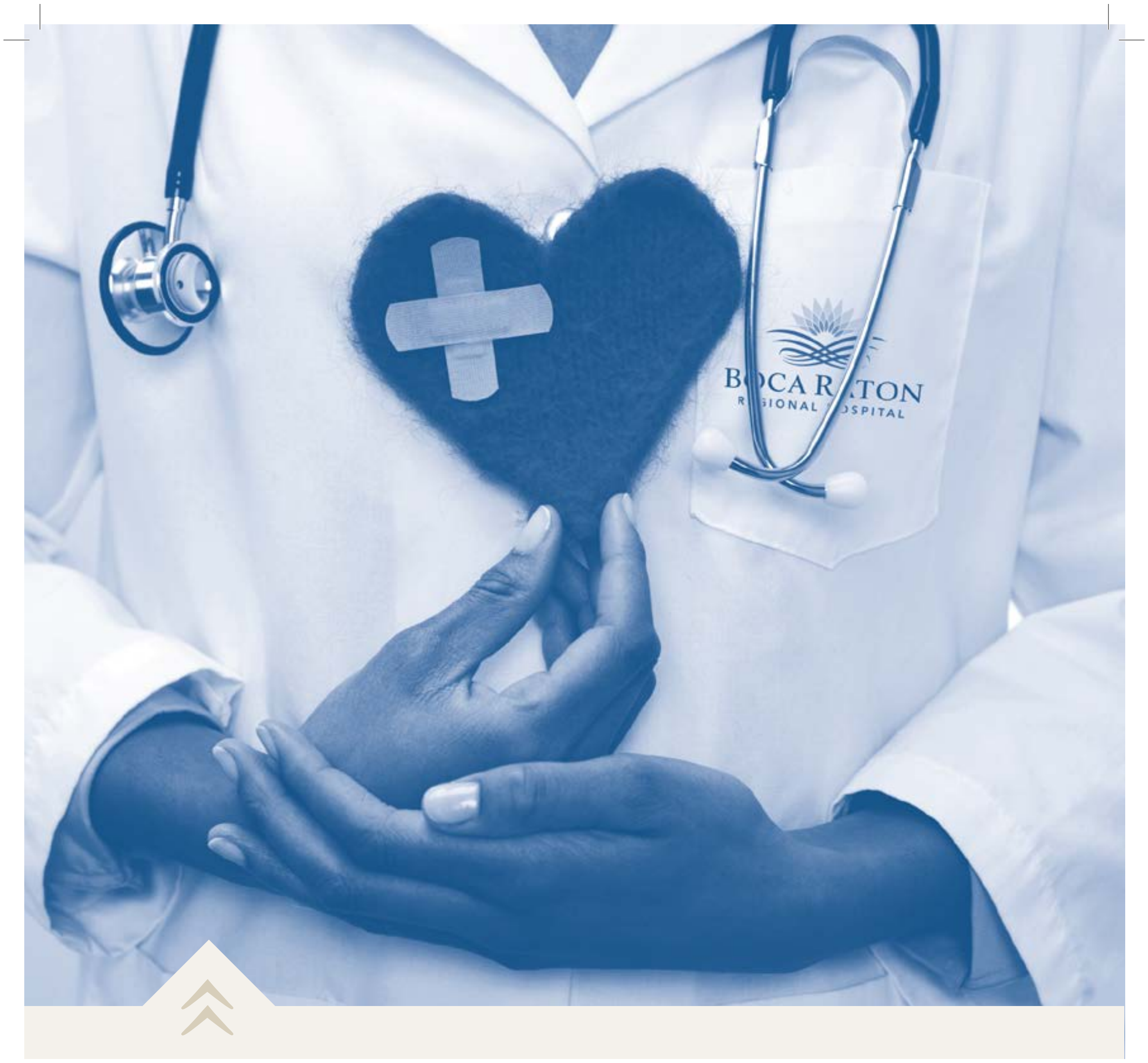
Send comments to heart.failure@readmissionscore.org

Qualitative Interview Questions for Intervention Participants

1. How would you describe your experience in the hospital and at home with your HFNN?
2. What topics did you discuss with the HFNN?
3. What changes in how you care for yourself have occurred due to the influence of the HFNN?
4. What was most helpful?
5. What could be improved? How?
6. Do you have any stories to share about this experience?

APPENDIX F

Patient Education Materials



RN to PATIENT TEACHING PLAN FROM HEART FAILURE EDUCATION BOOK

1. **Physiology – What is Heart Failure?**

   Review pages 2-3 with your patient. Personalize the causes to your patient's medical history. Review the symptoms to see which your patient has experienced. Your patient may have systolic, diastolic or combined heart failure. Systolic failure is a pumping problem and diastolic failure is a filling problem.

2. **Medicines to Treat Heart Failure**

   Review pages 4-7 with your patient. Review medications from that list that your patient is actually taking and discuss the actions, side effects and any other information.

   Review pages 22-23 and explain medication log.

3. **Diet, Sodium and Fluid Retention**

   Review pages 8-12 with your patient. Assist patient to record baseline "dry" weight range. Emphasize need to record daily weight and notify physician if 3-5lbs gained.

   Review Weight Log on page 24. Review Sodium Content in Foods, pages 26-27. Point out Food Diary on page 28 as a tool that can be used if needed.

4. **Exercise and Activity**

   Review pages 14-17 with your patient. Personalize information provided on exercise, oxygen and positioning based on your patient's general condition.

5. **Stop Smoking**

   Review smoking area of page 13 if needed

6. **Make and Keep Your Follow-up Physician Appointments**.

   Review "Talk to Your Doctor" on page 21. Discuss when to call the doctor.

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