# A COMPARISON OF THE INPATIENT MORTALITY AND 30-DAY READMISSION RATES OF HEART FAILURE PATIENTS

by

Freling S. Smith II



A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Doctor of Health Administration

University of Phoenix

The Dissertation Committee for Freling Smith certifies approval of the following dissertation:

A COMPARISON OF THE INPATIENT MORALITY AND

30-DAY READMISSION RATES OF HEART FAILURE PATIENTS

Committee:

Katherine Iaconetti, PhD, Chair

Francine Nelson, PhD, Committee Member

Fiona Sussan, PhD, Committee Member

Katherine Iaconetti, PhD

Francine Nelson, PhD

Fiona Sussan, PhD

Jeremy Moreland, PhD
Dean, School of Advanced Studies
University of Phoenix

Date Approved: August 26, 2014

ABSTRACT

Heart failure poses a significant public health issue in the United States, consuming a disproportionate share of the Centers for Medicare and Medicaid's annual expenditures (Ramani, Uber, & Mehra, 2010). The purpose of this retrospective quantitative study is to compare the inpatient mortality and 30-day readmissions for heart failure patients based on the patient's proximity to the hospital treated at either New York University Hospital (NYU), located in downstate NY with a very high population density, or Albany Medical Center (AMC), located in upstate NY in a less densely populated city. A subgroup analysis of race, socioeconomic status, and gender was completed to attempt to identify potential high risk groups. The hypothesis testing did not find a statistically significant overall difference in regard to 30-day readmission rates between the two hospitals or within any of the subgroup analyses. However, both hospitals had a significantly lower percentage of multiple admissions from patients residing in the distant quartile located farthest from the hospital as compared to heart failure patients residing in the distance quartile nearest the hospital. The study did detect statistically significant inpatient mortality differences in the socioeconomic status subgroup analysis between NYU and AMC as well as a difference in the overall study population. The study results add further empirical evidence to the existence of a "decay effect" of health care service utilization as patient proximity to those services decreases.

## DEDICATION

This dissertation is dedicated to my wife and my brilliant son. Know that you can accomplish anything with focus and belief in yourself.

This study is also dedicated to my finest teacher my late mother Margaret Smith. It grieves me that cancer robbed you of the opportunity to help celebrate this milestone.

Lastly, this dissertation is dedicated to Linda and my father. Without your constant support this doctoral journey would not have been possible.

ACKNOWLEDGEMENTS

I would like to acknowledge and thank my dissertation committee chair, Dr. Katherine Iaconetti as well as dissertation committee members Dr. Francine Nelson and Dr. Fiona Sussan for their feedback and encouragement. I would also like to express my sincere gratitude to my mentor Dr. Joseph Breault for all his support and encouragement during the completion of my dissertation.

I would like to acknowledge Dr. Mikhail Torosoff, and all those at Albany Medical Center, New York University Hospital and SPARCS who aided me in navigating the institutional processes, protocols, and review boards required to complete this study.

Lastly I would like to acknowledge all my professors at the University of Phoenix who helped me develop the necessary skill sets needed to complete this journey.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

## Chapter 1: Introduction to the Study

Chronic heart failure is the primary cardiovascular disease that continues to add to the increasing burden of hospitalization and financial drain on the United States health care system (Ramani, Uber, & Mehra, 2010). The American College of Cardiology and the American Heart Association use the same staging system to classify heart failure. Class I is pre-heart failure (Klapholz, 2009). The stage includes patients with certain risk factors associated with the disease (Klapholz, 2009). Class II, the next progressive stage of heart failure, is asymptomatic left ventricular dysfunction (Klapholz, 2009). Class III is symptomatic heart failure with fluid retention with or without dyspnea occurring at rest or from exertion (Klapholz, 2009). Patients with advanced heart failure, Class IV, are considered candidates for transplantation or assist devices (Ramani et al., 2010).

The profound impact of heart failure affects patients, the health care system, and society (Meyers, Grant, Lugan, Holbert, & Kvedar, 2006). Unfortunately, heart failure in the United States is a common condition. According to the National Heart Lung and Blood Institute (2010a), approximately 5.7 million people in the United States alone suffer from heart failure. Heart failure claims about 300,000 lives in the United States every year (National Institute of Health, 2010). As of 2010, there is no medical cure for heart failure; however, medications and lifestyle modifications can help heart failure patients live longer and more productive lives (National Institute of Health, 2010).

Heart failure is one of the principal causes of mortality and hospitalization in the United States (Esposito, Bagchi, Verdier, Bencio, & Kim, 2009). Treating heart failure consumes a disproportionate segment of the Centers for Medicare and Medicaid (CMS) annual budget (CMS, 2005). Approximately 14% of Medicare heart failure beneficiaries exhaust an astounding 37-50% of Medicare expenditures (American Heart Association, 2008b; Esposito et al., 2009). A significant percentage of heart failure expenditures result from hospitalization, often within 30 days of a patient's initial discharge (Jencks, Williams, & Coleman, 2009). Hospital readmissions within 30 days are becoming increasingly more important to a hospital's financial wellbeing, as CMS is not reimbursing hospitals for conditions unless a new diagnosis justifies the readmission. Many authorities speculate that CMS will in the future include heart failure as one of those conditions ("Scrutinize your readmissions," 2010; Woodson & Jenkins, 2010).

The study investigated whether there were differences in heart failure inpatient mortality and 30-day readmission rates based on proximity to a teaching hospital, comparing patients in densely populated areas with those in less populated areas. Chapter 1 supplies the framework for the current research study. The background of the problem is established and the problem statement, purpose, significance of the study, nature of the study, hypotheses, and theoretical framework is identified in the chapter. Provided in Chapter 1 are the definition of terms, assumptions, scope, limitations and delimitations of the proposed research study.

## Background of the Problem

Heart failure is a condition characterized by the heart's inability to pump an adequate amount of blood and oxygen to the body (American Heart Association, 2010a.). Nearly 5 million people live with heart failure in the United States, with approximately 550,000 people newly diagnosed with heart failure each year (Centers for Disease Control and Prevention [CDC], 2010a). Of the millions afflicted with heart failure, roughly 80% of the patients are 65 years of age or older (Titler et al., 2008).

**Cost of heart failure.** In 2006, the CDC (2010a) estimated costs associated with heart failure to be $29.6 billion. The costs related to the treatment of heart failure exceed the costs associated with lung and breast cancer combined (Titler et al., 2008). The Medicare diagnosis-related group (DRG) code for the reimbursement of heart failure often does not cover the average hospital expenditure. Researchers found that hospitals lost an average of $1000 per hospitalization for heart failure patients (Titler et al., 2008).

Heart failure is the disease state with the highest rate of hospitalization in the Medicare population (National Heart Lung and Blood Institute, 2010b). Medicare patients with heart failure consume a disproportionate amount of CMS's resources (Esposito et al., 2009). According to the American Heart Association (2008b), heart failure patients with Medicare benefits consumed 37% of the annual Medicare reimbursement and exhausted 37-50% of the total annual Medicare inpatient dollars (Esposito et al., 2009).

**Distance from hospital.** In a study conducted in China, Ali et al. (2007) found disparities in mortality rates between patients residing in urban and rural areas. The authors reported that the mortality rates increased as the distance from an urban center increased (Ali et al., 2007). Yamashita and Kunkel (2010) also found an inverse correlation between disease mortality and proximity to the hospital while studying heart failure patients in Ohio. Heart disease mortality rates increased as the proximity to the nearest hospital decreased.

**Race.** Heart failure occurs most often in the African American population as compared to any other ethnic group in the United States (National Heart Lung and Blood Institute, n.d.). African Americans are more apt to develop both more severe heart failure and heart failure at an earlier age than any other racial group in the United States (National Heart Lung and Blood Institute, n.d.). Heart failure hospitalizations occur more frequently in African American Medicare beneficiaries as opposed to Caucasian Medicare beneficiaries (CDC, 2010a). However, in a recent study, Gaskin et al. (2008) did not find a difference in the quality of care between Caucasians and minorities in the inpatient hospital setting.

**Socioeconomic factors.** Numerous researchers found an inverse correlation between socioeconomic status and heart failure mortality (Ali et al., 2007; DeWalt et al., 2009; Harris, Aboueissa, & Hartley, 2008). Philbin, Dec, Jenkins, and DiSalvo (2001) found that socioeconomic status was an independent risk factor for heart failure hospital readmission. The most economically disadvantaged patients use hospital services at a significantly greater rate than higher socioeconomic classes (Brameld & Holman, 2005).

**Gender.** According to the National Heart Lung and Blood Institute (n.d.), the incidence rate of heart failure was greater for men than for women. Nonetheless, because women tend to live longer than men do, there are more women living with heart failure as compared to men. When compared to men, women with heart failure also have a better long-term prognosis and survival rate (Konhilas, 2010). Theories to explain why women with heart failure have better survival rates than men have traditionally revolved around gender differences in the incidence rates of co-morbidities such as ejection fraction (Konhilas, 2010). Azevedo (2008) asserts that further research is needed to ascertain if gender-related pathophysical differences merit sex specific management of heart failure.

## Statement of the Problem

Despite recent therapeutic and medical device advances in treatment, heart failure is fatal. Nearly 50% of patients will succumb to the disease within 5 years after becoming symptomatic (Banasiak, 2008). There has been little quantitative research exploring the question of inpatient mortality and 30-day readmission rates of heart failure patients based on proximity to the hospital in densely populated areas and how that differs from that of heart failure patients based on proximity to the nearest hospital in less densely populated areas.

Used in the study was a retrospective quantitative design to identify differences between the inpatient mortality and 30-day readmission rates of heart failure patients based on proximity to two teaching hospitals. One hospital, New York University (NYU), is located in a densely populated area while the other hospital, Albany Medical Center (AMC), is located in a less densely populated area. Presented in the comparison was quantitative data concerning the need to offer heart failure services in proximity to the patient.

## Purpose of the Study

The purpose of the quantitative retrospective research study was to identify the differences in inpatient mortality and 30-day readmission rates for heart failure at two teaching hospitals, NYU and AMC. The study compared the inpatient mortality and 30-day readmission rates of heart failure patients based on proximity to the two hospitals: NYU, located in a densely populated area with a city population of 8,214,426; and AMC, located in a less densely populated area with a city population of 93,963 (U.S. Census Bureau, 2010). NYU and AMC are both teaching hospitals in New York, accredited by the Joint Commission (TJC). An analysis by demographic subgroups using the same state data from the United States Census was also calculated.

The study compared the 30-day re-hospitalization and inpatient mortality rates for patients hospitalized with heart failure at NYU and AMC from 2005 to 2009. Inpatient hospital records for each hospital submitted to the Statewide Planning and Research Cooperative System (SPARCS) database composed the study data. The SPARCS database collects and stores unaltered patient level data for all Article 28 hospitals in the State of New York (New York State Department of Health, 2007). This quantitative correlational study quantified the relationship between the independent variable of patient proximity to either NYU or AMC and the dependent variables which are inpatient mortality and 30-day readmission rates.

**Significance of the Problem**

Heart failure is a progressive chronic disease in which the heart cannot pump sufficient amounts of blood through the body. The deficiency of blood flow is detrimental to health because it results in the inability to keep up with the body's blood and oxygen requirements (American Heart Association, 2010a). Heart failure poses a significant public health issue, as heart failure is the most common cause of hospitalization for patients over the age of 65 (Liao, Allen, & Whellan, 2008). Up to 70% of the costs to treat heart failure can be attributed to the costs associated with hospitalizations (Liao et al., 2008). Reported heart failure readmission rates are as high as 50% within 6 months in different populations (Stromberg, 2005).

In 2009, TJC instituted performance measurement initiatives called core measurement areas that define areas needing improvement in hospitals. All four of the initial core measurement areas were associated with a high mortality rate in the hospital setting. Heart failure was one of the initial core measurement areas defined by TJC (TJC, 2008).

**Significance of the Study**

Cardiovascular disease, in terms of patient outcomes and hospitalization expenditures, is one of the largest cost drivers in the United States health care system. In 2006, the United States health care system spent approximately $403.1 billion treating patients with cardiovascular disease (Hickman, 2007). The costs associated with cardiovascular disease have continued to balloon, with 2010 costs estimated to be $444 billion. In 2010, approximately $1 out of every $6 spent on health care was used to treat cardiovascular disease in the U.S. (CDC, 2010b). Thus, examining ways to decrease this enormous expenditure of treating patients with cardiovascular disease is critical.

Heart failure is associated with a high rate of hospitalization and re-hospitalization in the Medicare population. In fact, despite recent advances in the treatment of cardiovascular disease, heart failure is the foremost reason for hospitalization in the elderly population (Gardetto & Carroll, 2007). Studying readmission for heart failure is important in that it may offer health care providers and health care administrators data about the delivery of health care to heart failure patients. Specifically, the study offered important empirical information about whether distance from the hospital significantly affects heart failure inpatient mortality and 30-day re-hospitalization rates as well as empirical information which suggested hospitals should consider investing in outreach programs or building satellite heart failure clinics in the surrounding communities to improve patient care.

The burden of heart failure falls primarily on the elderly (Liao et al., 2008). The consequence is that the government is responsible for financing a large percentage of heart failure treatments because most United States citizens are eligible for Medicare health benefits once they reach the age of 65 (CMS, 2005).

Heart failure patient care delivery will continue to be a significant public health issue as members of the Baby Boomer generation begin to qualify for and use Medicare. Heart failure is a progressive disease in which incidence increases with age. Less than 1% of individuals in the 20 to 39 age group suffer from heart failure whereas over 20% of individuals over the age of 80 have a diagnosis of heart failure (Jugdutt, 2010). Three principal risk factors help to explain the increased prevalence of heart failure in the elderly population: the human body deteriorates over time, cumulative exposure to other cardiac risk factors, and co-morbidities, such as hypertension (Jugdutt, 2010).

**Significance of the Study to Leadership**

Health care spending in the United States grew exponentially over time. Health care expenditures consumed approximately 17% of the nation's gross domestic product in 2007 (Getzen, 2007). Consequently, both the CMS and third party payers advocate pay-for-performance initiatives to enhance health care quality (Hickman, 2007). The pay-for-performance reimbursement model rewards hospitals with outstanding quality outcomes with higher reimbursements. Hospitals with exceptional quality outcomes are ready to capture market share from competing hospitals with lower quality outcomes. Hospitals with poor quality outcomes could have reimbursements reduced by 10% to 20% (Hickman, 2007).

The CMS requires hospitals, as of 2008, to report heart failure readmissions rates occurring within a 30-day period. Heart failure 30-day readmissions rates are a CMS quality metric. The CMS currently posts hospital readmission rates for heart failure on the Hospital Compare website ("Scrutinize your readmissions," 2010). Hibbard, Stockard, and Tusler (2005) reported that hospital quality scores had a significant effect on the public's perception of a hospital. Hibbard et al. (2005) also reported that approximately 70% of consumers who were aware of the hospital quality scorecard planned to share the information with others. Therefore, achieving high ratings on quality report cards may become an increasingly important benchmark for hospital administrators to be aware of and monitor. Identified in the study was whether hospitals with a wide catchment area for heart failure patients, in which patients travel long distances to the hospital, were at a disadvantage when benchmarked against hospitals with a narrow catchment area for heart failure patients, where most patients do not travel a large distance to the hospital.

Heart failure is one of the most costly chronic illnesses in industrial countries. The costs of treating heart failure patients in the United States were approximately $30.2 billion in 2007 (Liao et al., 2008). Lloyd-Jones et al. (2010) estimated that in 2010 the United States would spend approximately $39.2 billion to treat heart failure. Inpatient hospital services are the primary cost driver for heart failure (Whellan, Greiner, Schulman, & Curtis, 2010). Liao et al. (2008) attributed approximately 70% of the costs of treating heart failure patients in the United States to inpatient services.

The CMS is the largest payer in the United States health care system. A 1999 calculation by CMS estimated that the government's share of health care expenditures was approximately 45.2% (Bitton & Kahn, 2003). The CMS is also a significant payer in the hospital sector.

The reimbursement for the Medicare heart failure DRG code often is not enough to cover the average hospital expenditure. Titler et al. (2008) found that it costs hospitals an average of $1000 per hospitalization to treat a heart failure patient. The study helped to ascertain if hospitals with a wide catchment area were at a financial disadvantage when compared to hospitals with a narrow catchment area when treating heart failure patients.

The CMS began an initiative to improve patient care quality and reduce spending by instituting a new policy in 2008 concerning *never events*. Never events are events that officials at CMS assert should never have happened. Never events are always attributable to human error or health care providers not following standard national guidelines. The CMS will no longer reimburse never events because the event should never have occurred (Woodson & Jenkins, 2010). Speculation exists that in the near future CMS will add heart failure readmission rates within 30-days to its list of non-reimbursable never events ("Scrutinize your readmissions," 2010; Woodson & Jenkins, 2010). Section 3025 of the 2010 Patient Protection and Affordable Care Act established a reduction in Medicare reimbursement for hospitals with a high rate of preventable Medicare readmission rates beginning October 1, 2012 (U.S. House of Representatives, 2010).

## Nature of the Study

The study was a quantitative correlation analysis designed to measure the relationship between the independent variable of patient proximity to a teaching hospital and inpatient mortality and 30-day readmission rates, which were the study's dependent variables. A separate subgroup analysis of race, socioeconomic status and gender was performed to learn how the independent variable of patient proximity to a teaching hospital will affect the dependent variables of inpatient mortality and 30-day readmission rates of heart failure patients. The research study employed a log-linear model to evaluate the relationship between the variables.

The study population consisted of heart failure patients hospitalized between 2005 and 2009 at NYU or AMC. The two teaching hospitals chosen for the study, NYU and AMC, are both TJC accredited, teaching institutions with cardiac fellowship programs in New York State. NYU is in downstate New York, which is a densely populated area. AMC, conversely, is in upstate New York in a much less densely populated area.

The study data collection tool was the SPARCS database. SPARCS, established in 1979 under section 28.16 of the New York Public Health Law, is a public database that originated as a cooperative effort between the State of New York and the health care industry (SPARCS, 2007b). Mandated in the law is that all Article 28 hospital-based ambulatory surgery facilities submit the directed inpatient and outpatient data requested (New York State Department of Health, 2007). NYU and AMC are both hospital-based ambulatory surgery facilities and as such are appropriate for comparison in the current study.

**Overview of the Research Method**

A retrospective design empowers a researcher to use existing data to investigate questions. A retrospective design is appropriate as it looks back in time to use historical data to make observations and suppositions (Euser, Zoccali, Jager, & Dekker, 2009). A researcher using a retrospective design can collect data over a long period and capture a large number of subjects, which can potentially yield rich and meaningful information (Hulley, Cummings, Browner, Grady, & Newman, 2006).

A qualitative design is appropriate when the researcher seeks to explore a phenomenon which is poorly understood. The qualitative approach employs open ended questions to capture the views and perceptions of study participants in order to gain a greater understanding of the investigational phenomenon (Marshall & Rossman, 2011). A qualitative design is not suitable when the research variables are specific, known, and observable (Creswell, 2009).

A mixed design incorporates both quantitative and qualitative methodology to answer a research question (Hesse-Biber, 2010). The mixed method design was not appropriate since this methodology incorporates qualitative methods. The study did not seek to generate a theory about a phenomenon through inductive qualitative research (Creswell, 2005).

**Overview of the Design Appropriateness**

A correlational quantitative design was appropriate because researchers using quantitative studies seek to describe or explain relationships among variables (Blum, 2009). Researchers use correlational studies with statistics to ascertain the frequency at which variables vary in a consistent manner (Creswell, 2005). Quantitative researchers seek to answer specific research questions using observable and measurable data to describe variables (Merriam, 2009). Quantitative researchers use data collection instruments with predetermined questions and answers, which have proven reliability and validity (Merriam, 2009).

A quantitative design was appropriate for the study because it empowered the researcher to examine the relationship between proximity and the demographic variables of race, gender, and socioeconomic status. The correlational design allowed the researcher to measure the degree of association between hospital proximity and the inpatient mortality and 30-day readmission rates for each of the sub-groups.

**Research Questions and Hypotheses**

Sought in the study was the need for empirical data to investigate the relationship between proximity to the hospital and the inpatient mortality rates and 30-day readmission rates of heart failure patients. Patient proximity to the hospital was reflected the distance between the hospital and the center of the zip code where the patient resided. The study addressed two research questions:

1. What is the difference, if any, in the 30-day inpatient mortality rates of patients hospitalized with heart failure based on proximity to the hospital?
2. What is the difference, if any, in the 30-day readmission rates of patients hospitalized with heart failure based on proximity to the hospital?

The research study tested eight hypotheses.

