AN EDUCATIONAL APPROACH FOR IMPROVING HEALTH
LITERACY IN PATIENTS WITH HEART FAILURE

Lauren Kennedy

A DNP project submitted to the faculty of the University of North Carolina at Chapel Hill in partial
fulfillment of the requirements for the degree of Doctor of Nursing Practice in the School of Nursing.

Chapel Hill
2017

Approved by:

Elaine B Harwood

Margaretann House

Kelly Peck

ABSTRACT

Lauren Kennedy: An Educational Approach for Improving
Health Literacy in Patients with Heart Failure
(Under the direction of Elaine Harwood)

This project sought to modify an existing HF education book, which aimed to improve the quality of HF patient education and increase health literacy levels while achieving lower rates of hospital readmission and acute care utilization in patients with a recent HF admission. This quality improvement project utilized a quasi-experimental design. Participants were voluntarily enrolled as inpatients who possessed either new or existing diagnosis of heart failure and were going to follow up in the Advanced Heart Failure Clinic. Patients arrived for an education session and a pretest/posttest health literacy assessment using the short form of the test of functional health literacy in adults and the newest vital sign prior to their scheduled hospital follow-up visit.

After the education session, 58% of patients demonstrated an improvement in health literacy levels. Twenty-five percent of patients scored perfect scores on the health literacy screening tools and could not show an improvement. The greatest benefit on health literacy levels as measured by the S-TOFHLA was seen in the patient population who were diagnosed within one year of the visit (p=0.0278). The secondary outcome of 30-day readmission rate for this sample was 8.33%. This is lower than the hospital average 30-day readmission rate of 20.1%. Overall, the quality improvement project has shown a positive impact on patient health literacy levels and may indicate an improvement of 30-day readmission rates. A larger sample size will be required to definitively show a positive impact on 30-day readmission rates and acute care utilization rates.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACA	Affordable Care Act
ACC	American College of Cardiology
ACO	Accountable Care Organization
AHFC	Advanced Heart Failure Clinic
AHA	American Heart Association
CLT	Cognitive Load Theory
CMS	Centers for Medicare & Medicaid Services
CPAP	Continuous positive airway pressure
ERR	Excess Readmission Ratio
FPL	Federal Poverty Line
GDMT	Goal-directed medical therapy
HF	Heart Failure
HFpEF	Heart Failure with preserved Ejection Fraction
HFrEF	Heart Failure with reduced Ejection Fraction
HL	Health Literacy
HRRP	Healthcare Readmissions Reduction Program
NYHA	New York Heart Association
NVS	Newest Vital Sign
RN	Registered Nurse
S-TOFHLA	Short form of the Test of Functional Health Literacy in Adults
THN	Triad HealthCare Network

CHAPTER 1: INTRODUCTION

Patients in the United States (US) who suffer from congestive heart failure (HF) experience a range of chronic and acute symptoms that are optimally managed by collaboration between the patient and their caregiver (Islam, O'Connell & Lakhan, 2013). Heart failure is simply defined as a chronic condition that occurs when the heart muscle is too weak to pump a sufficient amount of blood and oxygen to meet the body's needs. As the disease progressively worsens, symptoms experienced by the patient with HF become worse (American Heart Association [AHA], 2015). There are many factors in the optimal management of HF symptoms, to include dietary restrictions, medication adherence, monitoring weight on a daily basis, and knowing when the symptoms require a call to the healthcare provider or admission to an acute care facility (Jurgens, Lee, Reitano & Reigel, 2013). There has been substantial improvement in the management of patients with HF in recent years but research continues to point to patient participation in their care as the most essential component of optimal management of symptoms of patients with HF (Chen, Yhele, Plake, Murawski & Mason, 2011).

In the US only 12% of adults possess health literacy at the proficient level. More significantly, 22% of adults read and understand health information at a basic level, with 14% of adults functioning below basic levels of health literacy (Kutner, Greenberg, Jin, & Paulsen, 2006). Health literacy is a key issue in the effort to improve the health of Americans. The *Healthy People 2020* guidelines have designated health communication and health information technology as a primary goal toward improving the health literacy of Americans (Office of Disease Prevention and Health Promotion [ODPHP], 2016). Health literacy level is not associated solely with a patient's education or reading level. While health literacy is influenced by a person's general literacy level, being literate is not associated with

possessing health literacy. Having the appropriate knowledge and skills required to perform self-care

tasks of HF

requires proficient health literacy and it should not be assumed that a person who possesses adequate

literacy is also literate regarding their health or in self-management of HF (Kutner et al., 2006).

One of the key factors in the improvement of health literacy is to universally address ways

information is conveyed between health care providers and patients. Information should be presented so

patients can understand and independently use the information provided (ODPHP, n.d.).

Patients with HF often exhibit poor health literacy. In patients with HF, poor health literacy

contributes to poor understanding and lack of application of key elements essential to maximizing health

and quality of life for these patients. In order to control the symptoms and adverse effects of HF and

maintain quality of life, patients must have a clear understanding of exercise regimen, dietary

recommendations, full adherence to the medication regimen, tracking of daily weights, and an

understanding of when to seek medical advice (Kollipara et al., 2008; Moser & Watkins, 2008).

The societal impact of the burden of HF is also significant. Patients who experience significant

symptoms are severely limited by their ability to perform physical tasks as simple as walking, going to a

store, and even engaging in independent activities of daily living (IADL) such as getting dressed or

brushing their teeth. This physical limitation can prevent a person from maintaining employment or

attending social events, which leaves a patient with HF isolated.

The health status of a patient with HF also has a significant impact on family and caregivers.

This impact is seen through both direct and indirect costs of caring for patients with HF. Direct costs

require financial contributions from the patient and family and can strain resources for the entire family.

Family members and caregivers also take on the burden of indirect costs associated with spending time

away from other responsibilities. Often, significant time is required to attend office visits as well as run errands to purchase food and medicine. This may require family and caregivers to lose productivity through lost work hours and lost income (Cook, Cole, Asaria, Jabbour, & Francis, 2014; Yancy et al., 2013).

The prevalence of Americans with HF is projected to increase by 25%, or an increase of 3 million people, from 2010 to 2030. Of all hospitalizations in the US, HF is the primary cause for admission. Approximately 50% of total cost of care for patients with HF care is spent on acute admissions (Yancy et al., 2013). The increase in the number of patients with HF will be accompanied by an 80% increase in indirect costs, from $9.7 billion to $17.4 billion by 2030 and an increase in direct costs of 215%, with the total expenditure reaching $77.7 billion, up from current spending of $24.7 billion annually (Heidenreich, Trogdon, Khavjou, & Butler, 2011).

Patients with HF who have higher health literacy levels experience fewer acute care utilizations (Wu et al., 2013). The goal of improving health literacy levels for patients with HF will decrease the overall societal burden of HF to the US healthcare system (Evangelista, 2005). All US hospitals are interested in reducing readmission rates of patients with HF so they can continue to meet triple aim population health goals as well as metrics required for full reimbursement as a result of the Hospital Readmissions Reduction Program (HRRP) (Centers for Medicare & Medicaid Services [CMS], 2016b; Stevens, 2015).

The Hospital Readmissions Reduction Program was introduced by Congress through the Affordable Care Act (ACA) as a means to reduce the payments to hospitals for excess readmissions. In 2012, CMS began HRRP as a step toward improving patient care quality and reducing costs of providing care to Americans covered under Medicare. Payment for HF admissions is now a pay for performance model of reimbursement that is linked to the quality of care provided through analysis of the 30-day readmission rates for any given hospital. More important to hospitals like Cone Health is the impact of the 30-day readmission rate of patients with HF to their overall reimbursement rate for any

hospitalizations for HF paid by Medicare (CMS, 2016c). This is calculated by the excess readmission

ratio (ERR), which is determined by 30-day readmission rate and data from comparable hospitals with

similar demographics. As an example, Cone Health's 30-day readmission rate is 20.1% and their ERR is

0.8657 according to the most recent publicly published data from 2014 (CMS, 2016a). Under HRRP,

when the ERR is greater than one, the hospital is determined to have failed to meet the expected 30-day

readmission rate goals for HF admissions and reimbursement for any HF admission will be less than

100% of the billable rate (CMS, 2016c).

Problem Statement

Poor health literacy precludes proper self-care adherence in adult patients with HF. Patients with

HF experience difficulty adhering to their individual plan of care, as evidenced by poor control of HF

symptoms, increased emergency department (ED) utilization, increased rates of hospital admission, and

increased rates of hospital readmission. This increases the care burden and cost of care for the patient and

family, as well as the cost and impact on the healthcare system.   Activity limitations caused by the

symptoms of HF result in disruption of daily routines for patients and family caregivers as well as

increased direct and indirect costs of care (Cook, Cole, Asaria, Jabbour, & Francis, 2014; Janssen,

Wouters, & Spruit, 2015). Health literacy is a direct mediator for hospital utilization rates. One possible

remedy is a patient educational tool aimed at improving health literacy which may also improve self-care

adherence (Wu, Moser, DeWalt, Rayens, & Dracup, 2016). This patient education tool will focus on

defining HF and teaching the basic pathophysiology of the disease, how each component of the plan of

care contributes to control of the symptoms of HF, and ways each component of the care plan affects the

underlying pathophysiology of HF.

The local environment within Cone Health saw an initial improvement in acute care utilization by

patients with HF after the implementation of the Triad HealthCare Network (THN) care management

team. Following initial improvement in rates of acute admission of patients with HF, the rate stabilized.

Since that time Cone Health has not been able to reach their readmission rate and emergency utilization

goals, specifically to be better than the national average (N. Tamborino, personal communication, March 21, 2016). Currently, Cone Health's 30-day readmission rates are equal to the national average, and they are not incurring any penalty. An ongoing commitment to meet the national standard for improvement in readmission rates through HRRP is a CMS requirement for all US hospitals. Cone Health continues work to improve their performance because HF readmission rates continue to improve nationally, further pressuring Cone Health to also continuing improvement in quality of HF care (K. Peck, personal communication, March 21, 2016; Boccuti & Casillas, 2017).

CHAPTER 2: REVIEW OF LITERATURE

A systematic review of the literature was performed by searching the terms heart failure, health literacy, admission, readmission, and self-care in PubMed, CINAHL, and the Cochrane databases. Studies were included if they examined HL in HF, measured HL level, and evaluated the measurable HF outcomes of self-care adherence, or readmission rates. Studies were excluded if they were opinion or editorial articles, study protocols, did not address HF, did not address HL, were published before 2010, or were written in any language other than English. Some articles written prior to 2010 were included as references for background information. Studies remaining totaled 26.

Overview of Health Literacy in Heart Failure

The review of literature provides a body of evidence that displays the impact of adequate HL on HF outcomes, identifies ways in which HL should be addressed, and reveals gaps in the evidence suggesting further research is needed on specific techniques that effectively improve a person's HL level. Possessing a lower HL level is accompanied by an increased risk of hospitalization, early readmission, and death in patients with HF (Cajita, Cajita, & Han, 2016; Moser et al., 2015; Peterson, Shetterly, & Clarke, 2011; Wiggins, Rodgers, DiDomenico, Cook & Page, 2013; Wu et al., 2013). The mechanism to explain the direct correlation between low HL and poor HF outcomes is not well understood because there are multiple factors that contribute (Cajita, Cajita, & Han, 2016; Chaudhry, et al., 2011; Peterson, Shetterly, & Clarke, 2011; Sperry, Ruiz, & Najjar, 2015; Wu et al., 2013). Three known associations between low HL and outcomes in patients with HF are: low HF knowledge, decreased knowledge of dietary sodium intake in HF, and lower adherence to self-care measures, including medication administration (Chen et al., 2014; Lambrinou, Protopapas, & Kalogirou, 2014; Levin, Peterson,

Dolansky, & Boxer, 2014; Macabasco-O'Connell et al., 2011; Matsuoka et al., 2016; Noureldin et al., 2012; Wu et al., 2013).

