ABSTRACT

Elizabeth Rochin: AN EXPLORATION OF HEART FAILURE READMISSION IN EASTERN NORTH CAROLINA. (Under the direction of Dr. Elaine Scott). College of Nursing, May 2016

The purpose of this study is to identify and associate the level of patient activation and presence of comorbidities with early readmission, hospital discharge disposition, length of stay, number of admissions and all-cause death in adults hospitalized for heart failure during the years of 2012- 2014. To clarify these associations, the total heart failure admission sample will be further defined by gender, race, age and type of admitting hospital (tertiary or community). Specifically, this study seeks to explore readmission and comorbidity patterns that may be associated with levels of patient activation, discharge disposition and personal characteristic variables related to early readmission within the heart failure population of Eastern North Carolina.

This was a non-experimental, retrospective cohort study designed to explore readmission patterns that may be associated with levels of patient activation, discharge disposition and characteristic variables related to early readmission within the heart failure population of Eastern North Carolina.

Findings from this study included a 24% 30-day readmission rate among heart failure patients between 2012 and 2014. Within this patient population, strong associations ($p < .0001$) were found between race/gender pairings and age, smoking status, payer source, discharge disposition, marital status and all-cause death during inpatient hospitalization. Associations were found between patient activation and age, payer source, initial discharge disposition and initial hospital type. In addition, significant associations were found between 30-day readmission status and all-cause hospital death ($p < .0001$). Comorbidities and comorbidity clusters within a primary diagnosis of heart failure were evaluated. Significant associations were found within comorbidity clusters and hospital type (medical center versus community hospital) ($p < .0001$).

This study represents new insights to the assessment and care of heart failure patients in Eastern North Carolina, and the unique needs related to discharge and the continuum of care to reduce readmission risk.

AN EXPLORATION OF HEART FAILURE READMISSION IN EASTERN NORTH CAROLINA

A Dissertation

Presented to the Faculty of the College of Nursing

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by

Elizabeth Rochin

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AN EXPLORATION OF HEART FAILURE READMISSION IN EASTERN NORTH CAROLINA

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DEDICATION

This dissertation is dedicated to my father, John Ektermanis. He was a passionate learner who instilled in me a love of knowledge, curiosity and scholarship. Complications of heart failure ended his life before I was able to truly appreciate everything he did for me, and for my family. He has been with me during the entirety of my graduate school journey. Thank you, Dad.

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CHAPTER 1: INTRODUCTION

It could be said that Florence Nightingale is a pioneer of healthcare quality and indirectly responsible for the meteoric trajectory of evidence-based care. Her work during the Crimean War focused on statistics and programs to mitigate mortality and improve outcomes (McDonald, 2001). Since that time, there has been a growing emphasis on quality in healthcare, and in 1966, Avedis Donabedian published what is considered the seminal review of healthcare quality. Donabedian's work (2005) provided the underpinnings for quality metrics within the emerging Social Security Act, legislation that created what is now known as the Centers for Medicare and Medicaid Services. Centers for Medicare and Medicaid Services (CMS) implemented programs between the years 1965 and 1972 to measure the effect of clinical services, such as staff credentialing, 24-hour nursing services, and utilization review, on hospital care (Luce, Bindman & Lee, 1994). This study became the foundation for current day reimbursement strategies. Since this time, there have been many initiatives to improve overall healthcare quality, such as restructuring of systems, encouragement of peer review, and incentivizing of competition between providers and organizations (Marjoua & Bozic, 2012).

The modern era of healthcare has added cost benefit analysis to the quality equation. One of the primary areas seen for improvement in this area is through the reduction of preventable readmission. In 2005, an analysis of Medicare claims data (MedPAC) concluded that approximately three-quarters of readmissions within thirty days were potentially preventable, representing an estimated $12.0 Billion in Medicare spending (James, 2013). Additionally, the trend in healthcare has moved away from acute care to a chronic care model, albeit slowly. Chronic disease, such as cardiovascular illness, diabetes and respiratory illness accounts for 80% of all healthcare dollars spent in the United States annually (Kelly, 2010).

In 2009, the Centers for Medicare and Medicaid Services (CMS) began publicly reporting on its Hospital Compare website all hospitals' 30-day readmission rates for patients hospitalized and discharged with pneumonia, acute myocardial infarction (AMI) or heart failure (HF) (Axon & Williams, 2011). In October 2014, Chronic Obstructive Pulmonary Disease (COPD) was added to this reporting structure. This singular move to a greater level of consumer transparency forever changed the healthcare landscape in the United States, and ushered in a new era of organizational accountability. Additionally, the Patient Protection and Affordable Care Act imposes negative adjustments to reimbursement for these patients if readmission occurs within 30 days. Effective October 2012, organizations with high readmission rates for these three disease processes have seen reductions in base operating payments through Centers for Medicare and Medicaid Services Hospital Readmission Reductions Program (HRRP) of up to one percent in FY 2013, two percent in FY 2014, and then three percent in FY 2015 (Axon & Williams, 2011; Centers for Medicare and Medicaid Services, 2014; Clancy, 2013;). Impact studies have found that organizations, at the three percent penalty level, could see withholdings at $6.4M annually and higher (Henry Ford Health System, 2013). The impact of readmission to organizations nationwide can be very costly, from a financial standpoint as well as in terms of human and capital resources. Table 1 evidences these cost estimates.

Table 1

Costs of Readmission for Centers for Medicare and Medicaid (CMS) Tracked Conditions. From *Becker's Infection Control and Clinical Quality, December 2013.*

Disease State	Initial Admission Cost	Readmission Cost	Readmission Rate
Heart Failure (2009)	$11,000	$13,000	25.1%
Heart Attack (AMI) (2009)	$7,600-$23,400	$20,800	17.1%

Table 1. *Costs of Readmission for Centers for Medicare and Medicaid (CMS) Tracked Conditions (continued)*

Disease State	Initial Admission Cost	Readmission Cost	Readmission Rate
Pneumonia (2009)	$9,600	$13,000	15.3%
Chronic Obstructive Pulmonary Disease (2008)	$7,100	$10,900	17.3%
All-Cause Readmission (2009)	N/A	$11,200	21.2%

Acute versus Chronic Illness

Throughout the United States, emergency rooms and tertiary care centers are configured to care for acute illness and injury. Major transitions in the age and number of patients with chronic illness and comorbidities challenges emergency departments structured for acute care situations. Acute and chronic illnesses can be differentiated by time and severity, with a severe and sudden onset of acute in contrast to a long-developing progression with chronic illness (Estes, 2011).

Acute illness. The World Health Organization (WHO) defines acute care as the health system components, or care delivery platforms, used to treat sudden, often unexpected, urgent or emergent episodes of injury and illness that can lead to death or disability without rapid intervention (Hirschon et al, 2013). Acute illness describes patients who have rapidly become ill with a severe condition that may be life-threatening, with a degree of reversibility from it (Mulryan, 2011). Between 2001 and 2004, Americans made an average of 1.09 billion acute care outpatient visits per year to physicians, of which 354 million were for acute care; 28% of these visits, or 99.1 million, were made in the Emergency Department (Pitts, Carrier, Rich &

Kellerman, 2010). By 2014 alone, the number of acute care visits had increased to 1.54 billion annually (Centers for Disease Control, 2016).

Chronic illness. Although the literature does not support a single, uniform definition of chronic disease, recurrent themes include the non-self-limited nature, the association with persistent and recurring health problems, and duration measured in months and years, rather than days and weeks (Baumann & Dang, 2012; Goodman et al, 2013). Regardless of age at onset, whether their etiology is known or whether their manifestations are primarily physical or psychosocial, essentially all chronic conditions present a common set of challenges to the sufferers and their families—dealing with symptoms, disability, emotional impacts, complex medication regimens, challenging lifestyle adjustments, and obtaining helpful medical care (Wagner et al, 2001) .

Chronic illness is often a result of personal choices and behaviors. "Four health behaviors—lack of exercise or physical activity, poor nutrition, tobacco use, and drinking too much alcohol—cause much of the illness, suffering, and early death related to chronic diseases and conditions" (http://www.cdc.gov/chronicdisease/overview/). In 2020, 157 million individuals will have at least one chronic illness; those persons with multiple chronic illnesses will surpass 81 million, with a staggering increased number of those individuals and families living below the federal poverty level (Bodenheimer, Chen & Bennett, 2009). Managing these patients effectively as they move within the healthcare system is imperative if costs and complications are to be minimized, and quality of life maximized.

Today, patients and consumers of healthcare are challenged to be more active participants in their care, as chronic illnesses, in the forms of obesity, heart disease, pulmonary disease and diabetes, continue to rise at an alarming pace. Never before has healthcare played such a key role in the national spotlight, and for good reason—the costs of healthcare continue to escalate with formidable speed. In 2014, the United States spent $3.09 trillion dollars on healthcare alone, and in 2022, that number is expected to swell to $5.0 trillion dollars (Centers for Medicare and Medicaid Services, 2014).

Statement of the Problem

Reducing hospital readmission is a current national priority and cost saving strategy for hospitals in the United States (Joynt & Jha, 2012). Heart failure patients are the largest diagnostic group for readmission (Coffey, Misra, Barrett, Andrews, Mutter & Moy, 2012). Heart failure is a disease with one of the highest mortality rates in the western world, with five year mortality rates approaching 68%, and a median survival time of 2 years (Larsen & Pedersen, 2014). Heart failure is a chronic, progressive condition where the heart fails to meet the body's metabolic demands (Evangelista, Liao, Motie, DeMichelis & Lombardo, 2014; Gilmour, Strong, Hawkins, Broadbent & Huntington, 2013; Islam, O'Connell & Lakhan, 2012; Lee & Moser, 2012; Siabani, Leeder & Davidson, 2013). With over six million hospitalizations for heart failure each year and direct/indirect responsibility for 60-70% of admissions over the age of 65, focus on reducing the burden of this disease remains a high priority (Fleming & Kociol, 2014; Shah, Rahim & Boxer, 2013).

Nursing has been linked to a reduction in 30 day readmission rates and readmission patterns for heart failure patients. "Nurses are the frontline for providing many of the core processes of care aimed at preventing readmissions – knowledge assessment, patient education, discharge preparation, and care-coordination" (McHugh & Chenjuan, 2013, p. 53). Understanding factors contributing to CHF patient re-hospitalization requires researching discharge regimens and post-hospitalization support as well as evaluating the association that demographical differences such as diagnoses, socioeconomic status, ethnicity, age, family support, discharge disposition and hospital type play in the likelihood of readmission patterns.

Another strategy to consider in evaluating factors contributing to hospital readmission is patient engagement and motivation to participate in healthy self-care. Patient engagement and activation is viewed as foundational to successful health system reform, with a growing body of evidence linking patient activation levels to health and cost of care outcomes (Hibbard & Greene, 2013; Lubetkin, Lu & Gold, 2010; Millenson & Macri, 2012).

Nurses have an opportunity and obligation to contribute to research that supports best practices for discharge management of heart failure patients. Therefore, empirical evaluation of the relationships that may exist related to personal characteristics, co-morbidities, patient engagement, and discharge disposition on subsequent readmission experiences is merited.

Background of the Problem

Transitions from the hospital to home present extraordinary care challenges to patients, families and providers alike. A complex interplay of personal, medical and social factors determines whether patients successfully recover and cope with their condition or experience deterioration that leads to readmission following a hospital stay, (McCarthy, Johnson & Audet, 2013).

Personal Characteristics and Hospital Readmission Patterns

Individuals with health disparities, including those with unmet functional needs, self-management skills or limited education, have been associated with an increased likelihood of early readmission (Arbaje et al, 2008). "Evidence suggests that the primary drivers of variability in 30-day readmission rates are the composition of a hospital's patient population and the resources of the local community" (Joynt & Jha, 2012, p. 1368).

Clinical Factors/Comorbidities and Hospital Readmission Patterns

Comorbidities are also linked to increased risk for readmission. Elderly patients often suffer from multiple chronic conditions that individually and jointly affect their quality of life, use of health services, morbidity and mortality (Zekry et al, 2012). Donzé, Lipsitz, Bates & Schnipper (2013) found in their study cohort of 12,383 patients, the five most frequent primary diagnoses of readmission were often related, either directly or indirectly, to patients' specific co-morbidities, with heart failure the most frequent cause of avoidable readmission. Comorbidities often yield other challenges to the health care system as well. Numerous comorbidities have been positively linked to increased length of stay, greater in-hospital mortality and a higher proportion of readmission at 30 days and one year post-discharge (Librero, Pieró & Ordiñana, 1999).

Discharge Disposition and Hospital Readmission Patterns

In addition, transitions in care after hospitalization include many options: home with self-care and/or family support, home with home health services or transfers to subacute nursing care services or assisted care residence. When patients move from the emergency room or inpatient unit back to the community, there is a shift from intensive, provider-initiated and controlled access to proper diet and medication adherence to self-managed care and decision-making about day-to-day health behaviors including following through with outpatient appointments and negotiating medications, transport, and equipment needs (Kansagara, Ramsay, Labby & Saha, 2012). Understanding the influences on post-discharge behaviors is essential for controlling readmissions into acute care facilities.

Patient Activation and Hospital Readmission Patterns

A review of the readmission literature suggests that the programs that are most successful in reducing readmissions involve enhancing patient-centered discharge processes, with a special focus on medication reconciliation, improving coordination with community-based providers, and effective patient engagement and care of their disease and treatment (Cloonan, Wood & Riley, 2013). Additionally, empowering patients and consumers to take an active role in their own health care has been nationally and internationally identified as a key factor in the drive to improve health services (Davis, Jacklin, Sevdalis & Vincent, 2007). Often described as p*atient engagement*, this concept refers to a set of reciprocal tasks between individuals and health care providers who work together to promote and support active patient and public involvement in health and health care; strengthening the patient's influence on their healthcare decisions, both at the individual and collective levels (Coulter, Saffran & Wasson, 2012).

Initiatives aimed at improving patient participation in care has its origins dating back to the 1800's in the United States, with John Gunn's *Domestic Medicine*, which stressed self-reliance and self-help modalities for illness (Steele, Blackwell, Gutmann, & Jackson, 1987). Public health nursing in the early twentieth century struggled with the moral tensions of giving services and resources to the needy, versus educating them to meet their own needs (Kulboch, Thatcher, Park & Mezaros, 2012). In 1964, the federal government passed the *Economic Opportunity Act*, which included two key measures: Community Action Programs (II-A) and Adult Basic Education Programs (II-B) (Marburger, 1965). Within the Community Action

Programs (CAP) legislation was the concept of *maximum feasible participation,* which called for equal representation of the poor and the prosperous to provide feedback and insight into community health programs and necessary services (Brieland, 1971); however, this strategy had mixed results. Motivation studies within public health research circles and how motivation (internal and external) impacted self-care outcomes were in their infancy during this period (Rosenstock, 1960). The perceptions of susceptibility and the benefits of taking recommended action were viewed to have an impact on the initial motivation of changing a health behavior (Strecher, DeVellis, Becker & Rosenstock, 1986). Studies performed in the early 1970's found that the poor were seeking health care providers who were agreeable to changing their care based on the needs of the community, while health professionals felt that recipients of services should change their behaviors to agree with recommended standards of care (Kurtz, Chalfont & Kaplan, 1974). As early as 1977 Roter openly defined the activated patient "as an equal and active partner with providers in the negotiation of care, which presents as a very rare situation" (p. 283). This work initiated debate and dialogue related to patients' perceived and real relationships with their providers. In the late 1980's, social scientists began to explore patient engagement with providers, and patient activation was defined as "rejecting the passivity of sick role behavior, and assuming responsibility for care, by asking questions, seeking explanations, stating preferences and offering opinions" (Steele, Blackman, Gutmann & Jackson, 1987, p. 4).

Contemporary definitions of consumer and patient activation refer to the degree to which the individual understands they must play an active role in managing their own health and health care, and the extent to which they feel able to fulfill that role (Hibbard & Mahoney, 2010). Less activated patients may have greater access problems because their passivity about their health means that they are more likely to be deterred by barriers to care (Cunningham, Hibbard & Gibbons, 2011).

Studies reveal patient activation disparities exist among socioeconomic, racial and ethnic groups (Cunningham, Hibbard & Gibbons, 2011; Hibbard et al, 2008; Beach et al, 2011). For example, many aged seniors have limited ability to participate in their healthcare and may be less willing to challenge a provider's expertise and authority; thus, may communicate less effectively with providers (Heller et al, 2009). Given that activation is linked with the full range of health behaviors and many health outcomes, investigating how patients become more or less activated is important (Hibbard & Mahoney, 2010). Activated patients are prepared to take on a key role in their care, are central to achieving improvements in the quality of care, and ultimately, promote better health outcomes and less costly health care service utilization (Hibbard, Mahoney, Stock & Tusler, 2007).

Research findings demonstrate that patient non-participation in care is associated with preventable illness and suffering, readmission after discharge, suboptimal outcomes, and wasted resources (Grumman et al, 2010). Measuring a patient's activation level before discharge may present an opportunity for healthcare providers to target specific at-risk populations for readmission and prepare to meet the individual's health needs in a more effective and cost-efficient approach (Mitchell et al, 2013).

Heart Failure and Hospital Readmission Patterns

A hospital admission for heart failure is the most expensive condition billed to Medicare, and the average cost for a heart failure admission has more than doubled in recent years, from approximately $7,000 in the late 1990's to $18,000 today (Park, 2013). The costs to the healthcare system are staggering, with estimates between $14 billion and $17 billion per year for the care of heart failure alone (Shah, Rahim & Boxer, 2013; Coffey, Misra, Barrett, Andrews, Mutter & Moy, 2012; Fida & Piña, 2012; Palacio, House, Ibrahim, Touchan & Mooradian, 2014). Between 24%-30% of patients admitted with heart failure are readmitted within 30 days of discharge (Shah, Rahim & Boxer, 2013; Fleming & Kociol, 2014; Desai & Stevenson, 2012; Butler & Kalogeropolous, 2012). One of the formidable challenges to heart failure care is that of patient adherence to formulated and negotiated care regimens. Patient non-adherence to heart failure medications ranges from 30% - 60% and non-adherence to lifestyle changes from 50% - 80%, with higher rates occurring in more socioeconomically disadvantaged subgroups (Powell et al, 2010).

Heart failure is commonly characterized by systolic and/or diastolic dysfunction. This type of dysfunction is typically found in the left ventricle of the heart, which results from one of two complex mechanisms: 1) Systolic heart failure (depressed ejection fraction), whereby the left ventricle is unable to contract normally, creating varying levels of inhibited blood flow back into circulation; 2) Diastolic heart failure (preserved ejection fraction), which is caused by inability of the left ventricle to relax normally and fill during the resting period of contractility (American Heart Association, 2016). In some cases, patients may have both systolic and diastolic heart failure, which again may be of varying degrees of severity, and may negatively impact normal body function and quality of life.

The Heart Failure Society of America is a team of academic cardiologists and cardiology nursing experts who provide a framework for the care of congestive heart failure that is accepted worldwide. In 2010, this team presented the latest version of the Heart Failure Guidelines which is the blueprint for most care providers caring for those patients with congestive heart failure.

The full working definition of congestive heart failure from their most recent guideline update is below:

> *"HF is a syndrome caused by cardiac dysfunction, generally resulting from myocardial muscle dysfunction or loss and characterized by either LV dilation or hypertrophy or both. Whether the dysfunction is primarily systolic or diastolic or mixed, it leads to neurohormonal and circulatory abnormalities, usually resulting in characteristic symptoms such as fluid retention, shortness of breath, and fatigue, especially on exertion. In the absence of appropriate therapeutic intervention, HF is usually progressive at the level of both cardiac function and clinical symptoms. The severity of clinical symptoms may vary substantially during the course of the disease process and may not correlate with changes in underlying cardiac function. Although HF is progressive and often fatal, patients can be stabilized and myocardial dysfunction and remodeling may improve, either spontaneously or as a consequence of therapy. In physiologic terms, HF is a syndrome characterized by either or both pulmonary and systemic venous congestion and/or inadequate peripheral oxygen delivery, at rest or during stress, caused by cardiac dysfunction."*
>
> (Heart Failure Society of America, 2010)

Heart failure may be classified by cardiologists according to severity of a patient's symptoms. It is important to note that there are several tools that exist to measure severity of heart failure, which may be confusing for patients as they navigate car providers. Many care providers utilize the New York Heart Association (NYHA) Functional Classification. Functional assessment may be a guide to understand the physical limitations that may exist for a patient ad how these limitations may impact daily living. This places patients into one of four categories based on how limited their physical activity is limited:

Table 2

Classes of Heart Failure. American Heart Association, Dallas, TX

Class	Functional Capacity: How a patient with cardiac disease feels during physical activity
I	Patient with cardiac disease but resulting in no limitation of physical activity. Ordinary physical activity does not cause fatigue, angina pain, or dyspnea.
II	Patient with cardiac disease resulting in slight limitation of physical activity. Comfortable at rest. Ordinary activity results in fatigue, dyspnea or angina pain.
III	Patient with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes fatigue, dyspnea, or angina pain.
IV	Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of heart failure may be present even at rest. If any physical activity is undertaken, discomfort increases.

Summary

In the late 1990's, the American Academy of Nursing Expert Panel on Quality Health Care identified five outcomes sensitive to nursing care: achievement of appropriate self-care, demonstration of health-promoting behaviors, health-related quality of life, perception of being well cared for, and symptom management (Richard & Shea, 2011). Under the Affordable Care Act (ACA), nurse accountability for promoting self-care and symptom management places the profession in a unique position to reduce unnecessary hospital readmissions. Nurses can develop evidence for how patient activation models can become foundational in planning care after discharge as well as generate standards to ensure that each patient is at an ideal level of engagement and ability to participate in making healthcare-related decisions. The challenge in nurse interventions that reduce hospital readmission rates stems from varied contributing factors to the outcome. These include the need to address varied patient populations that require multifaceted care processes to assure the highest levels of activation, engagement and overall health.

Purpose of the Study

The purpose of this study is to identify and associate the level of patient activation and presence of comorbidities with early readmission, hospital discharge disposition, length of stay, number of admissions and all-cause death in adults hospitalized for heart failure during the years of 2012- 2014. To clarify these associations, the total heart failure admission sample will be further defined by gender, race, age and type of admitting hospital (tertiary or community). Specifically, this study seeks to explore readmission and comorbidity patterns that may be associated with levels of patient activation, discharge disposition and personal characteristic variables related to early readmission within the heart failure population of Eastern North Carolina.

Synthesis and understanding of this data presents an opportunity to better identify and address the needs of patients at risk for early readmission and specific readmission patterns, which have obvious financial and outcome implications for healthcare organizations, systems and most importantly, quality of life for patients.