$H1_0$: There will not be a significant difference in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H1_a$: There will be a significant difference in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H2_0$: There will not be a significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H2_a$: There will be a significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H3_0$: There will not be a significant difference in regard to race in the inpatient mortality readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H3_a$: There will be a significant difference in regard to race in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H4_0$: There will not be a significant difference in regard to race in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H4_a$: There will be a significant difference in regard to race in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H5_0$: There will be not be a significant difference in regard to socioeconomic status in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H5_a$: There will be a significant difference in regard to socioeconomic status in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H6_0$: There will be not be a significant difference in regard to socioeconomic status in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H6_a$: There will be a significant difference in regard to socioeconomic status in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H7_0$: There will not be a significant difference in regard to gender in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, is in a less densely populated area with a city population of 93,963.

$H7_a$: There will be a significant difference in regard to gender in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H8_0$: There will not be a significant difference in regard to gender in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, is in a less densely populated area with a city population of 93,963.

$H8_a$: There will be a significant difference in regard to gender in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

Each hypothesis investigated if patient proximity to the hospital affected the inpatient mortality and 30-day readmission rates for heart failure patients in each of the aforementioned sub-groups. Each hypothesis also investigated if population density affected the inpatient mortality and 30-day readmission rates for heart failure patients in each of the specified sub-groups. Each of the sub-groups, race, socioeconomic status and gender, have been shown to be independent risk factors for heart failure patients (National Heart Lung and Blood Institute, n.d.; Philbin, Dec, Jenkins, and DiSalvo, 2001; Azevedo, 2008).

**Theoretical Framework**

Past researchers demonstrated differences in mortality rates as the proximity of the nearest hospital decreases (Ali et al., 2007; Harris et al., 2008); between African Americans and Caucasian Americans (CDC, 2010a; National Heart Lung and Blood Institute, n.d.); between differences in gender (National Heart Lung and Blood Institute, n.d.); and with differences in socioeconomic status (Ali et al., 2007; DeWalt et al., 2009; Harris, et al.; Philbin et al., 2001). Investigators noted both race and gender differences in heart failure mortality and morbidity (National Heart Lung and Blood Institute, n.d.). Past researchers also revealed socioeconomic disparities in the mortality rates of heart failure patients (Philbin et al., 2001).

Yamashita and Kunkel (2010) described the “decay effect” distances had on health care service utilization. The decay effect phenomenon is an inverse relationship between patient health care utilization and the distance to the nearest health care facility (Yamashita & Kunkel, 2010). Specifically, as the distance to the nearest health care facility increases, patient health care utilization rates decline (Yamashita & Kunkel, 2010). Proximity to the hospital is one of the theoretical constructs of the proposed study. Specifically that as patient distance from the hospital increases; heart failure 30-day readmission rates will decline.

Although Yamashita and Kunkel (2010) suggested that as the distance to the nearest hospital increased the mortality rates tended to improve, this benefit may be provisional. McClellan, McNeil, and Newhouse (1994) found that Medicare patients suffering a myocardial infarction living less than 2.5 miles from a hospital were more likely to receive more intense care and had a significantly greater mortality rate within the first 24 hours as compared to patients living more than 2.5 miles away from the hospital suffering from a myocardial infarction. However, the long-term mortality rate benefit between the two groups evens out within a year. It is important to note that the McClellan et al. studied patients with an acute disease as opposed to the typically chronic course of heart failure.

In terms of proximity to health care services and patient mortality, acute diseases have been studied extensively (Sabit et al., 2008; Yamashita & Kunkel, 2010; Yantzi, Rosenberg, Burke, & Harrison, 2001). In contrast, the relation between proximity to health care services and mortality for patients with chronic disease is meager. One potential reason for this discrepancy is the nature of acute disease. By definition acute diseases require immediate intervention, whereas the impact of chronic illness tends not to be immediate.

The current study homogenized hospital type to determine if proximity to the hospital is an independent risk factor for heart failure mortality. Past researchers that investigated mortality rates for heart failure patients based on distance to the nearest hospital included both rural and metropolitan hospitals as well as community and teaching hospitals (Harris et al., 2008). To date, no formal empirical research exists to determine if proximity to the hospital influences inpatient mortality and 30-day readmission rates for heart failure patients who receive treatment at a teaching hospital. The current study built on past research by examining two teaching hospitals in New York State; one hospital located in the densely populated area of downstate New York and one hospital located in the less densely populated area in upstate New York. The study provided empirical data to examine the relationship between distance from the hospital and race, gender, and socioeconomic status of the patient.

## Definition of Terms

The definitions of the following terms will afford readers with a familiarity of words and phrases used throughout the study. The chosen terms are relevant to the subject matter of the study. The definitions of terms will help to eliminate ambiguity.

*Centers for Disease Control and Prevention (CDC).* The CDC is a federal governmental agency whose mission is "collaborating to create the expertise, information, and tools that people and communities need to protect their health- through health promotion, prevention of disease, injury and disability, and preparedness for new health threats" (CDC, 2010d, para. 1).

*Decay Effect.* Decay effect is an inverse relationship between health care utilization and distance to the nearest health care facility (Yamashita & Kunkel, 2010.

*Diagnosis-related group (DRG).* A DRG is a prospective Medicare payment that reimburses an institution for all of a patient's services and treatments rendered during his or her hospital stay (Getzen, 2007). Prospective DRGs allow the government to contain costs because the intersection of supply and demand, which typifies a normal competitive market does not determine price (Getzen, 2007).

*Heart failure.* Heart failure is a condition characterized by the heart's inability to pump an adequate amount of blood and oxygen to the body (American Heart Association, 2010a).

*Hypertension.* Hypertension is either systolic blood pressure equal to or greater than 140 mmHg or diastolic blood pressure equal to or greater than 90 mmHg (U.S. Department of Health and Human Services, 2004).

*Internal Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).* The ICD-9-CM is a standardized medical coding system used in the United States to code patient diagnoses and procedures while in the hospital (CDC, 2010c)

*Ischemic Heart Disease.* Ischemic heart disease is a condition usually caused by a narrowing of the arteries where the heart muscle does not receive normal blood and oxygen flow (American Heart Association, 2010c).

*The Joint Commission (TJC).* TJC is a nonprofit, non-governmental agency that functions to provide voluntary accreditation to health care facilities (Carroll, 2004). "The mission of the Joint Commission is to continuously improve the safety and quality of care provided to the public through the provision of health care accreditation and related services that support performance improvement in health care organizations" (Joint Commission on Accreditation of Hospitals, 2009, "1999," para. 36).

*JNC 7.* JNC 7 are national guidelines concerning the prevention, detection, evaluation, and treatment of high blood pressure issued by the United States Department of Health and Human Services (U.S. Department of Health and Human Services, 2004).

*Left Ventricular Ejection Fraction (LVEF).* Left Ventricular Ejection Fraction is the amount of blood the left ventricle of the heart propels out with each contraction. The normal LVEF range is between 55 and 70 (American Heart Association, 2010b).

*National Institute of Health (NIH).* The NIH is a U.S. Federal Governmental agency that is the steward of medical and behavioral research for the Nation. Its mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and application of that knowledge to extend healthy life and reduce the burdens of illness and disability (NIH, 2010, para. 1).

*New York Heart Association functional class.* The New York Heart Association (NYHA) functional classification system categorizes heart failure patients based on patient symptoms (Heart Failure Society of America, 2002). The patient's symptoms progress and become more debilitating as a patient moves from NYHA Class I to the most incapacitating Class IV (Heart Failure Society of America, 2002).

*SPARCS.* The Statewide Planning and Research Cooperative System (SPARCS) database collects health care biometrics from Article 28 acute care hospitals in New York State for research as a tool to promote public health (SPARCS, 2007a). The New York State Department of Health manages the SPARCS database (New York State Department of Health, 2007).

## Assumptions

Assumed in the current study is that officials from participating teaching hospitals truthfully and accurately reported their heart failure patient data to the SPARCS. All non-Federal acute hospitals in New York State have a legal mandate to report data elements requested by SPARCS, including heart failure (SPARC, 2007b). Hospital leaders that fail to comply with this legal mandate could have their CMS reimbursements lowered (SPARCS, 2009). A second assumption was that heart failure patients return to the hospital, NYU or AMC, where initially treated for any additional health care services needed. In a retrospective analysis of Medicare data, Kind, Bartels, Mell, Mullahy, and Smith (2010) found that 78% of patients returned to the same hospital of their initially treatment.

## Limitations

The scope of the current study was the comparison of inpatient mortality and 30-day readmission rates of heart failure patients between two teaching hospitals. NYU is located in a densely populated area with a city population of 8,214,426. AMC is located in a less densely populated area with a city population of 93,963. A study limitation was the comparison of only two teaching hospitals in New York State with heart failure programs. The researcher did not attempt to measure or estimate patient travel time to the hospital. It is theoretically possible that a patient living in a densely populated area in proximity to the hospital will have a longer travel time than an individual living in a less densely populated area residing further away from the hospital. A third limitation highlighted in the gender section of the literature concerned the longevity of women with heart failure. Previous researchers were unclear as to whether the gender differences were because of earlier diagnosis or other factor. Jarrett, Bellamy, and Adeyemi (2007) discovered that women were more prone to seek health care services as compared to men.

Another study limitation was the self-reporting of each hospital's respective inpatient and outpatient heart failure data to the SPARCS database during the collection period of the study. The proposed study was confined to the SPARCS database as opposed to applying directly to NYU and AMC for their heart failure data. The study limited itself to only two teaching hospitals in the State of New York. A final limitation of the study was the potential for heart failure patients initially treated at either NYU or AMC to go to a different hospital if they required readmission because their disease. In an analysis of 16,662 Medicare patients, Kind et al. (2010) found that 22% of Medicare readmissions were to a different hospital.

From an historical perspective, the only potential limitation identified was an administrative change in the cardiovascular departments in both hospitals. During the study investigational period both AMC and NYU underwent an administrative change to their respective cardiovascular departments. In 2001 the Director for the Division of Cardiology at NYU changed from Dr. Arthur Fox to Dr. Glenn Fishman (J. Holt, personal communication, May 8, 2012). At AMC, Dr. Edward Philbin replaced Dr. Robert Capone as the Director of the Division of Cardiology in 2002 (A. Evans, personal communication, May 7, 2012).

## Scope

Because the scope of the study only involved two teaching hospitals, it was not possible to generalize the study results to all teaching hospitals. However, the research study may serve as an important indicator that proximity to the hospital is an independent risk factor. The research study may also help to identify sub-populations of heart failure patients who are at increased risk as their proximity to the hospital decreases.

## Delimitations

The study was confined to identifying the distance at which the “decay effect” occurred at NYU, located in a high density area, and AMC, located in a low density area.

The investigation was not designed to compare quality of care between the two teaching hospitals as this is beyond the scope of the study.

**Summary**

The elderly population in the United States continues to grow in number. The increase may result in an increased incidence of heart failure mortality, morbidity, and hospitalization, which in turn will produce an added financial strain on the United States health care system (Jugdutt, 2010). The average annual inpatient cost for Medicare patients with severe heart failure is drastically higher than that of the typical Medicare patient, $24,000 versus $3,000 respectively (American Heart Association, 2010a). The costs associated with heart failure in the United States alone are approximately $39.2 billion for 2010 (Lloyd-Jones et al., 2010). The primary cost driver of heart failure expenditure is inpatient services (Whellan et al., 2010).

The purpose of the retrospective quantitative study was to compare the inpatient mortality and 30-day readmission rates of hospitalized heart failure patients based on proximity to NYU, which is in a densely populated area with a city population of 8,214,426 with the inpatient mortality and 30-day readmission rates of hospitalized heart failure patients based on proximity to AMC, which is in a less densely populated area with a city population of 93,963. The objective of the study was to discover if patient proximity to hospital influences 30-day heart failure inpatient mortality and 30-day readmission rates. The analysis by the researcher attempted to determine if there were differences between 30-day heart failure inpatient mortality and 30-day readmission rates based on patient race, socioeconomic status, and gender.

Chapter 2 is a review of the pertinent literature as it relates to the independent variable, the dependent variables, and the identified patient populations. Chapter 2 includes a review the 30-day heart failure inpatient mortality and 30-day readmission literature pertaining to hospital proximity, race, socioeconomic status, and gender. The chapter contains a demarcation between the significance and rationalization of the research study.

# Chapter 2: Review of the Literature

Heart failure is a major public health issue that presents a significant challenge for cost-effective health care delivery for the elderly. The number of hospitalizations increases heart failure treatment costs (Lee, Chavez, Baker, & Luce, 2004). A diagnosis of heart failure is associated with high mortality rates and high morbidity rates. Aranda, Johnson, and Conti (2009) reported that approximately 60% of Medicare patients hospitalized with heart failure were rehospitalized at least once within the first 6 to 9 months after the initial hospitalization. Between 2002 and 2004, heart failure accounted for about 28% of the re-hospitalizations for all Medicare patients (Aranda et al., 2009). Revealed in the literature examined was the relationship between both mortality and 30-day readmission rates of patients with chronic illness to hospital proximity was sparse, particularly for heart failure. Sought in the current study was addition to the limited research by investigating the relationship between the proximity to the hospital, race, socioeconomic status, and gender with the mortality rates and 30-day readmission rates of hospitalized heart failure patients.

Presented in Chapter 2 is a literature review supporting a framework of the recent research examining the effect that patient distance from a hospital has on inpatient mortality rates and 30-day readmission rates. The literature review partitions the information in Chapter 2 into four sections. The first section includes a review of the relationship between patient proximity to health care services with mortality and morbidity. The remaining sections include reviews of the pertinent literature relating to the study's heart failure sub-populations; race, socioeconomic status and gender. The literature review explored cardiovascular disease as well as the relationship of both acute and chronic illness in regard to proximity, because of the limited data on the relationship between patient proximity to health care services and heart failure.

## Title Searches, Articles, Research Documents, and Journals

The literature review conducted for the current study was an exhaustive survey of the several databases. The current study includes literature from peer reviewed journals and scholarly textbooks. Access to the peer-reviewed journals used for the study was from the PubMed.gov and EBSCOHost databases. The following key words were used to search the databases: *distance, proximity, heart failure, hospital, hospitalization, readmission, re-hospitalization, chronic disease, African American, Black, socioeconomic status,* and *gender.* Reviewed in the section is each topic relating to the study problem, research questions, and global objective.

Heart failure morbidity is also examined in the literature review. Specifically, the literature review included heart failure morbidity studies where hospitalization was an endpoint as well as heart failure research that examined both morbidity and mortality as co-primary study endpoints. The literature review also included heart failure morbidity research in the subpopulations examined in the present study that may be at higher risk.

## Literature Review

### Proximity

Much of the literature pertaining to the relationship between proximity to health care services and mortality involved studies on a patient population with acute illness. Researchers conducted numerous studies to examine the effect that distance from health care services has on patient health and well-being (Sabit et al., 2008; Yamashita & Kunkel, 2010; Yantzi, Rosenberg, Burke, & Harrison, 2001). Revealed by the researchers was how proximity to health care services influenced acute conditions, emergency room utilization, and cardiac disease (Lee et al., 2007; Wei et al., 2008; Yamashita & Kunkel, 2008). Researchers looked at and defined proximity in terms of rural versus urban communities, regionally, and in terms of the degree of hospital specialization (Harris et al., 2008; Popescu, Nallamothu, Vaugh-Sarrazin, & Cram, 2008). One hypothesis put forward by Tonelli et al. (2007) was that as a patient's proximity to a health care institution decreased, the patient's risk of death would increase.

International scholars studied the conceptual framework that as the distance to health care facilities increases, the risk of mortality increases respectively. Kazembe, Kleinschmidt, and Sharpe (2006) conducted a study using spatial modeling to evaluate hospitalization and inpatient mortality of malaria patients in Africa. The authors reported a statistically significant increase in hospitalization and patient mortality resulting from malaria as the distance from a health care facility increased (Kazembe et al., 2006).

A wealth of researchers investigated the impact proximity to the nearest hospital had on cardiac patient mortality rates (Graves, 2010; Krumholz et al., 2009; Lipley, 2008). Wei et al. (2008) reported strong evidence that the proximity of the admitting hospital affected the mortality rates of patients experiencing their first myocardial infarction. The study investigators looked at the relation between patients experiencing a myocardial infarction and the distance the patient traveled between their home and the admitting hospital (Wei et al., 2008). The researchers used data from a regional database to gather information from acute care hospitals in a geographical area of about 4600 square miles from 1994 to 2003 (Wei et al., 2008). Despite adjusting for living in a rural setting, Wei et al. found a statistically significant association between the distance from the patient's home and the admitting acute care hospital with respect to patient mortality. The decline in patient mortality as patient proximity to the admitting hospital decreased was statistically significant both before and after patient hospitalization. However, patient proximity to the hospital did not affect patient mortality once the patient reached the hospital for this acute event (Wei et al., 2008).

Evidence exists to support the hypothesis that distance to hospital and mortality have a strong correlation with one another. Using myocardial infarction information from the United States Census, the CDC database, and the American Hospital Association, Graves (2010) used a multiple regression analysis to look at how the association of proximity to hospital, race, socioeconomic status, and education affected mortality in Alabama and Mississippi. Graves, contrary to Wei et al. (2008), found no significant correlation between proximity to hospital and the mortality of patients suffering from a myocardial infarction. Graves, however, did find a significant relation between mortality and socioeconomic status, education, and race.

In a study of patients treated in Pennsylvania and Virginia hospitals, Clarke, Davis, and Nailon (2007) found that heart failure patients living in closer proximity to the hospital had a lower mortality rate than those patients living at greater distances. The researchers used patient billing data to collect information on patients between 1998 and 1999 (Clarke et al., 2007).

Harris et al. (2008) used a geographic information system, which could measure distance, to examine myocardial infarction and heart failure hospitalization rates in Maine. The researchers found an inverse relation between distance to the hospital and hospitalization rates (Harris et al., 2008). Specifically, Harris et al. (2008) found heart failure patients living in closer proximity had more hospitalizations. The investigators hypothesized that this inverse relation was not necessarily an indication that patients residing in communities at greater distances from the hospital had better health or health care services (Harris et al., 2008). Rather, the researchers offered two potential reasons for the finding. First, the investigators speculated that patients residing in distant areas were simply less likely to request hospitalization because of the commute (Harris et al., 2008). Arcury et al. (2005), while studying health care in rural Appalachia, reported that distance to health care services influenced health care utilization. The individuals living a greater distances from health care services were less likely to use the health care services. Conversely, increased proximity to health care renders health care more accessible. The second reason put forth was that the primary care physicians living in remote communities might be reluctant to admit their patient to a distant hospital (Harris et al., 2008).

**Rural/urban.** Researchers examined the association between proximity to the hospital and mortality by looking at the patient's place of residence. More specifically, researchers investigated whether there is a difference in mortality for those patients living in a rural community, with a presumed longer travel distance to the nearest hospital, as compared to patients residing in an urban community, with a presumed shorter travel distance to the nearest hospital. Members of the Institute of Medicine (2004) prioritized research in rural populations to determine if this population is more likely to suffer inferior health outcomes. Researchers speculated that patients residing in rural communities might be at a disadvantage when suffering from medical conditions that required immediate and specialized treatment. For example, when suffering a myocardial infarction the patient residing in a rural community may be at greater risk because of the longer travel distances to obtain care. Ross et al. (2008) asserted that patient outcomes for conditions such as a myocardial infarction at urban hospitals might be superior to the outcomes of patients at rural hospitals because of easier access to specialists.

The description of rural versus urban is not always a universal indicator of distance from the hospital in the literature. A patient residing in a rural community may live close to a community hospital. Therefore, to avoid undue bias, the literature review includes only the studies that specifically articulate a patient's proximity from the hospital.

James, Li, and Ward (2007) compared the myocardial infarction mortality rates of rural and urban hospitals from 2002 to 2003 using Iowa State inpatient records. The study investigators used distance from the patient's home to the nearest hospital in for a risk adjusted mortality calculation to help control for confounding variables (James et al., 2007). James et al. reported that there was a significant unadjusted and risk adjusted difference in inpatient mortality rates. Urban hospitals had an appreciably lower inpatient mortality rate for patients experiencing a myocardial infarction when compared to the counterpart rural myocardial infarction patients (James et al., 2007). James et al. noted that the patient characteristics, such as age, co-morbidities, sickness acuity, gender, and race, between the urban group and the rural patient group were not similar. Furthermore, James et al. speculated that the differences in patient characteristics could confound the results that indicated proximity to hospital had a significant correlation to patient mortality.