Numeracy, a component of HL, is the ability to use and understand numbers to perform self-care activities and decreased numeracy ability is associated with increased 30-day readmission rate and other acute care utilizations (McNaughton et al., 2013). This is consistent with the findings of Levin and colleagues that reveals the ability to properly read medicine and food labels, a product of possessing sufficient numeracy, yielded better self-care adherence (2014). In this study, it was also found that a patient whose caregiver also had low health literacy performed worse on measures of self-care adherence than a patient whose caregiver had adequate HL. Further, patients and caregivers who had no difficulty reading labels were more likely have better self-care adherence (Levin et al., 2014). Numeracy directly impacts the self-care activities of medication administration and fluid-status monitoring through daily weights. Patients with higher HL will be more prepared to recognize discrepancies in medication lists, ask questions about medications, and will be able to more accurately self-administer medications (Ferguson & Pawlak, 2011; Mixon et al., 2014; Noureldin et al., 2012).

Treatment Guidelines for Patients with Heart Failure

According to the guidelines from the 2013 American College of Cardiology and American Heart Association (ACC/AHA) HF Guidelines and an April 2017 update to those guidelines, adherence to medication schedules, diet, fluid restriction, daily weights and healthy weight, daily s/s monitoring, smoking cessation, avoiding consumption of alcohol, stopping recreational drugs, regular exercise, cardiac rehabilitation, and the use of continuous positive airway pressure (CPAP) devices are all self-care measures that optimize a patient's disease and prolong progression of the disease (Yancy et al., 2013; Yancy et al., 2017).

Heart Failure Self-Care Constructs

One of the first self-care tasks a patient with an acute HF exacerbation should master is medication adherence. Several medications are prescribed and titrated upward to optimal doses for

prevention of HF disease progression. This process is called goal-directed medical therapy (GDMT) and requires dose changes at each visit until the goal dose is reached (Yancy et al., 2013). Patients must know how to read prescriptions on pill bottles and match pill bottles to their medication list. They also need to understand that all medications prescribed are still required even when they feel well. Continuous use of medications under GDMT is the most effective method for prevention of disease progression (Yancy et al., 2013).

Another task patients with acute exacerbations of HF need to master is daily monitoring of weight and experienced symptoms. If weight increases by two pounds in one day or five pounds in seven days or as otherwise specified by their provider, patients must recognize they have fluid retention and need to call their provider.   Along with weight, patients with HF must be aware of other signs and symptoms of fluid retention indicated by dyspnea (difficulty breathing), swelling of legs or abdomen, fatigue, unexplained cough, decreased appetite or nausea, increased heart rate, or impaired thinking. Onset of these signs and symptoms should be an indication for patients to contact their healthcare provider (Yancy et al., 2013).

Management of sodium intake is essential to mastering self-care for the patient with HF. Soon after the onset of HF, a patient must begin following a diet low in salt and reducing fluid intake. Salt is identified on nutrition labels as sodium. Sodium causes fluid retention, so limiting foods with high sodium content and avoiding cooking with salt will help with fluid management. Often, more fluid intake also leads to fluid retention, especially if a patient has any amount of kidney dysfunction that prevents adequate urination (Yancy et al., 2013).

Lifestyle changes are also important for patients to master within their daily routine. This includes maintaining a healthy weight measured by body mass index, smoking cessation, avoiding alcohol, ending recreational drug use, incorporating physical activity, cardiac rehab, and following recommendations for managing other health conditions.

Decreasing weight can ease the work of the heart by decreasing blood pressure and managing co-morbid conditions such as diabetes, a co-morbid condition for many patients with HF. Cessation of

smoking improves lung function and the control of respiratory symptoms of dyspnea, as well as decreasing the damaging effects of nicotine on blood vessels that impacts the work of the heart. Stopping alcohol and recreational drug use helps reduce strain on the heart and prevents progression of myocardial damage (Yancy et al., 2013). Regular exercise and cardiac rehabilitation are recommended to improve HF symptoms by improving physical endurance, allowing patients to be independent with activities of daily living, and increasing the patient's quality of life (Yancy et al., 2013).

Patients with HF who are also diagnosed with obstructive sleep apnea requiring the use of CPAP, must be committed to using CPAP whenever sleeping, whether at night or during naps. Sleep apnea causes decreased oxygenation and increases in pressure of the blood vessels in the lungs. These changes cause the heart to work much harder during periods of apnea while people are sleeping (Yancy et al., 2013).

Health Literacy, Health Disparities, and Health Outcomes

Because evidence shows low health literacy negatively impacts HF outcomes, an attempt to increase health literacy levels should benefit patients. Acknowledging low HL as a health disparity is important in the approach to its resolution (McNaughton et al., 2015). Compounding the issue of low HL is the possession of other disparities and social determinants of health with which patients with poor health literacy are also burdened. These characteristics include poor socioeconomic status, lack of high school education, Black race, Latino ethnicity, advanced age or living in assisted living or skilled nursing facilities (Falk, et al., 2013; Wiggins et al., 2013; Wu et al., 2013). Moser and colleagues also add comorbid disease burden as an indicator of higher readmission rates and increased mortality (2015). While lower educational level is associated with higher readmission rates, it is not independently predictive of low HL (Regalbuto, Maurer, Chapel, Mendez, & Shaffer, 2014; Wu et al., 2013). Knowing these additional predictors of low HL will enable a provider to appropriately respond to the need for additional interventions at the time of hospital discharge and care transition to improve overall morbidity outcomes (McNaughton et al., 2015).

17

Providing education at any encounter whether inpatient or outpatient is important. Patients need to be presented with information throughout all phases of care. However, there are certain encounters with the patient that provide better opportunities for the patient to learn for application of new concepts. The inpatient environment is one where patients are unable to remember the information provided. Patients must cope with acute issues and anxiety while they are inpatients, which make new learning difficult (Wiggins et al., 2013). Therefore, the initial outpatient visit is the next opportunity for patients to encounter a healthcare provider at a time with fewer barriers to learning.

Improving health literacy is a difficult task, as evidenced by the volume of studies attempting to positively impact a patient's health literacy. It is well established that health literacy at the intermediate or proficient level leads to better self-care adherence and self-confidence, so the goal of patient education should be to improve a patient's HL to proficient levels (Cajita, 2016; Chen, Yehle, Plake, Murawski, & Mason, 2011; Chen et al., 2014; Dennison et al., 2011; Evangelista et al., 2010; Macabasco-O'Connell, 2011; Matsuoka et al., 2016; Noureldin et al., 2012; Westlake, Sethares, & Davidson, 2013). Patient education designed to improve HL can lead to self-motivation for taking steps to adhere to recommendations for self-care (Eckman et al., 2012).

Provider Barriers

One provider barrier to achieving improved HL is the lack of knowledge of a patient's HL level. A provider may assume that a patient understands more than they do or the provider may not hold a personal belief that HL is an important part of care (Westlake, Sethares, & Davidson, 2013). It is important for providers to understand that low HL is not a barrier to increasing a patient's HF knowledge once the information is presented to patients appropriately (Eckman et al., 2012). Just as providers hold personal beliefs, patients may also possess beliefs from their culture or societal associations that aren't consistent with appropriate provider recommendations. The provider should be prepared to recognize these beliefs and offer suggestions that work within the patient's cultural norm (Lambrinou, Protopapas,

& Kalogirou, 2014). Providers should work to individualize patient education to address the barriers that exist for each patient (Lambrinou, Protopapas, & Kalogirou, 2014; Wiggins et al., 2013).

There is a common perception among healthcare personnel that education is time-consuming (Evangelista et al., 2010; Westlake, Sethares, & Davidson, 2013; Wiggins et al., 2013). Education can be time-consuming, but it can and should be delivered in short segments during both inpatient and outpatient encounters (Ferguson & Pawlak, 2011; Lambrinou, Protopapas, & Kalogirou, 2014). To overcome this perception, healthcare personnel should optimize their work environments to facilitate these short educational segments. Part of this preparation is to have educational materials easily accessible so time isn't spent locating materials. Creating written educational materials and establishing policies for patient education within the agency will aid in optimizing use of resources that will alleviate the pressures on prescribers' time (Lambrinou, Protopapas, & Kalogirou, 2014).

The provision of effective care for all patients takes a dedicated interprofessional team of providers focused on optimal care of their patient population. Prescribing providers can delegate educational responsibilities to team members who are trained in effective patient education techniques, such as nursing staff, pharmacists, physical therapists, and nutritionists.   When there is close collaboration among the interprofessional team providing patients with the optimal, integrated care and education, patient outcomes improve (Clarkson, Schaffer & Clarkson, 2017).

Consistency from all staff members to present accurate information is often difficult (Ferguson & Pawlak, 2011). To overcome this barrier, education for staff on ways to effectively provide patient education is required. In large agencies like Cone Health, ongoing education of all healthcare personnel regarding education methods for patients with HF may be difficult. Staffing turnover, timing of educational opportunities and team member motivation are all barriers to the provision of consistent and effective care for all patients (Ward & Wood, 2000). It is especially difficult to comprehensively teach motivational interviewing and setting realistic and attainable goals using the SMART goal pneumonic (Lambrinou, Protopapas, & Kalogirou, 2014).

19

Setting SMART goals is a structured means of creating goals that are simple, measurable, attainable, realistic, and timely. Creating patient-centered goals with the patient in this manner empowers the patient to accomplish these self-care tasks as part of their treatment plan by breaking the tasks into applicable steps (Falk et al., 2013; Neithercott, 2012). When a healthcare team member is able to engage the patient in this way, the patient is participating in the decision-making process and is more successful with adhering to the plan of care (Lambrinou, Protopapas, & Kalogirou, 2014).

All members of the healthcare team responsible for education of patients with HF should be aware of the need to communicate among the entire healthcare team regarding the presentation of consistent information. Staff and team members must understand the importance of patient education in reducing readmission rates and the provision of quality care for patients with HF (Ward & Wood, 2000). All education should be specifically documented (Lambrinou, Protopapas, & Kalogirou, 2014).

Principles of Patient Education

Several studies have explored educational programs as a method to improve outcomes for patients with HF. These outcomes include acute care utilization, symptom experience, and overall morbidity and mortality (Cajita, 2016; Evangelista et al., 2010). In these studies each educational program sought to improve HF outcomes and basic HF knowledge by attempting to define the necessary educational content that should be included in an educational session. While none of the studies detailed the exact educational intervention, they did yield information to suggest that educational interventions need to be easy to read and use for best success at improving outcomes (Baker et al., 2011; Evangelista et al., 2010; Lambrinou, Protopapas, & Kalogirou, 2014; Taylor-Clarke, 2012).   Successful education is also best delivered when the healthcare team uses short, repetitive, clear instructions that are difficult to misinterpret (Lambrinou, Protopapas, & Kalogirou, 2014; Westlake, Sethares, & Davidson, 2013; Wiggins et al., 2013). The most important points for successful self-care need to be prioritized for each educational session (Lambrinou, Protopapas, & Kalogirou, 2014). Dracup and colleagues emphasize that

patient education should focus on ways to avoid readmission, which includes symptom recognition, self-care activities, and monitoring of fluid status (2014).

It is also important to include a patient's caregiver during educational sessions because this can help overcome some of the barriers to self-care adherence, including a patient who has low HL (Levin et al., 2014). Often patients ask people they trust or a caregiver to help them with interpreting medical information and performing self-care tasks. The caregiver needs to also have an adequate level of health literacy to appropriately provide assistance. Patients with low HL who have a caregiver with adequate HL perform better with HF outcomes (Levin et al., 2014). If both the patient and caregiver have low HL, the patient will experience similar outcomes to a patient with low HL and no caregiver (Levin et al., 2014).

Discharge counseling can improve HL in patients with HF, but patients may not retain sufficient information during these sessions. Effective disease-specific education for self-care provided to a patient with HF should continue after discharge at the hospital follow-up visit and each visit thereafter (Wiggins et al., 2013). This is especially important because as a patient with HF progresses into increasingly worsening New York Heart Association (NYHA) functional class of HF, a patient's self-management decisions become more complex (Ferguson & Pawlak, 2011).

Gaps in Literature

The literature review exposes a discrepancy between what is known about the effect of HL on successful patient self-management in patients with HF and a lack of specifically defined educational content and methods that produce an improvement in HL for these patients (Adams, 2010; Albano et al., 2014; Eckman et al., 2012; Matsuoka et al., 2016; McNaughton et al., 2013; Westlake et al., 2013; Wu et al., 2013). Educational efforts improve health literacy, but studies published to date have not specified the details of educational efforts that were implemented. In this project and in future work, detailed descriptions of the educational intervention are needed to inform future efforts in the implementation of HF education.