Theoretical Perspectives

This study focuses on individuals with heart failure, seeking to understand the myriad of influences that affect hospital readmission patterns. The underpinnings of this research are guided through the frameworks of the Theory of Transition, and Theory of Self-Care of Chronic Illness. The conceptual model for this study utilizes the foundations of the Situation-Specific Theory of Heart Failure Self-Care. These theoretical perspectives provide a lens for exploring the multi-faceted influences and risk factors that contribute to hospital readmission in heart failure patients.

Meleis' Transitions Theory

Transition is from the Latin *transire*, meaning the "process or a period of changing from one state or condition to another" (Oxford Dictionary, 2014). Going home following hospitalization is a transition for the patient and family that begins prior to discharge and extends into the post-discharge period (Weiss et al, 2007). Early readmissions, those that occur in less than thirty days after discharge, are often attributed to poor care transition from inadequate patient and family preparation for discharge, a lack of post-discharge planning, or inadequate quality or capability of the discharge destination (Grigonis, Snyder & Dawson, 2013). Transitions from hospital to home or other environment, such as a long-term care facility, present unique and critical challenges. Meleis (2010) describes discharge from the hospital as a situational transition, one which requires a change in geographical location (hospital to home) that may have consequences on health and well-being.

Two outcome indicators have been noted for a period of transition: mastery of new skills needed to manage a transition and the understanding that a transition is flexible and variable depending upon the change (Meleis, Sawyer, Im, Hilfinger-Messias & Schumacher, 2000). Transitions may impact an individual's judgment on accessing care, or the ability of individuals to care for self after discharge. A new environment and lack of resources may result in a high level of stress and anxiety, leaving the individual unable to make sound judgments and therefore over reliant on healthcare professionals and resources for reassurance, even when those resources are unnecessary (Chick & Meleis, 1986). The consequence of a negative transition includes readmission into the healthcare system.

Theory of Self-Care of Chronic Illness

In 2012, Riegel, Jaarsma & Stromberg generated a middle range theory of self-care of chronic illness. The effective management of chronic illness requires engaging patients in the process of self-care that promotes health and mediates the relief of illness symptoms. There are three defined variables within the Theory of Self-Care of Chronic Illness: Self-Care Maintenance, Self-Care Monitoring, and Self-Care Management (Riegel, Jaarsma, & Stromberg, 2012).

Self-care maintenance. Self-care maintenance refers to those behaviors performed to improve well-being, preserve health, or to maintain physical or emotional stability (Riegel, Jaarsma & Stromberg, 2012). For example, people with heart failure (HF) who are high in self-care maintenance are those who weigh themselves daily, eat a low-salt diet, exercise or remain active, keep medical appointments and take medications as prescribed (Chriss, Sheposh, Carlson & Riegel, 2004). Cene et al (2013) found that perceived emotional and informational support and self-care maintenance appears to be mediated through self-care confidence. For supportive relationships to be health promoting, they must provide a sense of belonging and intimacy and must help individuals to be more competent and self-efficacious (Salyer, Schubert & Chiaranai, 2012). Patients with high self-efficacy practice self-maintenance behaviors on a more frequent basis (Schnell-Hoehn, Naimark & Tate, 2009).

Self-care monitoring. Self-care monitoring is a process of routine, vigilant body monitoring, surveillance, or body “listening (Riegel, Jaarsma & Stromberg, 2012). Individuals monitor many types of physiological means, such as weight, blood pressure, blood glucose, to name a few. Self-care monitoring is not limited to the physiological aspects of care; monitoring of emotions is an essential tool for self-care. Antecedents of self-monitoring are identified as diagnosis, knowledge about disease process and symptoms, social support for wellness, cultural factors, skills for problem solving; consequences of self-monitoring include improved self-management, better symptom management, reduction in complications, improved coping and quality of life (Richard & Shea, 2011).

Self-care management. Self-care management involves evaluating changes in signs and symptoms to tell if an action is needed, comprehending the meaning of changes, considering options and deciding on a course of action (Riegel, Jaarsma & Stromberg, 2012). Self-care management is the culmination of maintenance and monitoring, which facilitates individual decision-making. The process of self-management includes monitoring perceived health and implementing strategies to manage treatments and medications, safety, symptoms, and considerations of chronic disease (Richard & Shea, 2011). However, self-care management is not static—it is a fluid process that has long-term implications, particularly in the chronically ill patient. Self-care management is a dynamic, interactive and daily process aimed at helping patients maintain a wellness perspective by engaging in a set of tasks: medical management and emotional management (Peeters, Wiegers & Friele, 2013).

Conceptual Model

The conceptual model that guided this study is based upon Riegel and Dickson's (2008) middle range *Situation Specific Theory of Heart Failure Self-Care.*

Situation-Specific Theory of Heart Failure Self-Care

The availability of theoretical models specifically tailored to a particular disease or disease state can be of tremendous value to clinicians, providers and patients alike. Riegel and Dickson (2014) provide a situation-specific theory to heart failure self-care. Studies have reviewed the effects of self-care on HF management, and have discerned specific constructs that provide depth and greater understanding. As in the *Theory of Self Care of Chronic Illness*, Riegel & Dickson incorporate the theorems of self-care maintenance and self-care management into their model. Self-care management is an active, deliberate process that is essential for heart failure if patients are going to control the precarious balance between relative health and symptomatic heart failure (Riegel & Dickson, 2014). The ability to perform self-care and improve quality of life depends greatly on an ability to make sound and effective decisions. The factors most influential in developing decision-making expertise are knowledge, experience, skill and compatibility with values (Riegel & Dickson, 2014). A cardinal tenant within this theory is naturalistic decision-making, which stresses a level of developed expertise to mentally simulate how an action and subsequent reaction impact patient care. However, they add self-care confidence to their model and discover unique attributes of the ability to improve self-care. In 1977, Kaplan, Cassel & Gore (1977) described the healthcare model of the future, which would include embracing social support needs throughout the continuum of care. Confidence alone yielded some greater effect in self-care. Greater levels of social resource support and availability yielded additional improvements in patient self-confidence in ability to perform heart failure self-care (Riegel & Dickson, 2014).

Factors Affecting Self-Care. The Theory of Self-Care of Chronic Illness and Situation-Specific Theory of Self-Care also describes factors that influence self-care (Riegel, Jaarsma, & Stromberg, 2012; Riegel & Dickson, 2014). These factors include: 1) experience and skill, 2) motivation, 3) confidence, 4) cultural beliefs and values, 5) habits, 6) functional and cognitive abilities, 7) support from others, and 8) access to care. Applying these dimensions to the study of hospital readmission in heart failure patients is particularly relevant. Self-care in congestive heart failure is described as a naturalistic decision-making process enabling engagement with healthy behaviors such as daily monitoring and adherence to the plan of care and adequate management of symptoms and evaluation of applied treatment regimens (Siabani, Leeder & Davidson, 2013). Congestive heart failure is a long-term condition of which there is no "cure." Long-term conditions require daily attention because a cure is not the goal; rather, management aim to reduce the disease burden of the condition (Baumann & Dang, 2012). Chronic illness creates a cascade of potential challenges for patients as they construct pathways to contend with disease. Obstacles may present themselves in many forms depending upon the individual and ability to navigate the complexities of healthcare.

Adaptation. Adaptation to chronic illness is a complex process involving numerous internal and external factors that influence response and subsequent level of adaptation (Pollock, 1993). For many patients, chronic illness is a continual adaptation of events that have the potential to define a patient, family or community. External forces include the environment in which the individual finds oneself in managing their illness. The environment is all conditions, circumstances and influences that surround and affect the development of people as adaptive systems (Roy, Whetsell & Fredrickson, 2009). Adaptation level is constantly changing in response to environmental demands and will affect the ability of the human system to respond (Dixon, 1999). Within adaptation there are several levels of function: Integrated life processes function as a whole to meet human needs. Compensatory life processes are activated when responses are challenged to integrate human functioning, and compromised life processes are the result of inadequate integration of the whole, which results in an adaptive or ineffective response (Dunn, 2004) to chronic illness. The importance of positive adaptation strategies in chronic illness cannot be overstated. The process of psychosocial adaptation to chronic illness is key to developing self-management skills and achieving an acceptable quality of life (Weinert, Cudney & Spring, 2008).

Availability of resources. Resources are a vital component of chronic illness care. Resources such as providers, medications and treatments are necessary to ensure optimal health outcomes. There are individuals and communities in which these resources may be lacking. Vulnerable populations are social groups who have increased morbidity and mortality risks, secondary to factors such as low socioeconomic status and the lack of environmental resources (Flaskerud & Winslow, 1998). Aday (1994) proposed that risk of vulnerability may be predicted by social status (age, sex, race, ethnicity), social capital (family structure, marital status), and human capital (jobs, income, housing) (p. 492). People without resources are exposed to more and greater risks and, as a consequence, experience worse health status or health disparities (Flaskerud & Winslow, 2010). Vulnerability involves several interrelated dimensions: individual capacities and actions; the availability or lack of intimate and instrument support; and neighborhood and community resources that may facilitate or hinder personal coping and interpersonal relationships (Mechanic & Tanner, 2007). Vulnerability may be fluid, and situations may arise that increase the chances of reductions in care, such as unemployment, homelessness, or acute exacerbations of a chronic illness.

Culture and ethnicity. The health disparities that exist within ethnic backgrounds is well documented, and play a significant role in self-care strategies. A large body of published research reveals that racial and ethnic minorities experience a lower quality of health services, and are less likely to receive even routine medical procedures than are white Americans (Smedley, Stith & Nelson, 2003). Ryvicker, Peng & Feldman (2012) studied emergency room utilization and re-hospitalization within an elderly population with chronic illness, and found that non-whites were much more likely to have a hospitalization (OR=8.40, p =.002) or an emergency room visit (OR = 6.39, p = .004). However, this disparity is multifactorial. Knowledge, cultural beliefs and practices, influence of family members, perceived barriers and socioeconomic factors have been shown to affect African-Americans' self-care activities for hypertension and thus their ability to manage blood pressure (Warren-Findlow & Seymour, 2011). In a separate study, Warren-Findlow & Prohaska (2008) explored facets of self-care related to African-American women. A category of support that emerged—*behavioral support*—in which positive or *negative* encouragement and reinforcement of health related behavioral changes from family members within the context of self-care of chronic illness manifested itself.

Motivation and perception. Specifically, it appears that the more benefits patients perceive, the more likely they are to participate in health behaviors, and the more barriers they perceive, the less likely they are to do so (Oosterom-Calo, van Ballegooijen, Terwee, teVelde, Brouwer, Jaarsma & Brug, 2012; Shin, Hwang, Jeong & Lee, 2013). Barriers to self-care are a patient's own perception of how challenging is the social, personal, environmental and economic obstacles to achieving or maintaining a specific behavior or a set goal (Baumann & Dang, 2012).

Self-care maintenance relates to the long-term performance of self-care behaviors to maintain physiologic stability (Oosterom-Calo, van Ballegooijen, Terwee, teVelde, Brouwer, Jaarsma & Brug, 2012). Self-care management requires a certain amount of astuteness, thought and perception, whereas self-care maintenance can be accomplished in response to direction from an external source (Carlson, Riegel & Moser, 2001). One avenue for evaluating motivation and perception in patients is patient activation. Among congestive heart failure patients, there are diverse, common symptoms that may result in feelings of loss of control over health outcomes, inadequate self-management skills, knowledge and self-efficacy, all of which are expressed by the composite construct of patient activation (Evangelista, Liao, Motie, De Michelis & Lombardo, 2014).

Longevity of disease and recognition of symptoms. As an individual is diagnosed with a chronic condition, the opportunities to understand the complexity of symptoms within a very short period may be overwhelming. Carlson, Riegel & Moser (2001) found that patients newly diagnosed with heart failure had significantly more difficulty recognizing their symptoms as being related to heart failure ($p < .001$) when compared to more experienced patients (p. 356). In addition, Donald et al (2011) reviewed a sample of 1,470 individuals diagnosed with chronic illness (diabetes and cardiovascular disease) and their utilization of resources at different time intervals. Those individuals with diagnosis less than 24 months prior were three times more likely to frequently (more than twelve times per year) utilize healthcare resources (primary care and emergency room visits) than those diagnosed two or more years previously (p. 219).

Research Model

This research study explores the associations of patient activation and personal, support systems and clinical characteristics, and readmission patterns of HF patients. The model has been developed to assess relationships of the variables within the model, and any potential influence that the variables have on one another. The *Heart Failure Self-Care Transitions Continuum* depicts the variability of a patient's abilities and aptitudes during their journey with heart failure. It is important to note that this model represents a continuum, or the process in which a patient may find his or herself at different levels of ability and skill in caring for themselves during the course of illness. The Patient Activation measure will be utilized as the measure of a patient's self-confidence for care.

In this study the care transition is defined as the movement from the hospital to a post-discharge destination. Self-care monitoring, management and maintenance are evaluated using several factors that are elements of Theory of Self-Care of Chronic Illness and Situation-Specific Theory of Heart Failure Self-Care. These include: 1) experience and skill represented by educational level, 2) motivation and confidence measured using patient activation scores, 3) beliefs and values represented by race, gender, age, 4) functional abilities evidenced through evaluation of number and type of diagnoses and HF type, 5) support from others determined by assessing marital status, payment source and discharge disposition, and 6) access to care as indicated by hospital type (tertiary versus community).

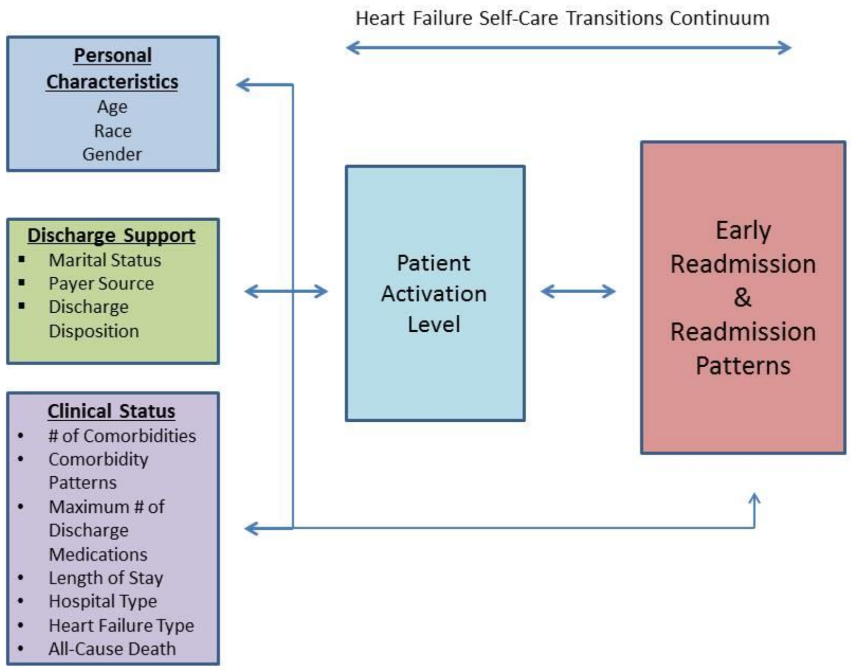


Figure 1. Research Model of Heart Failure Readmission Patterns in Eastern North Carolina

Significance of the Study

This study has the potential to contribute to new nursing knowledge, as there is little information that exists to inform nurses in the identification of risk factors and comorbidities related to early readmission and readmission patterns in heart failure patients. In addition, this study has the potential to provide specific information related to heart failure readmission variables that can lead to nurse-specific interventions prior to discharge that can reduce readmission. This knowledge can provide continued development of nursing-specific indicators that can be benchmarked and studied. It is imperative that nursing identifies those specific areas that can be targeted to provide even greater depth and breadth of the contributions of nursing to reducing readmissions, thereby providing significant financial benefit to an organization, which will continue to unleash and define the value of nursing.

Research Questions

The purpose of this study is to identify and associate the level of patient activation and presence of comorbidities with early readmission, hospital discharge disposition, length of stay, number of admissions and all-cause death in adults hospitalized for heart failure during the years of 2012- 2014. To clarify these associations, the total heart failure admission sample will be further defined by gender, race, age and type of admitting hospital (tertiary or community). Specifically, this study seeks to explore readmission and comorbidity patterns that may be associated with levels of patient activation, discharge disposition and personal characteristic variables related to early readmission within the heart failure population within Eastern North Carolina.

Research Question 1: What are the characteristics of the study sample with regard to personal (age, gender/race, smoking status), support system (marital status, initial discharge disposition, payer source), and clinical status (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Research Question 2: What are the associations of patient activation (PAM) levels with numbers of comorbidities, patterns of comorbidities, hospital discharge disposition, length of stay, number of admissions and all-cause hospital death and are these associations modified by gender, race, age, and type of admitting hospital?

Research Question 3: What is the association of race with personal (age, gender, smoking status), support (marital status, initial discharge disposition, payer status) and clinical status (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Research Question 4: What is the association of race/gender with personal (age, smoking status), support (marital status, payer source, initial discharge disposition) and clinical related (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Research Question 5: What are the distinct patient comorbidity profiles that can be formed from the comorbid conditions considered in the sample of hospitalized heart failure patients and are these profiles related to race/gender, patient activation, initial hospital disposition, and all-cause hospital death?

Theoretical and Operational Definitions

Patient – An individual when he/she is interacting directly with health care providers and services about personal health problems, specifically in the hospital setting (Gruman et al, 2010).

Patient Activation – An individual's skills, knowledge and confidence for managing his/her own health and health care (Hibbard & Mahoney, 2010).

Patient engagement – A set of reciprocal tasks by both individuals and health care providers who work together to promote and support active patient and public involvement in health and health care and to strengthen their influence on healthcare decisions, both at the individual and collective levels (Coulter, Saffran & Wasson, 2012).

Type of Admitting Hospital – The level of care provided by a particular hospital, as designated by tertiary or community-based setting, based on hospital bed size, location and teaching affiliation

Comorbidity – The simultaneous presence of two or more chronic diseases or conditions in a singular patient (Valderas et al, 2009).

Discharge – Release of a patient who has met specified medical criteria and had at least one (1) overnight stay (Organization for Economic Co-operation and Development, 2011).

Discharge Disposition – An individual's anticipated location or status following an inpatient encounter (home with self-care, home with home health services, subacute nursing facility, hospice) (Agency for Healthcare Research and Quality, 2009).

Self-Care – Self Care in health refers to the activities individuals, families and communities undertake with the intention of enhancing health, preventing disease, limiting illness, and restoring health. These activities are derived from knowledge and skills from the pool of both professional and lay experience. They are undertaken by lay people on their own behalf, either separately or in participative collaboration with professionals (World Health Organization, 1998).

Home Health – a health service provided in the patient's place of residence for the purpose of promoting, maintaining, or restoring health or minimizing the effects of illness and disability (Mosby's Dictionary of Medicine, Nursing & Health Professionals, 2012).

Early Readmission – Admission to a hospital within thirty (30) days of a discharge from the same or another hospital (Centers for Medicare and Medicaid Services, 2014).

Length of Stay – Duration of a single episode of hospitalization (Centers for Medicare and Medicaid Services, 2016).

Readmission Pattern – A discernable sequence of subsequent admission(s) after discharge that are similar and comparable to one another (Oxford Dictionary. 2015).

Summary

It is critical that healthcare providers are able to assess those factors which potentially impact a patient's ability to successfully achieve optimal outcomes within the sphere of chronic illness. Identification of readmission patterns within the heart failure population offer unique opportunities for discharge education and case management in the community. Being able to identify strategies that will yield self-management of chronic health conditions throughout the lifespan presents a clear necessity to our present-day healthcare system. This unique position will afford the opportunity for nurses, at the bedside, in the community, and in the boardroom to efficiently advocate for transitions in care that will facilitate the best possible outcome for patients with chronic illness.

CHAPTER 2: REVIEW OF THE LITERATURE

This chapter reviews the literature and current research on the contributing factors in unplanned hospital readmission. The review follows the research model by first examining personal characteristic factors that have been associated with heart failure patients and early hospital readmission. Next, the variables of clinical complexity, operationalized as multiple diagnoses, and discharge disposition are examined in relationship to hospital readmission. Finally, studies evaluating patient activation, both those that discuss what is associated with PAM scores and those relating PAM scores with hospital readmission will be explored.

Early Hospital Readmission Patterns in Heart Failure Patients

From the perspective of healthcare costs, unplanned early hospital readmissions have widely been viewed as one of the most serious problems in health services (Chan et al, 2007). Recent changes to health care reimbursement have included hospital readmission as a proxy for care and quality. Several authors and studies have stated that when patients are readmitted within 30 days of discharge, it may be due to low quality of care received during the initial hospital stay; however, this perspective has been very controversial (Carey & Lin, 2013; Mittler et al, 2013; Kashiwagi, Burton, Kirkland, Cha & Varkey, 2012; Allaudeen et al, 2011; Hu, Gonsahn & Nerenz, 2014). It is important to note that there are many contributing factors in unplanned early readmissions.

Readmission has historically been explored through the lens of the Medicare population, a primarily elderly or disabled population (Askren-Gonzalez & Frater, 2012; Axon & Williams, 2011; Clancy, 2013; Cloonan, Wood & Riley, 2013; Jencks & Brock, 2013; Kelly, 2010; Markley et al, 2013; McHugh & Ma, 2013; Stefan et al, 2012). Historically, there has been significant focus placed upon Medicare readmission, and the escalating costs borne through that program. However, there are significant segments of the healthcare population that warrant further consideration as well, specifically those of rural and socioeconomically challenged populations.

Economically disadvantaged patients tend to have overall poorer health status, fewer community resources, and less access to primary care, attributes potentially compounding readmission risk (Axon & Williams, 2011). Studies have revealed that Medicaid readmissions can be 26% higher than Medicare, and up to 83% higher than private insurance (Podulka, Barrett, Jiang & Steiner, 2012; Wier, Barrett, Steiner & Jiang, 2011). In addition, these patients, and the locales where they live, tend to have fewer resources available for preventive care. Historically, Medicaid patients face numerous barriers, such as limited access to primary and specialty care, difficulties obtaining medication, discontinuous insurance coverage, language barriers, low levels of social support, and inadequate transportation (Regenstein & Andres, 2014).

In June 2009, the Centers for Medicare and Medicaid Services (CMS) began publicly reporting on its Hospital Compare website a number of key metrics, including patient satisfaction, quality indices, and rates of unplanned readmission for Acute Myocardial Infarction (AMI), Congestive Heart Failure (CHF) and Pneumonia. This data was very timely—during this particular time period, about 1 in 5 Medicare patients were being readmitted within thirty days of discharge (Axon & Williams, 2011).

In order to better understand the complexities related to readmission and the heart failure population, a generalized review of early readmission risk will be explored. This will evolve into a more focused understanding of specific demographic factors related to early readmission and readmission patterns in the congestive heart failure population.