Ross et al. (2008) also examined and compared mortality data between urban and rural hospitals. The investigators looked at proximity to the hospital by categorizing the health care institutions geographical remoteness (Ross et al., 2008). Ross et al. used a zip code analysis to designate the hospital's rural urban commuting area. Previous researchers used and validated the application of rural urban commuting area (Ross et al., 2008). The researchers compared the 30-day heart failure and myocardial infarction mortality rates of urban and rural hospitals (Ross et al., 2008). Ross et al. found a statistically significant difference in the rates of myocardial infarction patients favoring urban hospitals, although there was no difference between urban and rural hospitals in terms of 30-day heart failure mortality.

**Hospital specialization.** The type of specialty services offered at a hospital has an effect on patient outcomes. Kajino et al. (2010) compared the patient survival rates of critical care medical centers with non-critical care medical centers in Japan from 2005 to 2007. Critical care medical centers offer services that specialize in the care of out-of-hospital cardiac arrest. The investigators found that patients transported to critical care medical centers had a significantly superior 30-day survival rate as compared to non-critical care medical centers (Kajino et al., 2010).

**Chronic.** Limited research exists on how proximity to the hospital affects the mortality and readmission rates of patients with chronic medical conditions. Tonelli et al. (2007) conducted a study supporting the theory that distance to the hospital correlated with the mortality of patients with chronic afflictions. The researchers studied a sample of dialysis patient in Canada using a national database from 1990 to 2000 (Tonelli et al., 2007). The investigators used the dialysis patient's addresses to calculate proximity to the hospital (Tonelli et al., 2007). Tonelli et al. (2007) reported a higher mortality rate for dialysis patients living in remote areas with increased distance to the treatment center when compared to dialysis patients living in closer proximity to the treatment center.

Baird, Flynn, Baxter, Donnelly, and Lawrence (2008) reported similar results when studying cancer patients in Scotland. The researchers used a national cancer registry and the geographical information system to examine the relationship between mortality rates and proximity to the hospital (Baird et al., 2008). Baird et al. found that cancer patients with long distances to travel to the hospital had a poorer survival rate as compared to those cancer patients living in closer proximity. The investigators proposed that the difference in patient mortality could also be a result of a delayed diagnosis associated with distance from the hospital (Baird et al., 2008).

Tseng, Hemenway, Kawachi, Subramanian, and Chen (2008) looked at patient proximity to the hospital and the relationship to readmission rates for schizophrenic patients in Taiwan. The investigators used a national database to identify patients hospitalized for schizophrenia from 1996 to 2000 and their respective addresses (Tseng et al., 2008). Tseng et al. found that patient proximity to hospital did not correlate to readmission rates, but did have a strong association with the patient's length of stay. Patients not living in proximity to the hospital had a significantly longer inpatient length of stay as compared to those schizophrenia patients living in proximity to the hospital (Tseng et al., 2008). Tseng et al. surmised that the increased inpatient length of stay was because of physician concerns that timely readmissions might not be feasible if the patient's mental status deteriorated.

Ferraris, Ferraris, Harmon, and Evans (2001) also conducted a study examining readmissions. The researchers examined what characteristics predisposed a patient to readmission after cardiac surgery (Ferraris et al., 2001). The researchers reviewed 2,650 patients from their own internal database and captured patient readmissions within 30 days of surgery (Ferraris et al., 2001). An increased distance from the patient's home to the hospital was a factor that was very strongly associated with likelihood of readmission for cardiac surgery patients (Ferraris et al., 2001). Ferraris et al. speculated that proximity to the hospital could be a significant characteristic because it reflects a patient's access to care.

**Health care utilization.** Yamashita and Kunkel (2010) conducted a study designed to test the decay effect. Decay effect is an inverse relationship between health care utilization and the distance to the nearest health care facility (Yamashita & Kunkel, 2010). Specifically, as the distance to the nearest health care facility increases, patient health care utilization rates decline. To test the decay effect, Yamashita and Kunkel looked at the mortality rates of Ohio residents throughout the state with heart disease and their geographical access to the nearest hospital. Yamashita and Kunkel reported that although there was a statistically significant positive correlation between proximity to hospitals and mortality, the correlation was not statistically significant when other variables such as socioeconomics were taken into account.

Numerous researchers reported health care utilization diminished as the distance from the health care services increased (Currie & Reagan, 2003; Lee et al., 2007; Sabit et al., 2008). Curries and Reagan, while studying African American children in Central City, Ohio, using a National Longitudinal Survey of Youth's Child-Mother, found a 3%

reduction in the likelihood of receiving a checkup regardless of private or public insurance, for every increasing mile away from the hospital. Lee et al.(2007), while examining emergency department use in Mississippi, reported that disadvantaged people living fewer than five miles away from emergency departments were more likely to use its services as compared to disadvantaged patients living greater than five miles away. Sabit et al., while studying pulmonary rehab patients in a retrospective analysis, found that patient distance from the program was a significant factor affecting patient attendance rates.

The overwhelming majority of the literature found that as patient proximity to health care services increased, mortality also increased (Baird et al., 2008; Clark et al., 2007; Wei et al., 2008). Graves (2008) however, while studying the relation proximity had on mortality in patients suffering an acute myocardial infarction did not see this association between increased patient proximity and increased mortality.

The literature review revealed that patients living closer to hospitals had more hospitalizations that those living further away, suggesting decay in the utilization of health care services (Harris et al., 2008). Ferraris et al. (2001), observed an increase in hospital readmissions for cardiac surgery patients as patient distance from the hospital increased.

**Race**

Disparities in health care refer to preventable health factors within subpopulations (Mensah, Mokdad, Ford, Greenlund, & Croft, 2005). The factors are variables modifiable through medication and lifestyle changes to reduce costly hospitalizations (Davis, Liu, & Gibbons, 2003). Mensah et al. investigated cardiovascular disparities in the United States using the Behavior Risk Surveillance System to identify behavioral risk factors conveyed by the participant. Mensah et al. also used the National Health and Nutrition Examination Survey to ascertain risk factors based on participant interviews and physical examinations, the National Health Interview Survey to detect morbidity, and mortality data from the CDC National Center for Health Statistics. The researchers indicated that African Americans tended to have a shorter life expectancy than Caucasians by about five years, and that the mortality rate of African Americans was greater regardless of age when equated to Caucasians (Mensah et al., 2005).

Heart failure is a disease that affects all races. Heart failure in African Americans has a significantly higher incidence as compared to Caucasian counterparts (Marcin, Schembri, Jingsong, & Romano, 2003). In the 1999 Resource Utilization among Congestive Heart Failure study, McCullough et al. (2002) uncovered that African Americans had the highest incidence of new onset of heart failure when compared to other racial groups. The frequency of new incidence of heart failure for African Americans was approximately 50% to 75% greater than other ethnic groups (Bolton & Wilson, 2005).

Within the last 40 years, there has been a radical shift between African Americans and Caucasians in the prevalence of heart failure. In the 1960s the African American heart failure mortality rates in men was 25% lower than the mortality rate for Caucasian men. This is interesting because there was no difference in heart failure mortality between African American women and Caucasian women (Bolton & Wilson, 2005). As early as 1991, there was a dramatic shift in the heart failure mortality rates between African American and Caucasian men with the heart failure mortality rate for African

American men increasing by an astonishing 28% from the 1960s (Bolton & Wilson, 2005). When compared to their Caucasian counterparts, the mortality rate in 1991 was 3% higher for African American men and 33% higher for African American women (Bolton & Wilson, 2005).

In 1991, the frequency of hospitalization of African Americans for heart failure was approximately 15 per 10,000, which is significantly higher than the 4.3 for Caucasians, 2.9 for Asians, and 2.0 for Hispanic men (Davis, Yong, & Gibbons, 2003). Although African Americans have a higher hospitalization rate, numerous researchers found that African Americans have a lower in-hospital mortality rate when compared to Caucasian heart failure patients (Brown, Hardeman, Croft, Giles, & Mensah, 2005; Kamath, Drazner, Wynne, Fonarow, & Yancy, 2008; Yancy et al., 2008).

African Americans receive the diagnosis of heart failure at a younger age and tend to have a more adverse progression of the disease when compared to the general population (Bibbins-Domingo et al., 2009; Hussey & Hardin, 2005). Not only are African American heart failure patients younger, African Americans are more likely to be on Medicaid and have co-morbid conditions such as diabetes and renal disease (Hussey & Hardin, 2005). The reasons for the differences in heart failure are not yet entirely clear, although it appears that a number of interrelated variables contribute to this imbalance of heart failure occurrence. Environmental, social, genetic, and physiologic factors are all contributing variables responsible for this disproportionate distribution of heart failure in African Americans (Franciosa, Ferdinand, & Yancy, 2010).

**Genetic and physiological factors.** Racial differences in heart failure occurrence appear to have a genetic component (Cohn, 2006; Ishizawar & Yancy, 2010). Small, Wagoner, Levin, Kardia, and Liggett (2002) put forth the notion that a synergistic polymorphic variation of the alpha 2C and beta 1 adrenergic receptors, which occurred more frequently in African Americans, was associated with an increased rate of heart failure. Small et al. (2002) theorized that the polymorphic variation results in an escalation of norepinephrine that over time led to the development of heart failure.

Hypertension tends to be the primary etiology of heart failure in African Americans (Ishizawar & Yancy, 2010). Mensah et al. (2005) reported that regardless of sex or educational attainment, African Americans suffered the highest incidence of hypertension (39.8%). Not only do African Americans suffer from some of the highest rates of hypertension in the world, but also the onset is earlier and the severity is greater as compared to the Caucasian population (Hussey & Hardin, 2005). African Americans also tend to respond differently to traditional hypertensive treatments (Bolton & Wilson, 2005; Cohn, 2006).

Clinical trials evaluating the efficacy of traditional medications, such as angiotensin-converting enzyme (ACE) inhibitors and beta-blockers, used to treat hypertension and heart failure have often yielded mixed or poor results in the African American population (Bolton & Wilson, 2005). However, Yancy (2005) asserted that the conclusions generated from the study outcomes might be incorrect. In the Studies of Left Ventricular Dysfunction (SOLVD) trial studying the effects of the ACE inhibitor *Enalapril*, *Enalapril* appeared to have a poor blood pressure lowering efficacy in the African American population (Yancy, 2005). A re-analysis of the SOLVD data revealed that there were a relatively small percentage of African Americans participating in the clinical trial (Yancy, 2005). The re-analysis also identified that the corresponding matched population of Caucasian Americans tended to be lower risk patients as compared to the African American study participants (Yancy, 2005). The reexamination of the SOLVD data casts some doubt on the generalized statement that ACE inhibitors are less efficacious in the African American population (Yancy, 2005). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) guidelines also acknowledge that African Americans receive a reduced benefit from ACE inhibitors (U.S. Department of Health and Human Services, N.I.O.H., 2004). Cited in the guidelines of the JNC7 are the results of the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) study, in which there were in excess of 15,000 African Americans, found that thiazide diuretics and calcium channel blockers were more effective anti-hypertensive agents than ACE inhibitors (U.S. Department of Health and Human Services, N.I.O.H., 2004). Compared to a diuretic, there was a 32% increased risk of heart failure in African American patients treated with an ACE inhibitor (U.S. Department of Health and Human Services, N.I.O.H., 2004).

Cohn (2006) pointed to the African American Heart Failure Trial as further evidence of a genetic component that was responsible for the increased incidence of heart failure in the African American population. In the clinical trial, researchers studied the medication, BiDil ™ in patients who identified themselves as African American (Taylor et al., 2004). The results of the African American Heart Failure Trial were that BiDil ™ provided significant mortality benefit for African Americans with heart failure (Taylor et al., 2004).

**Environmental and social factors.** Numerous researchers demonstrated that African Americans were more likely to be admitted into a hospital via the emergency department as compared to Caucasian patients (Khaliq & Broyles, 2006; Pines, Localio, & Hollander, 2009; Shen, Washington, Chung, & Bell, 2007). Investigators for the studies speculated that the higher incidence of hospital admission through the emergency department could be the result of the diminished access of African Americans to primary health care (Khaliq & Broyles, 2006; Pines, Localio, & Hollander, 2009; Shen, Washington, Chung, & Bell, 2007).

Pines et al. (2009) mined the National Hospital Ambulatory Medical Care Survey for intensive care (ICU) and non-intensive care (non-ICU) admissions from the emergency department of 406 institutions between 2003 and 2005. The investigators found that among all hospitals studied, African Americans waited about an hour longer in the emergency department than other races for admission (Pines et al., 2009). African Americans on average were also likely to wait significantly longer in the emergency department before admission to the ICU than other races in the same institution. However, the racial disparity within hospitals was not seen when African Americans were admitted to non-ICU beds from the emergency department (Pines et al., 2009).

Clarke et al. (2010) compared heart failure patient outcomes in Pennsylvania and Virginia hospitals that primarily serve African American or non-African Americans. Hospital records that contained patient race data were used to determine if a hospital treated primarily African American or non-African American patients (Clarke et al., 2010). The purpose of the study was to identify potential disparities in health care delivery based on race (Clarke et al., 2010). Clarke et al.'s primary endpoints measured heart failure patient race mortality and heart failure mortality rates between predominantly African American hospitals and non-African American hospitals. The investigators reported no difference between African American and non-African American heart failure patients within the same institution (Clarke et al., 2010). However, Clarke et al. did find that heart failure patients, both African American and non-African American, treated at African American predominant hospitals had a higher mortality rate than heart failure patients treated at predominantly non-African American hospitals. Clarke et al. suggested that one factor in observed health disparities between Caucasian and African American patients might be whether the admitting hospital services a geographic area with a high concentration of African Americans.

Trivedi, Sequist, and Ayanian (2005) conducted a study to discover if cardiovascular racial disparities correlated to the annual number of cardiovascular procedures conducted in an institution. The premise was that hospital volume would have a significant impact on patient outcomes (Trivedi et al., 2005). The investigators found that hospital procedure volume was a significant indicator of improved outcomes (Trivedi et al., 2005). Trivedi et al. also noted that African Americans were more likely than Caucasians to have cardiovascular procedures performed at low volume institutions.

Trivedi et al.'s (2005) discovery that African Americans were more likely to seek out services at low procedure volume hospitals was inconsistent, because other researchers reported that African Americans were more likely to reside in urban areas and frequented teaching hospitals for health care (Hussey & Hardin, 2005; Shen et al., 2007). Popescu, Nallamothu, Vaughan-Sarrazin, and Cram (2010) designed a data mining study to look at Medicare admission between 2002 and 2005. The investigators compared hospital admission in areas with at least one hospital recognized in *US News & World Report*'s annual "America's Best Hospitals" report (Popescu, Nallamothu, et al., 2010). What makes the study unique is that Popescu et al. controlled for patient proximity to nearby hospitals. Popescu et al. found no difference between African American and Caucasian admissions to these eminent hospitals for the patients suffering from a myocardial infarction or having a coronary bypass grafting procedure (CABG). However, the authors did report that a racial disparity existed for African Americans living in economically depressed areas (Popescu et al., 2010). The racial disparity transpired only in the CABG patients, for whom the procedure is often elective, as compared to those patients suffering myocardial infarctions that are acute episodes (Popescu, Brahmajee, et al., 2010). Popescu, Brahmajee, et al. indicated the disparity could be the result of physician referral patterns. Another potential limitation of the study, not pointed out by the investigators is that the study population only included Medicare patients, typically 65 or older. Heart failure characteristically strikes African Americans at an earlier age than Caucasian (Bibbins-Domingo et al., 2009; Hussey & Hardin, 2005). An examination of a more diverse cross section that included patients without medical insurance, those covered by Medicaid, private pay patients, and commercial patients may have yielded different results.

Research exists on the quality of care African American heart failure patients receive at a teaching institution. Ilksoy, Moore, Easley, and Jacobson (2006) studied physician compliance with established heart failure treatment protocols at Grady Memorial Hospital, a large inner city teaching institution. The study was a retrospective analysis of 104 heart failure patients (Ilksoy et al., 2006). The established heart failure treatment included the use of an echo, ACE inhibitor, beta-blocker, and lifestyle modification education prior to discharge (Ilksoy et al., 2006). The prescription of a beta-blocker was the largest area of non-compliance in treating African American heart failure patients (Ilksoy et al., 2006). Only 24.4% of appropriate patients received a beta-blocker prescription (Ilksoy et al., 2006). The other large discrepancy in treating African Americans with heart failure revolved around patient education; only 50% of the patients received education about medication compliance and only 48% received education about the importance of a low sodium diet (Ilksoy et al., 2006).

The literature review disclosed that the incidence of heart failure in African Americans is significantly higher than Caucasians or any other ethnic group (Bolton & Wilson, 2005). This difference in the incidence of heart failure appears to result from a genetic component (Cohn, 2006). The heart failure progression in African Americans is more adverse and more likely to begin at a younger age than in other ethnicities (Bibbins-Domingo et al., 2009).

## Socioeconomic Status

The correlation between socioeconomic status with morbidity and mortality is known and generally consistent throughout the literature (Antonelli-Incalzi et al., 2007; Chen et al., 2004; Kennedy, Paeratakul, Ryan, & Bray, 2007; Rask, O'Malley, & Druss, 2009). The preponderance of literature demonstrates that higher socioeconomic status is associated with reduced mortality rates when compared to the lower socioeconomic status. Rask et al. (2009) used the National Health and Nutrition Examination Survey (NHANES) data to investigate the weights of socioeconomic status, behavior risk factors such as smoking, and clinical risk factors such as cardiovascular disease on the general population's mortality. Whereas socioeconomic status, behavior, and clinical factors were all associated with mortality, only lower socioeconomic status correlated to increased mortality in the healthy general population (Rask et al., 2009). Researchers studied socioeconomic status in the context of how the status related to severity of illness, compliance, hospital readmission, chronic disease, cardiovascular disease, educational attainment, and race.

**Cardiovascular.** Scholars observed socioeconomic disparities in patient outcomes of both acute and chronic cardiac disease (Beauchamp, Peeters, Tonkin, & Turrell, 2010; Blair, Lloyd-Williams, & Mair, 2002; Chang, Kaul, Westerhout, Graham, & Armstrong, 2007; Singh et al., 2010). Bernheim et al. (2007) conducted a study to uncover underlying influences that result in higher mortality rates for socioeconomically disadvantaged patients after suffering a myocardial infarction. The researchers used the Prospective Registry Evaluating Myocardial Infarction: Events and Recovery (PREMIER) Registry, a national database that captures hospital statistics for acute myocardial infarctions to identify variables that contributed to differences in patient outcomes based on socioeconomic status (Bernheim et al., 2007). Bernheim et al. found that patients from socioeconomically disadvantaged groups had a statistically significant greater mortality rate after a myocardial infarction as compared to myocardial infarction patients from affluent socioeconomic groups. The study investigators discovered that myocardial infarction survivors from socioeconomically depressed groups presented to the hospital with a substantially poorer clinical status as compared to other socioeconomic groups (Bernheim et al., 2007). Bernheim et al. further found both socioeconomic status and educational attainment to be significant independent variables for increased mortality rates after a myocardial infarction. Bernheim et al. ascertained that the quality of care low socioeconomic patients received was inferior to patients with higher socioeconomic status, although the clinical status of the patient was the biggest determinant of mortality.

Singh et al. (2010) determined that socioeconomic status was an independent risk factor linked to biological corollaries for an individual's health. To add to the growing body of knowledge confirming that socioeconomic status correlates to mortality and morbidity, Singh et al. studied heart transplant rejection rates based on socioeconomic status. The investigators mined heart transplant data in four Boston hospitals between 1996 and 2005 (Singh et al., 2010). The researchers matched transplant patients from the lowest socioeconomic groups with control transplant patients based on clinical presentation. Singh et al. reported that heart transplant patients from the most socioeconomically deprived groups had statistically higher heart transplant rejection rates when compared to heart transplant patients from higher socioeconomically groups.

**Hospitalization.** Disadvantaged individuals with lower socioeconomic status use hospital services more than individuals with higher socioeconomic status (Lemstra, Mackenbach, Neudorf, & Nannapaneni, 2009). Hospitalization is often an indicator of a patient's severity of illness (Brameld & Holman, 2005). Brameld and Holman assessed the impact of socioeconomic status on patient outcome and the frequency of hospital use. The scholars analyzed information from a large Australian database that captured patient records from 1994 to 2000 (Brameld & Holman, 2005). After extracting mortality information, admission rates, 30-day readmission rates, and patient length of stay from the database, the investigators reported that most underprivileged patients had the highest hospital utilization rates and the worst outcomes (Brameld & Holman, 2005). The only exception Brameld and Holman noted was that the most underprivileged had a significantly lower surgical admission rate than patients from higher socioeconomic classes. The most disadvantaged patients also had the longest average length of stay, highest 30-day readmission rates, and highest mortality leading Brameld and Holman to speculate that disadvantaged patients' access to primary care services was a key variable that resulted in the increased mortality and morbidity in this group of patients.