CHAPTER 3: THEORETICAL FRAMEWORK

Overview of Adult Learning Theory

Malcolm Shepherd Knowles created the Adult Learning Theory as a means of highlighting ways adults learn differently from children. Knowles called his theory Andragogy and describes that adult learners are self-guided, they desire to learn information that they know they need to spend time to learn, their life experiences influence their ability to connect to information learned, problem and task-oriented learning is the preference of adult learners, and adults are often motivated to learn from a desire to improve (Conner, 2012; Knowles, 2001).

Knowles initially devised four principles that should be considered when teaching adult learners:

1. Adult learners should contribute content and process of their learning

2. Adult learning should consider the life experiences and knowledge from the student's past

3. Content should be focused on what the learner can apply to their personal or professional life

4. Learning should focus on solution of problems rather than memorization of content

(Conner, 2012; Knowles, 2001)

Adult learners desire to have the educator respect their life experiences when teaching new material. It is from these life experiences that adults are able to connect new information and learn new things (Conner, 2012). Through mutual respect, educator and learner can acknowledge each other's goals as they move through the learning process. This action places the focus of education on the learner rather than the educator (Fidishun, 2012).

As Knowles continued to work on his theory, he added two additional principles of adult learning. The first is identifying that every student possesses a motivation to learn. The second principle is that adults need to know why they should learn something (Fidishun, 2012). Defining motivation and a

reason for learning are important for both educator and learner to recognize. Motivations can be either internal or external, but an internal motivation is the most influential (Fidishun, 2012). Through these two additional principles, Knowles acknowledges that adult learning can be influenced externally with a mutual understanding between educator and learner about why learning should take place. Internal motivation allows for an easier answer for the reason of why the adult should learn. However, an adult learner can find a reason for learning even when external motivation is required (Fidishun, 2012).

Applicability of Adult Learning Theory to This Study

Adult learning theory will inform the project regarding the timing of the intervention and the informational content and style of written educational delivery for this project. When hospitalized, adults are generally more focused on learning what happened to prompt admission and what they need to do to get home (Wiggins, et al., 2013). Patients are generally more interested in learning what they can do to stay well at home at follow-up visits (Baker et al., 2011; Knowles, 2001; Paas, et al., 2010). Therefore, the initial follow-up visit is a point in the transition of care that provides a key opportunity to influence patient's health literacy regarding HF. It is at this stage that adult learning theory suggests education will be most beneficial because patients have available energy to devote to learning (Wiggins et al., 2013).

The education session will be structured while maintaining an individualized approach. By individualizing the approach, the project will maintain the adult learning theory principles. Not all subjects will need additional learning or will have interest in every topic. Some subjects will have different motivations and reasons for learning than others. Others still, will need the freedom to discuss life experiences to make connections to the material being presented.

The content of the written material will be focused on providing a reason to the explanation for self-care steps. If a subject does not have an internal motivation to learn the self-care task, the explanation may provide an external motivation and reason for learning. By adding a basic pathophysiology to the explanation for self-care activities, patients may be able to better understand the connection between the self-care activity, HF, and how it applies to their life.

23

Overview of Cognitive Load Theory

Cognitive load theory (CLT) describes the amount of information and working knowledge that a person can utilize. The basic constructs of CLT are that learners must be able to connect new information to older information that is already in their long-term memory in order to rationalize and conceptualize the new information learned (van Merrienboer & Sweller, 2005). This is particularly true for complex tasks that require the utilization of multiple pieces of information to apply. This knowledge can be expanded by using the experiences of other people and connecting experiences for the learners' application (Paas, van Gog, & Sweller, 2010). Ultimately, CLT seeks to explain how complex knowledge can be transferred without placing such a high demand on the learner that important knowledge doesn't become part of their working memory (Paas et al., 2010; van Merrienboer & Sweller, 2005).

The quantity or load of information is also at the center of CLT. If a learner is presented with a large volume of information at one time, the connections and application of information become more difficult. In many circumstances, education and learning requires a large quantity of information. Cognitive load theory emphasizes three forms of cognitive load: intrinsic load, or the complexity of information that cannot be changed; germane load, or the working memory required to process the intrinsic complexity of information; and extrinsic load, or the aspects of learning that can distract from what is being taught (Paas et al., 2010).

Despite the intrinsic complexity of learning and presence of distractions that can be barriers to learning, CLT posits that expertise in a subject can be achieved if the volume of information is presented in the right manner. Learning requires that new information be presented in either small or large segments with an opportunity for the learner to link the new information to existing memory or experiences (Paas et al., 2010; van Merrienboer & Sweller, 2005).

Applicability of Cognitive Load Theory to This Study

   Use of CLT adds substantially to how this study will address providing the large volume of information required to understand the self-care measures necessary for managing HF. Cognitive learning theory supports the need for long-term memory, in this case the experience of having HF, for forming new memory to use in everyday decision-making (Paas et al., 2010; van Merrienboer & Sweller, 2005). This experience can be a first hospitalization or any length of time the patient has had HF. In applying CLT to the project, it was important for the educational material to provide examples of how the information can be applied to the daily life of patients and individual self-care regimens. Utilizing examples was an effort to reduce the burden of processing the large volume of information required for self-care of HF (van Merrienboer & Sweller, 2005).

CHAPTER 4: METHODOLOGY

Research Question

Will modification of an existing HF education book with the addition of information on self-care and basic pathophysiology contribute to improved health literacy for patients with HF?

Purpose Statement

The purpose of this quasi-experimental project was the modification of an existing HF education book, which aimed to improve the quality of HF patient education and increase health literacy levels while achieving lower rates of hospital readmission and acute care utilization in patients with a recent HF admission who follow up in the Cone Health Medical Group AHFC.

Hypothesis

Modification of an existing HF education book with the addition of information on self-care and pathophysiology will improve health literacy and self-care management for patients with HF, leading to fewer acute care utilizations for HF.

Project Design

The study design for this project was a quasi-experimental study design used to measure the effectiveness of patient education regarding self-care and pathophysiology of HF on 30-day readmission rates of patients with HF. The selection of this study design was based on the intent to show the effectiveness of an intervention on the outcome of the study.   Quasi-experimental studies to prove an intervention, such as patient education, have been effective (Harris, McGregor, Perencevich, Furuno, Zhu, Peterson, & Finkelstein, 2006).

This project has been implemented within a larger research project at Cone Health. The larger project included all encounters of a group of approximately 50 patients with HF who are or will be

enrolled in the Triad HealthCare Network's (THN) care management program. Primary goals of the larger project are reduced ED utilization, reduced hospital admission, reduced hospital readmission, and reduced cost per patient. These outcomes will be achieved through THN for patients who qualify for the care management services with weekly nurse phone calls with patients to monitor daily weights, home visits one or two times weekly, and office visits as necessary for symptom optimization. In addition, the patients have access to an interactive online program that has educational information about HF and HF self-care. The locations involved include the Cone Health Medical Group Advanced HF Clinic (AHFC) and the following units at The Moses H. Cone Memorial Hospital: coronary care unit, intermediate care unit, the progressive care telemetry unit, and the HF telemetry units. Currently, patients with HF receive the educational material as an inpatient and receive supplemental education in the outpatient setting as it is deemed necessary by the clinic RN and other members of the care team.

As a part of the larger project being conducted by Norine Tamborino, RN and her colleagues at Cone Health, the educational intervention to improve health literacy for this project is a quality improvement project aimed to enrich the content of the written HF educational material currently used by Cone Health.

The content change of the educational booklet ensures content is written at a fifth grade reading level as evaluated by the Simple Measure of Gobbledygook readability formula and focuses on patient understanding of HF and application of the self-care tasks. The updated booklet was reviewed by the Cone Health Patient Education Committee for content appropriateness. The items addressed by the committee were reading level of the material, white space, general readability, and health literacy level required to utilize the information.

An educational session was provided to a convenience sample of patients with HF during the hour prior to the scheduled hospital follow-up visit, following an admission for HF. At that visit, the sample patients were given the opportunity to ask questions about how to apply the information using the booklet with the discharge summary they received from the hospital as a guide for their treatment

plan. Information and discussion with the patients at this encounter focused on topics with which patients were less familiar and for which they indicated an interest for more information. Discussion utilized the teach-back method to ensure patients understood what was taught. The teach-back method has been proven to be effective at assessing understanding if used appropriately. Questions asked during the session were open-ended and required that the patient critically apply information shared. The patients were able to easily explain in their own words what was taught. If there was any incorrect information in the patient explanation, the educator remediated and re-examined for understanding (Westlake et al., 2013; Lambrinou, Protopapas, & Kalogirou, 2014; Dracup et al., 2014).

The project took place in the AHFC and served as a cost-effective way to establish the effectiveness of the educational intervention on improving HL and HF outcomes as measured by 30-day readmission rate. The setting of the outpatient AHFC was chosen in contrast to one of the inpatient hospital units based on tenets of the adult learning theory that maintains adults learn what is important to them at the time of education (Conner, 2012; Knowles, 2001).

Sampling Overview

Recruitment.

Subjects were recruited through a convenience sample of patients who presented to the Cone Health AHFC for their first post-hospital follow-up appointment. This appointment was scheduled to occur within twenty one days following discharge for an acute hospitalization for HF. Patients were initially contacted by the principal investigator during an inpatient stay for HF at Moses H. Cone Memorial Hospital. The principal investigator collaborated with the heart failure nurse navigator to identify inpatients with a primary diagnosis of heart failure that were nearing discharge.

A sample size of 20 subjects was determined to be sufficient to show effect of the addition of information on self-care and pathophysiology of HF to the booklet. An actual sample size of 12 patients was achieved during the study period. This was determined by feasibility of recruitment in the time

available for study while providing sufficient data to perform statistical tests. Enrollment lasted six weeks.

Initial contact with the subjects occurred during hospitalization and verbal informed consent to participate in this project was obtained while the subject was still an inpatient. At that time, information about the education session and details for verbal consent were presented. The hospital follow-up appointment was scheduled prior to hospital discharge and instructions were given to the patient by the principal investigator to arrive one hour prior to that appointment for the education session. If it was agreeable to the patient, the education session was scheduled to occur one hour prior to their appointment time.

Inclusion Criteria.

Possible subjects were invited to participate in the educational intervention pilot study with the following parameters: adult (>18 years of age) with a new or existing diagnosis of HF with preserved ejection fraction (HFpEF – where the ejection fraction is greater than 40%) or HF with reduced ejection fraction (HFrEF – where the ejection fraction is less than 40%); had HF classified as NYHA class I-IV; was encountered in the AHFC at first hospital follow-up visit; and was hospitalized within the past one to twenty one days with a primary diagnosis of HF.

Exclusion Criteria.

Patients were excluded from the educational intervention pilot study if they spoke any language other than English; if they were pregnant; if they were mentally incompetent; if the initial hospital admission was outside of Cone Health; or if they resided in a skilled nursing facility, long-term acute care facility, or were currently receiving hospice care.

Patients with existing comorbidities were not excluded because HF management continues to be an important factor in improving their overall burden of disease.

Human Subjects Consideration

Subjects were identified by the above sampling criteria. The project and educational intervention was explained during an informed consent process that only obtained a verbal consent. All subjects were volunteers and there was no monetary compensation for participation in the study. Possible benefits were explained to each potential subject and included: better understanding of the disease of HF, better understanding of the self-care measures for HF, and improved ability to use the information provided to perform self-care independently.

Risks patients may have experienced were greater time committed to the appointment and the potential for additional questions regarding their HF plan of care. In addition to these defined risks, there were no risks associated with participation that were greater than those normally encountered during an office visit. To minimize risk of breach of confidentiality, subjects were assigned a unique code for storage of data. This code was created with the patient at the first assessment of health literacy and was stored separately from any medical record information that would identify the subject. All data was stored on encrypted electronic devices. Data collected from the project was maintained on a separate device from any information that would connect the subject to their medical record. Only the principal investigator will know the process for creating the unique code. The principal investigator was the only person to possess or use the information for re-identification of the subject to obtain data on 30-day readmission rates. Finally, all data and consent forms will continue to be maintained securely for three years with the project chair at The University of North Carolina at Chapel Hill School of Nursing and with Kelly Peck at Cone Health.