General Overview of Patient Characteristics and Readmission Patterns

Soeken, Prescott, Herron & Creasia (1991) performed a meta-analysis for predictors of hospital readmission. They reviewed forty-four studies (sample sizes ranged from 30 to 21,000 patients, median size 356), and found that the mean readmission rate was 27%, which did not differ based upon the study (p=.07). There was a significant difference in readmission rate by diagnosis (p=.02), with the lowest rate for surgical patients (5.6%), and the highest for cardiac patients (35%) or those with chronic illnesses (34.1%) (p.271). Twenty years later, Kansagara et al (2011) performed a systematic review of thirty similar type studies, and found the same readmission challenges of heart failure, but found likely that hospital and health-system factors may be contributing to readmission risk, including timeliness of post discharge follow-up, coordination of care with a primary care provider, and quality of medication reconciliation. Bradley, Yakusheva, Horwitz, Sipsma & Fletcher (2013) studied 5,511 patients in the Northeastern United States, and found an overall readmission rate of 16%, with a significant trend towards medical patients than surgical patients ($p < .009$), as well as a Rothman Index (RI) score ($p < .0001$), which utilizes information recorded in the Electronic Medical Record (EMR) related to vital signs, nursing assessments, electrocardiogram details, laboratory results and Braden score. Their findings did not establish any significance within age, gender or insurance type.

Leppin et al (2014) also performed a systematic review and meta-analysis of forty-seven clinical trials aimed at reducing hospital readmission. The majority of these studies were performed at academic medical centers, which may raise doubts about the applicability within smaller, rural hospitals. Interventions that utilized a supportive strategy to assess and address limitations in patient capacity within the transition from hospital to home were most effective at reducing early hospital readmission. It is important to note that of these forty-seven clinical trials, fifteen of them utilized targeted interventions with nurses in the hospital prior to discharge or in the community, which offers further evidence of a growing body of knowledge related to nurse-sensitive discharge and readmission strategies and interventions.

Health disparities and readmission patterns. *Healthy People 2020* defines a *health disparity* as "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion" (Healthy People, 2014). Health disparities create vulnerable populations within the healthcare community that historically have increased readmission risk and rates. The American Medical Association has systematically railed against the Medicare Payment Advisory Commission's (MedPAC) choice to treat all hospitals the same within the readmission penalty structure, without regard to location or patients served. Their focus has been a singular vision: a policy that links payment to performance without adjusting for important co-factors runs the risk of unfairly reducing payments to hospitals caring for a high proportion of minority or economically disadvantaged patients, historically who have poorer overall health status, fewer community resources, and poorer access to primary care (Axon & Williams, 2011).

Racial disparities and readmission patterns. Several studies highlight racial disparities and readmission risk. Joynt, Orav & Jha (2011) reviewed a total of 3,163,011 discharges: Acute Myocardial Infarction: 579,492; Congestive Heart Failure, 1,346,768; Pneumonia, 1, 236, 751. The following findings were significant: 1) Approximately 40% of African-American patients and 6% of Caucasian patients were cared for at hospitals designated as minority-serving; 2) A significantly higher number of African-Americans were Medicaid eligible ($p < .001$); 3) Length of stay was longer in minority-serving hospitals than in non-minority serving hospitals ($p < .001$); 4) African-Americans were less likely to be discharged to a skilled nursing facility (SNF) or rehabilitation center than Caucasians. Carey and Lin (2013) found in an observed population of 47,563 discharged patients in California the following results: 16% of heart attack patients were readmitted within 30 days and 8.8% were readmitted within 7 days; 12% of heart failure patients were readmitted within 30 days, and 4.1% readmitted within 7 days. Within this population, African-American men were more likely to be readmitted within 30 days for congestive heart failure ($p < .01$), and for heart attack ($p < .10$).

Socioeconomic factors and readmission patterns. Adults with complex care needs, particularly those with few resources to assist during their transition from hospital to home, are at risk for hospital readmission (Epstein et al, 2009). Socioeconomic status, such as income level, education and marital status, can provide a lens into which many Medicare beneficiaries find themselves. Fixed incomes, nebulous rules related to medical and prescription coverage, as well as other potential obstacles to care offer opportunities for readmission after hospitalization. Epstein et al (2009) reported that lower income was a significant predictor of increased risk of hospital readmission in patients with heart failure who were also African-American, women with greater co-morbidities and who relied on Medicaid for health insurance coverage (p. 73). Hu, Gonsahn & Nerenz (2014) completed a retrospective analysis of 7,845 Medicare fee-for-service patients age 65 and over in Michigan to discern any correlations between socioeconomic status and rate of unplanned readmission within 30 days of a discharge. Their findings illustrate some of the same findings of Epstein’s work: 1) African-American, male and unmarried were more likely to have at least one readmission ($p < .001$); 2) Patients living in a high poverty area were 28% more likely to be readmitted than those living elsewhere ($p < .001$); 3) Patients discharged with heart failure or acute myocardial infarction were at significantly higher risk of being readmitted than patients without those conditions.

Nursing environments and readmission patterns. McHugh & Ma (2013) studied the relationships between nurse staffing, nurse education levels and nurse work environment to the rate of 30-day readmissions for Heart Failure, Acute Myocardial Infarction and Pneumonia in California, Pennsylvania and New Jersey. The findings revealed in a hospital with good versus poor work environment, an associated 7% odds reduction for 30-day readmission for heart failure, 6% odds reduction in acute myocardial infarction, and 10% odds reduction in pneumonia readmission was found in those settings with a positive work environment. Readmission odds for heart failure were 7% higher for each additional patient per nurse in the average nurse workload, with similar findings for acute myocardial infarction (9% higher) and pneumonia (6% higher) (p. 55).Again, the argument can be made for review of nurse-sensitive indicators related to readmission risk and work environment.

Discharge preparation. Studies using the Readiness for Hospital Discharge (RHDS), Quality of Discharge Teaching (QDTS), and Post-Discharge Coping Difficulties Scale (PDCDS) found that living alone, content received in discharge teaching, teaching delivery and care coordination explained 51% of the variance for discharge readiness ($p \leq .01$) (Popejoy, Moylan

& Galambos, 2009). Reiley et al (1996) studied 97 nurse-patient pairs to ascertain differences in discharge teaching understanding. There was a high correlation between nurse and patient explanation/understanding of medication regimen, however this changed with understanding of medication side effects. Nurses believed that patients understood their medication side effects, but only 57% of patients reported such understanding ($p < .0001$).

Clinical status/diagnosis. Early hospital readmissions have been recognized as a common and costly occurrence, particularly among the elderly and high-risk patients (Leppin et al, 2014). The vast majority of published studies have focused on systematic reviews and meta-analyses to comprehend the expanse of readmission, and the factors surrounding this elusive problem.

Soeken, Prescott, Herron & Cresia (1991) completed one of the first nursing-related reviews of readmission. The researchers utilized 44 studies, with a wide range of sample sizes ($n = 30$ through $n = 21,000$). Their findings reveal that diagnosis, age, initial length of hospital stay and prior use of hospital or emergency room services are significant predictors for readmission.

Dharmarajan et al (2013) performed a retrospective cohort study on the pattern of 30-day Medicare readmissions between 2009-2011 ($n = 2,944,970$). The readmission diagnosis may not have been the same as the discharge diagnosis. The ten most common readmission diagnoses for this time period were: 1) heart failure, 2) renal disorders, 3) pneumonia, 4) arrhythmias, 5) shock, 6) cardiorespiratory failure, 7) chronic obstructive pulmonary disease, 8) chronic angina and cardiovascular disease, 9) acute myocardial infarction and 10) complications of care.

Avoidable versus unavoidable readmissions have been described by many as healthcare leaders, physicians and policy analysts debate readmission penalties. Shimizu et al (2014) performed a prospective, observational cohort study within a urban safety net hospital (public health assistance, 50%, self-pay or uninsured, 36%). Of 1,026 patients reviewed for this study, 153 were readmitted within 30-days (14.9%). 84% of these patients readmitted within 30 days were admitted with the same diagnosis as the previous discharge diagnosis, and 67% of these were deemed unavoidable, with the majority of these readmissions for malignancy complications, heart failure, renal failure, respiratory failure and chemotherapy. Of these readmissions, 6% were deemed to be avoidable, related to clinical factors such as improper medication reconciliation, ineffective discharge teaching, follow-up appointments not made prior to discharge (p. 4). Defining appropriate discharge regimens is critical for optimal outcomes for patients, particularly those with chronic illness.

Heart Failure and Readmission: Personal, Support and Clinical Characteristics

Within the purview of congestive heart failure is the necessary understanding of what factors may contribute to early readmission following hospital discharge. Among these demographic details are age, race, gender, payer source, comorbidities, type of admitting hospital (tertiary versus community), socioeconomic status and will be further explored.

Age. Throughout the literature, advanced age is a consistent finding related to heart failure and readmission patterns. The rate of readmission for heart failure increases quickly over the age of 65 (Braunstein et al, 2003; Islam, O’Connell & Lakhan, 2013). However, Shulan, Gao & Moore (2013) reviewed 8, 718 patients, including those with a primary diagnosis of heart failure, and found no statistical significance related to age (p = .170).

Race/ethnic background. Racial background and ethnicity have been found to positively correlate to readmission risk for patients with heart failure. Joynt, Orav & Jha (2011) have found that AfricanAmerican patients are at highest risk of readmission when discharged from a minority serving hospital opposed to being discharged from a non-minority serving hospital (p **<**. 001). Hispanics are the fastest growing population segment in the United States. Rodriguez et al (2011) found that Hispanics (n =32,339) had a greater risk of readmission after a diagnosis of heart failure (OR=1.11, $p < .001$). Brown et al (2005) reviewed Medicare enrollee data from 1990-2000, and found that African-American enrollees were 1.5 times more likely to be admitted with congestive heart failure than Caucasian, Hispanics were 1.2 times more likely to be admitted, and Asians 0.5 times more likely than Caucasians. All of these groups were more likely to be discharged home than Caucasians, who were more likely to be discharged to a skilled nursing or rehabilitation facility prior to transitioning home. Coffey et al (2012) found that patients discharged to another institution, including nursing homes, were less likely to be readmitted for heart failure.

Gender. When reviewing the literature for readmission patterns for heart failure, the data overwhelmingly supports that males are much more likely to be readmitted than females (Coffey et al, 2012; Care & Lin, 20144; Braunstein et al, 2003; Islam, O’Connell & Lakhan, 2013). Coffey et al (2012) reviewed the Healthcare Cost and Utilization Project database (inclusive of fourteen states) that revealed males were more likely to be readmitted for heart failure than females ($p < .001$). Carey & Lin (2014) also found males to be readmitted more frequently than females for heart failure within 30 days of discharge from hospitals in California in 2008. Calvillo-King et al (2012) performed a systematic review of heart failure readmission risk factors, and found older age, unmarried or single patients and smoking status to be associated with readmission, but found mixed results related to gender. Islam, O’Connell & Lakhan (2013) performed analysis of heart failure patients (n = 6,252) and found men were 1.2 times more likely to be readmitted within 30 days.

Payer source/socioeconomic status. Interestingly, most of the research related to heart failure has been directed towards the Medicare population. However, Coffey et al (2012) found that Medicaid had the strongest correlation to readmission of any payer group ($p < .001$). Philbin & DiSalvo (1998) found the same correlation in their population sample in New York State, whereby patients covered by Medicaid were more likely to leave AMA than any other payer source ($p < .001$), more likely to be readmitted within thirty days of discharge ($p < .001$), least likely to be referred for cardiology services ($p < .001$), and experience death or all-cause readmission ($p < .001$) than any other payer source. In addition, overall costs of care for the Medicaid population were the highest of all payer sources ($p < .001$). According to the Agency for Healthcare Research and Quality (AHRQ), in 2010 the admissions for heart failure fell within the age range of 65 years and greater, and increased in both age ranges of 18-44 and 45-64. In addition, Medicaid payers increased to 30.1%, over Medicare at 25% (Agency for Healthcare Research and Quality, 2013). It is essential that additional focus is expended to detail the challenges and needs of the Medicaid population and their heart failure journey through the health care system.

Comorbidities. The number of comorbidities that patients with heart failure contend with can be staggering. Braunstein et al (2003) explored a cross-sectional representation of Medicare beneficiaries ($n = 122,630$) and found that 40% of these beneficiaries had ≥ 5 comorbidities, and these comorbidities accounted for more than 81% of all inpatient admissions for heart failure patients. Strong associations related to greater numbers of comorbidities ($p < .0001$) were found, including those of chronic obstructive pulmonary disease (COPD), renal failure, diabetes, depression and other respiratory diseases. It is important to note that non-cardiac comorbid conditions were the greatest threat to readmission rates ($p < .01$).

Lee et al (2013) utilized Latent Mixture Modeling to identify common profiles of comorbidities during adult hospitalizations for heart failure (p. 1). Latent Variable Mixture Modeling refers to a family of modeling techniques in which individuals can be classified into subpopulations expected to be similar to one another, in this case, comorbidities (Schmiege, Meek, Bryan & Petersen, 2012). Lee et al (2013) found four profiles using their modeling process: common, lifestyle, renal and neurovascular (p. 6). Each of these profiles yielded specific comorbidities that were common within each one. For example, the Renal Profile included Hypertension, Diabetes, Fluid and Electrolyte Disorders, and Renal Disease (p. 6).

All-cause death. The rate of death, both inpatient and post-discharge, is an area of study that continues to generate interest, particularly as the rate of heart failure continues to increase. Pocock et al (2005) found that older age (> 65 years), male gender and prior heart failure hospitalization were predictor variables of mortality in heart failure hospitalizations. Vaartjes et al (2010) also found within a national cohort of patients with heart failure (n = 14,529) that men had a higher hazard ratio (1.21) of mortality at 28 days following discharge. Smoking status was also noted to contribute to all-cause death. Shah et al (20120) found that smoking cessation resulted in a 30% reduction in all-cause death following heart failure hospitalization. In addition to age, gender and smoking status, increased length of stay (5-10 days) during the index hospitalization ($n = 19{,}227$) was found by Reynolds et al (2015) to increase all-cause death by 52%. Foraker et al (2011) reviewed a cohort of patients throughout the United States (n = 15,792) and found that a higher comorbidity load, coupled with Medicaid utilization, increased the overall all-cause death rate among heart failure patients.

Type of hospital. The type of clinical setting for patient care has elucidated debate regarding patient outcomes, specifically in the realm on type of hospital. The literature captures two distinct types of hospitals: tertiary care and community hospitals. Patient outcomes, particularly quality, have garnered interest among researchers, however the findings are mixed. Au et al (2014) performed a systematic review and meta-analysis of teaching versus non-teaching hospitals. Of particular interest, there were no differences in readmission rates; however, there were longer lengths of stay in the teaching and tertiary care centers (p. 517) than in community or non-teaching facilities. Papanikolaou, Chrsitidi & Ionnidis (2006) performed a systematic review of 132 studies that specifically focused on teaching versus non-teaching, as well as tertiary and community-based hospitals. Their findings revealed that outcomes overall were no different between the two types of hospitals. Palacio, House, Ibraham, Touchan & Mooradian (2014) explored heart failure specifically within a teaching versus non-teaching facility, and found length of stay lower for teaching and tertiary facilities as compared to community facilities (p. 501), however, readmission and mortality rates were similar among both groups. Shahian et al (2014) found that tertiary care facilities, specifically teaching facilities, are significantly more likely ($p < .001$) to care for minorities and patients requiring transfer from community hospitals for higher levels of care (p. 94). As reviewed, findings for tertiary and community hospital settings are mixed, and therefore continue to merit exploration and study.

Medication regimens/polypharmacy. Many of the studies related to medication regimens, particularly for heart failure, are defined within the elderly population. That being said, it is clear that a growing population of patients is prescribed a considerable number of medications for health conditions. Patients who have more than one healthcare provider, or who may have any number of specialists, may find themselves with a substantial medication regimen.

In addition, there is a growing segment of the population who take additional supplements, such as herbal remedies, to prevent and alleviate a myriad of ailments, which only adds to the number of medications taken per day. Hajjar et al (2007) performed a systematic review of studies exploring polypharmacy and medication utilization, and found that increased age, Caucasian race, poorer health and multiple providers all contributed to polypharmacy. Wong, Chaudry, Desai & Krumholz (2010) reviewed trends across data periods from the National Health and Nutrition Examination Survey, and found that the number of comorbidities rose in patients with HF, but also revealed a higher average number of medications that these patients took on a regular basis, with an increase of 4.1 to 6.4 prescriptions ($p < .01$). In addition to the challenges of polypharmacy are the additional barriers of medication knowledge and understanding. Overall compliance related to medication regimens has been positively associated with marital status and patient’s self-confidence to maintain a positive health status (Van Der Wal, Jaarsma & van Veldhuisen, 2005). However, other studies have shown no similar correlations with support structures (marital status, presence of caregiver), but have found correlations related to the number of medications prescribed, medication adherence and readmission risk (Pasina et al, 2014).

Heart Failure: Discharge Disposition

The location of care following a hospital discharge is of the utmost importance to those patients experiencing chronic illness, particularly those patients with a diagnosis of heart failure. Anxiety from transitions in care, readiness for discharge and social support provide a robust platform upon which to evaluate various locations for post-hospital care.

Home with Self-Care

The long-term management of chronic conditions has come to dominate healthcare in most developed countries, and how well a person is able to self-manage their condition on a day-to-day basis (Dixon, Hibbard & Tusler, 2009).

The vast majority of self-care literature and research has been within the venue of heart failure and heart disease. It is a very robust topic, with many nurse-led and nurse-driven support interventions aimed at improving quality of life and the exploration of unplanned readmissions. Kelly (2011) performed a review of current evidence-based practices yielding reductions in readmissions for heart failure. The basis of her work stemmed from a summation of medication regimens, and the volume of prescriptions per patient: a patient with one chronic disease filled eight prescriptions annually, whereas those with five or more chronic illnesses filled over fifty-seven prescriptions annually. Kelly noted that 14% of patients within her sample had medication discrepancies upon discharge, and readmission occurred with 14.3% of the patients with at least one medication discrepancy.

Carlson, Riegel & Moser (2001) performed a descriptive, cross-sectional, comparative survey to assess demographic and clinical factors that may interfere with self-care and lifestyle changes in patients newly diagnosed with heart failure. Their findings were significant for patients having substantial difficulty recognizing their symptoms as being related to heart failure ($p < .001$). The finding that newly diagnosed patients have difficulty recognizing symptoms is supported by Lorig et al (2001) with a longitudinal study of chronic disease, including heart disease that revealed reductions in health distress, improvements in self-care and symptom monitoring over a two-year period from the time of diagnosis ($p < .005$). Oosterom-Calo et al

(2012) performed a systematic literature review, which included twenty-six studies related to self-care and heart failure. Their overall findings suggested that longevity of diagnosis related positively to the level of self-care, and that gender and cognition were found to be unrelated to an individual's level of self-care. Again, the longevity of disease is supported within the literature related to positive correlations and the ability to provide self-care. In contrast, a study by Morrow et al (2006) explored relationships between patients (n = 341) with heart failure and their ability to understand self-care instructions. Their findings were that African-American men, who had multiple co-morbidities and less education, had much greater challenges with health literacy, and that there was a strong association with cognitive ability and health literacy (p < .001). Harkness et al (2014) found similar issues related to cognitive impairment related to the general population. They found cognitively impaired patients scored significantly lower in self-management scales (p = .035), which had an impact on delays in seeking necessary guidance from a health care provider. It is important to note that cognitive impairments can set the stage for congestive heart failure patients who are unable to understand discharge instructions, medication bottles, follow-up appointment details and the like.

To confound this information, Powell et al (2010) performed a single center, randomized study (n = 902) over the course of three years, evaluating a self-management program for mild to moderate heart failure and its relationship to hospital readmission. This was a heterogeneous group (47% female, 40% racial minority) of which over half were socioeconomically challenged (annual income < $30,000). This study revealed no difference in readmission (cardiac or non-cardiac) between the self-management program and usual care heart failure education (40.1% versus 41.2% respectively). The ability to fully appreciate the educational needs for patients living with heart failure cannot be overstated, and analysis of those studies yielding no significance should be closely examined for application of future study.

Self-care and health literacy. The effects of health literacy—the ability to read and comprehend prescription bottles, appointment slips, and other essential health-related materials, such as discharge instructions—have begun to receive a great deal of interest and attention (Gazmarian, Williams, Peel & Baker, 2003). Williams et al (1995) studied 2,659 mostly indigent and minority patients, and assessed their levels of functional health literacy at two urban public hospitals (Atlanta, Georgia and Los Angeles, California) and discovered the following: 1) 41.6% were unable to comprehend directions for taking medication on an empty stomach; 2) 26% were unable to understand information for their next scheduled appointment; 3) 59% could not understand a standard informed consent document; 4) the prevalence of inadequate health literacy in the elderly (age ≥ 60) was 81.3%, providing additional support of the challenges the elderly can face when discharged home to self-care ($p < .01$) (p. 1680). Gazmararian, Williams, Peel & Baker (2003) corroborated the same findings within a Medicare population followed for asthma, and found that patients with inadequate health literacy were significantly ($p < .05$) less likely to answer questions correctly about asthma and understand the importance of seeing their primary care provider (p. 271). In addition to these studies, Chen, Yehle, Hess, Plake, Murawski & Mason (2011) found that low health literacy was positively related to self-care maintenance (p = .006) and interestingly, negatively related to self-care management ($p = .001$), and no statistical significance with self-care confidence ($p = .083$) (p. 449). However, Macabasco-O'Connell, Crawford, Stotts, Stewart & Froelicher (2008) found similar results in their study of indigent patients with congestive heart failure, in that participants with less education performed more self-care behaviors compared to those with higher than high school education ($p = .04$), which may provide greater emphasis on the need to explore the deeper meanings of self-care maintenance and self-care management in future studies.

Home with Home Health Care

With pressures for cost-containment, hospitals have been encouraged to expedite the rapid discharge of patients. Reduced length of stay has resulted in an increased use of extended care and skilled nursing facilities, rehabilitative units, and professional home care (Anderson, Helms, Hanson & DeVilder, 1999). Organizations have explored introducing measures into healthcare systems to address the growing challenge of hospital readmissions, and home care has become a vital intervention (Wong et al, 2008) in an attempt to keep patients in their homes when indicated.

Transitional care models and home health. Transitional care models are the predominant literature within the home health and readmission strata. A growing body of evidence addresses transitions among chronically ill elderly between hospital and home. Supporting this structure of home-based interventions, Naylor, Aiken, Kurtzman, Olds & Hirschman (2011) conducted a systematic review of twenty-one randomized clinical trials of transitional care interventions, of which twelve included a post-discharge home visit as one of the interventions by an advanced practice nurse. One of these particular trials yielded a reduction in 30-day readmission ($p < .05$) and three trials yielded a reduction in 90-day readmission ($p < .05$) that included targeted nursing interventions at discharge and health coaching at home (p. 750).