Researchers of empirical studies in the United States also reported the same correlation between socioeconomic status and health morbidity. Ramos, Talbott, Youk, and Karol (2006), while investigating if the degree of urbanization affects asthma hospitalization rates, also measured socioeconomic status as an independent variable. The study authors reported that socioeconomic status was the primary driver responsible for increases observed in hospitalizations because of asthma (Ramos et al., 2006).

Increased mortality and morbidity correlated with lower socioeconomic status and acute conditions (Marcin et al., 2003), although the data with acute mortality and mortality with pediatric patients was not conclusive. Marcin et al. designed a study to research socioeconomic differences in pediatric mortality resulting from trauma. The study authors combed through 10 years of pediatric trauma data in the Sacramento, California region, and found a higher mortality rate in pediatric trauma patients from lower socioeconomic groups as compared to children living in higher socioeconomic communities (Marcin et al., 2003). However, Marcin et al. attributed the higher mortality rate of underprivileged children to a greater acuity of trauma, such as injuries from gunshots.  When Marcin et al. controlled for trauma severity, there was not significant mortality difference between the classes.

The high degree of association between patients with lower socioeconomic status and poor mortality and morbidity was in countries with universal health care such as Canada (Lemstra et al., 2009).  Lemstra et al. mined a regional database to examine how socioeconomic status affected health care utilization.  The investigators analyzed the health records of 3,433 patients in Saskatchewan treated between 2001 and 2005 and concluded that low socioeconomic patients used a disproportionate amount of health care services, over 30% more (Lemstra et al., 2009).  The hospitalization rate for impoverished patients was about 30% greater than that of patients with average to high socioeconomic status (Lemstra et al., 2009).  Disadvantaged patients were also about 40% more likely to leave the hospital with a prescription for a medication when compared to patients with average to high socioeconomic status (Lemstra et al., 2009). What was unique about the study was that Lemstra et al. determined that patients from poorer socioeconomic groups also had significantly higher disease prevalence.  After controlling for self-reported poor general health and chronic diseases such as cardiovascular disease, the disparity between socioeconomic classes for health care utilization dropped significantly for the underprivileged (Lemstra et al., 2009.  Hospital utilization and medications decreased by over 70% and 55% respectively (Lemstra et al., 2009).  Lemstra et al. attributed the high health care utilization of lower socioeconomic groups to a higher incidence of chronic disease and disease burden, not socioeconomic status.

Izquierdo et al. (2010) conducted a study to examine if there were health outcome disparities resulting from socioeconomic status for hospitalized patients with community-acquired pneumonia. The study took place in Spain, a country with a national health care system (Izquierdo et al., 2010). Izquierdo et al. scrutinized 651 elderly patients hospitalized in five community hospitals between 2005 and 2007 and found no correlation between socioeconomic status and patient outcome or length of stay.

**Hospital readmissions.** Numerous investigators suggested that limited access to health care services was one of the key considerations responsible for the observed correlation of increased mortality and morbidity with lower socioeconomic status (Antonelli-Incalzi et al., 2007; Biello, Rawlings, Carroll-Scott, & Ickovicds, 2010; Blair et al., 2002). Robbins, Valdmanis, and Webb (2008) studied the impact of safety-net health clinics in Philadelphia on diabetes readmission rates. Safety-net health clinics are able to financially provide access to primary care services to lower socioeconomic status patients because of federal subsidizes (Robbins et al., 2008). Robbins et al. compared statewide readmission data for socioeconomically disadvantaged patients and found that readmission rates for patients receiving health care services at safety-net clinics were similar to other patients in the Philadelphia community. The authors suggested that further expanding the safety-net health clinic network could be an effective means to reduce the disproportionate mortality and morbidity associated with socioeconomically underprivileged patients (Robbins et al., 2008).

Ansari, Henderson, Ackland, Cicuttini, and Sundararajan (2003) conducted a study to see if there were potential gaps in the management of heart failure linked to primary care access or primary care management. The investigators compared heart failure admission rates of patients living in rural Australian communities to patients living in metropolitan communities using regional databases from 1994 to 2001 (Ansari et al., 2003). Ansari et al. concluded that rural patients had significantly more heart failure hospital admissions than the metropolitan patients did. By using the database to funnel down and identify which primary care physicians had the largest number of heart failure admissions, Ansari et al. learned that 17 individual primary care physicians had a disproportionate number of patients admitted to the hospital for heart failure. Because the study was retrospective, it was difficult for Ansari et al. to identify precise reasons for the unbalanced number of heart failure patients admitted from the 17 rural primary care providers. Ansari et al. speculated that the difference in heart failure admissions could be either the result of primary care accessibility or differences, despite national heart failure guidelines, in the provider's expertise in managing heart failure patients.

Socioeconomic status is a recognized independent risk factor for hospital readmission. Banham et al. (2010) analyzed 79,424 potentially preventable hospital admissions in Australia from 2006 to 2008. The three categories of preventable hospitalizations as defined by Australia's Institute of Health and Welfare are acute, chronic, and vaccine related (Banham et al., 2010). Banham et al. found that about 60% of chronic disease admissions were preventable hospitalizations, of which, almost half were patients from the most disadvantaged socioeconomic group.

Heart failure is a disease state where hospital readmission is common. Philbin et al. (2001) reported that about one quarter of hospitalized heart failure patients would be re-hospitalized for heart failure within the first 6 months of discharge. Aranda et al.

(2009) found in a 2003 analysis of Medicare heart failure admissions that heart failure accounted for almost 30% of all readmissions.

Philbin et al. (2001) conducted a study using retrospective data from the Statewide Planning and Research Cooperative System (SPARCS) database to identify predicting variables for heart failure readmission. The study authors specifically looked at socioeconomic status and race as potential independent variables responsible for increased heart failure readmission (Philbin et al., 2001). Philbin et al. (2001) reported socioeconomic status as an independent risk factor for heart failure re-hospitalization. The retrospective nature of the study precluded Philbin et al. (2001) from fully explaining why individuals from lower socioeconomic groups had higher hospital readmission rates for heart failure. The theoretical causes for the disparity in heart failure readmission between the classes offered by Philbin et al. (2001) included the likelihood of economically disadvantaged patients having Medicaid health insurance. Medicaid is associated with lower quality health care, educational attainment, substance abuse, cigarette smoking, and race (Philbin et al., 2001).

**Nationalized health.** Scientists explored whether socioeconomic status correlates with mortality and morbidity in countries with national health care. Theoretically, one would not expect to find a pronounced difference in patient mortality and morbidity attributable to socioeconomic status in these countries because reimbursement is not a barrier to health care. Menec, Shooshtari, Nowicki, and Fournier (2010) cross-referenced health care claims records with socioeconomic neighborhood data from the previous Canadian census to determine if there was a correlation between increased morbidity and neighborhood socioeconomic status. Limiting the investigation to individuals 65 and older, Menec et al. found (2010) that individuals from poor neighborhoods used a disproportionate amount of health care resources to treat chronic conditions such as cardiovascular disease, diabetes, and COPD when compared to individuals from affluent neighborhoods.

Heslop, Miller, and Hill (2009) conducted a similar study powered to detect mortality from coronary artery disease (CAD) and non-CAD chronic disease in Canadian neighborhoods of varying socioeconomic status. The study outcome was of note because Heslop et al. did not find a difference in CAD mortality that could be associated with neighborhood socioeconomic characteristics. However, Heslop et al. reported a statistically significant increase of about 25% in non-CAD mortality in socioeconomically disadvantaged neighborhoods as compared to the most affluent neighborhoods. Heslop et al. commented that one reason the results did not find a significant increase for CAD mortality in socioeconomically depressed neighborhoods was the small sample size of 485 patients as compared to past researchers who examined a larger sample size and reported a significant difference between socioeconomic neighborhoods.

**Education.** Several researchers demonstrated how socioeconomic status correlated to educational attainment (Kennedy et al., 2007; Saydah & Lochner, 2010; Young, Cunningham, & Buist, 2005; Zajacova, Dowd, & Aiello, 2009). Beauchamp et al. (2010) asserted that the combination of lower levels of educational attainment and health literacy were a substantial barrier to a patient's effective self-management of the disease. Educational attainment is also associated with qualifications for higher paying occupations.

**Race.** Chronic disease does not touch all racial groups equitably (Boudreaux, Edmond, Clark, & Camargo, 2003). Various researchers noted that both socioeconomic status and race were often independent variables that influenced disease mortality and morbidity (Norris & Nissenson, 2008; Vaccarino et al., 2002; Zajacova et al., 2009). However, the question of which independent variable plays a more important role in patient mortality and morbidity remains unclear.

Vaccarino et al. (2002) conducted a prospective study designed to measure differences in functional decline of daily living activities between African Americans and Caucasians. The researchers conducted a relatively small prospective study of approximately 80 African American patients with heart failure and a little more than 300 Caucasian heart failure patients 50 or older (Vaccarino et al., 2002). Vaccarino et al.'s main finding was that African American heart failure patients had a much more pronounced functional decline as compared to Caucasian counterparts, despite the absence of quality of care variations between the two groups. The study authors reported that within the first 6 months, African American patients hospitalized for heart failure had nearly 50% increased mortality risk or significant decline in functional status (Vaccarino et al., 2002). Adjusting for socioeconomic status did not explain the disparities between the two groups (Vaccarino et al., 2002). Vaccarino et al. indicated that race was a more important variable than socioeconomic status in predicting disparities in heart failure outcome.

Saydah and Lochner (2010) conducted a study to examine the effects of socioeconomic status and educational attainment on diabetes-associated mortality. The researchers analyzed 527,426 participants 25 or older who completed the National Health

Survey from 1990 to 2000 (Saydah & Lochner, 2010). Both educational attainment and socioeconomic status correlated with diabetes related mortality (Saydah & Lochner, 2010). After controlling for race, gender, age, and body weight index, Saydah and Lochner found that socioeconomic status was responsible for approximately 25% of excess risk of mortality in diabetics. This is notable because historically African Americans have a significantly higher mortality rate for diabetes related complications when compared to Caucasian counterparts (Saydah & Lochner, 2010).

The overwhelming majority of the literature uncovered in the literature review found that socioeconomic status has a positive correlation with mortality and morbidity (Antonelli-Incalzi et al., 2007; Chen et al., 2004; Kennedy, Paeratakul, Ryan, & Bray, 2007; Rask, O'Malley, & Druss, 2009). This correlation between increased mortality and morbidity in patients from lower socioeconomic status is also seen in countries with free national health care (Lemstra et al., 2009). Lower socioeconomic patients tend to use hospital services more than higher socioeconomic patients (Lemstra et al., 2009). Low socioeconomic status is also an acknowledged independent risk factor for increased hospital readmission (Banhan et al., 2009).

## Gender

Cardiovascular disease plagues both genders and is the principal cause of mortality for both men and women. A large subset of the population with cardiovascular disease will perish from heart failure (Konhilas, 2010). Median heart failure survival rates for men can be as low as 1.7 years once the patient becomes symptomatic, and 3.2 years for women (Listerman, Huang, Geisberg, & Butler, 2007). Men have a higher prevalence of heart failure regardless of age. However, the lifetime risk for heart failure is comparable for both genders (Rosengren & Hauptman, 2008). The reason for the statistical phenomenon is that women tend to live longer than men do (Rosengren & Hauptman, 2008). Additionally, women tend to present with heart failure at an older age then men (Konhilas, 2010; Rosengren & Hauptman, 2008).

Liu (2010), while analyzing National Hospital Discharge Surveys of patients, 65 or older hospitalized for heart failure between 1980 and 2006, noted a continued increase in hospitalization due to heart failure for both genders. During this period, heart failure hospitalizations for men grew by a yearly rate of approximately 1.2% and 1.55% in men and women, respectively (Liu, 2010). Heart failure was the most prevalent co-morbidity associated with increased hospitalization for both genders (Liu, 2010).

Nieminen et al. (2008) reported several gender specific differences in patients with acute heart failure after examining 3580 patients from the EuroHeart Failure Survey II. The investigators found that women were more apt to present with new-onset acute heart failure then men (Nieminen et al., 2008). Nieminen et al. (2008) found that although heart failure hospitalization and 1 year mortality were comparable between genders, woman had an overall lower all cause readmission rate than men.

Ng, Wong, Yong, and Sindone (2007) conducted a study to examine gender differences in heart failure patients. From 1997 to 2002, Ng et al. collected data on 168 consecutive heart failure patients from a single heart failure program. The study investigators enrolled 116 male heart failure patients and 52 female patients (Ng et al., 2007). Ng et al. found that woman had a significantly better left ventricular ejection fraction (LVEF). Numerous investigators noted that women with heart failure tended to have a better LVEF as compared to men with heart failure (Konhilas, 2010; Mejhert, Kahan, Edner, & Persson , 2008; Regitz-Zagrosek, Brokat & Tschope, 2007; Rosengren & Hauptman, 2008). An impaired LVEF has a strong correlation with increased mortality (Regitz-Zagrosek et al., 2007). The observed gender difference in LVEF of heart failure patients was proposed as a reason women with heart failure lived longer than men with heart failure (Regitz-Zagrosek et al., 2007).

Ng et al. (2007) also reported that women presented with a poorer New York Heart Association (NYHA) functional class. The NYHA functional class is a significant risk factor for both genders (Ng et al., 2007). The greatest predictor of mortality for women, however, was baseline age, whereas NYHA functional class was the best predictor for men (Ng et al., 2007).

Gronda et al. (2010), while mining an Italian national heart failure registry designed to capture gender differences, uncovered evidence confirming the results of past researchers. The investigators also found that men with heart failure were more likely to present with ischemic heart disease (Gronda et al., 2010). Similarly, Mullens et al. (2008) found that women with heart failure were less apt to present with ischemic heart disease as compared to male heart failure patients.

Men and women with heart failure also tend to differ in terms of the co-morbidities. Several researchers found that women with heart failure, when compared to men, had a higher prevalence of diabetes and hypertension (Gronda et al., 2010; Mejhert et al., 2008). Further research is necessary to determine if these sex-related pathophysiological differences warrant gender specific management of heart failure (Azevedo, 2008; Mejhert et al., 2008).

**Survival.** The leading cause of mortality in both genders is cardiovascular disease (Konhilas, 2010). Despite controlling for cardiac function, the survival rate and long-term prognosis for women with heart failure is significantly better than for their male counterparts (Konhilas, 2010). Scientists proposed numerous theories to explain the discrepancy in survival rates and long-term prognosis between male and female heart failure patients (Konhilas, 2010).

Acute myocardial infarction is a well-documented risk factor for heart failure. Heart failure patients suffering an acute myocardial infarction have a poor prognosis (Konstantino et al., 2007). The investigators examined the charts of 3,456 patients who had a myocardial infarction in Israel (Konstantino et al., 2007). Konstantino et al. found that women with heart failure suffered a higher unadjusted mortality rates than men with heart failure after an acute myocardial infarction. The mortality rate was similar for both genders after controlling for age, co-morbidities, and differences in treatment such as revascularization (Konstantino et al, 2007).

As previously noted, more men with heart failure, as compared to women with heart failure, have an impaired LVEF, which has a strong correlation with patient mortality (Regitz-Zagrosek et al., 2007). Past researchers suggested that the hormone estrogen, which naturally occurs at higher levels in women, might play an important role in preserving LVEF (Konhilas, 2010; Regitz-Zagrosek et al., 2007). However, the results of two large-scale clinical trials, the Heart and Estrogen-Progestin Replacement Study and the Woman's Health Initiative, prompted the officials from the United States Food and Drug Administration to developed new guidelines, which discourage the use of hormone replacement therapy for long-term use because of the increased risk of myocardial infarctions and stroke (Cleveland Clinic, 2005/2009).

Konhilas (2010) noted that pre-menopausal women regularly had better outcomes as compared to men in response to cardiac conditions such as myocardial infarction, heart failure, and hypertension. The hearts of men with the cardiac conditions predictably result in impaired contractility resulting from thinning of the wall and chamber dilatation (Konhilas, 2010) Woman with cardiac conditions, in contrast, are more likely to maintain an adequate cardiac function than men are (Konhilas, 2010).

Martinez-Selles, Dominguez, Martinez, Garcia Fernandez, and Garcia (2007) determined that the gender of heart failure patients with LVEF dysfunction did affect patient prognosis. Specifically, the prognosis of male heart failure patients with LVEF dysfunction was significantly worse than females (Martinez-Selles et al., 2007). However, Martinez-Selles did not find a statistically significant gender difference in mortality with patients with interaction ischemic heart disease.

Mejhert et al. (2008) also studied gender differences in heart failure patients with systolic dysfunction. All of the patients enrolled in the study were at least 60 or older, had LVEF dysfunction, and were New York Heart Association (NYHA) functional class between II and IV (Mejhert et al., 2008). Similar to Martinez-Selles et al. (2007), Mejhert et al. reported that women had superior prognoses when compared to men. However, Mejhert et al. found that a high left ventricular mass index (LVMI) was a powerful prognostic indicator of mortality in women but not in men. LVMI in female heart failure patients was a more compelling indicator of mortality than the more established measure of LVEF (Mejhert et al., 2008).

The gender difference in the prevalence of ischemic cardiac disease is another hypothesis to explain the superior survival rate women with heart failure have over men. Numerous researchers demonstrated that in heart failure patients, the prevalence of ischemic cardiac disease was greater in men than in women (Gronda et al., 2010; Mejhert et al., 2008; Mullens et al., 2008). Mullens et al. examined the medical records of 278 patients with advanced decompensated heart failure from 2000 to 2006. Women without ischemic cardiac disease had a statistically lower mortality rate then either men or women with ischemic cardiac disease (Mullens et al., 2008). However, Mullens et al. found that women with ischemic cardiac disease had a lower mortality rate than men.

Numerous heart failure researchers found that women had a higher incidence of diabetes then men (Ahmed & Lloyd-Jones, 2008; Gronda et al., 2010; Mejhert et al., 2008). Ahmed and Lloyd-Jones performed propensity matched studies to explore how the co-morbidity of diabetes affects mortality in heart failure patients. After controlling for age and other co-morbidities, the prognosis of heart failure patients with diabetes was poorer in women (Ahmed & Lloyd, 2008). The risk of increased hospitalization and mortality is evident especially in elderly female heart failure patients with diabetes (Ahmed & Lloyd, 2008). Ahmed and Lloyd indicated that elderly female heart failure patients with diabetes had a similar mortality rate as elderly men with diabetes. Diabetes in elderly women with heart failure negated the superior survival advantage women typically have over men (Ahmed & Lloyd-Jones, 2008).

**Readmission.** The literature tackling the question of whether there is a gender-related difference in heart failure hospital readmission is not conclusive. Lee, Capra, Jensvold, Gurwitz, and Go (2004) analyzed 1,700 random patients hospitalized between

1999 and 2000 to assess whether the risk of heart failure re-hospitalization correlates to gender. The study investigators reported no gender differences in the unadjusted rate of readmissions or readmission rates after adjusting for co-morbidity or age (Lee et al., 2004).

Conversely, Jimenez-Navarro, Ramirez-Marrero, Anguita-Sanchez, and Castillo (2010) offered evidence that gender might influence heart failure readmission rates. The researchers examined 4,720 patients from 62 specialized heart failure clinics or units and discovered that women had significantly more heart failure hospital readmissions then men (Jimenez-Navarro et al., 2010). It is important to note that the Jimenez-Navarro et al. noted gender related treatment differences that may have influenced readmission rates.

**Treatment compliance.** A number of researchers noted a gender bias in cardiovascular medication prescribed (Galvao, 2005; Gustafsson et al., 2004; Jimenez-Navarro, 2010). One United States heart failure national registry, ADHERE, and one Danish national heart failure registry, DIAMOND-CHF, found that women do not receive ACE inhibitors prescriptions when appropriate (Regitz-Zagrosek & Lehmkuhl, 2005). An ACE inhibitor is a medication that reduces mortality and morbidity in large-scale clinical heart failure trials for a large percentage of women participants (Regitz-Zagrosek & Lehmkuhl, 2005). However, there is evidence that women do not therapeutically benefit from ACE inhibitors to the same extent as men. Klabník and Murín (2009) pointed out that men tended to receive the same mortality benefit from either an ACE inhibitor or an angiotensin II receptor blocker (ARB). Women, conversely, receive a superior mortality benefit from an ARB as compared to an ACE inhibitor (Klabník & Murín, 2009).

Jimenez-Navarro et al. (2010), while studying gender differences in heart failure, discovered that women were less likely, as compared to men, to receive a prescription for a beta-blocker. Beta-blockers are a medication that reduces mortality and morbidity in heart failure patients. Women who did receive a prescription for a beta-blocker were given a lower mean dose when compared to men (Jimenez-Navarro et al.). However, selected data in the literature contradicts the notion of widespread gender-related differences in the prescription of heart failure medication. Nieminen et al. (2008), while analyzing the data of 3580 heart failure patients from the EuroHeart Failure Survey II, did not find any significant difference in the prescription of heart failure medication between genders. Nieminen et al. did find that men were more non-compliant with heart failure medication when compared to women.