Variables

In this project, the independent variable was the patient with HF. The dependent variables included health literacy level, 30-day acute care utilization rate, written educational material content and reading difficulty. The operational definitions of health literacy levels included the use of the following classifications:

- *Proficient:* the person possesses the necessary knowledge and skills to find information in a complex document about their medical condition, understand that information, and utilize that information to make a decision on which next step should be taken which are sometimes complex.

- *Intermediate:* the person possesses the necessary knowledge and skills to locate information in a complex document, understanding that information, and utilize that information to make a decision on which next step should be taken which may be moderately difficult.

- *Basic:* the person possesses necessary knowledge and skills to locate information in a simple document, understand that information, and utilize that information to do simple, single-step tasks.

- *Below basic:* the person possesses necessary knowledge and skills to locate information in a very basic document and act upon it without needing to make an analytical decision (Kutner et al., 2006).

The operational definition of acute care utilization includes any emergency room visit or readmission to an acute care hospital. Demographic variables that were collected include, NYHA class, HF stage, date of initial HF diagnosis, date of hospital discharge, annual income, highest level of education completed, age, and race. This will be self-reported information (see Appendix F) from the subjects except NYHA class, HF stage, and date of hospital discharge. The official date of hospital discharge was collected with the chart review for 30-day readmission data.

Setting

Triad HealthCare Network is an accountable care organization (ACO) affiliated with Cone Health. Coordination across the continuum of care to optimize patient outcomes is a goal of the organization. As an ACO, THN works with all levels of care including the acute visits to the hospital, home care, and clinics for outpatient care. In Moses H. Cone Memorial Hospital there are two telemetry

departments that care for the majority of HF patients requiring that level of care. There is one step-down unit/coronary care intensive care unit. A HF team rounds on patients to identify patients at highest risk for complications and to evaluate if additional resources are needed for management across the continuum of care. The HF team consists of physicians, nurse practitioners, physician's assistants, nurses, cardiac rehabilitation personnel, pharmacists, and nutritionists. The HF nurse navigator is part of this HF team and was utilized for identification of patients who could be recruited for the study.

The educational session was scheduled to begin one hour prior to the patient's hospital follow-up visit. At each clinic, there is a reception desk, waiting room, and individual rooms for clinic visits. The clinic manager agreed to provide a room for use of the principal investigator during study sessions. The principal investigator relied on staff at the reception desk to welcome the patient and notify the principal investigator of a patient's arrival. The principal investigator ensured an on-time arrival to the office visit to minimize clinic schedule disruptions. Only two education sessions were not completed due to lack of time prior to the office visit. See Appendix E for a letter of agreement with Cone Health granting permission to conduct the project.

Outcomes Measures

The primary outcome of this project was measurement of health literacy level. Health literacy level was measured using the short form of the Test of Functional Health Literacy in Adults (S-TOFHLA) and Newest Vital Sign (NVS) (see appendices C and D, respectively). The use of both these forms was necessary because the output of each form provides different types of information about HL. The use of both types of evaluations provided a more comprehensive assessment of the subject's HL level.

The NVS performs better for assessing numeracy than the S-TOFHLA. The NVS asks patients to read a nutrition label and answer questions about the information within it. At the more basic level, the NVS requires locating the answer on the nutrition label and regurgitating that information. At a higher level, the NVS requires mathematical calculations to correctly answer the question. The NVS also asks two general reading comprehension questions that do not require the use of numbers. Measuring

numeracy is a key component of the success of the educational intervention for nutritional self-care adherence and is consistent with the recommendation to measure more than just reading comprehension when measuring health literacy (Cajita, 2016).

The use of the S-TOFHLA was also needed because it has a stronger ability to assess reading comprehension than the NVS. The S-TOFHLA presents information a patient may encounter in the healthcare environment and asks patient to complete sentences with the most appropriate choice to fill in the blank. The blank is accompanied by four possible choices (Baker, Williams, Parker, Gazmararian, & Nurss, 1999). Of the choices provided only one will be both contextually and grammatically correct (Thomason & Mayo, 2015). The completion of these questions assesses a patient's ability to read and understand the information presented (Baker et al., 1999).

Together, the two assessments give an adequate measurement of health literacy. The combination of being knowledgeable in the reading and interpretations of food labels, along with the function of reading and comprehension of health literature and medication labels gives a more comprehensive assessment of HL (Cajita, 2016). Neither of the HL assessment is perfect, so two have been chosen that will best measure comprehension and numeracy as it best applies to the project (Cajita, 2016; Thomason & Mayo, 2015).

Determination of success of the educational intervention was measured as any single health literacy category improvement from below basic to basic, from basic to intermediate, or from intermediate to proficient. Each HL assessment also has a numeric score. The numeric scores were also evaluated for change measured as scoring a single point higher on the posttest than the pretest.

The secondary outcome measured was 30-day readmission rates for a patient with the diagnosis of HF. This outcome was and is the metric utilized by Cone Health system for measuring progress toward their readmission rate goals. In order for any cost increase incurred by the revisions to be justified, Cone Health expected to see improved readmission rates (K. Peck, personal communication, March 21, 2016).

Intervention

Prior to this project, no revision of educational materials had been done with regards to meeting the needs of the large quality improvement project planned for this population of patients at Cone Health. The current book used for education in the Cone Health System was created in 2011 by a Clinical Nurse Specialist to better meet the needs of the patients and is primarily used in the inpatient setting. Triad HealthCare Network would like to use this revised education book in all practices and settings of Cone Health where patients with HF are encountered. This educational document was revised to include, in plain language, a description of the basic pathophysiology of HF with and without adherence to each of the self-care measures identified in the 2013 American College of Cardiology and American Heart Association (ACC/AHA) HF Guidelines (see Appendix D) (Yancy et al., 2013).

It was hypothesized that patients would possess a higher level of health literacy with fewer acute care utilizations if provided educational tools that included basic pathophysiology of HF with and without adherence to the plan of care. Self-care for HF includes adherence to medication regimen, low-salt and low-fat diet, fluid restriction, daily weight monitoring, daily symptom monitoring, cessation of smoking, cessation of alcohol use, cessation of recreational drug use, regular physical activity, possible cardiac rehab, CPAP use if patient experiences sleep apnea as a co-morbidity, and maintenance of a healthy weight of having a body mass index between 30 and 35 per the 2013 ACC/AHA HF Guidelines (Yancy et al., 2013).

During the patient encounter at follow-up, each patient had a 30-minute education session and two ten-minute health literacy evaluations. A primary caregiver was allowed to attend in a "listen only" role. Because the HL of the patient is the focus of this project, the caregiver did not influence the discussion prior to the assessment or reassessment of HL. Caregivers in attendance were given a pad of paper to record any questions to be answered following the patient education session and caregiver questions were addressed after the final HL evaluation was completed. The caregiver was included in the education session because many patients require the help of another person to implement self-care tasks at

home. In any healthcare encounter, consistent information should be given to both the patient and caregiver so the proper steps for self-care are maintained. This is especially important for the patient with cognitive impairment or mental health disorders, which many patients with HF experience (Wiggins et al., 2013). During each of the HL evaluations, the caregiver was required to exit the room in order to avoid any influence or assistance to the patient in answering the HL assessment questions. The final minutes of each session were allotted for questions from any caregivers who may have been in attendance.

The education session included a review of each component of self-care as it related to HF pathophysiology and its relationship with disease progression. Patients were shown a picture of a medication container label with the standard components required by a prescription and an explanation for how to determine the dose when matching the medication list received at discharge or at office visits was added to the medication section. The nutrition section provided examples of nutrition labels and recommendations for reducing sodium intake. Other lifestyle modification sections of the booklet offered simple options for incorporating physical activity and setting personal goals for quitting smoking, drugs, and/or alcohol. Once a patient feels well following an acute admission, adherence to self-care measures may falter because the importance of continuous adherence may not be well understood. The education session closed with a summary of basic pathophysiology of HF and the necessity of continuous adherence to the care plan, described in plain language, in an effort to improve the providers' communication of the importance of maintaining these components of self-care (Wilson & Daley, 2009). See Appendix A for a table of contents of the educational booklet.

At the conclusion of the session, each patient was given the opportunity to make at least one SMART goal using the information provided during the education session. The National Committee for Quality Assurance (NCQA) has recognized that patient participation in the individual's healthcare is an essential component of success. Patients who are able to participate in goal-setting feel respected and feel that their goals respect their preferences and addresses their healthcare needs (NCQA, 2016).

To ensure each educational intervention was consistent, the principal investigator performed all education sessions. The same content in the educational booklet was reviewed in detail with each patient. To answer any questions broached by the patient, the educator referred only to the content of the booklet. If questions were beyond the scope of the material, the educator provided a generic response to include, "I am unable to answer that question during this educational session. Please ask your provider during your office visit."

Timeline of interventions and data collection processes.

Recruitment and data collection for this project began simultaneously two weeks after approval of this project by the Institutional Review Boards of Cone Health and The University of North Carolina at Chapel Hill in July 2017. Recruitment and data collection of the primary outcome occurred over six weeks between July 24, 2017 and August 30, 2017. Thirty days after the conclusion of recruitment and data collection of primary outcome, a retrospective chart review was performed to measure for the secondary outcomes of 30-day acute care utilization and 30-day hospital readmission rates. One day was allotted for the chart review. A total of ten weeks was spent in data collection. Data was analyzed in September and October 2017. The final project presentation was approved in November 2017 by the committee.

Data Collection.

Daily, the principal investigator obtained patient lists for patients who would follow up in the AHFC, attended progression rounds on the primary HF telemetry unit for information about discharge, and reviewed charts for discharge information if patients were located on other units. Patients were identified and those meeting all inclusion criteria were approached on day of discharge to determine their interest and verbal consent for participating in the education session. Forty six patients met inclusion and were asked about participation. Thirty three provided verbal consent. Only twenty-five appointments were scheduled because of scheduling conflicts for seven patients. A total of 12 patients completed all components of the education session with a complete data set.

The principal investigator was present for each education session. During each session verbal consent was confirmed, demographic information was obtained, HL assessments were completed, the entire revised book was reviewed, goals were set, questions were answered, and the secondary HL assessments were completed. Each education session was stopped promptly at one-hour maximum duration. Minimum duration was 50 minutes. At the conclusion of the session, HL assessments were scored and data were entered securely into a spreadsheet.

Recruitment was concluded by August 23, 2017 and all education sessions were completed by August 30, 2017. Thirty days after the final hospital discharge, readmission rates and acute care utilization rates were obtained via retrospective chart review. It is important to acknowledge that if a patient was readmitted at a hospital outside the Cone Health System, the clinic had been notified and a note had been entered into the chart as is standard practice for the clinic (D. Wood, personal communication, August 28, 2017).

Data analysis.

Statistical significance for a set confidence interval was unable to be accomplished due to the small sample size. Therefore, descriptive statistics were employed to describe the data at hand. Statistical analysis was performed on each HL evaluation and on 30-day readmission rate for change using descriptive statistics, chi square analysis, and fisher's exact test. Fisher's exact test is a version of chi square analysis that is more beneficial for small sample sizes. The exact tests run with their respective p values can be found in Appendix G.