Naylor et al (2013) followed up on this systematic review and conducted a prospective, quasi-experimental study of Mid-Atlantic Aetna Medicare Advantage members and paired usual care (*n* = 155 pairs). Advanced practice nurses with specialization of chronically ill elders provided the intervention that included in-hospital discharge planning and home visit follow-up with education targeted to self-management and disease process. Significant findings were discovered in decreased readmissions in the intervention group (*p* = .041) and total hospital days (*p* = .032) were observed at three months post-discharge (p. 729).

The use of advanced practice nurses within transitional home care strategies continues with Enguidanos, Gibbs & Jamison (2012). This consisted of a randomized controlled trial utilizing a nurse practitioner intervention including three (3) home health care visits and two telephone calls that consisted of medication review, assessment of medical care needs, and a brief coaching in self-management skills for hospitalized older adults discharged to home (*n* = 199). Usual care consisted of all standard medical care, and access to case management services if desired. Intervention participants reported improved satisfaction with medical care (*p* = .008), self-efficacy in managing their health conditions (*p* < .001) and fewer visits to emergency rooms (*p* = .036). However, there was no statistical change in hospital readmissions at six months of enrollment (p. 40).

This transitional care approach has been utilized by the Veterans Affairs administration with success. Kind et al (2012) conducted a study of a convenience sample (*n* = 708) of veterans in Wisconsin. This sample was homogeneous (Caucasian, male, high school education and average age of 70 years) with varying degrees of cognitive impairment. The intervention began in the hospital as reported in other studies, and was conducted with telephone support once per week regarding medication adherence and self-care strategies. Findings were significant for decreased 30-day hospital readmission of the intervention group (23% readmission rate) than of the baseline group (34%, p = .013). One of their findings is very important to note. Total medication discrepancies discovered while conducting this study were 639, yielding a 47% rate of veterans with medication discrepancies. This singular finding is startling and reaffirms the significance of the nursing process during periods of transition for patients discharging from hospitals and care facilities.

Stewart et al (2012) led the WHICH (Which Heart Failure Intervention is Most Cost Effective and Consumer Friendly in Reducing Hospital Care) Multicenter trial out of Australia and the United States. Hospitalized heart failure patients ($n = 280$) were randomized into a home-based intervention versus a clinic-based intervention. There was no statistical significance reached for unplanned readmission, however total unplanned hospitalization days were significantly lower in the home-based intervention than the clinic-based intervention ($p = .004$) (p. 1243). Total healthcare costs were 30% less in the home-based intervention than the clinic-based intervention (p. 1244).

In stark contrast to the studies related to the Medicare population, Jackson, Trygstad, DeWalt & DuBard (2013) described a transitional care intervention targeted at North Carolina Medicaid participants with multiple chronic diseases, ages 45-64 ($n = 13{,}476$). Transitional care patients with home-based interventions had seven to thirty-two fewer readmissions than the usual care group, particularly those in a high-risk category. No readmission after twelve months reached statistical significance in the transitional care group ($p < .0001$) (p. 1412).

Other home health studies related to readmission patterns. As with self-care, the majority of what studies exist related to home care and readmission have focused on the heart failure patient, and the elderly. Wong et al (2008) performed a randomized controlled trial ($n = 322$) in China to compare an intervention group receiving home visits by community health nurses with a control group which had routine discharge care. No statistically significant findings were detected related to readmission from either group. However, self-perceived life satisfaction (*p* = .004) and general symptoms (*p* = .014) were statistically significant for readmission (p. 591). Li, Morrow-Howell & Proctor (2004) reviewed the use of formal (home health care) and informal (family and friends) services for patients (*n* = 199) with heart failure. Of these 199 participants, the average age was 77.5 years; half of the participants were African-American and of lower socioeconomic status, and 55% had less than a high school education. The most common formal services were nursing care (85%), assistance with bathing (32%), and then housekeeping, meal preparation and grooming. Informal services included shopping (78%), housekeeping (66%), and medication management (43%). On average, elderly patients utilized forty episodes of informal services, and nine episodes of formal services (p. 281) per week, illustrating that perhaps the use of home health services is in need of review and refinement. Within this study, the number of chronic conditions, self-rated health and functional status were not significantly related to hospital readmission, which is inconsistent with those studies within self-care models that found the opposite to be true.

Subacute Inpatient Facilities and Readmission

Roughly 40% of Medicare beneficiaries are discharged to a post-acute setting upon discharge from a hospital, and half of this population receives their care within a skilled nursing environment; one-quarter of these patients are readmitted to a hospital within thirty days of discharge (Mor, Intrator, Feng & Grabowski, 2010; Centers for Medicare and Medicaid Services, 2014). It is this crippling information that has garnered interest within the transitions community and how to prevent readmissions from post-acute inpatient and skilled nursing facilities. To add to this complexity, many residents of skilled nursing facilities have multiple co-morbid conditions and chronic diseases that complicate usual care.

Again, the vast majority of these studies explore the unique needs of the elderly, as would be expected from a skilled level of post-acute care. Vest, Gamm, Oxford, Gonzalez & Slawson (2010) performed a systematic review of determinants of preventable readmission in the United States (*n* = 37 studies) and found that the risk of readmission after cardiovascular diagnoses was higher in patients discharged to skilled nursing facilities and those patients discharged home with supplementary care (p. 17). Interestingly enough, Dombrowksi, Yoos, Neufeld & Tarshsish (2012) found no correlations between cardiac disease upon admission to their skilled nursing facility and rate of readmission (*n* = 100). Those more likely to be rehospitalized were more likely to have a gastrointestinal condition prior to admission (p = .022), solid tumor (p = .038) or decrease in albumin (p = .005) (p. 1810). The finding of albumin is of interest, which possibly represents nutritional, specifically protein imbalance at the time of readmission to a hospital. The ability to come to a consensus regarding unplanned readmission from a skilled nursing facility continues to be somewhat elusive. Ouslander, Diaz, Hain & Toppen (2011) reviewed 10,778 discharges for a total of 8,261 patients. Infections and cardiovascular disorders were the primary readmission diagnoses (63%) of which pneumonia and heart failure (12% and 11%, respectively) bore the largest percentages (p. 197). Of note, their work revealed that one-third of hospital readmissions from skilled nursing facilities were readmitted within one week of discharge.

Most other findings relate their heart failure readmissions within 30 days of discharge, and not specific time frames within 30 days, including: Chen et al (2012), heart failure patients were more likely to be readmitted to a hospital from a skilled nursing facility within 30 days (p < .001) (p. 100e4); Jacobs (2011) described a 30-day readmission rate from skilled nursing facilities to the hospital at 50%, and from January to June 2009, heart failure 30-day readmissions from skilled nursing facilities averaged 30% (p. 22).

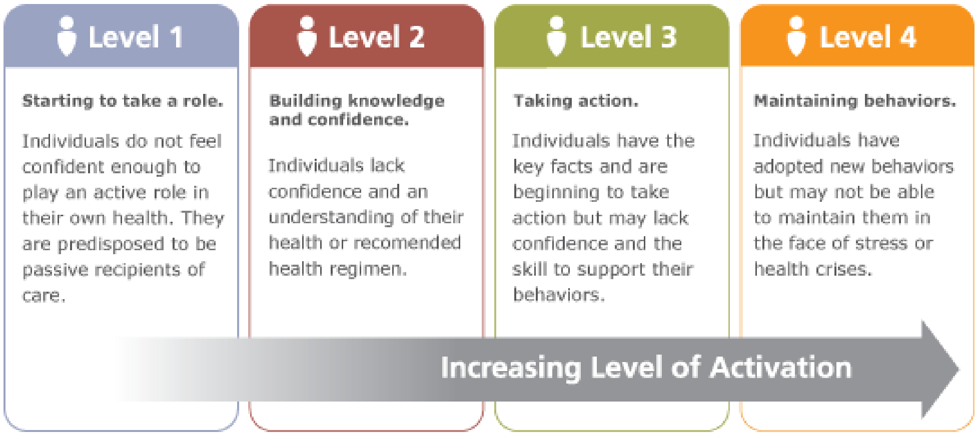
A clear lesson exists from Langer, Drinka & Voeks (1991). In 1986, these authors began their investigation of acute care readmissions from skilled nursing facilities. They asked the question, “How will the nursing homes manage?” How would nursing homes manage a higher case-mix index, a longer length of stay, and pressures to avoid readmission, when at the time the rehospitalization rate was 31% (p. 16)? The lesson learned is that we are still seeking the answers to the question they asked years ago. Twenty years later, in 2006, 23.5% of patients admitted to skilled nursing facilities were rehospitalized within 30 days (Ouslander & Berenson, 2011). The rates are lower, but not acceptable.

Patient Activation and Readmission Patterns

Grumman et al (2010) developed a conceptual framework for patient engagement that is defined as “actions individuals must take to obtain the greatest benefit from the health care services available to them” (p. 351). The state of patient engagement may be fluid, and may adjust according to the readiness of an individual and their ability to make changes based upon a physiologic need, real or perceived. It is important to note that the level of engagement of a patient may be directly related to such factors as socioeconomic status, background, values, beliefs, etc.

The concept of patient engagement includes a strong element of *self-management*. The Oxford Dictionary (2012) defines self-management as “the taking of responsibility of one’s own behavior and well-being.” Self-management is an essential component of disease management that involves collaboration between patients and healthcare providers to ensure patient engagement in behaviors that help control or reduce the impact of their disease (Bourbeau, 2008). Patients still tend to be an underutilized resource—the degree to which health providers are prepared to facilitate self-management skills and shared decision making continue to be examined and debated (Lubetkin, Lu & Gold, 2010). It is the formative ability and action to self-manage care that provides the activation necessary to meet one's own healthcare needs. Self-management is the foundation of an activated patient. "Active" patients are better equipped to make informed and personally relevant decisions about their care than those with lower levels of activation and lower levels of health literacy. Patients with these limitations as well as reduced support tend to defer to clinicians as decision makers and often remain at low levels of activation (Coulter, 2012). In 2004, responding to a growing need to understand what influences patient activation, Hibbard and colleagues developed the Patient Activation Measure (PAM), an instrument used to assess a patient's activation level in managing their health. (Hibbard, Stockard, Mahoney & Tusler, 2004). Differences in activation level, as measured by the Patient Activation Measure, have been shown to be associated with improved dietary habits, exercise, refilling prescriptions and greater engagement in actions that promote shared decision-making, such as bringing lists of questions and health care information to provider visits (Lubetkin, Lu, & Gold, 2010).

The Patient Activation Measure has four levels, from Level 1, the lowest level of patient activation to Level 4, the highest. Higher levels of activation correspond to patients who are involved in all aspects of their health and health care, and independently take an active role in making health care choices. In contrast, lower levels of patient activation are associated with patients who are more passive recipients of care and who do not believe they need to take an active patient role (Greene & Hibbard, 2011). Finding ways to measure and improve activation are becoming increasingly important as research shows that more activated individuals have better health and functioning, higher quality of life and increased satisfaction with their care (Green et al, 2010).



Starting to take a role. Individuals do not feel confident enough to play an active role in their own health. They are predisposed to be passive recipients of care.

Building knowledge and confidence. Individuals lack confidence and an understanding of their health or recomended health regimen.

Taking action. Individuals have the key facts and are beginning to take action but may lack confidence and the skill to support their behaviors.

Maintaining behaviors. Individuals have adopted new behaviors but may not be able to maintain them in the face of stress or health crises.

Figure 2. Patient Activation Measure Levels. Copyright 2013 by Insignia Health

Dixon, Hibbard and Tusler (2009) utilized the Patient Activation Measure (PAM) and structured interviews to discern and better understand how patients at different levels of activation self-manage chronic diseases. They found the following items were necessary to be successful at self-managing their disease: 1) knowledge about the condition; 2) knowledge about treatment options, medications, and how to prevent deterioration; 3) confidence to self-care, seek care when needed, and problem solve. At the low end of activation, self-management was primarily understood as compliance in care routines, whereas at the high end of activation, self-management was about begin in control of their disease (p. 265). Reducing readmissions and improving self-management of chronic illness is imperative if costs are to be lowered and outcomes are to be improved for individuals, communities and health care systems. An opportunity exists to explore avenues for optimizing patient activation and for examining the impact patient activation, demographics and discharge disposition have on contributing to early readmission in Eastern North Carolina.

Since the Patient Activation Measure (PAM) was developed in 2004, there has been a wealth of research related to patient activation level and community/outpatient settings (Cortes, Mulvaney-Day, Fortuna, Reinfeld & Alegria, 2008; Deen, Lu, Rothstein, Santana & Gold, 2011; Dixon, Hibbard & Tusler, 2009; Fowles et al, 2009; Hibbard, Greene & Tusler, 2009). The literature has grown in this area, and according to Insignia Health (2014), which owns rights to the Patient Activation Measure, approximately 160 studies have been completed to date that include multiple facets of healthcare.

Of these 160 cited studies, there have been few research studies that have explored the relationship between patient activation level and 30-day readmission rate. One of these studies focused on a thirty-day window, the other two focused on six months since discharge, and one year, respectively. In addition, a study by Shively and colleagues (2013) explored patient activation levels in congestive heart failure patients, and subsequent outcomes measures.

Mitchell et al (2014) conducted the only known published study related to patient activation levels and 30-day readmission rates. The researchers reviewed charts of a Boston, Massachusetts safety-net hospital (*n* = 694). These patients were part of a cardiology inpatient trial which included the use of the Patient Activation Measure (PAM) tool. The researchers found significant associations between patient activation level and years of education ($p = .01$), and years of education ($p = .02$) and depressive symptoms ($p < .001$). Of note, the researchers found that patients with the lowest levels of activation were 2.27 times higher risk of reutilization of hospital resources within 30 days of discharge (p. 352).

Shively et al (2013) conducted a randomized, two-group, repeated measures research study. This study utilized a six month outpatient program tailored to increase patient activation and improve heart failure self-management programs. The time of study was six months, and there is no definitive mention of how many of these patients returned to hospitals within thirty days of discharge or defined readmission patterns. Participants in the intervention group had fewer hospitalizations as compared to the usual care (UC) group ($p = .041$) within this six-month time frame. The findings also revealed a greater impact with patients at a medium level of activation, and a possible ceiling effect for those with high levels at baseline (p. 31).

Begum, Donald, Ozolins & Dower (2011) explored patient activation within an Australian diabetes self-management group ($n = 3,951$). This study reviewed the relationships between patient activation, self-management, and hospital readmission within 12 months after discharge. The findings revealed that patients with the lowest levels of activation were more likely to be hospitalized within one year (OR=1.7, $p < .001$) or to have visited the emergency room (OR=1.8, $p < .001$) than those with the highest levels of activation. Other statistically significant findings of readmission within one year were: age ($p < .001$), income ($p < .001$), disease duration ($p < .001$), disease severity ($p < .001$) and depressive symptoms ($p < .001$).

Chubak et al (2012) describe patient activation findings of seniors with chronic illness: older seniors tended to experience greater declines in activation than younger seniors, and those who reported being sicker at baseline were less likely to experience increases in activation levels. A finding that has implications for primary care was described by Greene and Hibbard (2010). Patients who report their provider helped them in very specific ways, such as learning how to monitor a condition and set goals, were more activated than those who stated that their provider did not help them. Chronic conditions are long-term focused challenges, and optimal outcomes require deliberate decisions and interventions on the part of patient and provider. Dixon, Hibbard & Tusler (2009) described activation levels of patients, in which those with lower activation levels tended to see successful self-management as *compliance*, whereas those with higher levels of activation described it as being *in control* of their chronic condition. Chronically ill patients with higher activation levels were more likely than those with lower levels to adhere to treatment, refill medication prescriptions, perform regular self-monitoring at home, and obtain regular chronic care, such as foot exams for diabetes (Hibbard & Greene, 2013).

Summary

It is clear that the literature has revealed a great lesson in better understanding the phenomenon of unplanned early readmission and readmission patterns. There are many factors that are involved in understanding risk of readmission, and how those risks are mitigated. The ability to provide self-care, and as importantly the barriers to self-care management during the evolution of chronic illness is critical to understand. Whether a patient is admitted home with self-care, home with home-health services or transferred to a skilled nursing facility, it is abundantly clear that nursing has been extended a tremendous opportunity to positively impact unplanned readmissions throughout a multitude of care venues. Nursing care and assessment were highlighted throughout this literature review, and the knowledge of the impact that advanced practice nurses will have on this issue is only beginning to be realized. Nursing leaders must accept these lessons, and this opportunity to shape policy and practice that will afford nursing its place in this healthcare quality revolution.

CHAPTER 3: RESEARCH METHODOLOGY AND DESIGN

The purpose of this study is to identify and associate the level of patient activation and presence of comorbidities with early readmission, hospital discharge disposition, length of stay, number of admissions and all-cause death in adults hospitalized for heart failure during the years of 2012- 2014. To clarify these associations, the total heart failure admission sample will be further defined by gender, race, age and type of admitting hospital (tertiary or community). Specifically, this study seeks to explore readmission and comorbidity patterns that may be associated with levels of patient activation, discharge disposition and personal characteristic variables related to early readmission within the heart failure population of Eastern North Carolina.

This chapter will review the study design, patient population, data collection instruments, as well as the statistical analyses that were utilized to examine and review the data, and the specific research questions that guided this study.

Study Design

This was a non-experimental, retrospective cohort study designed to explore readmission and comorbidity patterns that may be associated with levels of patient activation, discharge disposition and personal characteristic variables related to early readmission within the heart failure population of Eastern North Carolina.

Study Sample

Patient population. This study consisted of a sample of heart failure patients admitted to a large health system in Eastern North Carolina during the years 2012-2014. Eastern North

Carolina is classified as the forty-one counties east of the Interstate 95 Corridor that extends from South Carolina through Virginia that in essence, “splits” the state into two unique areas. In addition, there is a third segment, the twenty-nine most northeastern counties of the state:

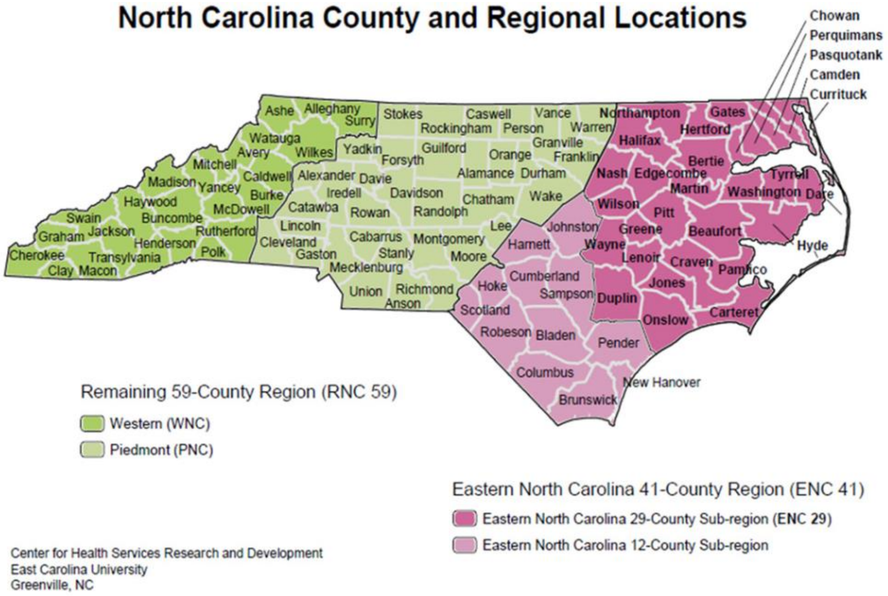


Figure 3. Geographic Representation of Eastern North Carolina. Center for Health Systems Research and Development, East Carolina University.

Eastern North Carolina faces a number of health disparities. The region is rural with a high percentage of citizens that are of an ethnic-minority and low socioeconomic status. Individuals living in Eastern North Carolina have higher rates of morbidity and mortality due to illness than any other region within the state (Innab, 2013), and the twenty-nine county sub-region is considered to have the poorest health (East Carolina University Center for Health Disparities, 2014). Of those twenty-nine counties, seven counties (24%) are ranked 85th or above (out of 100 counties) for poor health outcomes: Halifax (99th), Lenoir (94th), Bertie (92nd), Martin (91st), Northampton (90th), Edgecombe (88th), and Tyrell (87th) counties.

Healthcare for these counties is primarily provided through a large health system, which includes one tertiary care medical center and nine regional community hospitals, fourteen primary care sites, and eleven free-standing specialist locations (Vidant Health, 2013) within the health network. In FY 2012, this health system reported 68,618 inpatient admissions; 257, 591 emergency room visits; and 500,712 outpatient visits (Vidant Health, 2013). FY 2013 statistics for this health system were relatively unchanged, with 67,383 inpatient admissions, 273,073 emergency room visits, and 486,429 outpatient visits (Vidant Health, 2014). Health system hospital locations include:

Table 3

Study Health System Hospitals and Locations

Hospital	Classification	Number of Beds	Location
Medical Center	Tertiary	909	Greenville, NC
Hospital A	Community	114	Ahoskie, NC
Hospital B	Community	6	Windsor, NC
Hospital C	Community	117	Tarboro, NC
Hospital D	Community	49	Edenton, NC
Hospital E	Community	101	Kenansville, NC
Hospital F	Community	35	Belhaven, NC
Hospital G	Community	142	Washington, NC
Hospital H	Community	20	Nags Head, NC

In addition to the hospitals in Eastern North Carolina, there are three (3) Heart Failure programs in the region. These heart failure clinics assist with transitioning patients from hospital to home, in conjunction with primary care providers and cardiologists to improve quality of life and manage chronic illness through the lifespan (East Carolina Heart Institute, 2015).

Table 4

Health System Heart Failure Program Locations

Heart Failure Clinic	Location
Heart Failure Clinic Tarboro	Tarboro, NC
Heart Failure Clinic Ahoskie	Ahoskie, NC
East Carolina Heart Institute Heart Failure Clinic	Greenville, NC

Sample Size

The sample for the study was drawn from all of the hospitals within this health system (Table 3). The estimate of the potential sample size was based on data from the Medical Center and national data related to heart failure readmissions. The data for the other community hospitals was not available. The readmission history for heart failure at the medical center is presented in Table 5. Readmission rates have been reduced from 23.5% in 2013 to 20.4% in 2014. This table does not include the system-wide heart failure readmission analysis.