Two large-scale United States heart failure registries found that woman were less likely to receive discharge instructions as compared to men (Fonarow et al., 2009; Galvao, 2005). Discharge instructions contain information about medications and lifestyle modifications that help heart failure patients manage their disease. Heart failure discharge instructions are also important because they are part of TJC's quality measures (Galvao, 2005). The TJC is a national accrediting agency for the Centers for Medicare and Medicaid Services (CMS).

**Race.** Researchers conducted studies to discover if the survival benefit of gender extended to African American women. Confirmed in the limited literature was that gender-based heart failure differences played a more significant role in mortality than race-based differences (Hussey & Hardin, 2005; Parashar et al., 2009). Parashar et al. scrutinized the health records of 1,264 patients enrolled in the Cardiovascular Health

Study who developed heart failure and followed the group for 3 years. The researchers sorted the 1,264 heart failure patients into four groups: Caucasian women, African American women, Caucasian men, and African American men (Parashar et al., 2009). At the end of the 3 years, and after adjusting for covariates, the cardiovascular mortality risk in the female groups was up to 20% higher than the male groups (Parashar et al., 2009). Parashar et al. reported that gender was a more important predictor of cardiovascular mortality than race.

The literature review pertaining to gender revealed that although both genders share a similar lifetime risk for heart failure, there is a higher overall prevalence of heart failure in men (Rosengren & Hauptman, 2008). Women tend to present with heart failure at an older age than the male gender (Konhilas, 2010). The survival rate for women with heart failure is also significantly longer than men (Konhilas, 2010).

**Conclusions**

Revealed through the literature review was that heart failure has been studied extensively over the past decade. Race, socioeconomic status, and gender are all well documented independent variables that influence heart failure mortality and morbidity (Blair et al, 2002; W. Y. Lee et al., 2004; Yancy et al., 2005). However, limited research exists on how proximity to the hospital affects the mortality and readmission rates of patients with chronic medical conditions such as heart failure. Suggested in the literature was a decay effect of health care service utilization as proximity to the nearest health care facility increases (Yamashita & Kunkel, 2010). The net result of the decay effect is that as proximity to health care services increases, patient mortality increases. Past researchers studied whether cardiovascular disease mortality in total, including both acute and chronic, correlates to hospital proximity initially found empirical supporting evidence (Ali et al., 2007; Harris et al., 2008; Wei et al., 2008). However, after controlling for socioeconomic factors, the mortality proximity association fell below the statistical threshold (Yamashita & Kunkel, 2010). Gaps in the literature include whether proximity to the hospital is an independent risk factor for heart failure impatient mortality and 30-day readmission rates when the type of hospital is controlled. Popescu et al. (2008) discovered that the quality of care and compliance with core heart failure measures could vary by type of hospital.

## Summary

A wealth of research analyzing the correlation between proximity to health care services and mortality associated with acute illness exists (James et al, 2007; Kajino et al., 2010; Lipley, 2008). Past researchers demonstrated that as proximity to health care services increased the mortality rate for patients suffering a myocardial infarction increased (Wei et al., 2008). Several investigators studied the effects proximity to health care has on mortality by examining urban and rural populations. James et al. compared distance from the patient's home to the nearest hospital to determine if proximity affected patient mortality. The researchers found that urban myocardial infarction patients, with shorter distance to hospital, had a significantly lower inpatient mortality rate as compared to the rural myocardial infarction patients, with a longer distance to the hospital (James et al., 2007). Upon further analysis, James et al. found that the rural patients had greater sickness acuity then the urban patients. This observation supports the decay effect of health care use whereby as proximity to the nearest health care facility decreases, the use of health care services decreases (Yamashita & Kunkel, 2010). However, the association between proximity to health care services and patient mortality remains unclear. Kajino et al. demonstrated that the type of hospital a patient receives health care services from also influences mortality. Yamashita and Kunkel found that socioeconomic status might be a more influential variable in predicting patient mortality then proximity to health care services.

African Americans have a higher incidence of heart failure as compared to Caucasians (Marcin et al., 2003). When compared to the general population, African Americans receive the diagnosis of heart failure at a younger age and tend to have a more adverse progression of the disease (Bibbins-Domingo et al., 2009; Hussey & Hardin, 2005). African Americans are hospitalized more often for heart failure than Caucasians are (Davis et al., 2003). However, the inpatient mortality for African Americans hospitalized with heart failure is less than Caucasians (Brown et al., 2005; Kamath et al., 2008; Yancy et al., 2008).

The etiology of heart failure in African Americans is primarily hypertension (Ishizawar & Yancy, 2010). Furthermore, African Americans suffer the highest incidence of hypertension (Hussey & Hardin, 2005). African Americans also tend to respond differently to traditional hypertensive treatments (Bolton & Wilson, 2005; Cohn, 2006). In addition to genetic and physiological factors, researchers have found that health disparities shaped by environmental and social factors play an important role in the increased heart failure mortality of African Americans (Clarke et al., 2010).

The correlation between socioeconomic status with morbidity and mortality is consistent throughout the literature (Antonelli-Incalzi et al., 2007; Chen et al., 2004; Kennedy et al., 2007; Rask et al., 2009). Philbin et al. (2001) found that socioeconomic status was an independent risk factor for heart failure. The socioeconomic disparity in morbidity and mortality also appears in countries with universal health care (Lemstra et al., 2009).

The most economically disadvantaged patients have higher hospitalization rates, higher mortality, 30-day readmission rates, and longer length of stays than the rates of patients from higher socioeconomic classes (Brameld & Holman, 2005). Although recognized as an independent variable associated with increased morbidity and mortality, socioeconomic status is also associated with race (Mehta, Toto, Nelson, & Drazner, 2004). No definitive information exists whether socioeconomic status or race plays a more important role in patient mortality and morbidity.

Past researchers showed that women had a superior long-term prognosis for heart failure compared to men (Konhilas, 2010). A number of gender specific differences in heart failure exist (Ng et al., 2007). Women present with heart failure at an older age then men (Konhilas, 2010; Rosengren & Hauptman, 2008). Ng et al. discovered that women more often presented with a poorer New York Heart Association (NYHA) functional class. The LVEF of women with heart failure tends to be better than men did. LVEF is a strong predictor of heart failure mortality (Regitz-Zagrosek et al., 2007). The prognosis of women with LVEF dysfunction is significantly better than that for men (Martinez-Selles et al., 2007). Women with heart failure typically have different comorbidities, such as hypertension and diabetes (Gronda et al., 2010; Mejhert et al., 2008).

Gender appears to play a more significant role than race in heart failure outcomes (Hussey & Hardin, 2005). While analyzing the outcomes of African American men and women and Caucasian men and women from the Cardiovascular Health Study Report, Parashar et al. (2009) found that women had a 20% lower mortality risk than men.

Presented in Chapter 2 was a historical review of relevant literature relating to how the study variables race, socioeconomic status, and gender, relate to heart failure and its resulting mortality and 30-day readmission rates. Outlined in Chapter 3 is the methodology used to investigate the research questions. Furthermore, the study populations, instrumentation, data collection and analysis, validity and reliability, and appropriateness of the study design will be defined in Chapter 3.

## Chapter 3: Research Method

The purpose of the quantitative retrospective research study was to discover if proximity influences inpatient heart failure mortality and 30-day readmission rates. This study explored the potential differences in heart failure inpatient mortality and 30-day readmission rates due to patient race, socioeconomic status, and gender. The information from the study may also help to identify whether a patient's race, socioeconomic status, or gender places the patient at greater risk for heart failure inpatient mortality and 30-day readmission. A quantitative research methodology was appropriate because researchers use quantitative studies to describe the relationship between variables (Creswell, 2005). The study employed a correlational design to ascertain if the study variables influence one another in a predictable fashion (Creswell, 2005). A quantitative design was appropriate because quantitative research allows for the objective interpretation of a statistical analysis of numerical data accumulated during a study to test a hypothesis (Creswell, 2005). The study used a quantitative design to explore the relationship between proximity and heart failure inpatient mortality and 30-day readmission rates. An exploratory analysis was applied to identify demographic differences such as race, socioeconomic status, and gender.

Chapters 1 and 2 outlined of the current study and a review of the literature. Chapter 3 includes a rationalization for the methodology used to investigate the research question. Chapter 3 includes a discussion of the research design, the appropriateness of the design, population, sampling frame, instrumentation, data collection procedures, validity, and statistical analysis.

## Research Method and Design Appropriateness

Explored in this section of the chapter is the appropriateness of the quantitative methodology and design and analysis of the study variables. A quantitative methodology was most appropriate for the study because the research questions could be answered by examining differences between study variables. The quantitative methodology allows researchers to test hypotheses objectively through the examination of the relationship of variables (Creswell, 2005). Quantitative research data collection is very specific and narrowly focused on studying predefined variables (Creswell, 2005).

The qualitative approach is appropriate for research questions in which the goal of the proposed study is to explore a phenomenon (Creswell, 2007). Qualitative studies are exploratory, seeking to explain the how, what, and why of the central phenomenon under investigation (Marshall & Rossman, 2011). Qualitative research explores a phenomenon by drawing upon the views of participants (Marshall & Rossman, 2011). Researchers of qualitative studies use open-ended questions to capture the participant's perceptions to gain a greater understanding of the unknowns in the phenomenon under investigation (Marshall & Rossman, 2011). A qualitative approach is not the appropriate methodology to answer specific research questions in which the variables are known and observable (Creswell, 2009).

The mixed method approach employs both a quantitative and qualitative data to answer a research question (Hesse-Biber, 2010). The mixed method approach empowers a researcher to augment or reconcile attributes of either the qualitative or quantitative approach that do not adequately address the research question (Creswell, 2009). The qualitative approach was beyond the scope of the research study and hence the mixed method approach was not appropriate.

The purpose of the current study was be to examine the relationship between proximity to the hospital with the demographic variables of race, gender, and socioeconomic status. The correlational design was appropriate because of the use of statistics to measure the degree of association between variables. The purpose of the correlational design is to examine how two or more variables influence each other.

An experimental design was not appropriate to address the research questions posed in this study. A true experimental design is prospective, whereas this study is a retrospective (Rudestam & Newton, 2007). An experimental design empowers a researcher to manipulate the independent variable in the treatment group and compare the results with a control group to ascertain if the treatment resulted in a statistically significant difference between the treatment and control group (Rudestam & Newton, 2007). An experimental design is able to randomly assign study participants to help control for mitigating variables (Rudestam & Newton, 2007). The experimental design can draw causal conclusions based on the results. In contrast, a correlational study is not able to render a causal conclusion; rather it is only able to afford the degree of association between variables (Rudestam & Newton, 2007).

## Research Questions

Suggested by a review of the literature was that as proximity to the nearest health care facility decreased, the use of health care services decreased (Yamashita & Kunkel, 2010). The current study endeavored to uncover if there is a decay effect in health care utilization as the patient proximity to the hospital decreases. The research questions to detect the theoretical framework are:

1. What is the difference, if any, in the 30-day inpatient mortality rates of patients hospitalized with heart failure based on proximity to the hospital?
2. What is the difference, if any, in the 30-day readmission rates of patients hospitalized with heart failure based on proximity to the hospital? The research study will test eight hypotheses.

$H1_0$: There will not be a significant difference in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H1_a$: There will be a significant difference in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H2_0$: There will not be a significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H2_a$: There will be a significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H3_0$: There will not be a significant difference in regard to race in the inpatient mortality readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H3_a$: There will be a significant difference in regard to race in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H4_0$: There will not be a significant difference in regard to race in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H4_a$: There will be a significant difference in regard to race in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H5_0$: There will be not be a significant difference in regard to socioeconomic status in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H5_a$: There will be a significant difference in regard to socioeconomic status in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H6_0$: There will be not be a significant difference in regard to socioeconomic status in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of

8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H6_a$: There will be a significant difference in regard to socioeconomic status in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H7_0$: There will not be a significant difference in regard to gender in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, is in a less densely populated area with a city population of 93,963.

$H7_a$: There will be a significant difference in regard to gender in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

$H8_0$: There will not be a significant difference in regard to gender in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at

NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, is in a less densely populated area with a city population of 93,963.

$H8_a$: There will be a significant difference in regard to gender in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963.

## Population

The population of the current study was all patients captured in the SPARCS database who were admitted to either NYU or AMC between 2005 and 2009 with an Internal Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code for heart failure. The research study used the following heart failure ICD-9-CM codes: 428, 428.0, 428.1, 428.2, 428.20, 428.21, 428.22, 428.23, 428.3, 428.30, 428.31, 428.32, 428.33, 428.4, 428.40, 428.41, 428.42, 428.43, and 428.9. See Appendix A for a complete description of the diagnosis code.

## Sampling Frame

The SPARCS database collects health care biometrics from Article 28 acute care hospitals in New York State for research as a tool to promote public health. The research study analyzed a 5-year period of all heart failure patients admitted to NYU and AMC. The SPARCS database captured all heart failure patients treated at both NYU and AMC during the 5-year timeframe. Since the current study examined all heart failure patients treated at both institutions and not a sample of patients, the number of patients needed to calculate statistical differences was not estimated. The heart failure patients examined in the current study were sub-divided by patient race, gender, and socioeconomic status.

## Informed Consent

The research study used data from the SPARCS database, and no primary data collection involving human subjects was done in this study. Because the study data was mined from SPARCS, no informed consent forms were signed. Since the study data was mined from SPARCS, neither HIPPAA releases for patient information nor informed consent were signed. The SPARCS database contains data files with and without identifying data elements and this study made use of both. Patient identifiers were necessary to calculate 30-day heart failure readmission rates outlined in the study. The SPARCS Data Protection Review Board (DRRB) must approve requests for data elements with identifiers. In addition, the New York State Department of Health Commissioner must ratify the data request following DPRB authorization (SPARCS, 2006). The research required prior approval from University of Phoenix internal review board (IRB). A copy of the University of Phoenix internal review board approval can be found in Appendix B. SPARCS requires that all research requests for data garner IRB approval prior to SPARCS data being released to the investigator (SPARCS, 2007a).

According to Title 45 CFR part 46 of the United States Department of Health and Human Services regarding the protection of human subjects, informed consent was not required for the current study. Title 45 CFR part 46.116 (d) stipulates that an IRB may waive informed consent provided the research meets the following criteria. There is minimal risk to study subjects, subject rights and wellbeing will not be affected adversely, the research could not reasonably be conducted without the consent waiver and pertinent results will be shared with subjects when applicable (U.S. Department of Health & Human Services, 2010).

## Confidentiality

Unique identifiers were assigned by the SPARCS database administrators to protect the confidentiality of the study population. The unique identifiers assigned by SPARCS administrators did not contain patient names to preserve anonymity. The Office for Human Research Protections of the United States Department of Health and Human Services provides guidance on how to treat private patient information that has been coded to protect patient privacy. Specifically, the Office for Human Research Protections does not consider coded patient information to be identifiable patient information (U.S. Department of Health & Human Services, 2008). Therefore HIPAA patient releases and informed consent forms were not required and were not used in the study. Specifically, the Office for Human Research Protections does not consider coded patient information to be identifiable patient information when the code is not available to the investigator, which is the case with the researcher's access to the SPARCS database (U.S. Department of Health & Human Services, 2008). Under HIPAA, the SPARCS database is a limited dataset that does not require authorizations. Consent forms and authorizations would make the research impracticable to do given the large numbers of records with no patient contact and without access to enough identified information to be able to contact the patients. Therefore HIPAA patient releases and informed consent forms were not required by the regulations and were not used in the study.

Requests for data with and without patient identifiers are made through a formal prescribed process that includes a 17-page application. A copy of the SPARCS application can be found in Appendix C. Applicants requesting data from the SPARCS database must be present at the quarterly DPRB meetings reviewing requests to answer questions that any 1 of or all 12 SPARCS DPRB members may have. The formal application process involves a review by the SPARCS DRRB and subsequent approval by the Commissioner of the New York State Department of Health (SPARCS, 2006). The New York State Department of Health Commissioner has the right to either approve or reverse the DPRB decision (SPARCS, 2006, 2008). A checks and balances process is in place under which the DPRB may overturn the Department of Health Commissioner's denial (SPARCS, 2006, 2008).

The formal request process for SPARCS data-containing identifiers requires any individual with access to the data to sign an affidavit that specifically defines the processing and storing of data. The affidavit must further state that the requested data may only be used for the specific purposes outlined in the formal application. Any vendor or contractor handling the data must also sign the same affidavit (SPARCS, 2006, 2008). In addition, the SPARCS affidavit specifically prohibits any attempt to identify or contact individuals whose data is captured in the SPARCS dataset (SPARCS, 2006).

**Data Security**

Approved requests for data were provided to the requestor on either a CD or DVD that is encrypted and password protected in the form of an ASCII text file (SPARCS, 2006). The CD or DVD was stored in a secured location at the researcher's home until it was delivered to the contracted statistician for data analysis. The statistician provided a confidentiality statement. Copies of the SPARCS signed confidentiality affidavits can be found in Appendix D. The CD or DVD will be retained in a secure location for a period of 5 years after the completion of the research after which the CD or DVD will be destroyed using appropriate means.

## Geographic Location

The research study analyzed heart failure patients who were admitted to NYU and AMC. NYU and AMC are both teaching institutions located in New York State with cardiology fellowship programs. NYU is a 705-bed facility, while AMC is a 651-bed facility (Albany Medical Center, n.d.; NYU Langone Medical Center, n.d.).

The geographic location of New York State was appropriate because a legal mandate requires all New York State hospitals to submit all inpatient and outpatient data requested by SPARCS (New York State Department of Health, 2007). One of the disease data elements mandated by SPARCS is heart failure. The SPARCS database also collects both identifying and non-identifying patient information that will be necessary to calculate 30-day readmission rates.

Using hospitals that were both in New York State helped to control for seasonal migration patterns of elderly patients to warmer localities during the winter months. Both hospitals are in metropolitan statistical areas. The Agency for Healthcare Research and Quality (AHRQ2010) reported that in 2008 rural hospitals had approximately 43% more preventable hospital admissions than urban hospitals.

NYU and AMC have similar scores on the four heart failure process of care as measured by Medicare Hospital Compare Quality of Care. Medicare Hospital Compare Quality of Care (2010f) reported that 96% patients received discharge instructions, 100% patients received an evaluation of left ventricular systolic dysfunction, 99% of patients received an angiotensin-converting enzyme inhibitor or an angiotensin II receptor blocker for left ventricular systolic dysfunction, and 100% of patients received smoking cessation counseling based on a sample of heart failure patients treated at NYU from April 2009 through March 2010. Medicare Hospital Compare Quality of Care (2010e) reported the following process of care scores for a sample of heart failure patients treated at AMC from the same timeframe. Ninety six percent (96%) of patients received discharge instructions, 100% patients received an evaluation of left ventricular systolic dysfunction, 97% of patients received an angiotensin-converting enzyme inhibitor or an angiotensin II receptor blocker for left ventricular systolic dysfunction, and 100% of patients received smoking cessation counseling (Medicare Hospital Compare Quality of Care, 2010e).

Both NYU and AMC have similar all cause 30-day readmission rates for heart failure patients according to Medicare Hospital Compare Quality of Care (2010h, 2010i). According to CMS calculations based on Medicare data from July 1, 2006 until June 30, 2009, the 30-day readmission rates for NYU and AMC were, 23.6% and 23% respectively (Medicare Hospital Compare Quality of Care, 2010h, 2010i). The 30-day readmission rates for both NYU and AMC were similar to the national 30-day readmission rate of 24.7% (Medicare Hospital Compare Quality of Care, 2010h, 2010i).

However, there are some notable differences between NYU and AMC. There are 85 hospitals, including NYU, in a 25-mile radius of New York, NY (Medicare Hospital

Compare Quality of Care, 2010d). There are 17 hospitals, including AMC, in a 50-mile radius from Albany, NY (Medicare Hospital Compare Quality of Care, 2010c). The volume of hospitals in the New York City area as compared to the Albany area is a clear reflection of the differences in population density between the two cities. New York City is a densely populated area with a city population of 8,214,426, whereas Albany is a less densely populated area with a city population of 93,963 (U.S. Census Bureau, 2010).