Newest Vital Sign and S-TOFHLA pretest and posttest scores were compared to evaluate any positive change from baseline. Meaningful improvement in HL was defined by an increase in a single health literacy category on either HL measure or any improvement in numerical scoring on the NVS or S-TOFHLA. Since there was only one subject that demonstrated a categorical improvement, numerical scoring improvements of at least one point were used for statistical analysis.
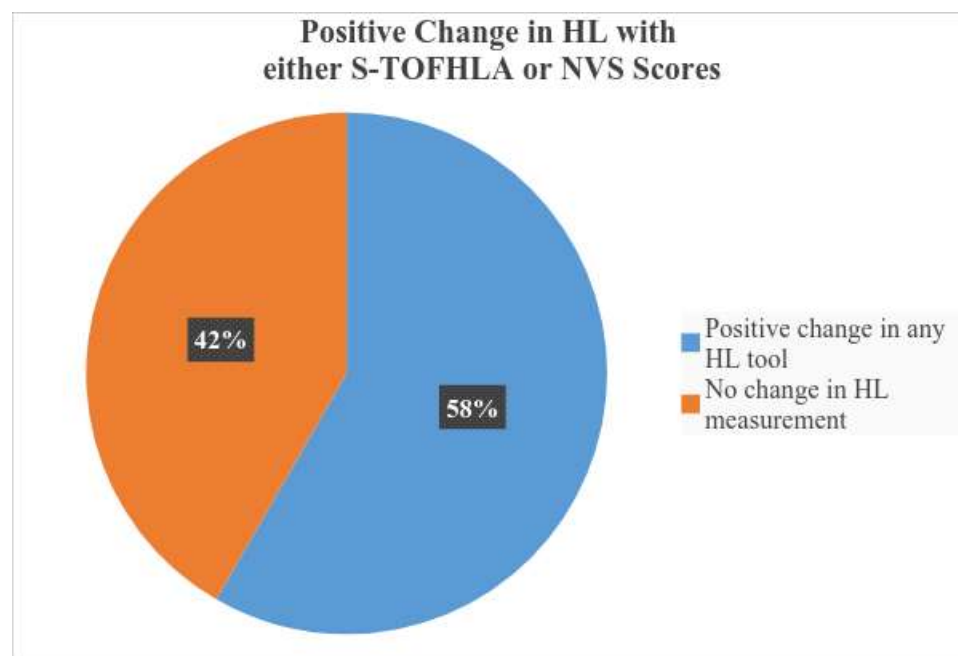
37

As a secondary outcome, 30-day readmission rate data was compared to Cone Health's 30-day readmission rates for the three months prior to the intervention for the group of patients studied. Demographic information was evaluated for both HL level increase and 30-day readmission rate using chi square analysis and fisher's exact tests to determine any potential relationships or associations to HL levels or 30-day readmission rate in patients with HF.

Results

Health Literacy Level.

Of the patients participating, there were 58% who showed improvement in HL by improving their HL assessment score by at least one point from pretest to posttest (Figure 1). There were five patients who scored the highest score on the pretest for S-TOFHLA and three patients who scored the highest possible score on the pretest for NVS. Therefore, there was no opportunity for improvement on the post-test and these patients are not included in the percentage of patients showing improvement. There was only one who patient who scored one item lower on the S-TOFHLA post-test, but this same person scored higher on the NVS post-test. See Figures 2 and 3.

Figure 1. Percent of subjects with any increase in HL Level

Figure 2. Percent of subjects with changes of HL scores using S-TOFHLA

Change in S-TOFHLA Scores

- Highest Score on Pretest
- No change
- Positive change
- Negative change

25%
25%
42%
8%
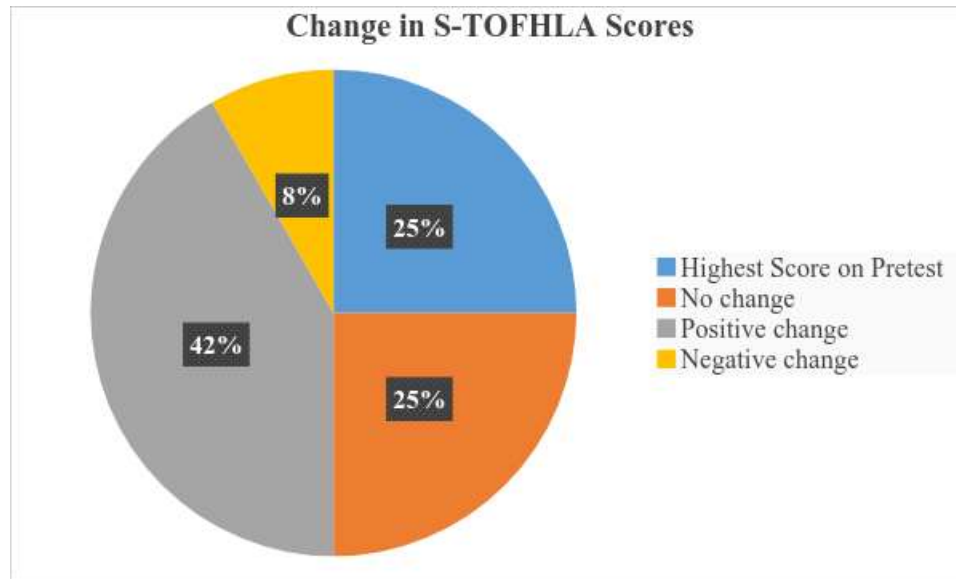
Figure 3. Percent of subjects with changes of HL scores using NVS
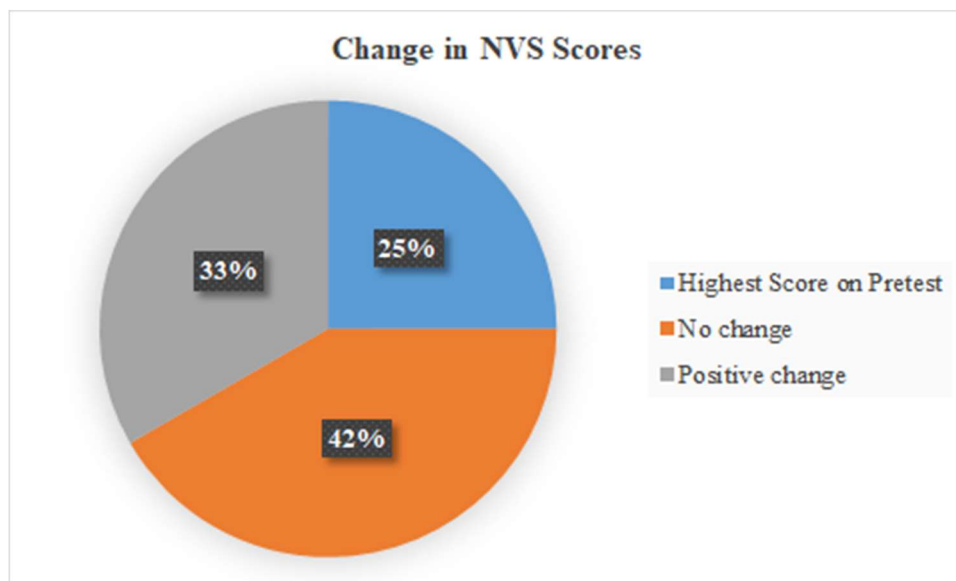

Change in NVS Scores

- Highest Score on Pretest
- No change
- Positive change

25%
42%
33%

When comparing the chi-square analyses to determine possible demographic variable associations, there were two characteristics that provided a p value less than 0.1. When evaluating S-TOFHLA scores, there is possible association for greater improvement in HL levels for patients who had been diagnosed with HF less than one year prior with a p value of 0.0278. This could also be due to less exposure to the material and a greater opportunity for learning or due to the patient having higher interest in learning to care for themselves. Motivation to complete self-care tasks was not measured.

When evaluating NVS scores, there seems to be an association between HL level and income. Via self-reported household income, if a patient is classified as living below 200% of the federal poverty line (FPL), they had a greater likelihood of having an improvement in HL as measured by the NVS with a p value of 0.0808.

Rates of 30-day readmission and 30-day acute care utilization.

Acute care utilization rate of the project sample was 16.67% (*n*=2), while the 30-day readmission rate of sample was 8.33% (*n*=1). Both events occurred after the education session and hospital follow-up visit. Based on the chi-square analysis of 30-day readmission rates and 30-day acute care utilization rates against demographic variables collected, there is a greater likelihood that people who live below 150% of the FPL either utilize acute care or need to be readmitted to the hospital within 30 days of discharge at a higher rate that those who live above 150% of the FPL.

Figure 4. Comparison of readmission and acute care utilization rates from project sample to prior Cone Health data

Readmission and Acute Care Utilization Rates

Category	Rate
30-DAY READMISSION RATE	8.33%
30-DAY ACUTE CARE UTILIZATION RATE	16.67%
CONE HEALTH CMS REPORTED 30-DAY READMISSION RATE	20.10%
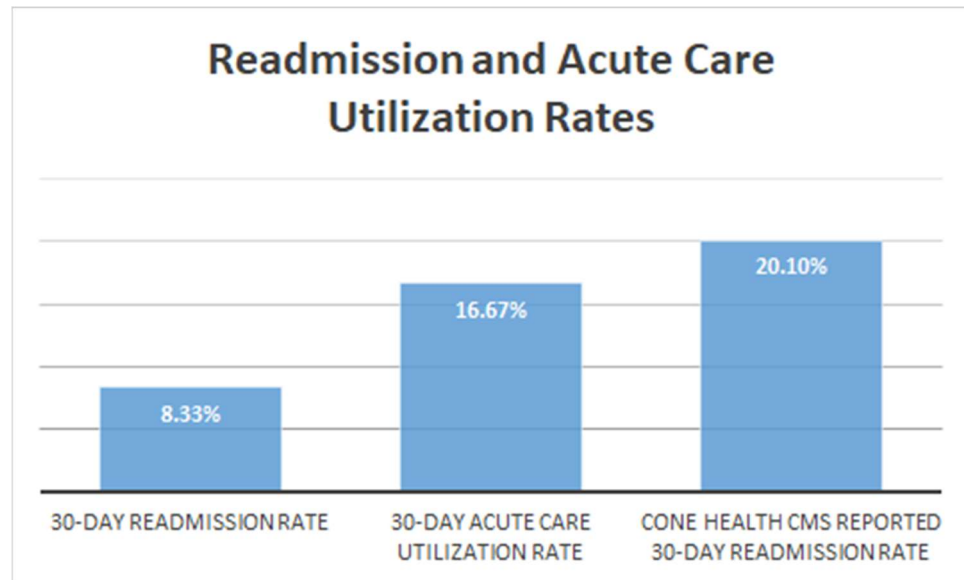
CHAPTER 5: DISCUSSION

Providing patient education to patients with heart failure is not a novel idea. This quality improvement project attempted to revise the content provided to patients in a way that improved patient understanding. Regardless of the outcomes of the study, the revised booklet now includes all self-care tasks recommended as part of the standard of care for the care of patients with HF as recommended by the AHA and ACC. The previous iteration of the booklet did not sufficiently cover these self-care tasks as evidenced by the extra papers that had to be used to supplement the booklet (D. Wood, personal communication, August 28, 2017). The results also show significant benefit to patients' health literacy levels which support the revisions made to the education materials. Claiming that the educational intervention provided significant improvement to 30-day readmission rates and 30-day acute care utilization cannot be made as a result of the sample size being too small.

Limitations

Selection bias was prevalent throughout both phases of implementation. First, subjects had to volunteer to participate. When potential subjects were approached about the project, the principal investigator asked if they were interested in hearing about the project. Some declined at that point. Others listened and didn't choose to participate for various reasons that included taking too much time at the follow-up visit, not having transportation to and from the appointment, not being interested, or feeling that they didn't have anything else to learn. These were some of the most common reasons stated by possible subjects at the time of recruitment. During the education session segment of implementation, patients had to report to the clinic. There was only a 48% response rate with a high rate of patients lost to follow-up. Reasons for non-response can be found in Figure 5.

Figure 5. Patients lost to follow-up

no -show, no-call:	6
cancelled appointment:	3
no-show, called:	1
Insufficient time to complete session:	2
hospitalized @ time of f/u visit:	1

Small sample size can be partially attributed to both selection bias, as previously described, and to the study design. The only educator was the principal investigator. Because of overlapping appointment times, some patients who were willing to participate were unable to be scheduled. Clinic appointments are scheduled every 20 minutes, and the implementation required one hour. It was not possible to schedule subjects to participate if their clinic visits overlapped with a prior subject.

Another point of consideration for selection bias is the characteristics of patients who maintain their relationship with the AHFC. The AHFC is a unique environment where patients are provided with additional time with providers, a pharmacist visit for medication assistance as needed, as well as a paramedicine program that places higher-risk patients on a list for Guilford County Emergency Medical Services reference. The paramedicine program allows for extra home visits outside of home health services and identification of the patient if anyone from that residence calls 9-1-1. If patients are non-compliant with treatment recommendations in this setting or do not show for appointments, they are referred back to their cardiologist. The clinic has very limited availability, and there is no tolerance for patients who fail to show some effort at improving their lifestyle if that is a contributing factor to their heart failure disease symptomatology or disease progression. This results in a patient population who may be significantly more interested in learning about their HF and are more likely to show improvement in HL. The patients seen in the AHFC are often in later stages of disease which could skew

outcomes. Despite this, data from this project did not reflect differences between NYHA classes. The 30- day readmission rates of the patients seen in the AHFC are also typically not much different than overall 30-day readmission rates for Cone Health despite the high numbers of patients with advanced disease (D. Wood, personal communication, August 28, 2017). Many of the patients who were classified as NYHA stage IV were also receiving hospice therapy and were excluded from this project. These patients would traditionally be included in readmission rates, but were not for this project.