Table 5

Heart Failure Readmission Data and Statistics for the Study Medical Center, 2012-2014 (East Carolina Heart Institute, 2015)

	Primary CHF Diagnoses	Readmissions
FY 2012	1221	227
FY 2013	1314	235
FY 2014	1363	231
Total	3898	693

The following table provides national data trends in heart failure. This provides comparative analysis of the medical center and supports assumptions used to draw a predictive sample for the full health system (Table 6):

Table 6

National Heart Failure Readmission Data, 2009-2012. Yale New Haven Health Services Corporation

	Primary CHF Diagnoses	Readmissions	Readmission Rate
2009-2012	1,262,826	292,438	23.2%

In the 909 beds at the medical center, there were 3,898 patient encounters with a primary diagnosis of heart failure during the years 2012-2014. Using this same statistical ratio applied to the 711 beds in the community health system hospitals, it was anticipated that an additional 3,049 patients were admitted with heart failure in these hospitals. Using the national readmission rate (23.2%), it was projected that an additional 707 patients would be available for review from these hospitals. Thus, a sample of over 4,000 patients was estimated for the study.

Sample and Inclusion Criteria

All patients discharged during the years 2012-2014 from the Health System with a primary diagnosis of heart failure (HF) were eligible for this study. Heart failure ICD-9 (International Statistical Classification of Disease and Related Health Problems) was utilized for patient data extraction.

Table 7

Heart Failure ICD-9 Codes

Heart Failure Codes	ICD-9 Diagnosis Codes
402, 404 and 428	402.01, 402.11, 402.91, 404.03, 404.11, 404.13, 404.91, 404.93, 428, 428.1, 428.2, 428.21, 428.22, 428.23, 428.3, 428.31, 428.33, 428.4, 428.41, 428.42, 428.43, 428.9

To be eligible for this study, participants met the following critieria:

Inclusion Criteria:

1) At least 18 years of age
2) Discharged with primary admission diagnosis of heart failure (ICD-9)

Protection of Human Subjects and Ethical Considerations

The East Carolina University and Medical Center Institutional Review Board (UMCIRB) served as the portal for internal and external review of this study. There was minimal risk associated with this study, and therefore eligible for expedited review. Processes were in place to protect and blind the identification of patients associated with electronic medical records. Requested tutorials and compliance modules were completed to remain compliant with all Vidant Health System research requirements.

Once UMCIRB approval was received, the Health System Quality Department, in conjunction with the Health System Informatics Team generated and ran a report of all patients with a primary diagnosis of Heart Failure between the years 2012 – 2014. This report included patient characteristics (gender, age, race, marital status, payer source, type of hospital), discharge status (home with self-care, home with home health, subacute care, such as skilled nursing facility), and clinical status (early readmission, readmission patterns, number and type of co-morbidities, number of medications, length of stay), as well as Patient Activation Measure and admission and discharge dates over the 2012-2014 period. The Health System Quality and Informatics Teams coded the hospitals with a numeric code and recoded the patients with a number other than the medical record number, thus de-identifying all patient and hospital data. In addition, hospital location was coded as medical center versus community. This information was delivered in a secure database for use and analysis by the researcher and statistician.

Study Protocol

This Eastern North Carolina health system utilizes the Epic® electronic medical record for all inpatient and outpatient documentation. The electronic medical record was utilized to collect data related to personal characteristics, clinical status (diagnoses), discharge disposition, Patient Activation Level (PAM level) and admission/discharge data through a computer generated Pulse Report. The Health System Quality Department, in conjunction with the Health System Informatics Team built and generated a Pulse report to discern all patients with a primary diagnosis of Heart Failure between the years 2012 – 2014. This Pulse report pulled discrete data fields which are specific to data capture, unlike most nurse’s notes fields or comment boxes. Patients with an inpatient primary diagnosis of Heart Failure (HF) and subsequent readmissions were extracted into a data file and eligible for this study. The pulse report included all variables needed to implement the study using the research model (Table 8). While Table 6 notes the originating source of all data, the researcher’s source was a de-identified secondary database with an assigned unique patient number. All data utilized within the Health System-generated database was entered and saved on the East Carolina University Pirate Drive®, which afforded a secure information environment, accessible only by the following team members: researcher and statistician.

Variables

The following patient variables were selected and designed for this study. All patient variables were extracted through the electronic medical record within discrete data fields:

Table 8

Description and Definition of Study Variables

Theoretical Dimension	Definition	Categorization
Personal		
Age	Patient age in years	18-45 46-64 65-75 76+
Gender	Patient gender	Male Female
Race	Patient race	White Black
Smoking Status	Current smoking status	Current smoker Former smoker Never smoked
Discharge Support		
Discharge Disposition	Care location at discharge	Home with self-care Home with home health Subacute Care Hospice Other[1] Died in hospital

Table 8. *Description and Definition of Study Variables (continued)*

Theoretical Dimension	Definition	Categorization
Marital Status	Current marital status	Married
		Single
		Widowed
		Divorced/separated
Payer Source	Patient insurer/payment source	Medicaid
		Medicare
		Other[2]
Clinical Status		
PAM Level	Patient Activation Level	Level 1
		Level 2
		Level 3
		Level 4
Type of Heart Failure	ICD-9 defined at admission	Systolic
		Diastolic
		Systolic + Diastolic
		Unspecified
		Other[3]
Admission Pattern	When admitted and number of admissions 2012-2014	Admit before 2012, one admit 2012-2014
		Admit before 2012, 2+ admits 2012-2014
		No admits before 2012, one admit 2012-2014
		No admits before 2012, 2+ admits 2012-2014

Table 8. *Description and Definition of Study Variables (continued)*

Theoretical Dimension	Definition	Categorization
Readmission Pattern	Days from discharge to readmission	< 30 days 30+ Days No readmissions
Admitting Hospital	Type of admitting hospital	Medical Center Community Hospital
Maximum Number of Discharge Medications	Number of medications at discharge	None 1-4 5-9 10+
Maximum Length of Stay	Duration of hospital stay at longest hospitalization	1-4 Days 5-9 Days 10+ Days
Number of Comorbidities	Number of comorbidities at discharge	1 2-4 5+
Hospital Death	All-cause hospital death	Yes No
Type of Comorbidities	Type of comorbidities at discharge	See Table 15

Note. [1]Other = Location other than specified; [2]Other = Tricare, Special programs, Blue Cross/Blue Shield, Self-Pay; [3]Other = Heart failure type unknown

Instrumentation

Patient Activation Measure

In 2004, Hibbard and colleagues (2004) developed the Patient Activation Measure. The Patient Activation Measure at that time was a unidimensional, interval-level Guttman style 22-question scale developed to assess levels of confidence, skill and knowledge in providing self-care (Hibbard, Stockard, Mahoney & Tusler, 2004). Convenience samples of patients with and without chronic illness, and a national probability sample (n = 1,515) were included. Instrument development proceeded through three development stages: Conceptualization, Preliminary Scale Development, and Final Refinement. The instrument was then tested with a national sample to assess the construct validity. In 2005, a Patient Activation Measure Short Form-13 was developed with reliability noted at 0.81 and 0.91, with no identifiable changes in activation level ascertained with the reduction of nine questions from the original tool. To calculate a score based upon the current short form, thirteen questions are answered, with a range of each question between 1 and 4 (1 = strongly disagree to 4 = strongly agree). The instrument measures patient activation from a score of 0 (raw score, 13; no activation) to 100 (raw score, 52; highest activation). General preventative behaviors and consumer behaviors were found to be very closely related in both the 22-question instrument and 13-question instrument (p values <.001) for constructs; disease specific behavior testing related to diabetes did not show statistical significance (p=.079), however other disease specific behaviors did match the constructs of the original 22-question tool. Overall, the short form instrument has slightly lower reliability for some subgroups: those individuals with no history of chronic illness; individuals aged 85 and older; those with self-rated poor health and those with lower income and education (Hibbard, Mahoney, Stockton and Tusler, 2005) but overall scores are closely related as previously mentioned. The following 13-question instrument was in use during the time of this study within the health system:

Table 9

Patient Activation Measure, 13 Question Instrument V 4.0 (Insignia Health, 2011, University of Oregon)

Patient Activation Measure Questions, 13-Question Instrument
Answers: Disagree Strongly, Disagree, Agree, Agree Strongly, N/A

1. When all is said and done, I am the person who is responsible for taking care of my health
2. Taking an active role in my own health care is the most important thing that affects my health
3. I am confident I can help prevent or reduce problems associated with my health
4. I know what each of my prescribed medications do
5. I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself
6. I am confident that I can tell a doctor concerns I have even when he or she does not ask
7. I am confident that I can follow through on medical treatments I may need to do at home
8. I understand my health problems and what causes them
9. I know what treatments are available for my health problems
10. I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising
11. I know how to prevent problems with my health
12. I am confident I can figure out solutions when new problems arise with my health
13. I am confident I can maintain lifestyle changes, like eating right and exercising, even during times of stress

The Patient Activation Measure instrument was built into the EPIC electronic medical record within this Health System and was planned to be utilized between 2012 and 2014 by both inpatients and outpatients. The Patient Activation Measure instrument was utilized as part of the Ideal Life® biometric telehealth program. Cardiovascular disease patients were screened during their inpatient stay, and if screened as a PAM Level 1 or 2 (lower levels of activation), were approached by a telehealth nurse regarding home telehealth services to monitor blood pressure, heart rate and weight. Upon admission, or before discharge, each inpatient was offered the instrument, completed by the patient and manually entered by a registered nurse to assess the PAM scale. In some cases, depending upon patient condition, the registered nurse read the PAM to the patient and transcribed answers to the questions on the tool. In late 2011, this health system began using the Patient Activation Measure (PAM) instrument to augment strategies in order to bolster patient decision-making, advance patient engagement in care, and offer health coaching in outpatient clinics. Initially, PAM scores were utilized in outpatient encounters, but as of April 2012 and through 2014, both inpatients and outpatients were eligible to complete the PAM instrument during the admission process, or prior to discharge. During the years specific to this study (2012-2014), three variations of the Patient Activation Measure (PAM), were in use: the traditional patient PAM, the Caregiver PAM, and Parent-PAM. It is the traditional PAM that will be utilized for the purposes of this study.

Comorbidities

The dataset received by the researcher included the ICD-9 comorbidity codes listed for each particular patient. Missing comorbidities were notated. The Centers for Medicare and Medicaid Services ICD-9 Code Lookup (Centers for Medicare and Medicaid Services, n.d.) was utilized to review all comorbidities and placed into disease categories designated by the researcher. The following table provides all of the ICD-9 Codes retrieved within the database, and their respective categories

Table 10

Comorbidity Classifications

Comorbidity	ICD-9 Code(s)
Cardiomyopathy	425.4 – 425.8; 674.54
Other Cardiac	V42.1; 401.1; 410.71 – 410.91; 411.1; 411.89; 414.02 – 414.04; 415.0; 420.9; 426.0; 426.53; 426.54; 427.0 – 427.1; 427.32; 427.41; 427.5; 397; 424.90; 397.0; 424.1; 426.89; 429.5; 441.01; 745.5; 996.01; 996.04; 996.72; 996.74
Obesity	V85.41; V85.42; V85.43; 278.03
Alcohol and Drug	291.0 – 291.81; 292.0; 304.00 – 304.90; 304.02; 305.60
Psychiatric Disorders	V62.84; 290; 290.0 – 290.3; 294.21; 293.0; 295.30; 296.20 – 296.30; 296.44; 296.80 – 296.89
Respiratory Failure	V46.11; 415.19; 496; 518.81; 518.82; 518.83; 518.84; 519.02
Other Respiratory	011.90; 416.0; 415.19; 416.2; 496; 507; 507.0; 511.9; 512.1; 512.89; 514; 516.30; 516.8; 517.3; 786.03; 786.30 – 786.39; 799.02; 860.0
Fluid and Electrolyte	276.0 – 276.7
Vascular	440.24; 440.4; 453.40 – 453.9; 459.2; 686.01; 682.2 – 682.9; 707.10 – 707.19; 747.49; 785.4; 789.5 – 789.59; 999.82
Oncology	V42.81; 153.4 –210
Sepsis	031.2; 038.11; 038.19; 038.42; 038.9; 041.3; 785.51; 785.52; 790.7; 998.59; 995.90; 995.91; 995.92; 996.62; 995.93; 999.32; 999.39; 999.82
Diabetes	250.0 – 250.90
Renal Failure	V42.0; 584.9; 996.73; 996.81
Renal Disease	270.6; 403.00; 403.91; 404.01; 580.9; 581.9; 583.0;

Table 10. *Comorbidity Classifications (continued)*

Comorbidity	ICD-9 Code(s)
Renal Disease (continued)	585.2 – 585.6; 585.9; 591; 753.10; 785.4
Gastrointestinal Disease	008.45; 009.3; 112.0; 112.84 – 112.89; 127.9; 456.1; 456.21; 530.20; 531.40; 552.1; 555.0; 555.9; 556.9; 557.9; 560.1; 560.30; 560.81 – 560.9; 566; 568.81; 569.3; 569.85; 574.10; 575.0; 577 – 577.1; 578.1; 578.9; 579.9; 750.3; 751.5; 782.4
Coagulation and Blood Disease	042; 238.76; 238.79; 279.9; 283.9; 284.11; 284.12; 284.19; 285.1; 286.7; 287.31; 289.81; 998.12
Pressure Ulcer	707.23 – 707.24
Pneumonia	480.9; 482.42; 482.83; 486
COPD	490-492.8; 493.00-493.91; 494
Urinary Tract Infection/Disorder	593.4; 599.0; 867.0; 996.76
Liver Disease	070.30; 070.32; 070.33; 070.54; 456.0; 456.1; 456.20; 456.21; 570; 571.0; 571.2; 571.3; 571.5; 571.6; 571.7; 571.8; 571.9; 572.3; 572.8; V42.7
Neurological Disorders	059.13; 066.1; 094.0; 290.41; 292.81; 336.9; 342.90; 344.1; 344.0; 348.1 – 348.39; 349.82; 361.81; 433.10; 433.30; 434.11; 434.91 – 435.9; 437.2; 438.20; 572.2; 780.01; 780.03; 780.1; 780.72; 784.3; 997.02
Endocrine	253.1; 253.2; 253.6; 255.41; 588.81
Malnutrition	V85.0; 260; 262; 263.0 – 263.9; 799.4
Musculoskeletal Disorders	117.9; 135; 238.74; 277.30; 277.39; 701.2; 710.3; 710.4; 730.00 – 730.27; 733.11; 733.13; 805.2; 805.4; 807.00; 821.20; 996.78

Data Analysis Plan

Data analysis was performed with SPSS version 22 (Statistical Package for the Social Sciences, IBM, Inc., Armonk, New York). Frequencies and descriptive percentages were utilized to summarize the demographic, clinical and support system variables within the study. Pearson's chi square was utilized for tests for independence for the variables within the study sample. The characteristics of this data set were compared to the following national samples specifically related to heart failure: *National Inpatient Survey of Heart Failure, 2001-2009* (Chen et al, 2013); *Comorbidity Profiles During Hospitalization for Heart Failure, 2009 National Inpatient Survey* (Lee et al, 2014). Prior to the analysis, all data was evaluated for outliers and missing data was evaluated and screened for appropriate inclusion in the study. Statistical significance was evaluated using a p value of $\leq .05$. The following research questions were developed to explore these phenomena in greater detail:

Research Question 1: What are the characteristics of the study sample with regard to personal (age, gender/race, smoking status), support system (marital status, initial discharge disposition, payer source), and clinical status (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Analysis strategy for research question 1. Descriptive statistics, including means, standard deviations, frequencies and percentages are used to characterize the study sample.

Research Question 2: What are the associations of patient activation (PAM) levels with numbers of comorbidities, patterns of comorbidities, hospital discharge disposition, length of stay, number of admissions and all-cause hospital death and are these associations modified by gender, race, age, and type of admitting hospital?

Research Question 3: What is the association of race with personal (age, gender, smoking status), discharge support (marital status, initial discharge disposition, payer status) and clinical status (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Research Question 4: What is the association of race/gender with personal (age, smoking status), support (marital status, payer source, initial discharge disposition) and clinical related (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Analysis strategy for research questions 2, 3 and 4. Since all the associations identified in the research questions 2-4 are between categorical variables, the chi-square test for independence is used to investigate the associations. The rejection of the null hypothesis that there is no association between two categorical variables establishes the presence of an association. However, the chi-square statistic itself is not a satisfactory measure of association strength because its magnitude is affected by the total frequency of observations in the contingency table. Cramer's V is used to measure the strength of a statistically significant association, and the interpretation of Cramer's V is dependent on the degrees of freedom (df) of the contingency table. The df for a contingency table is the number of rows – 1 times the number of columns – 1. For a 2x2 (2 rows and 2 columns) contingency table the df is 1, while for a 4x3 contingency table the df is 6. The size of Cramer's V can be converted to qualitative descriptions of small, medium and large according to guidelines established by Cohen (1988). For example, a Cramer's V value of .21 in a 2x2 table would indicate a small effect, while the same value in a 2x3 table would indicate a medium effect, as illustrated in Table 11 below:

Table 11

Cramer's V Contingency Table

	df = 1	2	3	4	5
Small	0.1	.07	.06	.05	.045
Medium	0.3	.21	.17	.15	.13
Large	0.5	.35	.29	.25	.22

Note: Cohen J. (1988). *Statistical power analysis for the behavior sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates (p. 276).

When a chi-square test result for a contingency table larger than 2x2 is statistically significant, the source of the statistically significant result is unclear. For example, in a two row [2(r)] x three column [3(c)] chi-square test of independence, is the source of dependence between row 1 and 2, (r1 and r2) versus columns 1 and 2 (c1 and c2)? Or is it r1 and r2 versus c1 and c3? Or is it r1 and r2 versus c2 and c3? One recommendation is to identify those cells with the largest residuals, where a residual is the difference between the observed and expected values for a cell. The larger the residual, the greater the contribution of the cell to the magnitude of the resulting chi-square obtained value. A cell-by-cell comparison of observed and expected frequencies helps us to better understand the nature of the evidence, and cells with large residuals show a greater discrepancy that we would expect if the row and column variables were truly independent. SPSS provides a residual called an 'adjusted standardized residual'. When these residuals have an absolute value that exceeds about 2 in smaller contingency tables or greater than 3 in larger tables, this indicates a lack of fit of the null hypothesis of independence in those cells. If the adjusted standardized residual for a cell has a large negative value, this indicates that there were fewer cases in the cell than expected under the null hypothesis, while a large positive residual indicates more cases in the cell than expected under the null hypothesis. In the tables generated for research questions 2, 3 and 4 where chi-square values have P values $\leq .05$, indicating a statistically significant association, cells which have the largest positive adjusted residuals (>2.0) will have a subscript of ‘a’ attached to the percentage values in those cells, while cells which have the largest negative residuals (<-2.0) will have a subscript of ‘b’ attached to the percentage values in those cells.

Research Question 5: What are the distinct patient comorbidity profiles that can be formed from the comorbid conditions considered in the sample of hospitalized heart failure patients and are these profiles related to race/gender, patient activation, initial hospital disposition, and all-cause hospital death?

Analysis strategy for research question 5. The initial analysis is to form clusters, or independent subgroups of patients, where the patients in each cluster have a distinct pattern, or profile, of comorbidities. The SPSS Two-Step Cluster procedure is used to generate subgroups of patients where each subgroup has a different profile of comorbidities. This clustering procedure is an exploratory procedure which does not involve hypothesis testing and calculation of observed significance levels. The second part of research question 5 uses chi-square to investigate associations between the independent patient profiles and the categorical variables of race/gender, patient activation, initial hospital disposition, and all-cause hospital death.

Summary

Heart failure has a tremendous impact upon healthcare in numerous ways. There are human, capital and economic costs that are associated with this disease, of which the manifestations are far reaching for patients, families and communities. The opportunity to closely study this phenomenon and determine potential associations between readmission and personal characteristics, patient activation, clinical and support variables could have tremendous benefit to nursing and healthcare outcomes. Thorough assessment of a patient’s ability, aptitude and capacity for self-care is an essential requisite for successful discharge and subsequent self-care in the community. It is essential to better understand the characteristics that are associated with readmission patterns and patient activation, and how to affect those areas proactively during hospitalization and throughout the continuum of care.

CHAPTER 4: RESULTS

This chapter contains descriptive statistics of the study sample as well as statistical analysis related to each question. The four study questions will be outlined in conjunction with the statistical tests utilized and interpretation of those results.

Descriptive Statistics

Research Question #1

What are the characteristics of the study sample with regard to personal (age, gender/race, smoking status), support system (marital status, initial discharge disposition, payer source), and clinical status (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and hospital all-cause death) variables?

This study consisted of 4,087 unique patients who were discharged from one of the healthy system hospitals with a primary admission diagnosis (ICD-9) of heart failure during the years 2012-2014.

Personal characteristics were defined as age, gender and race, and are summarized in Table 11. The ages of the participants ranged from 19-102 years (M = 69, SD = 14.99 years). The study sample reflected a slightly higher male population (51.5%) and slightly higher African American representation (50.4%). Smoking status was utilized as a proxy for health behavior (19.7%). Table 11 summarizes the personal characteristics of the study population. Support system characteristics were defined as discharge disposition, payer source and marital status. Clinical status characteristics were defined as patient activation level, early readmission

(readmission within 30 days of discharge), readmission patterns, heart failure type, type of discharge hospital, maximum number of discharge medications, number of comorbidities, length of stay and all-cause death. These characteristics are described below in Table 11.

Table 12

Personal, Support System and Clinical Status Characteristics of the Study Sample (N = 4,087)

Characteristic	n	%
Age		
18-45	281	6.9
46-64	1210	29.6
65-75	1069	26.2
76+	1527	37.4
Gender		
Male	2104	51.5
Female	1983	48.5
Race		
White Male	1041	25.5
Black Male	1063	26.0
White Female	943	23.1
Black Female	1040	25.4
Smoking Status		
Never	1365	33.4
Quit	1675	41.0
Yes	807	19.7
Missing	240	5.9
Marital Status		
Married	1561	38.2
Single	792	19.4
Widowed	1159	28.4
Divorced/Separated	567	13.9

Table 12. *Personal, Support System and Clinical Status Characteristics of the Study Sample (N = 4,087)(continued)*

Characteristic	n	%
Missing	8	0.2
Payer Source		
Medicaid	371	9.1
Medicare	3138	76.8
Other	578	14.1
Initial Discharge Disposition		
Home with Self Care	2569	62.9
Home with Home Health	620	15.2
Subacute Care	692	16.9
Hospice	72	1.8
Other	206	5.0
Died	110	2.7
Patient Activation Level		
Level 1	414	10.1
Level 2	416	10.2
Level 3	311	7.6
Level 4	68	1.7
Missing	2878	70.4
Heart Failure Category		
Systolic	1331	32.6
Diastolic	1293	31.6
Systolic + Diastolic	784	19.2
Unspecified	654	16.0
Other	25	0.6
Admission Pattern		
Admit before 2012, one admit 2012-2014	1232	30.1
Admit before 2012, 2+ admits 2012-2014	586	14.3

Table 12. *Personal, Support System and Clinical Status Characteristics of the Study Sample (N = 4,087)(continued)*

Characteristic	n	%
No admits before 2012, one admit 2012-2014	1623	39.7
No admits before 2012, 2+ admits 2012-2014	646	15.8
Early Readmission		
No Readmission	1623	39.7
> 30 Day Readmission	1406	34.4
< 30 Day Readmission	1019	24.9
Uncertain	39	1.0
Initial Admitting Hospital		
Medical Center (MC)	2522	61.7
Community Hospitals (CH)	1565	38.3
Maximum # of Discharge Medications		
None	1115	27.3
1-4	1141	27.9
5-9	1156	28.3
10+	675	16.5
Number of Comorbidities		
1	1274	31.2
2-4	1753	42.9
5+	248	6.1
Missing	812	19.9
Maximum Length of Stay		
1-4	2641	63.3
5-9	1141	27.4
10+	387	9.3
Hospital Death		
Yes	188	4.6
No	3899	95.4

Table 12 summarizes the characteristics of the study sample. Of the 4,087 heart failure in-patients in the study sample, over 35% are younger than 65 or older than 75 years of age. The distribution of patients based on ethnicity and gender are similar, while about 20 percent continue to smoke. Over 75% of the patients are on Medicare, while the majority of the total sample (61.8%) is single, widowed, separated or divorced. Patient Activation Measurement scores were only available on 1,209 patients (29.6%) within the sample, and of those with scores, 379 (31.3%) scored at the highest levels.