The all cause 30-day mortality for heart failure patients at NYU is 6.6%, which is better than the national average (Medicare Hospital Compare Quality of Care, 2010b) The all cause 30-day mortality for heart failure patients at AMC is 11.8%, which is similar to the national average (Medicare Hospital Compare Quality of Care, 2010a). The all cause 30-day mortality rates calculations by CMS result from a sample of Medicare patients discharged from July 2006 to June 2009 (Medicare Hospital Compare Quality of Care, 2010a, 2010b). The sample does not include Medicare patients on Medicare Advantage plans (Medicare Hospital Compare Quality of Care, 2010a, 2010b).

Nonetheless, AMC received an advanced certification in heart failure treatment by the Joint Commission (The Joint Commission, n.d.). An advanced certification distinguishes a hospital's efforts to cultivate better patient outcomes (The Joint Commission, n.d.). To date, NYU has not received an advanced certification in heart failure (The Joint Commission, n.d.)

## Data Collection

The data collection tool for the study was the SPARCS database. SPARCS is a large public data system for New York State funded by a $1.1 million grant from the Department of Health in 1977 (Quan, 1980). Designed to be a cooperative effort between the State of New York and the health care industry, SPARCS became public law in 1979. Under this law, all non-federal hospital-based ambulatory surgery facilities in New York must share all requested impatient and outpatient data (New York State Department of Health, 2007). In 2003, the Department of Health worked with SPARCS in an effort to promote public health by identifying significant data elements to collect and track in a health database. SPARCS gathers and stores patient level information such as patient attributes, diagnosis, treatments rendered, and billing source for all Article 28 hospitals in the State of New York (New York State Department of Health, 2007). In 2004, SPARCS fell under the jurisdiction of the Bureau of Biometrics and Health Statistics that in turn is a subdivision of the office of the New York State Department of Health (New York State Department of Health, 2007).

SPARCS has strict data submission requirements. Hospital officials must electronically submit 95% of the inpatient required data within 60 days of patient discharge (SPARCS, 2009). One hundred percent (100%) of inpatient required data must be submitted within 180 days of the close of the hospital's fiscal year (SPARCS, 2009.).

The data stored in the SPARCS database is archival and is comprised of patient level information submitted to SPARCS from all Article 28 hospitals in New York State (New York State Department of Health, 2007). This study did not collect any primary data involving human patients. The archived data stored in the SPARCS database was not processed or altered from the original source (Weller, Kabra, Cozzens, & Hannan, 2010). Because the data was not been processed or altered from its original data source, it is primary data. The purpose of SPARCS is to serve as a public database for conducting financial studies, rate setting, surveillance, health planning and resource allocation, epidemiological studies, research studies and quality of care assessment (SPARCS, 2006).

The patient's zip code was used to determine socioeconomic status. The mean household income of a zip code according to the 2010 United States Census data served as a quantitative approximation of patient income. The mean household income for all the zip codes was broken into quartiles for the NYU patients and a separate quartile for the AMC patients. Expressing socioeconomic status based on quartiles helped to control for cost of living differences between downstate New York where NYU is located and upstate New York where AMC is located. The approach to defining socioeconomic status is an established practice and used in previous studies (Braithwaite et al., 2009; Fairclough, Boddy, Hackett, & Stratton, 2009; Philbin et al., 2001).

**Instrumentation**

The SPARCS database and GIS were the two instruments used to collect data. The data collection instrument articulated the independent variable of patient proximity to the hospital. A geographic information system (GIS) is a computer-based approach that is able to display, store, and manipulate geographic spatial data (Mulvenon, Kening, Mckenzie, & Anderson, 2006). Capitalized in the study was the mapping capabilities of GIS. The study used the ArcGIS™ brand name GIS software to calculate distance from the patient's zip code to the hospital.

The SPARCS database provided patient zip code data that was used to calculate patient distance from the hospital using the GIS software. Patient socioeconomic status was determined by utilizing family median income zip code data from the 2010 United States Census. Unique identifier assigned by SPARCS administrators was employed to ascertain if a patient was readmitted within 30 days of patient discharge. Patient gender and race was captured by SPARCS (SPARCS, 2009).

## Validity and Reliability

Examined in the concept of research validity was the credibility of the study method. Validity denotes that, given study limitations, the conclusions of the study are a true reflection of the researcher's intent and the underlying study rationale (Leedy & Ormrod, 2005). In order to access the overall validity of a research study, one must examine both internal and external validity.

### Internal Validity

Internal validity refers to the instrument's ability to measure what it intends to measure (Rudestam & Newton, 2007). External validity allows researchers to make inferences from the results of the sample to the larger population (Rudestam & Newton, 2007). Internal validity is ascertained by the ability of the research instrumentation to measure precisely. Geographic information system, particularly the mapping function, is a valid and reliable instrument (Broda, & Baxter, 2002). Researchers used GIS in numerous public health research studies to calculate proximity and provide spatial mapping (Brower & Carroll, 2007; Trevisan et al., 2010; Yang & Jin, 2010; Zeichner & Adams, 2010).

### External Validity

External validity is ascertained by the ability to generalize the results to similar populations (Rudestam & Newton, 2007). Interaction of selection threats to external validity are characterized by the population studied and may not be representative to a larger generalized population. The study used the SPARCS database, which collects data from all acute hospitals in New York State, with the exclusion of Federal institutions. The legal mandate to report all requested data elements to SPARCS improves the external validity of the research study because it is more representative of the total population.

**Reliability**

The concept of reliability examines the consistency of results of an instrument (Rudestam & Newton, 2007). The SPARCS database is a repository for core data elements to satisfy public health and human service needs (SPARCS, 2009). Investigators used data from the SPARCS database to explore health care and epidemiological disease patterns (Gonzalez-Fernandez, Kuhlemeier, & Palmer, 2008; Jong, Westert, Lagoe, & Groenewegen, 2006; Philbin et al., 2001).

The data contained in the SPARCS database receives a proactive internal review, with aid from the Bureau of Biometrics' Data Quality Unit, to maintain accurate and complete data (SPARCS, 2006, 2009). Data issues are identified by comparing the SPARCS database with other New York State Department of Health databases. SPARCS administrators contact individual institutions with discrepancies. Data discrepancy reports are typically available within 2 hours of data submission SPARCS, 2009). Hospitals administrators who fail to submit data or submit corrected data could have their CMS reimbursements reduced (SPARCS, 2009).

Geographic information system technology proved to be both accurate and reliable. GIS technology reliability has been validated in a study comparing GIS technology to field surveys and cartographic products (Srbinoski, 2009). Srbinoski

(2009) found that the position accuracy of GIS technology was within 1.94 meters of field surveys and cartographic products.

## Data Analysis

The research study employed log-linear modeling to analyze the relationship between the variables. Log-linear models evaluate the relationship between variables in multi-way tables. Log-linear models do not attempt to distinguish dependent and independent variables (Field, 2009). The log-linear model can be used to communicate the relationship between categorical variables (Steinberg, 2008).

The current study employed a log-linear model to determine if there is a difference in the inpatient mortality rates and 30-day readmission rates of patients hospitalized with heart failure located in the densely populated area of New York City as compared to the less densely populated Albany, NY with regard to the patient's proximity to the hospital. The current study also conducted a subgroup analysis of the study population to determine if there are differences in inpatient mortality and 30-day readmission rates in regard to a patient's race, socioeconomic status, or gender. A chi-square analysis was also employed to identify differences in each of the distance quartiles for each hospital for the study's predetermined categorical outcomes; heart failure patients either survive their hospital admission or expire and heart failure patients may or may not be readmitted within 30-days of hospital discharge

The following data elements were necessary for the study; heart failure ICD-9-CM data for NYU and AMC between 2005 and 2009, race, gender, zip code, and patient identifiers. The ICD-9-CM codes identified heart failure patients in the SPARCS database (see Appendix A). The SPARCS patient identifiers were used to determine if the heart patient was admitted within a 30-day timeframe. Race and gender data elements were collected from the database to determine if the two descriptive independent variables significantly interact with the independent variable of proximity. Patient zip code data was necessary to calculate patient proximity to the admitting hospital.

## Summary

Chapter 3 included the details and rationale for the study's research methodology. The quantitative retrospective study used pre-existing data from a validated survey instrument provided through SPARCS. SPARCS is a database that collects information from all non-federal acute hospitals in New York State in order to explore health care and epidemiological disease patterns (SPARCS, 2009). The SPARCS data pertaining to heart failure admissions at NYU and AMC between the years of 2005 and 2009 was used to answer the study’s hypotheses after statistical manipulation. A log-linear model analyzed the categorical outcome; heart failure patients either survive their hospital admission or expire and heart failure patients may or may not be readmitted within 30-days of hospital discharge. A log-linear model is an appropriate statistical treatment to calculate a dichotomous outcome (Field, 2009).

Chapter 4 contains a description of the study results. A data analysis of how the study variables race, socioeconomic status, and gender, relate to inpatient mortality and 30-day readmission rates based on the heart failure patient’s proximity to the teaching hospital. The findings of Chapter 4 provide the basis for Chapter 5, which includes a discussion and interpretation the study results found in Chapter 4.

# CHAPTER 4: RESULTS

The purpose of the quantitative retrospective research study will be to discover if proximity to the admitting hospital influences inpatient heart failure inpatient mortality and 30-day readmission rates. A subgroup analysis of race, socioeconomic status, and gender was also performed to detect potential differences as to how the independent variable of heart failure patient proximity to the hospital would affect the dependent variables: impatient mortality and 30-day readmission.

## Research Design and Methodology

Chapter 4 reveals the results of the analysis and findings employed to answer the research questions and hypotheses using the methodology outlined in Chapter 3. This quantitative correlational study examined the relationship between the independent variable of patient proximity to either NYU or AMC and the dependent variables of inpatient mortality and 30-day readmission rates. This chapter sets forth patient demographics, data analysis, and the results of the log-linear modeling analysis to measure the relationship between the variables and a brief summary. The research questions directing this study were:

1. What is the difference, if any, in the 30-day inpatient mortality rates of patients hospitalized with heart failure based on proximity to the hospital?
2. What is the difference, if any, in the 30-day readmission rates of patients hospitalized with heart failure based on proximity to the hospital?

## Study Participants Demographics

The study compared the impatient mortality and 30-day readmission rates for heart failure patients treated at either NYU or AMC between 2005 and 2009. Both NYU and AMC are teaching hospitals with cardiology fellowship programs located in New York State. NYU, however, is located in an area with a city population of 8,214,426, while AMC is located in area with a city population of 93.963 (U.S. Census Bureau, 2010). The data revealed that heart failure patients in the study treated at NYU resided in New York, New Jersey, Massachusetts, Connecticut, Pennsylvania, and Maryland. AMC patients inhabited New York, Massachusetts, Vermont, and New Hampshire.

The study included 5303 heart failure admissions; 2998 from NYU and 2192 from AMC. The 3619 unique patients among the 5303 admissions is illustrated in Table 1.

Table 1

*Number of Total Admissions Per Subject*

| Number of Hospital Admissions Per Subject | AMC | NYU | Total |
|---|---|---|---|
| 1 | 1194 | 1607 | 2801 |
| 2 | 183 | 293 | 476 |
| 3 | 83 | 110 | 193 |
| 4 | 29 | 40 | 69 |
| 5 | 17 | 14 | 31 |
| 6 | 10 | 12 | 22 |
| 7 | 3 | 6 | 9 |
| 8 | 0 | 2 | 2 |
| 9 | 1 | 1 | 2 |
| 10 | 1 | 4 | 5 |
| 11 | 1 | 0 | 1 |
| 12 | 2 | 1 | 3 |
| 13 | 0 | 1 | 1 |
| 20 | 0 | 2 | 2 |
| 23 | 1 | 0 | 1 |
| 27 | 1 | 0 | 1 |
| Total | 1526 | 2093 | 3619 |

A total of 226 inpatient deaths were recorded in the SPARCS data. The inpatient mortality number was 141 for NYU and 85 for AMC. The number of 30-day readmissions during the study period for NYU was 208 and 186 for AMC.

The gender mix for the NYU population consisted of 1145 males and 948 females, while AMC had 880 men and 646 women. The racial composition of the study population was 1412 Caucasians, 144 African Americans, and 537 patients categorized as other at NYU, whilst AMC had 1231 Caucasians, 198 African Americans and 97 patients classified as other.

## Data Collection

The study population consisted of all heart failure patients who were admitted between January 1, 2005 and December 31, 2009 at either AMC or NYU. The data was collected from the SPARCS database. All Article 28 hospitals in New York State are legally mandated to report patient level data to SPARCS (New York State Department of Health, 2007). The study patients were identified using the ICD-9-CM codes listed in Appendix A. Patient socioeconomic status was determined by patient zip code which ascertained the mean household income data from the 2010 U.S. Census. The socioeconomic status was broken into quartiles for each individual hospital. Table 2 illustrates the socioeconomic status quartiles for both NYU and AMC.

Table 2

*Socioeconomic Status Quartiles*

**Percentiles**

| | | | Percentiles | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MedCenter2 | 5 | 10 | 25 | 50 | 75 | 90 | 95 |
| Weighted Average (Definition 1) | income | AMC | 45153.40 | 49751.80 | 57284.00 | 65966.00 | 81027.50 | 98842.60 | 111896.00 |
| | | NYU | 46314.35 | 53936.50 | 68212.75 | 93399.00 | 129059.50 | 183034.20 | 204325.15 |
| Tukey's Hinges | income | AMC | | | 57320.00 | 65966.00 | 80817.00 | | |
| | | NYU | | | 68259.00 | 93399.00 | 128996.00 | | |

The study population was restricted to less than or equal to a distance of two hundred miles. The two hundred mile distance was also broken into the same quartiles for both hospitals. Table 3 illustrates the distance quartiles employed in the study.

Table 3

*Distance Quartiles*

| | | Percentiles | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 5 | 10 | 25 | 50 | 75 | 90 | 95 |
| Weighted Average (Definition 1) | distance | 0.0000 | 1.0000 | 2.1000 | 7.0000 | 12.7000 | 34.1000 | 50.9000 |
| Tukey's Hinges | distance | | | 2.1000 | 7.0000 | 12.7000 | | |

The distance at which the "decay effect", where health care utilization rates decline, at NYU, located in a high-density area, and AMC, located in a lower density area was identified using GIS technology. The GIS software calculated proximity to the hospital from the center of the zip code where the patient resides.

**Data Analysis include tools**

SPSS version 19 was used to statistically treat the raw data collected from the SPARCS database. The study employed the SAS/GIS software version 9.2 to calculate the proximity of the heart failure patient to the hospital. The SAS/GIS software zip code function calculates distance based on the center of the zip code.

## Findings

### Hypothesis 1-Inpatient Mortality

Research hypothesis one predicted there would be a significant difference in the inpatient mortality of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 96,963. A log-linear model did not detect a statistically significant difference between NYU and AMC in heart failure inpatient mortality with respect to patient proximity to hospital $x^2$ (3, N = 5130) = 7.482, $p$ = .058. An interquartile analysis of inpatient mortality at AMC revealed a significantly higher mortality rate, 46.4%, in the fourth quartile as compared to patients that did not expire, 36.5% ($x^2$ (3, N = 2149) = 8.474, $p$ = .037). In AMC's nearest quartile, the inpatient mortality rate was 6.0% as compared to those who did not expire, 16.9%. No significant correlation between distance quartile and inpatient mortality was observed among NYU patients $x^2$ (3, N = 2973) = 2.384, $p$ = .497. The null hypothesis was not rejected, a significant difference in the inpatient mortality of heart failure patients based on their proximity to the hospitals was not observed between hospitals $x^2$ (3, N = 5130) = 7.482, $p$ = .058.

**Hypothesis 2-Readmission Rates**

Research hypothesis two predicted there would be a significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. A log-linear model did not detect a statistically significant difference in 30-day heart failure readmissions between NYU and AMC with respect to patient proximity to hospital $x^2$ (3, N = 1559) = 3.478, $p$ = .324. An interquartile difference in total readmissions was not observed at NYU $x^2$ (3, N = 898) = 0.693, $p$ = .875. A statistically significant difference in all readmissions, both 30-day or less as well as over 30-day was noted in an interquartile analysis of heart failure patients treated at AMC $x^2$ (3, N = 653) = 8.435, $p$ = .042. The null hypothesis was not rejected, a statistically significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity to their respective hospital was not observed $x^2$ (3, N = 1559) = 3.478, $p$ = .324.

**Hypothesis 3- Inpatient Mortality in regard to Race**

Research hypothesis three predicted there would be a significant difference in regard to race in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. A log-linear model did not detect a statistically significant difference between NYU and AMC in heart failure inpatient mortality with respect to patient race and proximity to hospital $x^2$ (9, N = 3661) = 6.832, $p$ = .655. A chi-square test did not detect a significant association in the inpatient mortality between the patient's race and any of the four interquartile distances from either NYU ($x^2$ (3, N = 2082) = 1.066, $p$ = .785) or AMC ( $x^2$ (3, N = 1497) = 7.717, $p$ = .052) . The null hypothesis was not rejected, a statistically significant difference between NYU and AMC in the inpatient mortality of hospitalized heart failure patients in regard to race and proximity to their respective hospital was not observed $x^2$ (9, N = 3661) = 6.832, $p$ = .655.

**Hypothesis 4-Readmission Rates in regard to Race**

Research hypothesis four predicted there would be a significant difference in regard to race in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. A log-linear model did not detect a statistically significant difference in 30-day heart failure readmissions between NYU and AMC in regards to and proximity patient race $x^2$ (9, N = 842) = 15.710, *p* = .073. A significant difference in 30-day readmission rates in regards to patient race and interquartile distance at either NYU ($x^2$ (3, N = 484) = 2.827, *p* = .419) or AMC ($x^2$ (3, N = 326) = 2.108, *p* = .55) was not identified with the chi square analysis performed. The null hypothesis was not rejected, a statistically significant difference between NYU and AMC in 30-day readmissions of hospitalized heart failure patients in regard to race and proximity to their respective hospital was not observed $x^2$ (9, N = 842) = 15.710, *p* = .073.

**Hypothesis 5-Inpatient Mortality in regards to Socioeconomic Status**

Research hypothesis five predicted there would be a significant difference in regard to socioeconomic status in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. A log-linear model did not detect a statistically significant difference between NYU and AMC in the inpatient mortality of heart failure patient with respect to patient socioeconomic status and proximity to hospital $x^2$ (9, N = 3591) = 12.786, *p* = .173.

A chi square analysis uncovered a statistically significant difference in inpatient mortality at AMC for patients from income quartile one $x^2$ (3, N = 1484) = 7.854, p = .049. An inverse relation was noted at AMC for patient's from income quartile one in the furthest and nearest distance quartiles. In the nearest distance quartile, 6.7% of patients expired as compared to 44.10% who did not expire. Conversely, a much higher percentage of income quartile patients from the farthest distance quartile expired (80.0%) as compared to those that survived (38.0%). No statistically significant difference in inpatient mortality was observed in the any of the distance or income subgroup analyzes at NYU $x^2$ (3, N = 2075) = 1.082, $p$ = .781. See Table 4 and 5 for the interquartile analysis of inpatient mortality based on the patient's socioeconomic status and proximity to AMC and NYU respectively.