With any study of populations, there are opportunities for confounding bias. To address confounding bias, demographic variables were obtained and measured for associations. It is important to note that the clinic generally sees approximately 50% African-American patients and approximately 50% Caucasian patients. The sample for this study was significantly biased toward Caucasian patients, therefore no conclusions or associations regarding race can be considered.

Implications for Future Research

Additional study for Cone Health could include assessment of HF education practices in all settings, to include inpatient settings, additional outpatient cardiology practices and THN contacts. During progression rounding, a case manager for THN is present to identify opportunities for patients who qualify for the ACO. When this occurs, patients are automatically placed into a program that creates additional contacts such as additional phone call follow-up, education, and home visits. This would provide a unique opportunity to identify additional areas for improving HF care and attempts to impact the 30-day readmission rate. Due to the unique nature of the AHFC, studies comparing outcomes of patients who follow at the AHFC, to cardiology only and patients under THN management could reveal opportunities to improve HF care and 30-day readmission rates outside of the AHFC.

Observations made by the principal investigator during patient progression rounds also revealed the potential for impacting HF education and the 30-day readmission rate in the inpatient setting. Addressing nursing attitudes and barriers to care could allow for more optimal care of the patient. There were nurses who appeared frustrated, exhausted, and exasperated with the care of some of the patients who were reported to return to the hospital frequently. Explorations of ways to address

44

nursing attitudes or identify specific barriers that prevent nurses from providing the care these patients need would be beneficial. Addressing possible knowledge barriers of nurses, including intensive, ongoing education for how to be successful with motivational interviewing or helping patients identify their own barriers to care could provide some answers. Another barrier to care that may help nurses provide better care is addressing the nurse to patient ratio. At the time of recruitment, charge nurses were obligated to cover staffing needs and each nurse was caring for six to seven patients. Reducing the nurse to patient ratio to 1:5-6 could prove beneficial to outcomes in patients with HF if the time the nurses gain can be used with patients for teaching and helping patients set goals to apply the knowledge to real life scenarios.

One possible opportunity the principal investigator observed was the difficult task of helping patients acknowledge their HF diagnosis as a chronic disease. This was identified through the progression report or from speaking with the patients directly. For Cone Health, only a small reduction in 30-day readmission rates would support and enhance their efforts to reach their HRRP goals.

Implications for Clinical Practice

The average time from hospital discharge to the hospital follow-up appointment for this sample is ten days, ranging between 6-16 days from discharge. There were two patients who were excluded due to the follow-up appointment being scheduled too far from date of discharge, which made their appointment time greater than 21 days from discharge. It is important to note that the standard of care as recommended by AHA/ACC guidelines is to have the hospital follow-up within seven days or less of hospital discharge. The AHFC should consider their time to follow-up for future practice, which may require creative scheduling options or adding an additional medical provider to see patients.

Generalizability of the knowledge learned from this project is poor. Therefore, the information gleaned is to be applied to patient education only at Cone Health facilities. The improvement in health literacy for this patient population should support the use of the revised education booklet throughout Cone Health's care settings. If cost becomes a barrier to this widespread implementation, it is possible that an additional revision could be made that would separate each of the self-care steps into smaller information packets that can be given to patients as the topics arise. This method could provide the

opportunity to expand on some of the self-care measures that were limited by space in the current iteration of the booklet, providing additional opportunity for patients to understand their self-care tasks and how to apply them.

Time also restricts the ability of a nurse or other educator to review the entire booklet with a patient. The principal investigator allowed 30-40 minutes with each patient to review the book and answer questions. Each session conducted utilized the full 30-40 minutes of dedicated education time which would not be conducive for a typical patient encounter, particularly in the inpatient setting at discharge.

As the principal investigator conducted the education sessions, there were some topics patients felt they had mastered and others with which they acknowledged they needed help. Smaller content books could allow for a more customized education and also decrease the volume of information patients must process. Cognitive load theory, a theoretical framework for this project, would also support providing the information in smaller portions. It should be noted that it is important to have all self-care tasks presented together at some point in time so patients have a clear and comprehensive understanding of the recommendations. Failure to provide this information can create a gap in best practices. The complete book should still be provided in the inpatient setting and possibly also by THN during home visits, while the smaller content books could be used by THN and clinics in the outpatient setting as way to reinforce education or to introduce the education slowly to someone who has difficulty with being presented all of the information at once. This would save the cost of multiple complete books being given to the same patient if they didn't need the entire content a second or third time.

Summary and Conclusions

As a primary outcome of the study, health literacy levels were positively impacted by the education session and the content presented within the revised HF education book. Acknowledgement by healthcare providers of the need to work toward the improvement of health literacy levels is essential. Measuring a patient's health literacy level and reassessing it at subsequent encounters is important to understanding what a patient needs.

While there were some patients whose health literacy levels were already high, there was opportunity for improvement for the majority of patients in this sample. For Cone Health, implementing this revised educational tool will present the information in a manner that improves patients' understanding of health information in general as well as their specific HF self-care tasks. While the impact of 30-day readmission rates and financial gain from this intervention cannot be fully supported from this project, it is important to recognize that patients who have higher levels of health literacy have better health outcomes. Cone Health should strongly consider the implementation of this educational book for the benefit of their patients and health outcomes as they strive to reach their patient care goals and become a national healthcare leader.

What I Need to do to Take Care of Myself

1. **Monitor how you feel** (your symptoms)

| Red Zone | Yellow Zone | Green Zone |
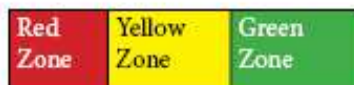
2. **Weigh Yourself Daily**

3. **Take all of your medicines**

4. **Eat a healthy diet low in sodium** (less than 2,000 mg)

5. **Limit how much water and other liquid you drink**

6. **Get regular physical activity - Get up and move!**

7. **If you have a bad habit, quit the habit.**
   Quit smoking. Quit drinking alcohol.
   Quit using recreational drugs.

8. **Take care of your other health problems**

APPENDIX B. S-TOFHLA

Short Test of Functional Literacy in Adults
STOFHLA
READING COMPREHENSION

HAND PATIENT THE READING COMPREHENSION PASSAGES TO BE COMPLETED. FOLD BACK THE PAGE OPPOSITE THE TEXT SO THAT THE PATIENT SEES ONLY THE TEXT.

PREFACE THE READING COMPREHENSION EXERCISE WITH:

"Here are some other medical instructions that you or anybody might see around the hospital. These instructions are in sentences that have some of the words missing. Where a word is missing, a blank line is drawn, and 4 possible words that could go in the blank appear just below it. I want you to figure out which of those 4 words should go in the blank, which word makes the sentence make sense. When you think you know which one it is, circle the letter in front of that word, and go on to the next one. When you finish the page, turn the page and keep going until you finish all the pages."

STOP AT THE END OF 7 MINUTES

PASSAGE A: X-RAY PREPARATION

PASSAGE B: MEDICAID RIGHTS AND RESPONSIBILITIES

PASSAGE A

Your doctor has sent you to have a _____ X-ray.
                a. stomach
                b. diabetes
                c. stitches
                d. germs

You must have an _____ stomach when you come for _____.
     a. asthma   a. is.
     b. empty   b. am.
     c. incest   c. if.
     d. anemia   d. it.

The X-ray will _____ from 1 to 3 _____ to do.
     a. take   a. beds
     b. view   b. brains
     c. talk   c. hours
     d. look   d. diets

THE DAY BEFORE THE X-RAY.

For supper have only a _____ snack of fruit, _____ and jelly,

a. little	a. toes
b. broth	b. throat
c. attack	c. toast
d. nausea	d. thigh

with coffee or tea.

After _____ , you must not _____ or drink

a. minute,	a. easy
b. midnight,	b. ate
c. during,	c. drank
d. before,	d. eat

anything at _____ until <u>after</u> you have _____ the X-ray.

a. ill	a. are
b. all	b. has
c. each	c. had
d. any	d. was

THE DAY OF THE X-RAY.

Do not eat _____ .
          a. appointment.
          b. walk-in.
          c. breakfast.
          d. clinic.

Do not _____ , even _____ .
     a. drive,   a. heart.
     b. drink,   b. breath.
     c. dress,   c. water.
     d. dose,   d. cancer.

If you have any _____ , call the X-ray _____ at 616-4500.
      a. answers,   a. Department
      b. exercises,   b. Sprain
      c. tracts,   c. Pharmacy
      d. questions,   d. Toothache

PASSAGE B

I agree to give correct information to _____ if I can receive Medicaid.
          a. hair
          b. salt
          c. see
          d. ache

I _____ to provide the county information to _____ any
  a. agree   a. hide
  b. probe   b. risk
  c. send   c. discharge
  d. gain   d. prove

statements given in this _____ and hereby give permission to
          a. emphysema
          b. application
          c. gallbladder
          d. relationship

the _____ to get such proof. I _____ that for
  a. inflammation   a. investigate
  b. religion   b. entertain
  c. iron   c. understand
  d. county   d. establish

Medicaid I must report any _____ in my circumstances
          a. changes
          b. hormones
          c. antacids
          d. charges

within _____ (10) days of becoming _____ of the change.

    a. three
    b. one
    c. five
    d. ten

    a. award
    b. aware
    c. away
    d. await

I understand _____ if I DO NOT like the _____ made on my

    a. thus
    b. this
    c. that
    d. than

    a. marital
    b. occupation
    c. adult
    d. decision

case, I have the _____ to a fair hearing. I can _____ a

    a. bright
    b. left
    c. wrong
    d. right

    a. request
    b. refuse
    c. fail
    d. mend

hearing by writing or _____ the county where I applied.

    a. counting
    b. reading
    c. calling
    d. smelling

If you _____ TANF for any family _____ , you will have to

    a. wash
    b. want
    c. cover
    d. tape

    a. member,
    b. history,
    c. weight,
    d. seatbelt,

_____ a different application form.   _____ , we will use

a. relax
b. break
c. inhale
d. sign

a. Since,
b. Whether,
c. However,
d. Because,

the _____ on this form to determine your _____ .

a. lung
b. date
c. meal
d. pelvic

a. hypoglycemia.
b. eligibility.
c. osteoporosis.
d. schizophrenia.

Short Test of Functional Health Literacy in Adults (STOFHLA)
Joanne R. Nurss, Ph.D., Ruth M. Parker, M.D., Mark V. Williams, M.D., & David W. Baker, M.D., M.P.H.

TOFHLA is a measure of the patient's ability to read and understand health care information, their functional health literacy. TOFHLA Numeracy assesses their understanding of prescription labels, appointment slips, and glucose monitoring. TOFHLA Reading Comprehension assesses their understanding of health care texts such as preparation for a diagnostic procedure and Medicare Rights & Responsibilities.

Date _____/_____/_____

Name _____ _____ M _____ F

Birthdate _____/_____/_____ Age _____   SSN or ID# _____

Hospital or Health-care Setting _____

City, State _____

Short Form Administered: _____English   _____Spanish

STOFHLA - Score

TOFHLA Total Score:
Reading Comprehension Raw Score (0-36)

Functional Health Literacy Level:

   0 - 16 -- Inadequate Functional Health Literacy

   17 - 22 -- Marginal Functional Health Literacy

   23 - 36 -- Adequate Functional Health Literacy

July 1995
© Emory University

Large Print Version, English 14 point font • STOFHLA

APPENDIX C. NVS

The Newest Vital Sign

Score Sheet for the Newest Vital Sign
Questions and Answers

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

	ANSWER CORRECT?	
	yes	no

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 2,500 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.

Number of correct answers:

Interpretation
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 Working together for a healthier world

February 2011

57

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.