Although the study period included hospitalized heart failure patients in the years 2012 to 2014, 1818 (43.4%) of those patients had one or more hospital admissions prior to 2012, while the remaining 2,269 patients had their first admission during the study period. There were 1,232 (30.1%) who had multiple admissions during 2012-2014, with 646 (52.4%) of the readmissions coming from those hospitalized for the first time with a primary admission diagnosis of heart failure. When describing the readmission patterns of this patient sample, 1019 (24.9%) of the patients had at least one readmission within 30 days of being discharged from a hospital. There were 39 patients who were readmitted to the hospital on the same day of discharge but were categorized by the electronic medical record as not a readmit.

With regard to hospitalizations, 2522 (61.7%) of the patients upon their first discharge from a hospital in 2012-2014 were discharged from the medical center while the remainder (38.3%) were discharged from a community hospital. The discharge disposition at this initial discharge resulted in 2569 (62.9%) patients discharged to home with self-care, 15.2% were discharged home with home health services, and 16.9% were admitted to a subacute inpatient facility. The majority of the patients were admitted with two or more comorbidities, and approximately 45% of the patients were discharged with five or more medications. The maximum length of stay for the majority of patients was from 1 to 4 days (63.3%), while the hospital death rate was 4.6%.

Research Question #2

What are the associations of patient activation (PAM) levels with numbers of comorbidities, patterns of comorbidities, hospital discharge disposition, length of stay, number of admissions and all-cause hospital death and are these associations modified by gender, race, age, and type of admitting hospital?

As evidenced from the table above, there were a significant number of heart failure in-patients who did not have a documented screening with a Patient Activation Measure (PAM) tool during their stay. Based upon the Heart Failure Screening process during the time of this study, all heart failure patients eligible for discharge were to be screened with the Patient Activation Measure tool. Exclusions to this process would be those patients who were critically ill, cognitively impaired, or refused to participate. Unfortunately, in the patient documentation system, there was no specific mechanism in place to define refusal, with the exception of a comment field that was not ab le to be downloaded into a discrete data file for the purposes of this study. It is therefore unclear as to whether any of the missing fields were refusals to participate, and therefore the inability to assess the frequency of refusals.

For this study, PAM Levels were subcategorized into two distinct categories: PAM Levels 1-2 and PAM Levels 3-4. This was based upon the numbers of tools completed and the ability to better establish possible significance within the study characteristics. Chi square testing on the two defined PAM Levels with the study characteristics follow:

Table 13

Patient Activation and Hospitalized Heart Failure Patients, 2012-2014 (n = 1209)

Characteristic	PAM 1-2		PAM 3-4				
	n	%	n	%	χ^2	Cramer's V	*p*
Age					15.48	.113	<.0001
18-45	62	62.6	37	37.4			
46-64	249	62.1_b	152	37.9_a			
65-75	205	66.3	104	33.7			
76+	298	74.5_a	102	25.5_b			
Gender/Race					.337	.017	.953
White Male	189	67.5	91	32.5			
Black Male	247	68.0	116	32.0			
White Female	144	65.8	75	34.2			
Black Female	234	67.4	113	32.6			
Smoking Status					.872	.027	.647
Never	277	66.3	141	33.7			
Quit	328	66.3	167	33.7			
Yes	181	69.3	80	30.7			
Marital Status					6.57	0.74	.087
Married	293	63.4	169	36.6			
Single	167	68.2	78	31.8			
Divorced/Separated	120	67.8	57	32.2			
Widowed	232	72.0	90	28.0			
Payer Source					8.11	.082	.017
Medicare	613	69.4_a	270	30.6_b			
Medicaid	86	65.6	45	34.4			
Other	115	59.0_b	80	41.0_a			
Initial Discharge Disposition					12.01	.100	.007
Home w/Self Care	562	65.0_b	302	35.0_a			
Home w/Home Health	148	77.9_a	42	22.1_b			

Table 13. *Patient Activation and Hospitalized Heart Failure Patients, 2012-2014 (n = 1209)(continued)*

Characteristic	PAM 1-2		PAM 3-4				
	n	%	n	%	χ^2	Cramer's V	*p*
Subacute Care	86	66.2	44	33.8			
Other	18	72.0	7	28.0			
Heart Failure Type					2.67	.047	.615
Systolic	268	70.2	114	29.8			
Diastolic	251	66.8	125	33.2			
Systolic + Diastolic	174	66.7	87	33.3			
Unspecified	117	63.6	67	36.4			
Other	4	66.7	2	33.3			
Admission Pattern					.191	.013	.979
Admit before 2012, one admit 2012-2014	156	67.0	77	33.0			
Admit before 2012, 2+ admits 2012-2014	148	67.0	73	33.0			
No admits before 2012, one admit 2012-2014	301	68.1	141	31.9			
No admits before 2012, 2+ admits 2012-2014	209	66.8	104	33.2			
Early Readmission					1.22	.032	.542
No Readmission	308	67.8	146	32.2			
> 30 Days	303	68.6	139	31.4			
< 30 Days	203	64.9	110	35.1			
Initial Admitting Hospital					18.07	.122	<.0001
Medical Center	442	73.1	163	26.9			
Community Hospital	372	61.6	232	38.4			
Discharge Medications					4.84	.063	.184
None	173	72.7	65	27.3			
1-4	216	65.1	116	34.9			

Table 13. *Patient Activation and Hospitalized Heart Failure Patients, 2012-2014 (n = 1209)(continued)*

Characteristic	PAM 1-2 n	PAM 1-2 %	PAM 3-4 n	PAM 3-4 %	χ^2	Cramer's V	*p*
5-9							
10+	174	68.5	80	31.5			
Number of Comorbidities					1.54	.041	.469
1	273	67.4	132	32.6			
2-4	311	66.9	154	33.1			
5+	37	75.5	12	24.5			
Length of Stay					28.7	.154	.681
1-4 Days	524	65.0	259	65.5			
5-9 Days	219	26.7	108	27.1			
10+ Days	98	8.3	24	7.4			
Died					0.30	.005	.862
No	792	67.3	385	32.7			
Yes	22	68.8	10	31.3			

There were no statistically significant associations of patient activation levels with marital status, gender/race, heart failure type, readmission pattern, maximum length of stay, maximum number of discharge medications, number of comorbidities or hospital death.

Patient activation levels are significantly related to age, type of insurance, initial admitting hospital and initial discharge disposition. All of the statistical associations had a small effect size. For the age category variable, the strongest contribution to the overall chi-square value is in patients aged 75 or older where there are fewer patients with high patient activation (PAM 3-4) levels (25.5%) than would be expected by chance compared to patients with low patient activation (PAM 1-2) levels (74.5%). There is a higher proportion of patients less than

65 years of age with higher patient activation levels compared to patients older than 65. For the payer source variable, there were fewer patients with Medicare who had high PAM level scores (30.6%) than expected, while the proportion of patients in the "Other" category (41.0%), which was primarily private insurance, is higher than expected. The proportion of patients admitted to a community hospital with high patient activation (PAM 3-4) levels (38.4%) was significantly higher than the proportion of patients admitted to the Medical Center with high patient activation level scores (26.9%). The proportion of patients discharged to home self-care with high PAM levels (35.0%) was higher than expected by chance, while the proportion of patients discharged to home health with high PAM levels was lower than expected by chance (22.1%).

Overall, in reviewing the low number of completed Patient Activation instruments within the medical record (29.4% completed, 70.6% missing), there may not be enough statistical power to generalize these findings to this population of heart failure patients, or the heart failure population at large. As such, these findings must be examined carefully.

Research Question #3

What is the association of race with personal (age, gender, smoking status), support (marital status, initial discharge disposition, payer status) and clinical status (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and all-cause hospital death) variables?

Table 14 describes the findings for the associations of patient characteristics and race for the hospitalized heart failure population of Eastern North Carolina.

Table 14

Characteristics and Racial Associations of Heart Failure Patients 2012-2014 (N = 4,087

Characteristic	White		Black				
	n	%	n	%	χ^2	Cramer's V	*p*
Age					490.6	.346	<.0001
18-45	45	2.3_b	236	11.2_a			
46-64	353	17.8_b	857	40.8_a			
65-75	589	29.7_a	480	22.8_b			
76+	997	50.3_a	530	25.2_b			
Gender					1.51	.019	.219
Male	1041	52.5	1063	50.5			
Female	943	47.5	1040	49.5			
Smoking Status					54.46	.119	<.0001
Never	672	35.9	693	35.1			
Quit	895	47.8_a	780	39.5_b			
Yes	304	16.2_b	503	25.5_a			
Marital Status					320.9	.281	<.0001
Married	900	45.5_a	661	31.5_b			
Single	186	9.4_b	606	28.9_a			
Divorced/Separated	216	10.9_b	351	16.7_a			
Widowed	677	34.2_a	482	23.0_b			
Payer Source					205.0	.224	<.0001
Medicare	1707	86.0_a	1431	68.0_b			
Medicaid	75	3.8_b	296	14.1_a			
Other	202	10.2_b	376	17.9_a			
Patient Activation Level					.137	-.011	.712
1-2	333	66.7	481	67.7			
3-4	166	33.3	229	32.3			
Early Readmission					.009	.002	.995
No Readmits	806	40.6	856	40.7			

Table 14. *Characteristics and Racial Associations of Heart Failure Patients 2012-2014 (N = 4,087)(continued)*

Characteristic	White		Black				
	n	%	n	%	χ^2	Cramer's V	*p*
< 30 Day Readmission	684	34.5	722	34.3			
30+ Day Readmission	494	24.9	525	25.0			
Heart Failure Type					19.29	.069	.001
Systolic	672	33.9	659	31.3			
Diastolic	640	32.3	653	31.1			
Systolic + Diastolic	326	16.4_b	458	21.8_a			
Unspecified	333	16.8	321	15.3			
Other	13	0.7	12	0.6			
Maximum # of Discharge Medications					29.58	.085	<.0001
None	612	30.8_a	503	23.9_b			
1-4	556	28.0	585	27.8			
5-9	515	26.0_b	641	30.5_a			
10+	301	15.2_b	374	17.8_a			
Number of Comorbidities					.785	0.15	.675
1	621	39.7	653	38.2			
2-4	828	52.9	925	54.1			
5+	116	7.4	132	7.7			
Initial Admitting Hospital					.968	-.015	.325
Medical Center	1209	60.9	1313	62.4			
Community	775	39.1	790	37.6			
Hospital							
Initial Discharge Disposition					76.5	.137	<.0001
Home w/Self Care	1134	57.2_b	1435	68.2_a			
Home w/Home Health	306	15.4	314	14.9			
Subacute Care	406	20.5_a	286	13.6_b			

Table 14. *Characteristics and Racial Associations of Heart Failure Patients 2012-2014 (N = 4,087)(continued)*

Characteristic	White		Black				
	n	%	n	%	χ^2	Cramer's V	*p*
Other	138	7.0	68	3.2_b			
Admission Pattern					56.03	.117	<.0001
Admit before 2012, one admit 2012-2014	685	34.5_a	547	26.0_b			
Admit before 2012, 2+ admits 2012-2014	270	13.6	316	15.0			
No admits before 2012, one admit 2012-2014	785	39.6	838	39.8			
No admits before 2012, 2+ admits 2012-2014	244	12.3_b	402	19.1_a			
Maximum Length of Stay					2.27	.024	.321
1-4	1046	52.7	1139	54.2			
5-9	642	34.2	684	32.5			
10+	296	14.9	280	13.3			
Death					19.73	-.069	<.0001
No	1863	93.9_b	2036	96.8_a			
Yes	121	6.1_a	67	3.2_b			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis.

Regarding patient characteristics, there were no statistically significant associations of race with gender, early readmission, patient activation level, number of comorbidities, initial admitting hospital type, and maximum length of stay. Statistically significant associations within the personal characteristic variables were found between race and age. Support characteristic variable associations were found within all of the variables of marital status, payer source, and initial discharge disposition. Within the clinical characteristics, the variables of heart failure type, readmission pattern, maximum number of discharge medications, and hospital death also showed significant associations. The race and age association, as well as readmission pattern, had a medium effect size, while all the other association had a small effect size.

The association of race with age showed that the proportion of black patients over age 75 was lower than expected (25.2%) compared to white patients (50.3%), while the proportion of black patients 46-64 was higher than expected (40.8%) compared to white patients (17.8%). Similarly, the proportion of black patients 18-45 was higher than expected (11.2%) compared to white patients in the same age group (2.3%).

In the association of race with marital status, the largest difference was in the proportion of black patients who are single (28.9%) compared to white patients who are single (9.4%). The proportion of black patients who are married (31.5%) or widowed (23.0%) are lower than expected by chance. The association of race with payer source showed that the percentage of black patients on Medicaid (14.1%) was higher than expected compared to white patients on Medicaid (3.8%), while the proportion of black patients on Medicare (68.0%) was lower than expected compared to white patients on Medicare (86.0%). In the association of race and initial discharge disposition, the proportion of black patients discharged to home self-care (68.2%) was higher than expected compared to white patients (57.2%), while black patients discharged to subacute care facilities (13.6%) was lower than expected compared to white patients (20.5%).

Regarding the association related to readmission pattern, black patients were found to have a higher than expected percentage of multiple admissions (19.1%) within the 2012-2014 timeframe, while white patients (12.3%) was lower than expected. However, conversely, white patients were found to have a higher than expected admission prior to 2012 (34.5%) with only one admission during 2012-2014 compared to black patients who had a lower than expected proportion (26.0%).

In the association of race and type of heart failure, the proportion of black patients with both systolic and diastolic heart failure (21.8%) is higher than expected compared to white patients (16.4%). With regard to the maximum number of discharge medications, black patients with no discharge medications (23.9%) was lower than expected compared to white patients (30.8%) while the proportion of black patients with 5-9 discharge medications (30.5%) was higher than expected compared to white patients (26.0%). The proportion of black patients dying in the hospital during their initial hospitalization for heart failure (3.2%) was lower than expected compared to white patients (6.1%).

Probing deeper within all-cause hospital death and the racial demographic, the finding of early readmission and all-cause death did present statistically significant associations. Those findings are presented in Tables 15 and 16:

Table 15

All-Cause Death and Early Readmission (N = 4,087)

	No Readmit		30+ Days		< 30 Days		χ^2	Cramer's V	*p*
	n	%	n	%	n	%			
All-Cause Hospital Death							16.72	.064	<.0001
No	1606	96.6_a	1343	95.5	950	93.2_b			
Yes	56	3.4_b	63	4.5	69	6.8_a			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis.

Table 16

Racial Demographics, Early Readmission and All-Cause Death (N = 4,087)

	No Readmit		30+ Days		< 30 Days		χ^2	Cramer's V	*p*
	n	%	n	%	n	%			
All-Cause Death									
White/Died							13.83	.083	.001
No	769	95.4	647	94.6	447	90.5_b			
Yes	37	4.6	37	5.4	47	9.5_a			
Black/Died							4.71	.047	.095
No	837	97.8	696	96.4	503	95.8			
Yes	19	2.2	26	3.6	22	4.2			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis.

Overall, the all-cause death rate was 6.8% during a hospitalization associated with a readmission within 30 days, which was twice that of patients with no readmissions (3.4%). The death rate among white patients (9.5%) was almost twice as high as among black patients (4.2%) during an early readmission within 30 days of discharge.

Research Question #4

What is the association of race/gender with personal (age, smoking status), support (marital status, payer source, initial discharge disposition) and clinical related (patient activation level, type of heart failure, admission status, readmission pattern, initial discharge hospital, discharge medications, comorbidities, length of stay, and hospital death) variables?

Table 17 outlines the findings of the associations below:

Table 17

Gender and Racial Difference within Heart Failure Population (N = 4,087)

Characteristics	WM^{1}		BM^{2}		WF^{3}		BF^{4}				
	n	%	n	%	n	%	n	%	χ^2	Cramer's V	*p*
Age									664.74	.233	<.0001
18-45	25	2.4_{b}	141	13.3_{a}	20	2.1_{b}	95	9.1			
46-64	230	22.1_{b}	496	46.7_{a}	123	13.0_{b}	361	34.7_{a}			
65-75	365	35.1_{a}	248	23.3	224	23.8	232	22.3			
76+	421	40.4	178	16.7_{b}	576	61.1_{a}	352	33.8			
Smoking Status									334.46	.208	<.0001
Never	209	21.3_{b}	252	25.2_{b}	463	51.9_{a}	441	45.2_{a}			
Quit	563	57.5_{a}	448	44.8	332	37.2_{b}	332	34.1_{b}			
Yes	207	21.1	301	30.1_{a}	97	10.9_{b}	202	20.7			
Patient Activation Level									.337	.017	.953
1-2	189	67.5	247	68.0	144	65.8	234	67.4			
3-4	91	32.5	116	32.0	75	32.4	113	32.6			
Marital Status									896.73	.271	<.0001
Married	621	59.8_{a}	426	40.2	279	29.6_{b}	235	22.6_{b}			
Single	121	11.7_{b}	336	31.7_{a}	65	6.9_{b}	270	26.0_{a}			
Divorced/Separated	137	13.2	188	17.7_{a}	79	8.4_{b}	163	15.7			

Table 17. *Gender and Racial Difference within Heart Failure Population (N = 4,087)(continued)*

Characteristics	WM[1]		BM[2]		WF[3]		BF[4]				
	n	%	n	%	n	%	n	%	χ^2	Cramer's V	*p*
Widowed	159	15.3_{b}	111	10.5_{b}	518	55.0_{a}	371	35.7			
Payer Source									281.35	.186	<.0001
Medicare	855	82.1	675	63.5_{b}	852	90.3_{a}	756	72.7			
Medicaid	40	3.8_{b}	142	13.4	35	3.7_{b}	154	14.8			
Other	146	14.0	246	23.1_{a}	56	5.9_{b}	130	12.5			
Early Readmission									7.8	.031	.246
No Readmits	444	42.7	424	39.9	362	38.4	432	41.5			
> 30 Day Readmission	355	34.1	384	36.1	329	34.9	338	32.5			
< 30 Day Readmission	242	23.2	255	24.0	252	26.7	270	26.0			
Admission Pattern									64.86	.073	<.0001
Admit before 2012, one admit 2012-2014	332	31.9	286	26.9	353	37.4_{a}	261	25.1_{b}			
Admit before 2012, 2+ admits 2012-2014	142	13.6	160	15.1	128	13.6	156	15.0			
No admits before 2012, one admit 2012-2014	432	41.5	413	38.9	353	37.4	425	40.9			
No admits before 2012, 2+ admits 2012-2014	135	13.0	204	19.2_{a}	109	11.6_{b}	198	19.0_{a}			

Table 17. *Gender and Racial Difference within Heart Failure Population (N = 4,087)(continued)*

Characteristics	WM[1]		BM[2]		WF[3]		BF[4]				
	n	%	n	%	n	%	n	%	χ^2	Cramer's V	*p*
Discharge Disposition									118.15	.098	<.0001
Home w/Self Care	642	61.7	769	72.3_a	492	52.2_b	666	64.0			
Home w/Home Health	145	13.9	135	12.7	161	17.1	179	17.2			
Subacute Care	180	17.3	123	11.6_b	226	24.0_a	163	15.7			
Other	74	7.1	36	3.4	64	6.8	32	3.1			
Heart Failure Type									202.85	.129	<.0001
Systolic	430	41.3_a	404	38.0_a	242	25.7_b	255	24.5_b			
Diastolic	238	22.9_b	250	23.5_b	402	42.6_a	403	38.8_a			
Systolic + Diastolic	199	19.1	254	23.9_a	127	13.5_b	204	19.6			
Unspecified	166	15.9	148	13.9	167	17.7	173	16.6			
Other	8	0.8	7	0.7	5	0.5	5	0.5			
Maximum # of Discharge Medications									39.55	.057	<.0001
None	339	32.6_a	262	24.9	273	29.0	241	23.2_b			
1-4	285	27.4	280	26.3	271	28.7	305	29.3			
5-9	249	23.9	334	31.4	266	28.2	307	29.5			
10+	168	16.1	187	17.6	133	14.1	187	18.0			

Table 17. *Gender and Racial Difference within Heart Failure Population (N = 4,087)(continued)*

Characteristics	WM^1		BM^2		WF^3		BF^4				
	n	%	n	%	n	%	n	%	χ^2	Cramer's V	*p*
Admitting Hospital									26.95	.081	<.0001
Medical Center	679	65.2_a	697	65.6_a	530	56.2_b	616	59.2			
Community Hospitals	362	34.8_b	366	34.4_b	413	43.8_a	424	40.8			
Number of Comorbidities									6.20	.031	.400
1	323	40.3	334	38.6	298	39.1	319	37.9			
2-4	415	51.7	454	52.5	413	54.1	471	55.7			
5+	64	8.0	77	8.9	52	6.8	55	6.5			
Length of Stay									155.95	.113	.234
1-4	637	61.1	703	66.1	567	60.2	679	65.3			
5-9	295	28.4	276	26.0	277	29.3	269	27.4			
10+	109	10.7	84	9.1	83	10.4	68	6.7			
Died									20.87	.071	<.0001
No	973	93.5_b	1031	97.0_a	890	94.4	1005	96.6			
Yes	68	6.5_a	32	3.0_b	53	5.6	35	3.4			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis; ^{1}White Male; ^{2}Black Male; ^{3}White Female; ^{4} Black Female.

Upon review of the findings (Table 15), there were no statistically significant associations of race/gender with early readmission, patient activation level, number of comorbidities, and maximum length of stay. Statistically significant associations were found between race/gender and age, smoking status, marital status, payer source, initial discharge disposition, heart failure type, readmission patterns, maximum number of discharge medications, initial admitting hospital, and hospital death.