Table 4

*Inpatient Mortality at AMC based on Proximity and Socioeconomic Status*

| **AMC** | | | | PatientDeath | | |
|---|---|---|---|---|---|---|
| income_quart2 | | | | .00 Other dispositior | 1.00 Patient Died | Total |
| 1 | DistQuartiles | 1 | Count | 116a | 1b | 117 |
| | | | % within PatientDeath | 44.10% | 6.70% | 42.10% |
| | | 2 | Count | 38a | 1a | 39 |
| | | | % within PatientDeath | 14.40% | 6.70% | 14.00% |
| | | 3 | Count | 9a | 1a | 10 |
| | | | % within PatientDeath | 3.40% | 6.70% | 3.60% |
| | | 4 | Count | 100a | 12b | 112 |
| | | | % within PatientDeath | 38.00% | 80.00% | 40.30% |
| | Total | | Count | 263 | 15 | 278 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| 2 | DistQuartiles | 1 | Count | 33a | 1a | 34 |
| | | | % within PatientDeath | 8.10% | 11.10% | 8.20% |
| | | 2 | Count | 27a | 0a | 27 |
| | | | % within PatientDeath | 6.70% | 0.00% | 6.50% |
| | | 3 | Count | 152a | 4a | 156 |
| | | | % within PatientDeath | 37.40% | 44.40% | 37.60% |
| | | 4 | Count | 194a | 4a | 198 |
| | | | % within PatientDeath | 47.80% | 44.40% | 47.70% |
| | Total | | Count | 406 | 9 | 415 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| 3 | DistQuartiles | 1 | Count | 59a | 0a | 59 |
| | | | % within PatientDeath | 14.30% | 0.00% | 13.70% |
| | | 2 | Count | 155a | 8a | 163 |
| | | | % within PatientDeath | 37.40% | 44.40% | 37.70% |
| | | 3 | Count | 37a | 3a | 40 |
| | | | % within PatientDeath | 8.90% | 16.70% | 9.30% |
| | | 4 | Count | 163a | 7a | 170 |
| | | | % within PatientDeath | 39.40% | 38.90% | 39.40% |
| | Total | | Count | 414 | 18 | 432 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| 4 | DistQuartiles | 2 | Count | 146a | 13a | 159 |
| | | | % within PatientDeath | 43.60% | 54.20% | 44.30% |
| | | 3 | Count | 54a | 3a | 57 |
| | | | % within PatientDeath | 16.10% | 12.50% | 15.90% |
| | | 4 | Count | 135a | 8a | 143 |
| | | | % within PatientDeath | 40.30% | 33.30% | 39.80% |
| | Total | | Count | 335 | 24 | 359 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| Total | DistQuartiles | 1 | Count | 208a | 2b | 210 |
| | | | % within PatientDeath | 14.70% | 3.00% | 14.20% |
| | | 2 | Count | 366a | 22a | 388 |
| | | | % within PatientDeath | 25.80% | 33.30% | 26.10% |
| | | 3 | Count | 252a | 11a | 263 |
| | | | % within PatientDeath | 17.80% | 16.70% | 17.70% |
| | | 4 | Count | 592a | 31a | 623 |
| | | | % within PatientDeath | 41.70% | 47.00% | 42.00% |
| | Total | | Count | 1418 | 66 | 1484 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |

Table 5

*Inpatient Mortality at NYU based on Proximity and Socioeconomic Status*

| **NYU** | | | | PatientDeath | | |
|---|---|---|---|---|---|---|
| income_quart2 | | | | .00 Other dispositior | 1.00 Patient Died | Total |
| 1 | DistQuartiles | 1 | Count | 79a | 2a | 81 |
| | | | % within PatientDeath | 11.50% | 6.70% | 11.30% |
| | | 2 | Count | 280a | 10a | 290 |
| | | | % within PatientDeath | 40.80% | 33.30% | 40.50% |
| | | 3 | Count | 289a | 17a | 306 |
| | | | % within PatientDeath | 42.10% | 56.70% | 42.70% |
| | | 4 | Count | 38a | 1a | 39 |
| | | | % within PatientDeath | 5.50% | 3.30% | 5.40% |
| | Total | | Count | 686 | 30 | 716 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| 2 | DistQuartiles | 1 | Count | 69a | 4a | 73 |
| | | | % within PatientDeath | 17.00% | 25.00% | 17.30% |
| | | 2 | Count | 80a | 2a | 82 |
| | | | % within PatientDeath | 19.70% | 12.50% | 19.40% |
| | | 3 | Count | 181a | 6a | 187 |
| | | | % within PatientDeath | 44.60% | 37.50% | 44.30% |
| | | 4 | Count | 76a | 4a | 80 |
| | | | % within PatientDeath | 18.70% | 25.00% | 19.00% |
| | Total | | Count | 406 | 16 | 422 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| 3 | DistQuartiles | 1 | Count | 9a | 0a | 9 |
| | | | % within PatientDeath | 3.40% | 0.00% | 3.30% |
| | | 2 | Count | 100a | 4a | 104 |
| | | | % within PatientDeath | 37.90% | 36.40% | 37.80% |
| | | 3 | Count | 16a | 1a | 17 |
| | | | % within PatientDeath | 6.10% | 9.10% | 6.20% |
| | | 4 | Count | 139a | 6a | 145 |
| | | | % within PatientDeath | 52.70% | 54.50% | 52.70% |
| | Total | | Count | 264 | 11 | 275 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| 4 | DistQuartiles | 1 | Count | 437a | 20a | 457 |
| | | | % within PatientDeath | 69.10% | 66.70% | 69.00% |
| | | 2 | Count | 89a | 4a | 93 |
| | | | % within PatientDeath | 14.10% | 13.30% | 14.00% |
| | | 3 | Count | 1a | 0a | 1 |
| | | | % within PatientDeath | 0.20% | 0.00% | 0.20% |
| | | 4 | Count | 105a | 6a | 111 |
| | | | % within PatientDeath | 16.60% | 20.00% | 16.80% |
| | Total | | Count | 632 | 30 | 662 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |
| Total | DistQuartiles | 1 | Count | 594a | 26a | 620 |
| | | | % within PatientDeath | 29.90% | 29.90% | 29.90% |
| | | 2 | Count | 549a | 20a | 569 |
| | | | % within PatientDeath | 27.60% | 23.00% | 27.40% |
| | | 3 | Count | 487a | 24a | 511 |
| | | | % within PatientDeath | 24.50% | 27.60% | 24.60% |
| | | 4 | Count | 358a | 17a | 375 |
| | | | % within PatientDeath | 18.00% | 19.50% | 18.10% |
| | Total | | Count | 1988 | 87 | 2075 |
| | | | % within PatientDeath | 100.00% | 100.00% | 100.00% |

**Hypothesis 6-Readmission Rates in regards to Socioeconomic Status**

Research hypothesis six predicted there would be a significant difference in regard to socioeconomic status in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. A log-linear model did not detect a statistically significant difference in 30-day heart failure readmissions between NYU and AMC in regards to socioeconomic status and proximity $x^2$ (9, N = 840) = 3.684, $p$ = .931. A statistically significant interquartile difference in 30-day readmission rates were not observed when accounting for socioeconomic status and proximity to the hospital within either of the individual hospitals; NYU ($x^2$ (3, N = 483) = 2.661, $p$ = .447) or AMC ($x^2$ (3, N = 323) = 2.021, $p$ = .568). The null hypothesis was not rejected as a statistically significant difference in 30-day readmission rates between NYU and AMC was found $x^2$ (9, N = 840) = 3.684, $p$ = .931.

**Hypothesis 7- Inpatient Mortality in regards to Gender**

Research hypothesis seven predicted there would be a significant difference in regard to gender in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. A log-linear model did not detect a statistically significant difference between NYU and AMC in the inpatient mortality of heart failure patient with respect to patient gender and proximity to hospital $x^2$ (3, N = 3595) = 0.318, $p$ = .957. A chi-square test did not find a significant interquartile difference in impatient mortality in respect to patient gender and interquartile distance from the hospital at either NYU ($x^2$ (3, N = 2082) = 1.066, $p$ = .785) or AMC ($x^2$ (3, N = 1497) = 7.717, $p$ = .052). The null hypothesis was not rejected, a statistically significant difference between NYU and AMC in the inpatient mortality of hospitalized heart failure patients in regard to patient gender and proximity to their respective hospital was not observed $x^2$ (3, N = 3595) = 0.318, $p$ = .957.

**Hypothesis 8- Readmission Rates in regards to Gender**

Research hypothesis eight predicted there would be a significant difference in regard to gender in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area with a city population of 8,214,426, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area with a city population of 93,963. . A log-linear model did not detect a statistically significant difference in 30-day heart failure readmissions between NYU and AMC in regards to patient gender and proximity $x^2$ (3, N = 826) = 2.680, $p$ = .444. A chi square analysis did not find a statistically significant interquartile difference in readmission for NYU ($x^2$ (3, N = 484) = 2.827, $p$ = .419) or AMC ($x^2$ (3, N = 326) = 2.108, $p$ = .55) in regard to patient gender. The null hypothesis was not rejected. There was not a statistically significant difference between NYU and AMC in 30-day readmission rates of hospitalized heart failure patients in regard to gender and proximity to the hospitals $x^2$ (3, N = 826) = 2.680, $p$ = .444.

## Conclusions

Chapter 4 portrayed the statistically treated records of heart failure patients treated at NYU and AMC between 1999 and 2009 collected from the New York State SPARCS database. The methodology utilized to treat the raw data was outlined in Chapter 3, and the results are put forward in both written and graphical forms throughout Chapter 4. The findings for the research questions and each of the hypotheses were put forth and described.

Chapter 5 will offer a comprehensive discussion and analysis of the results presented in Chapter 4. The following section will also discuss the study limitations. Chapter 5 will conclude with recommendations for future research to build on the existing body of knowledge.

# CHAPTER 5: CONCLUSIONS AND RECOMMEDATIONS

Hospitalization and hospital readmission of heart failure patients is a major driver in the cost of treatment (Jencks, Williams, & Coleman, 2009). Heart failure treatment exhausts a disproportionate share of the CMS annual budget (CMS, 2005). The enormous financial drain heart failure treatment places on CMS prompted the organization to institute numerous programs designed to reduce the costs associated with heart failure treatment. For example, heart failure was included as one of the core measures of the Hospital Inpatient Quality Reporting program. The Hospital Inpatient Quality Reporting program is part of the Section 501(b) of the 2003 Medicare Prescription Drug, Improvement, and Modernization Act (CMS, 2012b). Hospitals that did not comply with the Hospital Inpatient Quality Reporting program lost 0.4% of their CMS reimbursements. In order to increase hospital reporting, the reduction was increased from 0.4% to 2.0% in 2005 by order of the Deficit Reduction Act. In 2005 www.medicare.gov/hospitalcompare, a website which allowed consumers to compare hospitals on care measures including heart failure was introduced in an attempt to bring increased scrutiny on inpatient treatment (CMS, 2012a). By 2007, approximately 95% of all hospitals participating with CMS reported the mandated quality measures, heart failure being one of those core measures (CMS, 2012b). In 2008 hospital compare.gov began reporting 30-day heart failure mortality (CMS, 2012a). Heart failure 30-day readmissions were added to www.medicare.gov/hospitalcompare in 2010. Finally beginning in 2012, section 3025 of the Affordable Care Act will require CMS to reduce reimbursements to hospitals with excess 30-day heart failure readmissions (CMS, 2012c).

## Conclusions

The purpose of the current retrospective quantitative study was to identify how patient proximity influenced inpatient mortality and 30-day readmissions of heart failure patients. The study examined patients at two teaching hospitals with cardiology fellowship programs; NYU in Downstate NY and AMC in Upstate NY. NYU is located in a high population density area, while AMC is located in an area with a lower population density. The study encompassed 3619 patients and included a sub-group analysis of patient race, socioeconomic status and gender.

The research study investigated two research questions, with each research question bearing four hypotheses. Collectively the eight hypotheses answered the two research questions in regard to differences in the overall study population, race, socioeconomic status, and gender.

### Discussion of the Hypotheses

Research hypothesis one predicted there would be a significant difference in the inpatient mortality of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference in inpatient mortality based on between the hospitals was not detected $x^2$ (3, N = 5130) = 7.482, $p$ = .058. An interquartile probe did find a statistically significant difference in the inpatient mortality of heart failure patients quartile at AMC within both distance quartile one and quartile four $x^2$ (3, N = 2149) = 8.474, $p$ = .037. No statistically significant interquartile difference was found between the percentage of heart failure patients at NYU that expired and those that survived $x^2$ (3, N = 2973) = 2.384, $p$ = .497. The overall heart failure inpatient mortality rate when all the distance quartiles are considered in total did not show a statistically significant difference between NYU and AMC $x^2$ (3, N = 5130) = 7.482, $p$ = .058.

A review of the literature of the mortality of patients in relation to the patient proximity to health care services is mixed. Many studies have reported an increase in patient mortality as proximity to health care services increases (Baird et al., 2008; Clark et al., 2007; Wei et al., 2008). Yamashita and Kunkel (2010) have attributed this inverse relation between patient mortality and patient proximity to health care facilities to be a result of access challenges to health care services. This “decay effect” in health care utilization was not found in cardiac study by Graces (2008) which examined the mortality of patients suffering an acute myocardial infarction in relation to distance to the hospital. The present study did not find an overall difference in the inpatient mortality rates of heart failure patients between the two hospitals. The study did note a significant intra-quartile difference between patients that expired and those that survived within the first and fourth distance quartile at AMC, which is located in the lower density area.

Research hypothesis two predicted there would be a significant difference in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference between hospitals in the 30-day readmission rates of heart failure patients based on their proximity was not observed $x^2$ (3, N = 1559) = 3.478, $p$ = .324.

The number of hospitalizations, both 30-day and over 30 days, by distance quartile was significantly associated for AMC ($x^2$ (3, N = 653) = 8.435, $p$ = .042), but not for NYU ($x^2$ (3, N = 898) = 0.693, $p$ = .875). The total percentage of heart failure patients admitted only once at AMC from the farthest quartile was 45.1%, while only 12.5% of the patients from the closest distance quartile were hospitalized only once. A chi square test demonstrated that a significant association with the medical center $x^2$ (1, N = 1564) = 5.140, $p$ = .023. The 30-day readmission rate for AMC was 28.1%, while the heart failure readmission rate for NYU was 23.1%. The post hoc comparison analysis of an ANOVA demonstrated that heart failure patients with only one admission had a significantly greater distance from the hospital than those readmitted within 30 days and over 30 days ($p$=.006). The post hoc analysis of this ANOVA is portrayed in Table 6.

Table 6

*Post Hoc Analysis of ANOVA*

| | (I) thirtyorless | (J) thirtyorless | Mean Difference (I-J) | Std. Error | Sig. | Interval Lower Bound | Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| LSD | .00 none | 1.00 readmitted <=30 days | 3.40982* | 1.25031 | .006 | .9584 | 5.8612 |
| | | 2.00 readmitted > 30 days | 3.75995* | .73010 | .000 | 2.3285 | 5.1914 |
| | 1.00 readmitted <=30 days | .00 none | -3.40982* | 1.25031 | .006 | -5.8612 | -.9584 |
| | | 2.00 readmitted > 30 days | .35013 | 1.37814 | .799 | -2.3519 | 3.0521 |
| | 2.00 readmitted > 30 days | .00 none | -3.75995* | .73010 | .000 | -5.1914 | -2.3285 |
| | | 1.00 readmitted <=30 days | -.35013 | 1.37814 | .799 | -3.0521 | 2.3519 |

Heart failure patients treated at AMC with only one hospitalization had the greatest average distance from the hospital at 22.6 miles. This phenomenon was also true at NYU, however the average distance for heart failure patients with just one hospitalization was 9.8 miles. Figure1 illustrates the relationship between mean distance from the hospital and readmission.

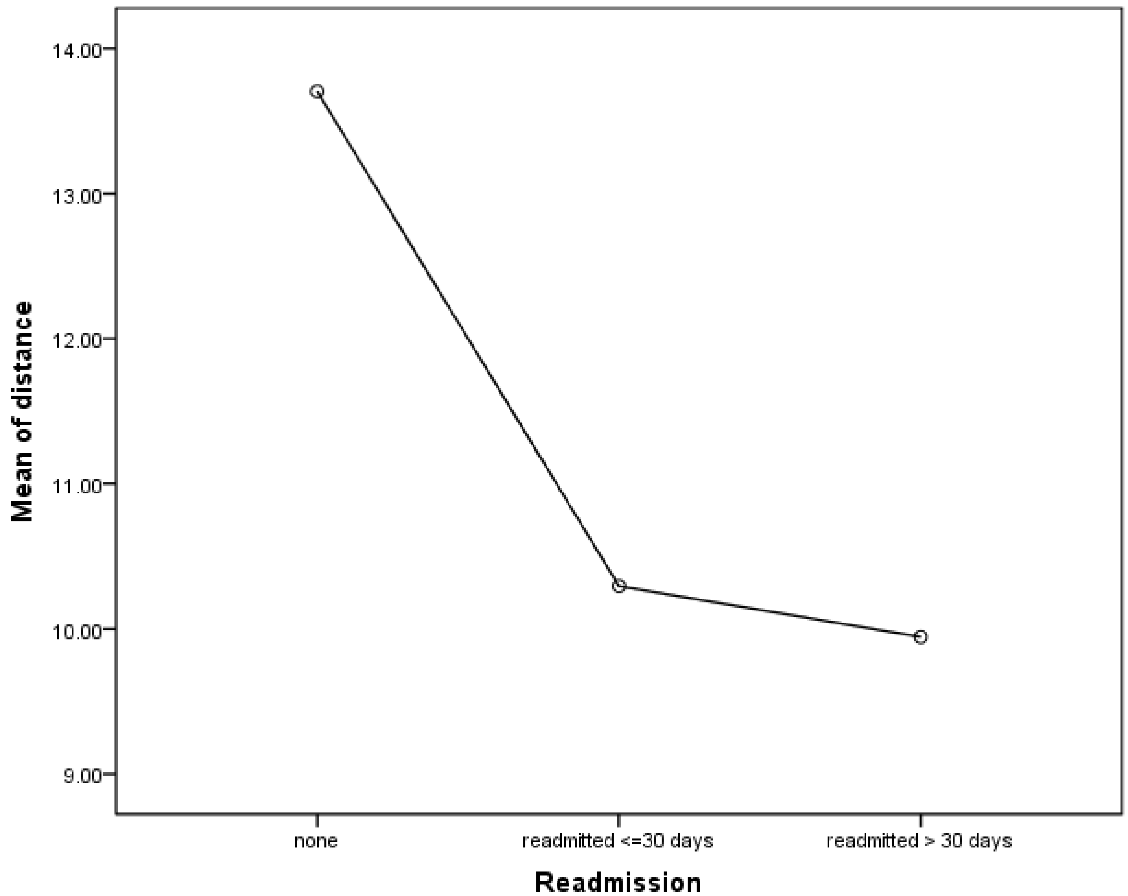


*Figure 1.* Mean Distance from Hospital and Readmission.

Both hospitals, AMC ($x^2$ (3, N = 1502) = 23.838, $p < .0005$) and NYU ($x^2$ (3, N = 2090) = 12.685, $p = .005$), had a statistically significant association between quartile distance and readmission. For AMC 30% of patients in the nearest quartile had one or more readmission while that percentage was only 16% of patients in the farthest quartile. For NYU, 26.9% of patients in the nearest quartile had one or more readmission while only 17.2% in the furthest quartile had multiple readmissions.

The literature exploring the association between hospital readmissions distance from the hospital is not conclusive. Ferraris et al. (2001) while studying cardiac surgery patients found that as a patients distance from the hospital increased, so did their likelihood for readmission. Harris et al. (2008) reported that heart failure patients living in closer proximity to the hospital had more hospitalizations. The findings of the present study were similar to those reported by Harris et al. (2008), both NYU and AMC had significantly more readmission in the nearest distance quartile as compared to the furthest distance quartile. The present study did not detect a statistically significant difference in total readmissions of heart failure patients between a hospital located in a high density population area and a hospital located in a lower density area $x^2$ (3, N = 1559) = 3.478, *p* = .324.

Research hypothesis three predicted there would be a significant difference in regard to race in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference in inpatient mortality based patient race and proximity between the hospitals was not detected $x^2$ (9, N = 3661) = 6.832, *p* = .655. A chi-square test did not find a significant interquartile difference in regard to the inpatient mortality of patients based on patient's race and proximity to NYU ($x^2$ (3, N = 2082) = 1.066, *p* = .785) or AMC ( $x^2$ (3, N = 1497) = 7.717, *p* =.052) .

The present study did determine via a chi-square test that race was associated with patient death within the entire study population $x^2$ (5, N = 3606) = 19.036, *p* = .002. A smaller percentage of African Americans expired (4.5%) as compared to the 9.7% of African Americans who did not die. This finding is consistent with the current literature. Numerous researchers have reported that African Americans have a lower inpatient mortality rate for heart failure as compared to Caucasian heart failure patients even though African Americans have a higher hospitalization rate (Brown et al, 2005; Kamath et al., 2008; Yancy et al., 2008).

Research hypothesis four predicted there would be a significant difference in regard to race in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference between hospitals in the 30-day readmission rates of heart failure patients based on their race and proximity was not observed $x^2$ (9, N = 842) = 15.710, $p$ = .073. A chi square analysis was utilized to ascertain if race correlated with readmission. Patient race and interquartile distance was not found to have a significant difference in 30-day readmission at either NYU ($x^2$ (3, N = 484) = 2.827, $p$ = 0.419) or AMC ($x^2$ (3, N = 326) = 2.108, $p$ = .55)

The literature review did not uncover any research that attempted to answer the present study question of whether there are racial disparities in 30-day readmissions for heart failure patients based on their proximity to a hospital. Ilksoy et al. (2006) did investigate the quality of care African Americans heart failure patients received at a large inner city teaching hospital. The investigators found two primary discrepancies in treating African American patients. The first discrepancy was that African Americans were less likely to be prescribed a beta-blocker, which is an established heart failure medication. Secondly, only about half of the African American heart failure patients in the study received education about medication compliance or the importance of a low sodium diet. The uses of beta blockers, patient medication compliance and a low sodium diet have all been shown to improve heart failure outcomes (Ilksoy et al., 2006). The present study was designed to detect racial differences in heart failure outcomes as opposed to revealing racial treatment differences. The present study did not detect a difference between the two hospitals for 30-day readmission rates based of the heart failure patient's race or proximity to the hospital $x^2$ (9, N = 842) = 15.710, $p$ = .073.