APPENDIX D. ACC/AHA HF GUIDELINE PLAN OF CARE (TABLE 34 OF THE GUIDELINE)

Table 34. Plan of Care for Patients With Chronic HF

Plan of Care	Relevant Guideline Section/Reference
Guideline-directed medical and device therapy	
ACE inhibitor/ARB	Sections 7.3.2.2 and 7.3.2.3
Beta blocker	Section 7.3.2.4
Aldosterone receptor antagonist	Section 7.3.2.5
Diuretic	Sections 7.3.2.1 and 8.4
Hydralazine and isosorbide dinitrate	Section 7.3.2.6
Digoxin	Section 7.3.2.7
Discontinuation of drugs that may worsen HF	Section 7.3.2.9
Biomarker-related therapeutic goals	Section 6.3
HF-related devices (MCS, CRT, ICD)	Sections 7.3.4 and 7.4.5
Management of comorbidities (examples)	
Ischemic heart disease	2012 ACCF/AHA SIHD Guideline (14)
Antithrombotic therapies	Section 7.3.2.8.1
Arrhythmia/arrhythmia risk	Sections 7.3.2.9.2 and 9.1
Hypertension	Section 7.1.1, JNC-VII (27)
Diabetes mellitus	2012 ADA Standards (90)
Chronic renal failure	Section 8.5
Chronic obstructive pulmonary disease	2011 ACCP/ATS/ERS Guideline (908)
Secondary prevention interventions (e.g., lipids, smoking cessation, influenza and pneumococcal vaccines)	2011 AHA/ACCF Secondary Prevention and Risk Reduction Guidelines and Centers for Disease Control Adult Vaccinations (13,909,910)
Patient/family education	
Diet and fluid restriction, weight monitoring	Sections 7.3.1.1, 7.3.1.3, 7.3.1.5, and 7.4.3
Recognizing signs and symptoms of worsening HF	Table 24
Risk assessment and prognosis	Sections 3, 4.6, 6.1.2
QOL assessment	2012 AHA Scientific Statement on Advanced HF (30)
Advance care planning (e.g., palliative care and advance directives)	Section 11.3 (30,888)
CPR training for family members	AHA Family & Friends CPR (911)
Social support	Section 7.3.1.2
Physical activity/cardiac rehabilitation	
Exercise regimen	Sections 7.3.1.5 and 7.3.1.6
Activities of daily living	Section 7.3.1.6
Functional status assessment and classification	Section 3
Psychosocial factors	
Sex-specific issues	2011 AHA Guidelines for the Prevention of Cardiovascular Disease in Women (912)
Sexual activity	2012 AHA Scientific Statement on Sexual Activity (913)
Depression screening	U.S. Preventive Services Task Force Guidelines (914)
Clinician follow-up and care coordination	
Cardiologists and other relevant specialists	2000 AHA Scientific Statement for Team Management of Patients With HF (900)
Primary care physician	NQF Preferred Practices for Care Coordination (898)
Advanced practice nurse	Section 11.1–11.3, Joint Commission 2013 National Patient Safety Goals (915)
Other healthcare providers (e.g., home care)	
Medication reconciliation Establishment of electronic personal health records HHS Meaningful Use Criteria	
Socioeconomic and cultural factors Culturally sensitive issues	NQF: A Comprehensive Framework and Preferred Practices for Measuring and Reporting Cultural Competency (916)
Education and health literacy	Section 7.3.1.1
Social support	Section 7.3.1.2

ACCF indicates American College of Cardiology Foundation; ACCP, American College of Chest Physicians; ACE, angiotensin-converting enzyme; ADA, American Diabetes Association; AHA, American Heart Association; ARB, angiotensin-receptor blocker; ATS, American Thoracic Society; CPR, cardiopulmonary resuscitation; CRT, cardiac resynchronization therapy; ERS, European Respiratory Society; HF, heart failure; HHS, Health and Human Services; ICD, implantable cardioverter-defibrillator; JNC, Joint National Committee; MCS, mechanical circulatory support; NQF, National Quality Forum; QOL, quality of life; and SIHD, stable ischemic heart disease.

APPENDIX E. LETTER OF AGREEMENT FROM KELLY PECK

RE: HF project meeting

Peck, Kelly <Kelly.Peck@conehealth.com>

Tue 3/22/2016 2:15 PM

To: Kennedy, Lauren Renee <laurenrk@email.unc.edu>;

📎 1 attachments (22 KB)

Kelly Peck,MS PI.docx;

Hi Lauren!
It was great to meet you this morning. I hope this is not too late. Attached is my most recent resume. Please let me know if you need more.

I am very much looking forward to working with you- I think we can create something great.

Kelly A. Peck, MS, PCMH-CCE
Triad HealthCare Network
Quality Program Manager
Kelly.peck@conehealth.com
Direct Dial: 336.832.3587

APPENDIX F. DEMOGRAPHICS DATA COLLECTION SHEET

Health Literacy in Heart Failure Demographic Data   Subject code: _____

Place a check mark next to the answer that describes you. Turn this page over when complete.

1. **How long ago were you first told you had heart failure?** _____

2. **What is the highest level of education you have completed?**

   ___ Some High School   ___ Some College

   ___ 9th grade   ___ Associate's Degree

   ___ 10th grade   ___ Bachelor's Degree

   ___ 11th grade   ___ Master's Degree or Higher

   ___ High School Diploma or GED

3. **What is your age?**

___ 18-19 years	___ 40-44 years	___ 65-69 years
___ 20-24 years	___ 45-49 years	___ 70-74 years
___ 25-29 years	___ 50-54 years	___ 75-79 years
___ 30-34 years	___ 55-59 years	___ 80-85 years
___ 35-39 years	___ 60-64 years	___ >85 years

4. **Which race or ethnicity do you use to identify yourself?**

   ___ American Indian or Alaska Native   ___ Native Hawaiian or Pacific Islander

   ___ Asian   ___ White (non-hispanic)

   ___ Black or African American   ___ Other: _____

   ___ Hispanic or Latino

5. **What is your yearly income?**

___ Less than $10,000	___ $40,000 - $54,999	___ $85,000 - $99,999
___ $10,000 - $24,999	___ $55,000 - $69,999	___ Greater than $100,000
___ $25,000 - $39,999	___ $70,000 - $84,999	

6. **What is your yearly household income?**

___ Less than $10,000	___ $40,000 - $54,999	___ $85,000 - $99,999
___ $10,000 - $24,999	___ $55,000 - $69,999	___ Greater than $100,000
___ $25,000 - $39,999	___ $70,000 - $84,999	

7. **How many people live in your house?** _____

APPENDIX G. TABLES WITH CHI SQUARE P VALUES

	χ2 with 1 degree of freedom	two tailed p value χ2 test	two tailed p value Fisher's exact test
Increase in HL with STOFHLA			
Variable being compared			
II vs III	0.171	0.6788	1
<1 year w/ HF	3.536	0.06	0.0278
edu >/= Bach	1.371	0.2416	0.2424
Cauc vs AA	0.274	0.6005	0.4697
# days from D/C </7 d	0.114	0.7353	0.5227
< 150% FPL	0.043	0.836	0.5758
< 200% FPL	0.01	0.9212	1
> 300% FPL	0.171	0.6788	1

Increase in HL with NVS			
II vs III	0.188	0.665	1
<1 year w/ HF	0.171	0.6788	1
edu >/= Bach	0	1	1
Cauc vs AA	0.3	0.5839	1
# days from D/C </= 7 d	0.5	0.4795	0.4909
< 150% FPL	1.172	0.279	0.2081
< 200% FPL	2.1	0.1473	0.0808
> 300% FPL	0.047	0.8286	0.5475

30 - day acute care utilization			
II vs III	0.075	0.7842	0.5152
<1 year w/ HF	0.069	0.7934	1
edu >/= Bach	0.6	0.4386	0.4545
Cauc vs AA	0.48	0.4884	1
# days from D/C </= 7	0.8	0.3711	0.4545
< 150% FPL	1.875	0.1709	0.0909
< 200% FPL	1.097	0.2949	0.1515
> 300% FPL	0.075	0.7842	0.5152

30- day RR			
II vs III	0.545	0.4602	1
<1 year w/ HF	0.779	0.3774	1
edu >/= Bach	1.091	0.2963	1
Cauc vs AA	0.218	0.6404	0.25
# days from D/C </= 7 d	0.364	0.5465	0.25
< 150% FPL	0.136	0.7119	0.3333
< 200% FPL	0.031	0.8599	0.4167
> 300% FPL	0.545	0.4602	1

REFERENCES

Adams, R. J. (2010). Improving health outcomes with better patient understanding and education. *Risk Management and Healthcare Policy, 3*, 61-72. doi:10.2147/RMHP.S7500

Albano, M. G., Jourdain, P., De Andrade, V., Domenke, A., Desnos, M., & d'Ivernois, J. (2014). Therapeutic patient education in heart failure: Do studies provide sufficient information about the educational programme? *Archives of Cardiovascular Diseases, 107*(5), 328-339. doi:10.1016/j.acvd.2013.12.002

American Heart Association. (2015). *Heart failure: About heart failure.* Retrieved from http://www.heart.org/HEARTORG/Conditions/HeartFailure/AboutHeartFailure/About-Heart-Failure_UCM_002044_Article.jsp#.V7sVlJgrKhc

Baker, D. W., Williams, M. V., Parker, R. M., Gazmararian, J. A., & Nurss, J. (1999). Development of a brief test to measure functional health literacy. *Patient Education and Counseling, 38*(1), 33-42.

Baker, D. W., DeWalt, D. A., Schillinger, D., Hawk, V., Ruo, B., Bibbins-Domingo, K., . . . Pignone, M. (2011). "Teach to goal": Theory and design principles of an intervention to improve heart failure self-management skills of patients with low health literacy. *Journal of Health Communication, 16*(sup3), 73-88. doi:10.1080/10810730.2011.604379

Boccuti, C. & Casillas, G. (2017). Aiming for fewer hospital U-turns: The medicare hospital readmission reduction program. Retrieved from https://www.kff.org/medicare/issue-brief/aiming-for-fewer-hospital-u-turns-the-medicare-hospital-readmission-reduction-program/

Cajita, M. I., Cajita, T. R., & Han, H. (2016). Health literacy and heart failure: A systematic review. *The Journal of Cardiovascular Nursing, 31*(2), 121-130.

Centers for Medicare and Medicaid Services (2016a). *Hospital compare: Hospital readmissions reduction program.* Retrieved from https://data.medicare.gov/en/Hospital-Compare/Hospital-Readmissions-Reduction-Program/9n3s-kdb3/15725

Centers for Medicare and Medicaid Services (2016b). *Hospital readmission reduction program.* Retrieved from https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Readmissions-Reduction-Program.html

Centers for Medicare and Medicaid Services (2016c). *Hospital readmissions reduction program: Frequently asked questions.* Retrieved from https://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228890577835&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DFY17_HRRP_FAQs.pdf&blobcol=urldata&blobtable=MungoBlobs

Chaudhry, S. I., Herrin, J., Phillips, C., Butler, J., Mukerjhee, S., Murillo, J., . . . Krumholz, H. M. (2011). Racial disparities in health literacy and access to care among patients with heart failure. *Journal of Cardiac Failure, 17(2),* 122-127. doi:10.1016/j.cardfail.2010.09.016

Chen, A. M. H., Yehle, K. S., Albert, N. M., Ferraro, K. F., Mason, H. L., Murawski, M. M., & Plake, K. S. (2014). Relationships between health literacy and heart failure knowledge, self-efficacy, and self-care adherence. *Research in Social and Administrative Pharmacy, 10(2),* 378-386. doi:10.1016/j.sapharm.2013.07.001

Chen, A. M. H., Yehle, K. S., Plake, K. S., Murawski, M. M., & Mason, H. L. (2011). Health literacy and self-care of patients with heart failure. *The Journal of Cardiovascular Nursing, 26*(6), 446-451. doi:10.1097/JCN.0b013e31820598d4

Clarkson, J. N., Schaffer, S. D., & Clarkson, J. J. (2017). The effect of an interprofessional heart failure education program on hospital readmissions. *Journal for Healthcare Quality, 29*(2), 78-84. doi:10.1097/JHQ.0000000000000027

Conner, M. (2012). Adult learning theory. In N. M. Seel (Ed.), *Encyclopedia of the sciences of learning* (pp. 141-143). Boston, MA: Springer US. doi:10.1007/978-1-4419-1428-6_1003

Cook, C., Cole, G., Asaria, P., Jabbour, R., & Francis, D. P. (2014). The annual global economic burden of heart failure. International journal of cardiology, 171(3), 368-76. doi:10.1016/j.ijcard.2013.12.028

Dennison, C. R., McEntee, M. L., Samuel, L., Johnson, B. J., Rotman, S., Kielty, A., & Russell, S. (2011). Adequate health literacy is associated with higher heart failure knowledge and self-care confidence in hospitalized patients. *The Journal of Cardiovascular Nursing, 26*(5), 359-367. doi:10.1097/JCN.0b013e3181f16f88

Driscoll, A., Davidson, P., Clark, R., Huang, R. L., & Aho, Z. (2009). Tailoring consumer resources to enhance self-care in chronic heart failure. *Australian Critical Care, 22*(3), 133-140. doi:10.1016/j.aucc.2009.05.003

Eckman, M. H., Wise, R., Leonard, A. C., Dixon, E., Burrows, C., Khan, F., & Warm, E. (2012). Impact of health literacy on outcomes and effectiveness of an educational intervention in patients with chronic diseases. *Patient Education and Counseling, 87(2),* 143-151. doi:10.1016/j.pec.2011.07.020

Evangelista, L. S. (2005). What do we know about adherence and self-care? *The Journal of Cardiovascular Nursing, 23*(3), 250; 250-257; 257.