Within the personal characteristics variables, several were found to have statistically significant associations. For the association of race/gender with age, the major contributors to the overall chi-square value was the proportion of black males (16.7%) over 75 years of age was smaller than expected. The proportion of white females over 75 years of age was larger than expected (61.1%) and the proportion of black males aged 46-64 (46.7%) was higher than expected compared to a lower than expected proportion of white females aged 46-64 (13.0%). Regarding the association of race/gender with smoking status, the proportion of white males who never smoked (21.3%) was lower than expected while the proportion of white females who never smoked was higher than expected (51.9%). In addition, the proportion of white males who quit smoking was higher than expected (57.5%) while the proportion of black males who continue to smoke (30.1%) was higher than expected and the proportion of white females who continue to smoke was lower than expected (10.9%).

The support status characteristics of marital status, payer source and initial discharge disposition were also found to have statistically significant associations. For the association of race/gender and marital status, the proportion of white men who are married is higher than expected (59.8%), while the proportion of married black females is lower than expected (22.6%) with a moderate effect size. The proportion of black males who are single is higher than expected (31.7%), while the proportion of single white females is lower than expected (6.9%). In addition, the proportion of widowed white females is higher than expected (55.0%) while widowed black males is lower than expected (10.5%), both with a moderate effect size.

In reviewing the association of race/gender and insurance status, the proportion of black males on Medicare is lower than expected (63.5%), while white females on Medicare is higher than expected (90.3%), with a moderate effect size. The proportion of black females on Medicaid (14.8%) is higher than expected, while white males (3.8%) and white females (3.7%) are less than expected. The proportion of black males in the “Other Insurance” category (23.1%) is higher than expected while white females (5.9%) are lower than expected. For the association of race/gender and initial discharge disposition, the proportion of black males discharged to home self-care (72.3%) is higher than expected while white females discharged home (52.2%) is lower than expected. White females discharged to a subacute care facility (24.0%) were higher than expected while black males discharged to a subacute care facility were lower than expected (11.6%).

Clinical characteristic variables of type of heart failure, maximum number of discharge medications, initial admitting hospital, and hospital death had significant associations. Upon review of the association of race/gender and type of heart failure, the proportion of white men with systolic heart failure is higher than expected (41.3%) while black females (24.5%) and white females (25.7%) are lower than expected. White females (22.9%) and black males (23.5%) have lower rates of diastolic heart failure than expected, while white females (42.6%) have a higher rate than expected. For the association of race/gender and maximum number of discharge medications, the proportion of white men with no discharge medications (32.6%) is higher than expected, while black females with no discharge medications (23.2%) is lower than expected. The proportion of white women with 5-9 discharge medications (23.9%) is lower than expected.

For the association of race/gender and initial admitting hospital, the proportion of white females (56.2%) admitted to the medical center is lower than expected, while black males admitted to the medical center (65.6%) is higher than expected. For the association of race/gender and hospital death, the proportion of white males (6.5%) and white females (5.6%) who died in the hospital is higher than expected while the death rate for black males (3.0%) and black females (3.4%) is lower than expected.

Research Question #5

What are the distinct patient comorbidity profiles that can be formed from the comorbid conditions considered in the sample of hospitalized heart failure patients and are these profiles related to race/gender, patient activation, initial hospital disposition, and all-cause hospital death?

It is not uncommon for patients who are admitted with a primary diagnosis of heart failure to have one or more comorbidities that may be superimposed and confound an already complex treatment plan. To better understand the challenges that exist within this care paradigm, it is essential to explore the comorbidities that exist within this particular patient population. The prevalence of comorbidities within this patient population is described below in Table 18.

Table 18

Prevalence of Comorbidities of Heart Failure Patients Admitted 2012-2014 (N = 3,197)

Comorbidity Classification	n	%
Renal Disease	991	31.0
Renal Failure	749	23.4
Other Cardiac	693	21.7

Table 18. *Prevalence of Comorbidities of Heart Failure Patients Admitted 2012-2014 (N = 3,197)(continued)*

Comorbidity Classification	n	%
Respiratory Failure	643	20.1
Electrolyte Imbalance	509	15.9
Obesity	465	14.5
Urinary Tract Infection	426	13.3
Other Respiratory	412	12.8
Pneumonia	347	10.8
Vascular Disorders	341	10.6
COPD	332	10.3
Neurological Disease	271	8.5
Endocrine Disorders	203	6.4
Gastrointestinal Disorders	169	5.3
Coagulation/Blood Disorders	146	4.6
Sepsis	114	3.6
Oncology	109	3.4
Liver Disease	60	1.8
Psychiatric Illness	51	1.6
Diabetes	35	1.1
Alcohol/Drug Abuse	28	0.9
Pressure Ulcer	22	0.7

Table 18 shows the prevalence of comorbidities in the study sample. Of the 4,097 total patient sample, 890 (21.7%) did not have any documented comorbidities. The most common comorbidities included renal disease (30.1%), renal failure (23.4%), other cardiac (21.7%) and respiratory failure (20.1%). The least common comorbidities included liver disease (1.9%), psychological problems (1.6%), diabetes (1.1%), alcohol/drug abuse (0.9%) and pressure ulcer (0.7%).

In further review and evaluation of the comorbidities within this study population, Two-Step Clustering was utilized to assess comorbidity groupings that may be similar to one another. The SPSS Two-Step Cluster procedure is used to generate subgroups of patients where each subgroup has a different profile of comorbidities. This clustering procedure is an exploratory procedure which does not involve hypothesis testing and calculation of observed significance levels. A review of missing data shows that 890 patients were missing comorbidity data. Therefore, 3,197 patients were eligible for cluster analysis. Table 17 below reveals the clusters observed:

Table 19

Comorbidity Profiles and Differentiating Comorbidities (n = 3,197)

Comorbidity	Profile 1 n =384 %	Profile 2 n = 389 %	Profile 3 n = 447 %	Profile 4 n = 669 %	Profile 5 n = 538 %	Profile 6 n = 451 %	Profile 7 n = 319 %
Renal Disease	**50.5**	**100.0**	**47.6**	13.4	2.8	11.5	11.9
Renal Failure	**47.9**	0.0	**100.0**	3.0	2.0	12.2	10.0
Other Cardiac	**39.1**	0.0	5.4	2.8	1.3	**100.0**	13.2
Respiratory Failure	**46.6**	0.0	11.6	**41.3**	12.3	9.1	9.1
Electrolyte	**49.2**	6.7	11.9	7.2	**28.4**	6.4	3.4
Obesity	23.2	0.0	4.9	4.2	1.3	0.0	**100.0**
Urinary Tract Infection	27.6	5.4	11.2	3.4	**33.3**	5.5	6.9
Other Respiratory	23.4	6.4	4.0	4.9	**37.0**	6.9	5.0
Pneumonia	22.4	0.0	4.9	**31.1**	0.7	3.3	3.8
Vascular	32.0	3.9	3.6	2.1	**25.7**	5.5	3.1
COPD	17.7	0.0	2.9	**32.9**	0.5	3.5	3.7
Neurological	30.2	3.3	5.8	9.4	5.2	4.8	0.9
Endocrine	18.5	17.2	4.9	3.7	0.3	1.5	2.8
Blood Disorder	16.7	4.4	0.8	5.6	1.4	2.2	1.5
Sepsis	18.5	1.0	1.2	2.8	2.0	0.8	0.0
Oncology	6.0	2.8	1.7	4.7	3.7	2.8	0.6
Liver Disease	9.9	0.8	0.6	1.2	0.3	1.1	0.3
Psychological Disease	3.4	0.0	0.6	3.7	0.3	1.1	0.9

Table 19. *Comorbidity Profiles and Differentiating Comorbidities (n = 3,197)(continued)*

Comorbidity	Profile 1 n =384 %	Profile 2 n = 389 %	Profile 3 n = 447 %	Profile 4 n = 669 %	Profile 5 n = 538 %	Profile 6 n = 451 %	Profile 7 n = 319 %
Diabetes	2.3	1.8	1.5	0.7	0.9	0.4	0.0
Alcohol/Drug	2.6	0.3	1.1	1.2	0.1	0.6	0.0
Pressure Ulcer	3.9	0.3	0.2	0.3	0.5	0.0	0.0

Table 19 reports on the results of the SPSS two-step clustering procedure. Among the 22 comorbid conditions considered, seven distinct comorbidity profiles were identified. It is important to note that these comorbidity clusters are not the reason for each admission—heart failure is the primary admission diagnosis. However, the comorbidity is a compounding factor that affects patients in the hospital and community. The largest profile, P4 (*n* = 669, 20.9%), had the highest prevalence of COPD (32.9%) and pneumonia (31.1%), and the second highest prevalence of respiratory failure (41.3%). The smallest profile, P7 (*n* = 319, 10.0%) was defined by a 100.0% prevalence of obesity. Profile P1 (*n* = 384, 12.0%) consisted of 11 conditions with prevalence rates greater than 20%. The most prevalent conditions included renal disease (50.5%), electrolyte abnormalities (49.2%), renal failure (47.9%), and respiratory failure (46.6%), which represents the most multi-morbid of heart failure patients. The P2 profile (*n* = 389, 12.2%) was defined by renal disease (100.0%). Profile P3 (*n* = 447, 14.0%) was defined by renal failure (100.0%). Profile P5 (*n* = 538, 16.8%) was characterized by three conditions: urinary tract infection (33.3%), electrolyte abnormalities (28.4%) and vascular disease (25.7%). Profile P6 (*n* = 451, 14.1%) was characterized by other cardiac diseases, which also had a 100% prevalence within that profile group.

Tables 20, 21 and 22 review the associations of race/gender, patient activation, and initial discharge disposition with the comorbidity clusters.

Table 20

Association of Comorbidity Profiles and Gender/Race Pairs (N = 3197)

Comorbidity Cluster	WM[1]		BM[2]		WF[3]		BF[4]				
	n	%	n	%	n	%	n	%	χ^2	Cramer's V	*p*
Profile									210.73	.148	<.0001
P1: Multiple Comorbidities	99	25.8	108	28.1	86	22.4	91	23.7			
P2: Renal Disease	69	17.7	142	36.5_a	50	12.9b	128	32.9			
P3: Renal Failure	119	26.6	119	26.6	80	17.9	129	28.9			
P4: Respiratory Failure/COPD	196	29.3_a	158	23.6	183	27.4_a	132	19.9_b			
P5: UTI/Electrolyte/Vascular	139	25.8	77	14.3_b	196	36.4_a	126	23.4			
P6: Other Cardiac	142	31.5_a	130	28.8	93	20.6	86	19.1_b			
P7: Obesity	52	16.3_b	79	24.8	57	17.9	131	41.1_a			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis. [1]White Male; [2]Black Male; [3]White Female; [4] Black Female.

Table 21

Association of Comorbidity Profiles and Patient Activation (N = 896)

Comorbidity Cluster	PAM 1-2		PAM 3-4				
	n	%	n	%	χ^2	Cramer's V	*p*
Profile					2.61	.054	.856
P1: Multiple Comorbidities	52	64.2	29	35.8			
P2: Renal Disease	56	63.6	32	36.4			
P3: Renal Failure	95	66.0	49	34.0			

Table 20. *Association of Comorbidity Profiles and Patient Activation (N = 896)(continued)*

Comorbidity Cluster	PAM 1-2		PAM 3-4				
	n	%	n	%	χ^2	Cramer's V	*p*
P4: Respiratory Failure/COPD	113	69.3	50	30.7			
P5: UTI/Electrolyte/Vascular	111	71.6	44	28.4			
P6: Other Cardiac	104	67.1	51	32.9			
P7: Obesity	74	67.3	36	32.7			

Table 22

Association of Comorbidity Profiles and Initial Discharge Disposition (N = 3197)

Comorbidity Cluster	Home w/SC[5]		Home w/HH[6]		Subacute		Other				
	n	%	n	%	n	%	n	%	χ^2	Cramer's V	*p*
Profile									203.22	.146	<.0001
P1: Multiple Comorbidities	134	34.9_b	86	22.4_a	105	27.3_a	59	15.4_a			
P2: Renal Disease	270	69.4_a	53	13.6	52	13.4	14	3.6			
P3: Renal Failure	236	52.8	79	17.7	93	20.8	39	8.7			
P4: Respiratory Failure/COPD	411	61.4	108	16.1	115	17.2	35	5.2			
P5: UTI/Electrolyte/Vascular	289	53.7	103	19.1	120	22.3	26	4.8			
P6: Other Cardiac	294	65.2	69	15.3	69	15.3	19	4.2			
P7: Obesity	238	74.6_a	41	12.9	37	11.6	3	0.9_b			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis.[5]Self-Care; [6]Home Health.

Based upon associations of gender/race pairing in previous research questions, it was important to consider this particular variable within the comorbidity cluster review. Table 18 describes the associations of the specific comorbidity profiles and gender/race pairing. In Profile One (P1), with multiple conditions, the proportion of gender/race individuals is similar. For Profile Two (P2), where every patient has renal disease, the proportion of black males with renal disease (36.5%) is higher than expected, while the proportion of white females with renal disease (12.9%) is lower than expected. In Profile Three (P3), where every patient has renal failure, the proportion of white females with renal failure is less than expected (17.9%). Profile Four (P4), characterized by respiratory conditions, evidenced a less than expected proportion of black females (19.7%). In Profile Five (P5), categorized by other respiratory issues, urinary tract infection and electrolyte abnormalities, the proportion of white females (36.4%) is higher than expected while the proportion of black males (14.3%) is lower than expected, with moderate effect size. In Profile Six (P6), characterized by cardiac issues other than heart failure, the proportion of white males (31.5%) is higher than expected and black females (19.1%) is lower than expected. In Profile Eight (P8) where every patient is obese, the proportion of black females (41.1%) is higher than expected, while white males (16.3%) is lower than expected.

Table 21 describes the associations of the defined comorbidity clusters and patient activation. From the findings, there is no association between any of the comorbidity clusters and a patient's activation level. The levels are nearly identical throughout the clusters, with little variation. The majority of patients screened (> 60%) reveal a PAM Level 1-2, with a maximum of 36.4% at a PAM Level 3-4. Profile Five (P5) had a slightly higher than expected (71.6%) within a PAM Level 1-2, and slightly lower than expected (28.4%) within PAM Levels 3-4. The effect size was very small, and not found to be statistically significant.

Table 22 describes the associations of the specific comorbidity profiles and initial discharge disposition. In Profile One (P1), with multiple conditions, the proportion of patients discharged home (34.9%) is lower than expected while those discharged to subacute care facilities (27.3%) and other facilities (15.4%) is higher than expected. Profile Two (P2), with 100% prevalence of renal disease, has a higher proportion of home discharge (69.4%) than expected. In Profile Seven (P7), with 100% prevalence of obesity, the proportion of discharges to home (74.6%) is higher than expected. Profiles Three (P3), Four, (P4), Five (P5) and Six (P6) do not contribute to the overall chi-square statistic.

Table 23

Association of Comorbidity Profiles and Hospital Death 2012-2014 (N = 3,197)

	Died						
	No		Yes		χ^2	Cramer's V	*p*
Comorbidity Profile					87.08	.165	<.0001
P1: Multiple Comorbidities	327	85.2_b	57	14.8_a			
P2: Renal Disease	378	97.2_a	11	2.8_b			
P3: Renal Failure	424	94.9	23	5.1			
P4: Respiratory Failure/COPD	637	95.2	32	4.8			
P5: UTI/Electrolyte/Vascular	507	94.2	31	5.8			
P6: Other Cardiac	432	95.8	19	4.2			
P7: Obesity	317	99.4_a	2	0.6_b			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis.

Table 23 describes the association of comorbidity profiles with all-cause death during inpatient care for this patient population during the study period of 2012-2014. The proportion of hospital deaths was higher than expected in Profile One (P1) (14.8%) and lower than expected in Profile Two (P2) (2.8%) and Profile Seven (P7) (0.6%). The other comorbidity profiles (P3, P4, P5 and P6) do not contribute to the chi square statistic.

Table 24

Association of Comorbidity Profiles and Initial Admitting Hospital 2012-2014 (N = 3,197)

Comorbidity Profile and Admitting Hospital	Medical Center		Community Hospital		χ^2	Cramer's V	*p*
					86.37	.164	<.0001
P1: Multiple Comorbidities	297	77.3_a	87	22.7_b			
P2: Renal Disease	277	71.2_a	112	28.8_b			
P3: Renal Failure	303	67.8	144	32.2			
P4: Respiratory Failure/COPD	364	54.4_b	305	45.6_a			
P5: UTI/Electrolyte/Vascular	305	56.7_b	233	43.3_a			
P6: Other Cardiac	313	69.4	138	30.6			
P7: Obesity	202	63.3	117	36.7			

Note. $_a$more than expected under the null hypothesis; $_b$less than expected under the null hypothesis.

In comparing the hospital type and comorbidity clusters, specific observations were made. Profile One (P1) patients admitted to the medical center (77.3%) is higher than expected, while the same comorbidity cluster of patients admitted to community hospitals is less than expected (22.7%). A higher than expected percentage of multiple comorbidities (14.7%) were found at the medical center, and lower than expected in the community hospital setting. However, a higher percentage (26.8% versus 17.7%) of Profile Four (P4) patients were admitted at community hospital setting than was expected, and lower than expected at the medical center. Profile Five (P5) patients were also found to have a larger percentage representation in the community hospitals as opposed to the medical center (56.7%) compared to (43.3%), with a small effect size.

CHAPTER V: DISCUSSION AND CONCLUSIONS

Summary of the Problem

Heart failure is a common syndrome that is associated with poor quality of life, frequent hospitalization and premature death (Riegel & Dickson, 2008). In the United States alone, there are 5.8 million cases with greater than 550,000 new cases diagnosed each year (Roger, 2013). Total annual costs of heart failure are around $20.9 Billion dollars, with costs expected to rise to $53.1 Billion dollars in 2030 (Soundarraj, Singh, Satija & Thakur, 2015). Components of these costs are associated with early readmission to hospitals after discharge. Approximately 20% of Medicare beneficiaries are readmitted within 30 days of discharge, and upwards of 30% within 90 days (McClintock, Rose & Smith, 2014). Heart failure is a chronic disease that requires self-care strategies to manage symptoms, medications and activities of daily living, particularly for older patients or those without support services to assist in meeting daily needs. Eastern North Carolina, particularly the twenty-nine northeast counties, has the poorest health outcomes within the state, lowest levels of income and education and highest levels of mortality across all ethnic/racial groups (East Carolina University Center for Health Disparities, 2016). Eastern North Carolina presents an opportunity to study a unique heart failure patient population in light of documented health disparities.

Purpose of the Study

The purpose of this study was to identify and associate the level of patient activation and presence of comorbidities with early readmission, hospital discharge disposition, length of stay, number of admissions and all-cause hospital death in adults hospitalized for heart failure during the years of 2012- 2014. To clarify these associations, the total heart failure admission sample was further defined by gender, race, age and type of admitting hospital (medical center or community hospital). Specifically, this study sought to explore readmission and comorbidity patterns that may be associated with levels of patient activation, discharge disposition and personal characteristic variables related to early readmission within the heart failure population of Eastern N Carolina. This concluding chapter provides an overview of the major findings of the study. In addition to discussion of these major findings, implications for nursing practice, education, and research are considered. Strengths and limitations to the study are delineated, and recommendations for future study made. The major findings of the study are presented below.

Major Findings of the Study

The first research question explored the overall characteristics of the heart failure population in Eastern North Carolina during the period 2012-2014. This study population revealed several particular findings that merit discussion, particularly surrounding racial/ethnic background.

The second research questions focused on associations of patient activation (PAM) levels with numbers of comorbidities, patterns of comorbidities, hospital discharge disposition, length of stay, number of admissions and all-cause death and were these associations modified by gender, race, age, and type of admitting hospital. Patient activation did have a demonstrated association with age, payer source, initial discharge disposition, and initial admitting hospital. There was a larger proportion of patients less than 65 years of age with higher patient activation levels compared to patients older than 65. For the payer source variable, there were fewer Medicare patients with high PAM level scores (30.6%) than expected, while the proportion of patients in the “Other” category (41.0%), which was primarily private insurance, is higher than expected. Other associations to the study characteristic variables did not reveal statistically significant associations. Overall, the patient activation levels were low (Levels 1-2) among this study population. Since the PAM tool was utilized as an indicator of confidence in self-care, the results are concerning, and additional study is warranted, particularly in light of the low number of completed patient tools in comparison to patients within this study.

The third research question evaluated the associations of race with personal, support and clinical status characteristics of the study population. Support characteristic variable associations were found within all of the variables of marital status, payer source, and initial discharge disposition. Within the clinical characteristics, the variables of heart failure type, readmission pattern, maximum number of discharge medications, and hospital death also showed significant associations.

The fourth research question explored an additional layer of racial and gender associations with the personal, support and clinical status variables. There were no statistically significant associations of race/gender with patient activation level, number of comorbidities, and maximum length of stay. Statistically significant associations were found between race/gender and age, smoking status, marital status, payer source, initial discharge disposition, heart failure type, readmission pattern, maximum number of discharge medications, initial admitting hospital and hospital death.

The fifth and final question focused on comorbidity profiles within the study population, and evaluated if these profiles related to race/gender, patient activation, initial hospital disposition, and hospital death. Discharge disposition and race/gender pairing also had a statistically significant association, while patient activation had no association with comorbidity profiles.

Discussion of Findings

Research Question #1

The study sample comprises 4,087 adult patients admitted during the years 2012-2014 with a primary admitting diagnosis of heart failure. Approximately 44 percent of the patients had one or more admissions for heart failure before 2012, while the majority had their first admission for heart failure during 2012-2014. The gender and racial distribution was very homogenous, with black patients comprising a majority (51.4%) of the study sample. The average age was 69 years, ranging from 19 to 102. Over 36% of the patients were less than 64 and over 37% were over 75 years of age. Thirty eight percent of the patients were married and 42% were widowed, divorced or separated. The majority (76.8%) of the patients were on Medicare, while 14% had some form of private health insurance. Over 61% of the patients were initially admitted during 2012-2014 from the medical center, with the remaining admitted from one of the system's community hospitals. Approximately 63% of the patients at their initial discharge during 2012-2014 was to their home with self care, while another 15% went home with Home Health and another 17% were sent to another subacute inpatient facility. Of the patients with defined comorbidities, 31% had one comorbidity, 43% had 2-4, while another 6% had 5 or more comorbidities. Sixty-three percent of the patients had a length of stay from 1-4 days, 27% had stays ranging from 5-9 days, and another 9% had stays of 10 days or longer. The all-cause hospital death rate among the 4.087 patients during 2012-2014 was 4.6%

It is important to note that 19.7% of the study patients still smoke despite a diagnosis of heart failure, while 41% were previous smokers. Smoking cessation programs must target these particular patients to continue reduction of potential readmission, and continued research to better understand and identify the social and economic barriers to quitting.