Evangelista, L. S., Rasmusson, K. D., Laramee, A. S., Barr, J., Ammon, S. E., Dunbar, S., . . . Yancy, C. W. (2010). Health literacy and the patient with heart Failure—Implications for patient care and research: A consensus statement of the heart failure society of America. *Journal of Cardiac Failure, 16*(1), 9-16. doi:10.1016/j.cardfail.2009.10.026

Falk, H., Ekman, I., Anderson, R., Fu, M., & Granger, B. (2013). Older patients' experiences of heart failure – An integrative literature review. *Journal of Nursing Scholarship, 45(3),* 247-255. doi:10.1111/jnu.12025

Ferguson, L. A., & Pawlak, R. (2011). Health literacy: The road to improved health outcomes. *The Journal for Nurse Practitioners, 7(2),* 123-129. doi:10.1016/j.nurpra.2010.11.020

Fidishun, D. (2012). Adult Learning/Andragogy. In N. M. Seel (Ed.), *Encyclopedia of the sciences of learning* (pp. 143-145). Boston, MA: Springer US.

Harris, A. D., McGregor, J. C., Perencevich, E. N., Furuno, J. P., Zhu, J., Peterson, D. E., & Finkelstein, J. (2006). The use and interpretation of quasi-experimental studies in medical informatics. *Journal of the American Medical Informatics Association, 13*(1), 16-23. doi:10.1197/jamia.M1749

Heidenreich, P., Trogdon, J., Khavjou, O., & Butler, J. (2011). Forecasting the future of cardiovascular disease in the United States: A policy statement from the American heart association. *Circulation (New York, N.Y.), 123*(8), 933; 933-944; 944.

Islam, T., O'Connell, B., & Lakhan, P. (2013). Hospital readmission among older adults with congestive heart failure. *Australian Health Review: A Publication of the Australian Hospital Association, 37*(3), 362-368. doi:10.1071/AH12042

Janssen, D. J. A., Wouters, E. F. M., & Spruit, M. A. (2015). Psychosocial consequences of living with breathlessness due to advanced disease. Current opinion in supportive & palliative care, 9(3), 232-237. doi:10.1097/SPC.0000000000000146

Jurgens, C. Y., Lee, C. S., Reitano, J. M., & Riegel, B. (2013). Heart failure symptom monitoring and response training. *Heart & Lung: The Journal of Critical Care, 42*(4), 273-280. doi:10.1016/j.hrtlng.2013.03.005

Knowles, M. S. (2001). Understanding the adult learner. In B. Woolls, & B. E. Sheldon (Eds.), *Delivering lifelong continuing professional education across space and time* (pp. 242-247). Berlin/Boston, DE: De Gruyter Saur.

Kollipara, U. K., Jaffer, O., Amin, A., Toto, K. H., Nelson, L. L., Schneider, R., . . . Drazner, M. H. (2008). Relation of lack of knowledge about dietary sodium to hospital readmission in patients with heart failure. *The American Journal of Cardiology, 102*(9), 1212-1215. doi:10.1016/j.amjcard.2008.06.047

Kutner, M., Greenberg, E., Jin, Y., & Paulsen, C. (2006). *The health literacy of America's adults: Results from the 2003 national assessment of adult literacy.* (No. NCES2006-483). Washington, DC: National Center for Education.

Lambrinou, E., Protopapas, A. & Kalogirou, F. (2014). Educational challenges to the health care professional in heart failure care. *Current Heart Failure Reports, 11(3),* 299-306. doi:10.1007/s11897-014-0203-y

Levin, J. B., Peterson, P. N., Dolansky, M. A., & Boxer, R. S. (2014). Health literacy and heart failure management in patient-caregiver dyads. *Journal of Cardiac Failure, 20(10),* 755-761. doi:10.1016/j.cardfail.2014.07.009

Macabasco-O'Connell, A. (2011). Relationship between literacy, knowledge, self-care behaviors, and heart failure-related quality of life among patients with heart failure. *Journal of General Internal Medicine: JGIM, 26*(9), 979-986. doi:10.1007/s11606-011-1668-y

Matsuoka, S., Tsuchihashi-Makaya, M., Kayane, T., Yamada, M., Wakabayashi, R., Kato, N. P., & Yazawa, M. (2016). Health literacy is independently associated with self-care behavior in patients with heart failure. *Patient Education and Counseling* [in press]*.* doi:10.1016/j.pec.2016.01.003

McNaughton, C. D., Cawthon, C., Kripalani, S., Liu, D., Storrow, A. B., & Roumie, C. L. (2015). Health literacy and mortality: A cohort study of patients hospitalized for acute heart failure. *Journal of the American Heart Association, 4,* 1-9. doi:10.1161/JH.115.001799

McNaughton, C. D., Collins, S. P., Kripalani, S., Rothman, R., Self, W. H., Jenkins, C., . . . Storrow, A. B. (2013). Low numeracy is associated with increased odds of 30-day emergency department or hospital recidivism for patients with acute heart failure. *Circulation: Heart Failure, 6*(1), 40-46. doi:10.1161/CIRCHEARTFAILURE.112.969477

Mixon, A. S., Myer, A. P., Leak, C. L., Jacobsen, J. M. L., & Cawthon, C. (2014). Characteristics associated with postdischarge medication errors. *Mayo Clinic Proceedings, 89(8),* 1042-1051. doi:10.1016/j.mayocp.2014.04.023

Moser, D. K., & Watkins, J. F. (2008). Health literacy predicts morbidity and mortality in rural patients with heart failure. *Journal of Cardiac Failure, 21*(8), 612-618. doi:10.1097/01.JCN.0000305097.09710.a5

Moser, D. K., Robinson, S., Pelter, M. M., Nesbitt, T. S., Southard, J., Cooper L., & Dracup, K. (2015). Health literacy predicts morbidity and mortality in rural patients with heart failure. *Journal of Cardiac Failure, 21(8),* 612-618. doi:10.1016/j.cardfail.2015.04.004

National Committee for Quality Assurance (2016). *Goals to care: How to keep the person in "person-centered.*" Retrieved from https://www.ncqa.org/Portals/0/Programs/Goals%20to% 20Care%20-%20Spotlight%20Report.pdf?ver=2016-02-23-113526-113

Neithercott, T. (2012). On you mark, get set, goal! Smart steps for making healthful changes. *Diabetes forecast, 65(12),* 56-59. Retrieved from http://search.proquest.com/docview/1237073083

Noureldin, M., Plake, K. S., Morrow, D. G., Tu, W., Wu, J., & Murray, M. D. (2012). Effect of health literacy on drug adherence in patients with heart failure. *Pharmacotherapy, 32*(9), 819-826. doi:10.1002/j.1875-9114.2012.01109.x

Office of Disease Prevention and Health Promotion (2016). *Health communication and health information technology.* Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/health-communication-and-health-information-technology/objectives

Office of Disease Prevention and Health Promotion (n.d.). *Quick guide to health literacy.* Retrieved form http://health.gov/communication/literacy/quickguide/Quickguide.pdf

Paas, F., van Gog, T., & Sweller, J. (2010). Cognitive load theory: New conceptualizations, specifications, and integrated research perspectives. *Educational Psychology Review, 22*(2), 115-121. doi:10.1007/s10648-010-9133-8

Peterson, P. A., Shetterly, S. M., & Clarke, C. L. (2011). Health literacy and outcomes among patients with heart failure. *JAMA: The Journal of the American Medical Association, 305(16),* 1695-1701. doi:10.1001/jama.2011.512

Regalbuto, R. Maurer, M. S., Chapel, D., Mendez, J., & Shaffer, J. A. (2014). Joint commission requirements for discharge instructions in patients with heart failure: Is understanding important for preventing readmissions? *Journal of Cardiac Failure, 20(9),* 641-649. doi:10.1016/j.cardfail.2014.06.358

Sperry, B. W., Ruiz, G., & Najjar, S. S. (2015). Hospital readmission in heart failure, a novel analysis of a longstanding problem. *Heart Failure Reviews, 20(3),* 251-258. doi:10.1007/s10741-041-9459-2

Stevens, S. (2015). Preventing 30-day readmissions. *The Nursing Clinics of North America, 50*(1), 123-137. doi:10.1016/j.cnur.2014.10.010

Taylor-Clarke, K. (2012). Assessment of commonly available education materials in heart failure clinics. *The Journal of Cardiovascular Nursing, 27*(6), 485; 485-494; 494.

Thomason, T. R. & Mayo, A. M. (2015). A critique of the short test of functional health literacy in adults. *Clinical Nurse Specialist, 29*(6), 308-312. doi:10.1097/NUR.0000000000000156

van Merrienboer, J. J. G., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review, 17*(2), 147-177. doi:10.1007/s10648-005-3951-0

Ward, J. & Wood, C. (2000). Education and training of healthcare staff: The barriers to its success. *European Journal of Cancer Care, 9*(2), 80-85. doi:10.1046/j.1365-2354.2000.00205.x

Weiss, B. D. (2005). Newest vital sign--English. *Annals of Family Medicine, 3*(6), 514; 514.

Westlake, C., Sethares, K., & Davidson, P. (2013). How can health literacy influence outcomes in heart failure patients? Mechanisms and interventions. *Current Heart Failure Reports, 10*(3), 232-243. doi:10.1007/s11897-013-0147-7

Wiggins, B. S., Rodgers, J. E., DiDomenico, R. J., Cook, A. M., & Page II, R. L. (2013). Discharge counseling for patients with heart failure or myocardial infarction: A best practices model developed by members of the American college of clinical pharmacy's cardiology practice and research network based on the hospital to home (H2H) initiative. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy, 33(5),* 558-580. doi:10.1002/phar.1231

Wilson, N., & Daley, C. (2009). Health literacy: Promoting the health professionals' role. *Journal for Nurses in Staff Development, 25*(6), 319-320. doi:10.1097/NND.0b013e3181aed34c

Wu, J., Moser, D., DeWalt, D., Ravens, M., Dracup, K. (2016). Health literacy mediates the relationship between age and health outcomes in patients with heart failure. *Circulation: Heart Failure, 9(1),* e002250. doi:10.1161/CIRCHEARTFAILURE.115.002250

Wu, J., Holmes, G. M., DeWalt, D. A., Macabasco-O'Connell, A., Bibbins-Domingo, K., Ruo, B., . . . Pignone, M. (2013). Low literacy is associated with increased risk of hospitalization and death among individuals with heart failure. *Journal of General Internal Medicine: JGIM, 28*(9), 1174-1180. doi:10.1007/s11606-013-2394-4

Yancy, C. W., Jessup, M., Bozkurt, B., Butler, J., Casey, D. E., Drazner, M. H., . . . Wilkoff, B. L. (2013). 2013 ACCF/AHA guideline for the management of heart failure: A report of the American college of cardiology foundation/American heart association task force on practice guidelines. *Circulation, 128*, e240-e327. doi:10.1161/CIR.0b013e31829e8776

Yancy, C. W., Jessup, M., Bozkurt, B., Butler, J., Casey Jr., D.E., Colvin M.M., Drazner, M.H., . . . Westlake, C. (2017). 2017 ACC/AHA/HFSA focused update of the 2013 ACCF/AHA guideline for the management of heart failure, *Journal of the American College of Cardiology,* accepted manuscript. doi:10.1016/j.jacc.2017.04.025.