The latest National Inpatient Sample studies of hospitalized heart failure patients (Chen et al, 2013; Lee et al, 2014) reveal some important differences compared to the heart failure population in Eastern North Carolina. The 2012-2014 study sample is younger, 41% aged 19-64 compared to 27% for the National Inpatient Survey and includes more Black patients, 51.4% compared to only 17.2% in the Chen study (Chen et al, 2013) and 19% in the Lee study (Lee et al, 2014). The percentage of early readmission (within thirty days of discharge) in this study was 24.9%, which is slightly higher than the National Heart Failure Readmission Data (23.9%) presented in 2013. This finding is consistent nationally with Centers for Medicare and Medicaid Services (2014) Hospital Readmission Reductions Program. [may need a reference for the above]

Research Question #2

The second question examined the associations of patient activation upon the study characteristic variables. Chi square analysis revealed associations with age, payer source, initial discharge disposition and admitting hospital. In essence, these associations were found to have the greatest impact on a patient's confidence and skill to provide or assist in the provision self-care in this study. Again, it is important to note that due to the low number of completed instruments within the patient medical record (29.6%), there may not be enough statistical power to generalize these findings to this particular patient population, or the heart failure population at-large. These findings must be carefully assessed , examined and considered within the context of this study.

Patients who were greater than 76 years of age had a significantly lower patient activation level (PAM 1-2) than younger patients. However, there was not much difference between those younger than those who were older. Payer source also had a statistically significant association, with Medicare and Medicaid patients having a lower patient activation level than those in the "other" category, which includes commercial carriers, self-pay and charity. An interesting finding is the difference in patient activation between the medical center and community hospital settings. This finding is interesting for several reasons: 1) Within the PAM findings, age > 65 years was found to be statistically significant for lower PAM levels, particularly Levels 1-2; 2) With a higher percentage of older adults within community hospitals, this would lead to the assessment that higher age would result in a lower PAM level at the community hospital level. However, this was not the case in this study, and the findings demonstrate the opposite. A higher percentage of community hospital patients reported higher PAM levels (PAM Level 3-4) than their medical center counterparts. This is an area that would merit additional research and understanding, particularly along the lines of how to engage and encourage both types of hospital patient populations, if indeed these differences do exist within other health systems.

Of interest, the readmission pattern subgroups had virtually identical patient activation within both levels (Levels 1-2 and Levels 3-4) and admits/no admits prior to 2012. The differences were negligible between patients who were admitted prior to 2012 and those who were not. However, it is clear that two-thirds of each readmission subgroup had low levels of patient activation.

A finding that was not statistically significant, however noteworthy, is the distribution of Patient Activation Levels within gender and race. The findings were virtually identical within each gender and race pairing, inclusive of Patient Activation Level. White females had the fewest number of PAM tools entered into the medical record (*n* = 219), followed by white males (*n* = 280). Albeit perhaps notable, black patients' completion of the PAM during hospitalization (*n* = 710) was higher than that of white patients (*n* = 499), providing a platform for potential study regarding tool completion within a hospital setting particularly as it concerns caregiver and patient experiences and potential biases towards patient populations and perceived needs.

Research Question #3

The third question addressed the associations of race upon the study characteristics. Overall, there were several statistically significant findings regarding the associations of race and virtually all study characteristics, including personal, support and clinical. Black patients were more likely to be younger, single, and higher users of Medicaid as a payer source. This study did support the previous findings of black patients and discharge disposition. Black patients were more likely to be discharged home, and less likely to be discharged to subacute facilities. Length of stay revealed minimal statistical significance, with black patients representing a higher rate of shorter length of stay, and conversely with white patients having slightly greater lengths of stay, particularly 10+ days. However, in stark contrast to the literature, there was virtually no difference in 30-day readmission within both racial groups. The literature review within this study revealed higher rates of 30-day readmission and hospitalization for black patients over white patients, however the rate of death for this particular segment was higher for white patients than black patients. In addition, the literature also revealed lower rates of discharge to subacute care facilities, such as skilled nursing facilities, for black patients, which this study supported. Given the lower death rate among black patients it could be argued that the discharge disposition among black patients within this population is appropriate. This is an interesting finding meriting additional exploration, as most previous findings in the literature indicate higher early readmission rates for black patients. This may be attributable to a more homogeneous representation of racial groups within this particular study.

Research Question #4

The fourth question probed deeper into race and gender pairing, and explored the associations within the study characteristic variables. This particular study population was representative of the current heart failure and readmission literature. Black patients are younger than their white counterparts, particularly men. Through age 64, black men have higher rates of readmission for heart failure. Black men are younger, are more likely to smoke despite a diagnosis of heart failure, and are more likely to be single. Black men and women are more likely to utilize Medicaid for their payer source (13.4% and 14.8%) as compared to white men and women (3.8% and 3.7% respectively).

As described previously, black men were more likely to be discharged to home with self-care than any other gender/race pairing, and conversely, less likely to be discharged to home health or subacute care facilities. Additionally, black males had the highest number of self-pay reports than any other gender/race pair within the 18-45 and 46-64 age groups ($p < .0001$). White females were more likely than any other gender/race pairing to be discharged to another facility, rather than home with self-care or home with home health care.

White men were more likely to have fewer medications at discharge than any other racial subtype while both white and black women were more likely to be admitted to a community hospital than the tertiary medical center than men. Patient activation, number of comorbidities and length of stay had no statistically significant associations within the pairing of gender and race. Early readmission continued to reveal no statistical associations; however, within this gender/race pairing, both white and black women had a slightly higher rate of readmission (26.7% and 26%) than males (23.3% and 24%).

One of the essential findings of this study related to marital status. In this study, both white and black women were more likely to be widowed than their male counterparts. Black men had the highest percentage of single status. As marital status was one of the discharge support characteristics, it is important to understand this finding in its context. Many patients with heart failure find themselves in need of assistance for activities of daily living, such as cooking, dressing, medication adherence and transportation. Older patients who live alone or who may not have consistent caregiver support may be at greater risk of complications or readmission. In addition, social or cultural norms may influence who they are comfortable asking for support and assistance (Riegel, Dickson & Faulkner, 2016), which may further compound discharge support.

However, contrary to current research is the rate of death among white and black patients. Recent studies have shown that black patients have higher rates of inpatient mortality than white patients. Within this particular study group, white men and women were more likely to die while an inpatient (6.5% and 5.6%) than their black counterparts (3.0% and 3.4%, respectively). While these differences may not seem to be significantly large, they do provide statistical significance and merit additional study within this particular Eastern Carolina patient population.

Research Question #5

The final research question focuses on exploring the comorbidity profiles within the study population and their associations with race/gender, PAM level, discharge disposition, type of admitting hospital and all-cause hospital death. Of the 4087 patients in the study sample, 3197 (78.2%) of the patients had one or more of the 22 comorbidities listed in Table 16. The most prevalent comorbidities include renal disease (31%), renal failure (23.4%), other cardiac (21.7%) and respiratory failure (20.1%). The 22 comorbidities listed in Table 16 are used as input to a two-step clustering procedure which identified seven unique subgroups of patients or profile groups.

Table 19 presents the seven profiles and the percentage of patients in each profile who have one or more of the 22 comorbidities. Profile 1, termed multiple comorbidities, comprises 344 (12.0%) of the patients and is characterized by patients with multiple comorbidities at a relatively high level of prevalence. Four of the profiles, 2, 3, 6 and 7, are characterized by patients who all have a single comoribidity and lower prevalence on the other comorbidities. In profile 2, all the patients have renal disease with low prevalence on the other comorbidities, while in profile 3 all the patients have renal failure failure. In profile 6, all patients have other cardiac problems, and in profile 6 all patients are obese. Profile 4 and 5 have multiple comorbidities, with profile 4 having high prevalence comorbidities related to respiratory problems, and profile 5 having high prevalence comorbidities related to respiratory, urinary tract infections, electrolyte problems and vascular problems.

There were statistically significant associations with all the variables except for PAM level. The strength of association was moderate for all of the significant associations. In the association of profiles and gender/race pairings, the proportion of gender/race pairs was similar in profile 1 (multiple comorbidities) and profile 3 (renal failure), while the proportion of black males and females was higher than the white patients in profile 2 (renal disease). White males and females had the highest prevalence in profile 4 (respiratory failure/COPD), and black females the lowest prevalence. In profile 6 (cardiac), white males had the highest prevalence and black females the lowest, while in profile 7 (obesity), black females had the highest prevalence and white males the lowest.

In the association of comorbidity profiles and discharge disposition, the proportion of patients discharged home with self care was highest in profiles 7 (obesity) and profile 2 (renal disease) and lowest in profile 1 (multiple comorbidities). Discharge to home with home health was most frequent in profile 1 and less frequent in profiles 7 and 2. Discharge to a subacute inpatient facility was highest in profiles 1 and 5 (UTI/Electrolyte/Vascular) and lowest in profiles 2 and 7. For the association of profiles and admitting hospital, profiles 1 and 2 had a higher prevalence than expected for Medical Center admissions, while profiles 4 and 5 had a lower prevalence than expected for Community Hospital admissions. For hospital deaths, profile 1 had the largest percentage of deaths and profiles 7 and 2 had the lowest percentages of deaths. Within profile 1, black females (11.0%) and black males (13.0%) had the lowest death rates, while white females (18.6%) and white males (17.2%) had the highest rates.

The comorbidities presented in Chen’s (2013) work reveal differences in comorbidity clusters of this study population to national inpatient studies. Most of the comorbidity percentages are lower for Eastern North Carolina, both at the medical center as well as the community hospitals. Two particular comorbidities are higher for Eastern North Carolina, specifically oncology and obesity. Obesity has a higher representation at the medical center (16.2%) than within the community hospitals or the National Inpatient Sample. However, the prevalence of diabetes within this Eastern North Carolina study population merits additional review and correlation to current prevalence studies within the region. The prevalence of diabetes in this study population was only 1.0% as compared to a10.9% prevalence within the state of North Carolina during this same study time period, and in those older than 65 years the prevalence was 23.2% (North Carolina Department of Public Health, 2013). This stark difference merits further discussion and study.

Summary of Significant Findings

One of the most significant findings of this study are the findings of discharge disposition after discharge for heart failure care, particularly within race/gender pairing. Current heart failure research continues to support racial disparities and access regarding post-discharge care of patients (Allen et al, 2011; Pu, Thorpe, Kennelty & Chewning, 2014). The ongoing challenges that face healthcare providers in safeguarding equal care and treatment for heart failure continue to provide a platform for robust study and exploration.

In addition to discharge disposition, all-cause death was a significant finding. Early readmission within 30 days of a previous discharge did yield a higher percentage of inpatients that died during that readmission stay, as opposed to the two other early readmission categories of no readmits or a readmission that occurred after 30 days of discharge. This finding reflects the heart failure readmission literature regarding morbidity and mortality of early readmission. Gender singularly did not produce statistically significant results. Racial background did produce statistical significance, with twice the number of white patients dying during hospitalization ($p < .0001$). However, when the pairing of gender and race are combined and tested, white males and females had nearly twice the likelihood of death during an inpatient stay ($p < .0001$) as their black counterparts, with white males having the highest rate of death, which contrasts with current readmission literature.

Overall, this study provides additional insight into the heart failure readmission paradigm, and highlights the need to continue to dedicate efforts in health disparities. In addition, this study illuminates the importance of transitions between hospital and community, and the need to carefully assess patients for the best discharge disposition. Linking the adequacy of continuing care arrangements in the face of heart failure, the potential comorbidities and complications is requisite for the continued reduction of readmission.

Conceptual and Research Model Findings

The conceptual model utilized for this study, *Situation Specific Theory of Heart Failure Self-Care*, provided a supportive framework regarding the discharge support characteristics. Riegel and Dickson's work in heart failure self-care focuses on the attributes of the support required to achieve the highest levels of independence with care. In persons with heart failure, repeated hospitalizations and early readmission have been attributed to a failure of the self-care process (p. 192). Self-care confidence was evaluated through the utilization of the Patient Activation Measure as a key facet within the research model. In addition, identification of those with low self-care ability, including confidence, skill and knowledge may provide additional support in discharge disposition planning, which are intrinsic to the research model utilized for this study.

The research model created and utilized during this study was a supportive framework, but not all of the relationships were confirmed by the study results. The Patient Activation level was utilized as the capacity of patient confidence within the research model. Patient Activation did not have the associations that were expected within the model; however, these findings must be couched within the context of a low number of respondents. Over 60% of the patient population scored within the PAM Level 1-2 category, revealing low activation, however this was not found to be associated with readmission. However, there were specific characteristics that were found to have significant associations within Patient Activation, particularly age, payer source, discharge disposition and type of admission hospital. There were no specific relationships between Patient Activation and early readmission or readmission patterns, or particularly within the facets that would directly relate to self-care aspects (number of medications, or type of heart failure).

Overall, the research model facilitated the study, but may need to be reformatted to better capture the self-care aspects (confidence, skill) of heart failure and how those are associated with early readmission and readmission patterns. Particularly the availability of community and hospital resources to assure the highest capabilities of self-care outcomes may inform the model to better define the complexities of the care continuum. Upon review of the research model, the following conceptual model has been developed to better define the transition points (white arrows) within the continuum of care. The dashed lines represent the diffusion amd multiplicity that may exist within the characteristics and how they are interrelated. A heart failure patient may experience multiple transitions between home, hospital environment and community resources. It is essential to identify the integral role that the patient study characterists (personal, support and clinical characteristics) create during this dynamic patient experience.

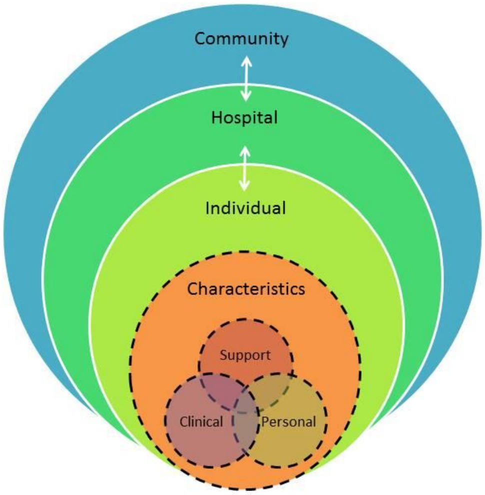


Figure 4. Heart Failure Self-Care Transitions Conceptual Model

Strengths and Limitations of the Study

This study is the first of its kind to specifically explore the heart failure population of Eastern North Carolina within a health system. Because of the different levels of hospitals within the system (both tertiary care and community), the study provides a rich environment to compare and contrast outcomes of urban and rural settings. In addition, the study provides a robust sampling of both white and black patients within the same study. As stated previously, the National Inpatient Sample (NIS) historically has been utilized for large-scale research. However, the NIS sample includes a dearth of black patients, as compared to white. This particular population in Eastern North Carolina affords a much more homogeneous representation. However, even with these study strengths, there are limitations that must be addressed.

The challenges that exist within clinical electronic documentation cannot be overstated. As an example, the prevalence of diabetes in this patient population was found to be 1.1% based off of ICD-9 coding completed in the health system medical record. In 2009 alone, twelve of the counties represented in this study had prevalence rates of Diabetes at greater than 11% (East Carolina University Center for Health Services Research and Development, 2009). It is difficult to discern whether there is actual low diabetes prevalence in this particular patient population, or coding errors or omissions that reached the clinical record. Unfortunately, the information regarding Ideal Life® telehealth services acceptance was not entered into the EPIC medical record, which would have offered an additional dimension of home health study and intervention.

During the study period, Registered Nurses who worked with the Telehealth home health team used the Patient Activation Measure as a screening tool for home health services. If a patient could not complete independently, the Registered Nurse would read the questions and prompt an answer. There is the potential for bias and interpretation as the questions are read, and answered. As over two-thousand patients did not complete the tool (per missing entries in the electronic medical record), it is difficult to ascertain how each Registered Nurse screened patients for inclusion and why so many patients did not receive and complete the tool during the study period. In addition, the number of missing patient activation instruments from the medical records of these patients may not afford statistical power to generalize these findings to this study population, or the heart failure population in general. The utilization of the Patient Activation measure as a means to assess patient confidence within the defined research model may be compromised within this particular study population.

Another limitation of this study was the patient population itself. Although this study had a robust distribution of white and black patients, this study was lacking in other diverse racial and ethnic backgrounds, such as Asian, Hispanic and Native American. It is critical that these patients and their unique needs are represented in future studies of heart failure patients in this region.

Implications and Recommendations for Nursing Practice, Education and Research

This next section will focus on the specific implications and recommendations based upon this study and the associated findings of the study, including nursing practice, education and research.

Nursing Practice

Nursing has a unique opportunity to contribute to a reduction in heart failure readmission. For decades, nurses have been eager to demonstrate their financial value and contribution within the healthcare marketplace. Patient education, specifically heart failure within the context of this study, and post-discharge home health visits by an RN provides an exceptional platform upon which to define that value. Specific core measures are in place that directly impacts an organization’s reimbursement strategy. As heart failure discharge education is one of the Centers for Medicare and Medicaid Services core measures, this research provides new information from which to improve patient assessment prior to discharge within this population. Having additional research, information and tools to better understand the challenges of heart failure readmission patterns and early readmission may serve as an adjunct for improved discharge planning.

In addition to readmission data, the knowledge of comorbidities that impact heart failure patients in Eastern North Carolina can provide essential information to care providers. Analysis of comorbidity prevalence and clusters within this study population may afford increased awareness of those conditions which may require additional monitoring. Specific comorbidity clusters identified within this study, particularly multiple comorbidities (P1), renal disease (P3) and urinary tract infection/electrolyte/vascular (P5), had higher than expected death during admission. These particular patients may be found to require additional support during their admission as additional monitoring resources upon discharge, and merits additional study within both the inpatient and outpatient settings.

Nursing Education

The emphasis on quality, outcomes, and healthcare economics must continue to move into formal nursing education programs. As new nurses move into practice, a solid understanding of their role in healthcare quality and reimbursement strategy becomes a requisite skill for successful transitioning. The financial aspects of nursing and healthcare, if not clearly understood during a period of transition from classroom to practice, can be overwhelming. The desire to care for the patient and family, within the constraints of organizational financial goals, may generate early feelings of frustration that must be managed carefully and appropriately. It is essential for nurses transitioning to practice to fully understand the quality metrics they are responsible for at the bedside, including readmission penalties and risks, and their role in mitigating those risks within their scope of practice.

Unfortunately, nursing students are infrequently afforded the opportunity to view nursing through a real-time integrated continuum of care. The roles within hospital and community are routinely isolated; historically, the work of both groups is not paired together. The opportunity to experience nursing through multiple venues simultaneously would be of tremendous value, and assist in the appreciation of each essential role and the significance to the patient, family and community. Collaborative practive and educational models may provide exceptional opportunities to eliminate a siloed approach to nursing education. It is critical that novice nurses entering clinical practice understand the roles that support patients outside of the hospital setting. The current paradigm involves nursing students following patients through the course of a hospital stay, or separately in the community setting. Availing students the opportunity to follow a patient from hospital to home harbors a significant benefit to a deeper understanding of the entirety of transition stressors and challenges.

In addition, it is critical to ensure that education and assessment of patient transitions are incorporated into simulation learning and clinical activities. The ability to fully appreciate and recognize the complexities of discharge upon heart failure patients and families must be practiced through a variety of didactic and tactile methods. The critical thinking that is required to create discharge education plans based upon personal, discharge support and clinical characteristics must be encouraged and developed throughout the nursing education continuum. Competency of assessing specific post-discharge care indicators is essential, just as students are expected to achieve competency in the art of assessing a hospitalized patient's subtle clinical status changes. Both skills are critical for ensuring optimal patient outcomes throughout the continuum of care.

Nursing Research

Never before has nursing had access to massive amounts of data, particularly for nursing outcomes research. The ability to capture entire healthcare organizations' and systems' information and translate into measurable changes and outcomes is on the horizon. As nursing leaders, it is essential that we work with those charged in building electronic health records (EHR's) to ensure that the nursing information captured is quantifiable, measurable and interoperable. The current challenges that impact nursing within the EHR platform exist within this "interoperability." Each organization tailors their nursing documentation in a way that is not standardized across organizations, states, or nationwide, which may be viewed as a failure of health information technology. Most nursing data currently entered into electronic health record platforms cannot be extracted for study, which creates significant challenges for nursing research. Complicating this even more, hospitals may have differing methods of identifying the same nursing care assessment, which further reduces the option of interoperability. The ability to provide a structured electronic process in which to evaluate nursing care and outcomes is a necessity. The analytics available to nurses and nursing leaders will continue to evolve and represents an additional opportunity to demonstrate nursing's value and importance to healthcare outcomes. It is essential that nursing documentation can provide the essence of practice no matter the location, and become a means of defining and measuring our work, outcomes and contributions to care. The opportunities in creating new nursing knowledge based on "big data" and standardized definitions cannot be overstated, and requires rapid evolution and acceptance.

There are additional opportunities for nursing research that exist within this particular patient population in Eastern North Carolina. Despite the focus on health disparity research, it is clear from the findings of this study that health disparities do and continue to exist. The associations of racial differences in discharge disposition, particularly for black men, continue despite focused attention in this area. There must be continued research on the health disparities that exist in this region, and the barriers that remain in place for healthcare equality. In addition to racial differences, the gender differences that exist within this study require additional research, particularly around heart failure itself. Men and women in this study were impacted by separate types of heart failure—men with higher percentages of systolic heart failure, and women with higher percentages of diastolic failure. This finding continues to support the recognition that men and women may suffer from different forms of heart disease, and that ongoing research is required to better understand and appreciate gender differences.

Lastly, the opportunities that are available to research and document value analysis related to nursing care and readmission reduction cannot be overstated. The number of nurse-sensitive quality indicators, such as heart failure discharge education, that directly impact the financial success of organizations should continue to generate study and assessment.

Summary

In summary, this study represents additional support for the importance of early readmission assessment and the importance of discharge transitions. Personal, discharge support and clinical characteristics have revealed associations that will continue to generate additional questions and nursing research within population health. Nurses and nursing leaders are in an exceptional position to positively impact reductions in readmission by thorough assessment and evaluation of patient condition, patient engagement, patient activation and discharge support systems. Reduction of risk, advocacy of patient needs and outcome support throughout the continuum of care are fundamental components of nursing practice

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APPENDIX A

IRB Approval

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Exempt Certification

From: Biomedical IRB
To: Elizabeth Rochin
CC: Elaine Scott
Date: 9/16/2015
Re: UMCIRB 15-001171
An Exploration of Patient Activation and Readmission in Eastern North Carolina

I am pleased to inform you that your research submission has been certified as exempt on 9/16/2015. This study is eligible for Exempt Certification under category #4 .

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.