Research hypothesis five predicted there would be a significant difference in regard to socioeconomic status in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference in inpatient mortality based patient socioeconomic status and proximity between the hospitals was not detected $x^2$ (9, N = 3591) = 12.786, $p$ = .173. Only AMC patients from income quartile one in the nearest and farthest distance quartile had a significantly different proportion of deaths $x^2$ (3, N = 1484) = 7.854, $p$ = .049. The proportions of deaths for income quartile one patients in the first distance quartile were significantly lower (6.7%) as compared to the proportion that did not expire (44.1%). An inverse relationship between deaths and non-deaths was observed at AMC for patients from income quartile one distance quartile one, as the proportion of patients deaths was significantly greater (80.0%) than patients that did not expire (38.0%). A statistically significant difference in the proportion of patients that expired versus those who did not expire was not observed in any of the NYU income distance subgroup analyzes or any other subgroup analyzes at AMC $x^2$ (3, N = 2075) = 1.082, $p$ = .781.

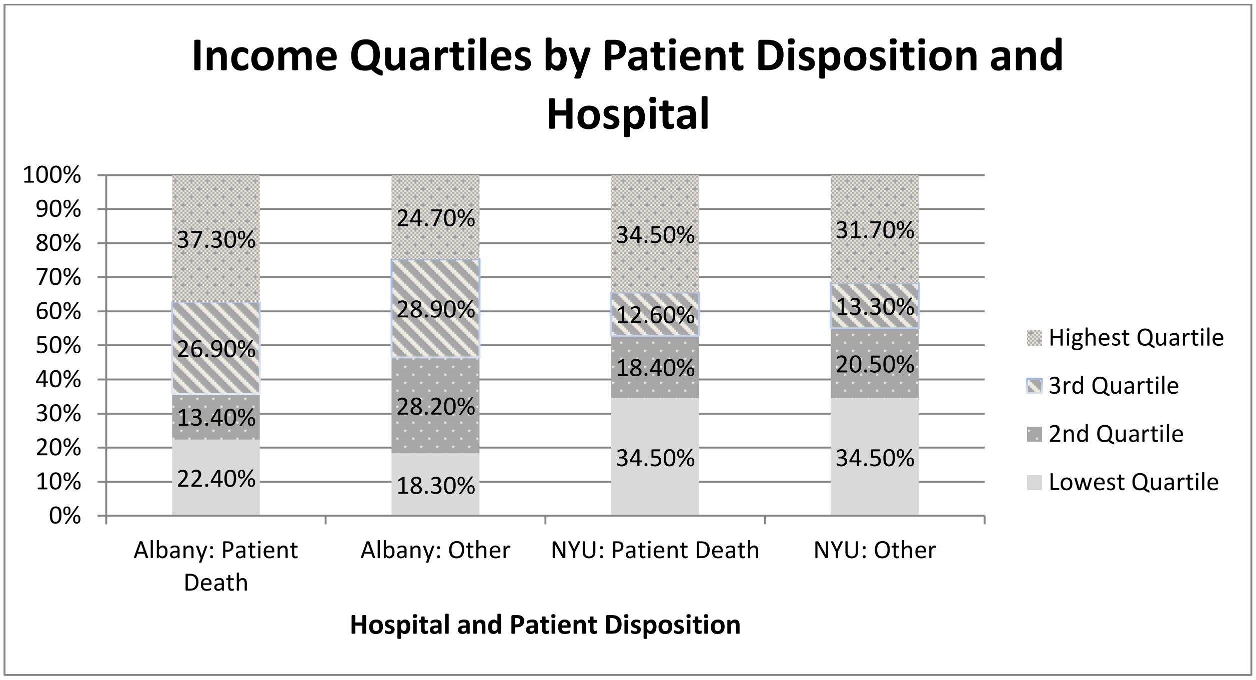


*Figure 2.* Income Quartiles by Patient Disposition and Hospital.

Past research that has observed how socioeconomic disparities have affected patient mortality has generally found that patients from higher socioeconomic groups tend to have better mortality rates as compared to patients from lower socioeconomic groups (Beauchamp, Peeters, Tonkin, & Turrell, 2010; Blair, Llyod-Williams, & Mair, 2002; Chang, Kaul, Westerhout, Graham, & Armstrong, 2007; Singh et al., 2010). The present study found a significant difference in the inpatient mortality of heart failure patients in only patients classified in the lowest socioeconomic status group at the hospital located in a lower density area, AMC.

Research hypothesis six predicted there would be a significant difference in regard to socioeconomic status in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference between hospitals in the 30-day readmission rates of heart failure patients based on their socioeconomic status and proximity was not observed $x^2$ (9, N = 840) = 3.684, $p$ = .931. A statistically significant interquartile difference within either NYU ($x^2$ (3, N = 483) = 3.684, $p$ = .447) or AMC ($x^2$ (3, N = 323) = 2.021, $p$ = .568) was not found in regard to 30-day readmission rates when considering socioeconomic status and patient proximity to the hospital. The findings of the present study are not consistent with the bulk of the literature in regards to readmissions and socioeconomic disparities (Brameld & Holman, 2005; Lemstra et al., 2009; Philbin et al., 2001; Ramos et al., 2006)

Research hypothesis seven predicted there would be a significant difference in regard to gender in the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the inpatient mortality rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference in inpatient mortality based patient gender and proximity between the hospitals was not detected $x^2$ (3, N = 3595) = 0.318, $p$ = .957. The chi-square test used to compare distance quartiles did not find a statistically significant difference between NYU ($x^2$ (3, N = 2082) = 1.066, $p$ = .785) or AMC ($x^2$ (3, N = 1497) = 7.717, $p$ = .052). .

The study findings are fairly consistent with the reported literature. Nieminen et al. (2008), while scrutinizing 3580 patients from the EuroHeart Failure Survey II, found that one year mortality rates between genders were similar. However, Konhilas (2010) has reported a better survival rate and long-term prognosis for female heart failure patients when compared to males.

Research hypothesis eight predicted there would be a significant difference in regard to gender in the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at NYU, which is in a densely populated area, as compared to the 30-day readmission rates of hospitalized heart failure patients based on proximity treated at AMC, which is in a less densely populated area. The null hypothesis was not rejected as a statistically significant difference between hospitals in the 30-day readmission rates of heart failure patients based on their gender and proximity was not observed $x^2$ (3, N = 826) = 2.680, $p$ = .444. A statistically significant difference in the cumulative distance quartiles for 30-day readmission was observed. A higher percentage of females were admitted within 30 days, 31.6%, at Albany Medical Center compared to females admitted within 30 days, 21.3%, at NYU $x^2$ (1, N = 394) = 8.824, $p$ = .003.

The data analysis revealed that 29.5% of readmitted subjects in the closest quartile at AMC were female as opposed to NYU where the female percentage in the nearest quartile was 49.2% $x^2$ (1, N = 202) = 16.034, $p < .0005$. In the second quartile, 42.1% of the patients readmitted to AMC were female as compared to NYU where the female percentage was 51.6% NYU $x^2$ (1, N = 222) = 4.301, $p$ = .038. In total, 63.1% of the readmitted subjects at AMC were male, while that percentage at NYU was 51.9% ($x^2$ (1, N = 875) = 19.167, $p < .0005$).

The results of the present study do align to the literature uncovered in the literature review. Although the one year heart failure hospitalization survival rates between genders are similar, men tend to have an overall higher readmission rate than woman (Nieminen et al., 2008). Similarly, Konhilas (2010) found that the long-term prognosis for men with heart failure is significantly worse than the long-term prognosis for the female gender.

### Implications

The current research study offers further empirical evidence to support what Yamashita and Kunkel (2010) described as the "decay effect" distance has on health care service utilization. Although there was not a statistically significant difference in the overall inpatient mortality of heart failure patients, the present study did detect an inpatient mortality difference at AMC for patients residing in the distance quartiles nearest and farthest from the hospital. Both hospitals had a statistically greater percentage of heart failure readmissions, albeit not necessarily 30-day or less, for patients living in the quartile closest to the hospital. Conversely both NYU and AMC had a statically smaller percentage of patients who lived in the distance quartile farthest from the hospital who had one or more readmissions. The result of this study as well as the current literature investigating the effects of patient proximity to health care services suggests that patients living at greater distances from health care services may be more vulnerable. This phenomenon of increased vulnerability to mortality and morbidity has been described as a "decay effect", whereby patients are less likely to use health care services as their proximity to those services decreases.

## Recommendations

The present study examined how proximity of heart failure patients to two different hospitals, either AMC or NYU, with vastly different population density may have contributed to the patient's potential for impatient mortality or 30-day readmissions. The study results found significant differences between the two hospitals in terms of overall inpatient mortality and impatient mortality based on socioeconomic status. However, the study did find evidence that patient proximity to the hospital may also influence 30-day readmission rates, as both hospitals had significantly fewer readmissions in the farthest distance quartile. The study findings add to the evidence of the existence of a "decay effect" in the use of health care services as a patient's proximity to those services decreases. Chapter 2 revealed a gap in the literature as to how patient proximity to health care services affects the outcomes of heart failure patients as well as chronic disease in general. Clearly additional research is warranted to build on this subject matter.

### Outreach Clinics

Khunti, Stone, Paul, and Squire (2008) conducted a study in the United Kingdom which examined the effects of the use of specialized cardiology nurses to administer heart failure disease management programs in the primary care setting. The authors noted that despite evidenced based national guidelines, heart failure management in the primary care setting is often not managed optimally. Khunti, Stone, Paul, and Squire (2008) discovered that heart failure disease management programs administered by specialized cardiology nurses resulted in superior intermediate patient outcomes.

Heart failure clinic program complexity as it relates to patient outcomes has also been assessed. Thomas et al. (2013) explored how the use of specialized heart failure clinics affected unplanned hospital admissions and readmission. The study authors generated a meta-analysis which concluded that heart failure programs with a high intensity follow up with heart failure clinic appointments after hospital discharge yielded better outcome. Specifically, heart failure clinics which employed intensive patient monitoring in the first two months after hospitalization and follow up appointments once every three months subsequently had significantly fewer unplanned heart failure admissions. Similarly, a meta-regression analysis by Phillips, Singa, Rubin, and Jaarsma (2005) also explored the effects of a nurse-led heart failure disease management complexity of program on patient outcomes. The authors reported a 70% relative risk reduction in readmission as compared to standard care ($p$ = .01).

Nurse directed heart failure clinics managing patients in the outpatient setting have proven to be a successful tactic in reducing heart failure readmission, lowering mortality, shortening hospitalizations, and improving quality of life (Gustafsson & Arnold, 2004). Schadewaldt and Schultz (2011) conducted a meta-analysis comparing nurse-led clinics and non-nurse lead clinics. The authors reported that care given at the nurse-led cardiac clinics was equivalent. Patients treated at the nurse-led cardiac clinic were at no greater risk of a poor outcome as compared to the clinics not nurse-led (Schadewaldt & Schultz, 2011). Nurse directed heart failure clinics may prove to be a more cost effective strategy in managing heart failure patients in the outpatient setting as opposed to the traditional physician led model.

**Telemedicine**

The term telemedicine has been broadly used to describe the use of telecommunications and electronic technologies to deliver health care services (Kleinpell & Avitall, 2005). Key factors which have previously been identified as causes for heart failure hospital readmission include patient medication noncompliance, poor diet, poor social support system, and the inability of heart failure patients to recognize symptom changes which require medical intervention (Knox & Mischke, 1999). Telemedicine is able to influence many if not all of these considerations with can lead to hospital readmissions.

Scalvini et al. (2004) studied the effects of a nurse-led telemedicine program managing heart failure patients. This telemedicine program allowed nurses to monitor medication compliance, monitor vitals, adjust medications, alter medication dose, reinforce disease self-management skills, direct deteriorating patients to hospital or health care provider if warranted. The nurse-led program reduced annual per patient heart failure hospitalizations from the previous year baseline of 1.8 to 0.2 (Scalvini et al., 2004).

Piedmont Hospital employed a form of telemedicine for heart failure patients recently discharged. The technology enabled the hospital to reduce 30-day heart failure readmissions by 75% as compared to recently discharged patients not using the telemedicine technology. Specifically, the 75% decrease in readmission rate was realized by reducing heart failure readmits from 5.85% for the non-telemedicine group to 1.45% for the telemedicine group (*Healthcare Benchmarks & Quality Improvement*, 2007).

Polisena et al. (2010) conducted a meta-analysis which examined how telemedicine influenced heart failure mortality. The meta-analysis reflected on 3082 patients from 21 randomized controlled trials. The authors found that remote patient monitoring, telemedicine, was associated with a significantly lower mortality, increased primary care and specialist visits as compared to the traditional usual care control group. The remote patient monitoring was also associated with a significant reduction in overall heart failure management cost compared to the traditional treatment group. Much of this cost savings was attributed to a reduction in heart failure hospitalization admission since 75% of all heart failure direct expenditures are from hospitalizations (Polisena et al., 2010).

**Transition Coaches**

Dr. Coleman's Transition Care Model, Mary Naylor Care Model, Project Red, Project Boost, and INTERACT are all examples of patient transition programs whose goals are to help patients improve their disease self-management skills, improve communication skills, and help manage health care segmentation. The common thread in all these models is that accountability for patient transition from the hospital is assigned to a specific group or person. Naylor et al. (2004) assessed transitional care for heart failure patients delivered by advanced practice nurses. The authors reported that the treatment group exposed to the advanced practice nursing transitional program had a significantly lower heart failure and all-cause readmissions as well as lower mortality rates as compared to the control group. Although the investigators did not observe an improvement in quality of life, there was a cost savings benefit realized with the advanced practice nurse transition program. The per patient mean costs for transitional program patients was $7636 while the costs for the control group exposed to the usual discharge process was $12481 (Naylor et al., 2004).

## Limitations

There were several limitations of the study. The present study made use of strictly quantitative methodology. Future studies which employ a qualitative or a mixed-method methodology may afford additional insight as how proximity to health care services might influence patient outcomes. A qualitative design would allow patients to furnish additional insight into the reasons which affect their decision to their thought process to seek health care services. The mixed-methods could allow patients the opportunity to offer researchers an understanding as to why they did or did not seek out health care services for specific events.

An additional limitation of the study was that only two hospitals were studied. The results may differ when the patients from a larger group of hospitals are analyzed. A recommendation for future researchers is to continue to explore this important issue of managing heart failure patients with varied methodologies as well as expanding the population with a greater number of hospitals and geographies. Additionally further research on the potential differences in heart failure outcomes based on the population density of the community the hospital serves would be useful.

## Summary

The current study examined how the proximity of heart failure patients to two different teaching hospitals with vastly different population density affected patient health outcomes. The following two research questions helped guide the research:

1. What is the difference, if any, in the 30-day inpatient mortality rates of patients hospitalized with heart failure based on proximity to the hospital?
2. What is the difference, if any, in the 30-day readmission rates of patients hospitalized with heart failure based on proximity to the hospital?

Four different hypotheses were generated from each of the two research questions. Three of the hypotheses specifically looked at heart failure populations that the literature review in Chapter 2 identified. A subgroup analysis of race, socioeconomic status and gender was performed to detect potential subpopulations which may be at higher risk for 30-day inpatient mortality and 30-day readmissions. The findings indicate that as a heart failure patient's proximity to health care services decreases their use of health care services also decreases. The present study found a statically significant difference within the interquartile distances between NYU and AMC. Patients residing in the furthest distance quartile who were treated at the hospital with a less dense population, AMC, were more likely to expire. This phenomenon was not observed with NYU, which is located in a major metropolitan with heavy population density, with patients who resided in the furthest distance quartile. It is important to note that the overall inpatient mortality rate between NYU and AMC was not statistically different.

References

Agency for Healthcare Research and Quality. (2010). *Four million hospital admissions potentially unnecessary.* Retrieved from http://www.hcup-us.ahrq.gov/reports/statbriefs/sb99.jsp

Ahmed, A., & Lloyd-Jones, D. M. (2008). Diabetes-related poor outcomes in chronic heart failure: Complex interactions with sex and age. *Cardiology Review, 25*(7), 22-28.

Albany Medical Center. (n.d.). *About us.* Retrieved from http://www.amc.edu/About%20Us/ index.html

Ali, M., Jin, Y., Kim, D., De, Z., Park, J., Ochiai, R., et al. (2007). Spatial risk for gender-specific adult mortality in an area of southern China. *International Journal of Health Geographics*, *6*31. Retrieved from MEDLINE with Full Text database.

American Heart Association. (2008a). *Heart failure patients have more doctor visits, medications than others on Medicare.* Retrieved from http://americanheart.mediaroom.com/index.php?s=43&item=561

American Heart Association. (2008b). *News Releases.* Retrieved from http://www.newsroom.heart.org/index.php?s=43&item=561

American Heart Association. (2010a). *About heart failure.* Retrieved from http://www.heart.org/HEARTORG/Conditions/HeartFailure/AboutHeartFailure/About-Heart-Failure_UCM_002044_Article.jsp

American Heart Association. (2010b). *Ejection fraction heart failure measurement.* Retrieved from http://www.heart.org/HEARTORG/Conditions/HeartFailure/

SymptomsDiagnosisofHeartFailure/Ejection-Fraction-Heart-Failure-Measurement_UCM_306339_Article.jsp

American Heart Association. (2010c). *Silent ischemia and ischemic heart disease.* Retrieved from http://www.americanheart.org/presenter.jhtml?identifier=4720

Ansari, M. Z., Henderson, T., Ackland, M., Cicuttini, F., & Sundararajan, V. (2003). Congestive cardiac failure: urban and rural perspectives in Victoria. *Australian Journal of Rural Health, 11*(6), 266-270.

Antonelli-Incalzi, R., Ancona, C., Forastiere, F., Belleudi, V., Corsonello, A., & Perucci, C. A. (2007). Socioeconomic status and hospitalization in the very old: a retrospective study. [Article]. *BMC Public Health, 7*, 227-229. doi: 10.1186/1471-2458-7-227

Aranda, J. M., Jr., Johnson, J. W., & Conti, J. B. (2009). Current trends in heart failure readmission rates: analysis of Medicare data. *Clinical Cardiology, 32*(1), 47-52. doi: 10.1002/clc.20453

Arcury, T. A., Gesler, W. M., Preisser, J. S., Sherman, J., Spencer, J., & Perin, J. (2005). The effects of geography and spatial behavior on health care utilization among the residents of a rural region. *Health Service Resources, 40*(1), 135-155.

Azevedo, A. (2008). Gender differences in heart failure. *Heart, 94*(3), 264-265. doi: 94/3/264

Baird, G., Flynn, R., Baxter, G., Donnelly, M., & Lawrence, J. (2008). Travel time and cancer care: an example of the inverse care law? *Rural & Remote Health, 8*(4), 1003-1003.

Banasiak, W. (2008). Diagnostic and therapeutic problems in heart failure. *Polskie Archiwum Medycyny Wewnętrznej*, *118*(9), 485-488. Retrieved from MEDLINE with Full Text database.

Banham, D., Woollacott, T., Gray, J., Humphrys, B., Mihnev, A., & McDermott, R. (2010). Recognizing potential for preventing hospitalization. *Australian Health Review, 34*(1), 116-122.

Beauchamp, A., Peeters, A., Tonkin, A., & Turrell, G. (2010). Best practice for prevention and treatment of cardiovascular disease through an equity lens: a review. *European Journal of Cardiovascular Preventative Rehabilitation*. doi: 10.1097/HJR.0b013e328339cc99

Bernheim, S., Spertus, J., Reid, K., Bradley, E., Desai, R., Peterson, E., . . . Krumholz, H. (2007). Socioeconomic disparities in outcomes after acute myocardial infarction. *American Heart Journal, 153*(2), 313-319. doi: S0002-8703(06)01021-0 [pii] 10.1016/j.ahj.2006.10.037

Bibbins-Domingo, K., Pletcher, M. J., Lin, F., Vittinghoff, E., Gardin, J. M., Arynchyn, A., . . . Hulley, S. B. (2009). Racial Differences in Incident Heart Failure among Young Adults. *New England Journal of Medicine, 360*(12), 1179-1190.

Biello, K., Rawlings, J., Carroll-Scott, A., & Ickovicds, J. (2010). Racial disparities in age at preventable hospitalization among U.S. Adults. *American Journal of Preventive Medicine, 38*(1), 54-60.

Bitton, A., & Kahn, J. (2003). Government share of health care expenditures. *Journal of American Medical Association, 289*, 1165-1166. Retrieved from http://jama.ama-assn.org/cgi/reprint/289/9/1165

Blum, K. (2009). *Lecture 3: Qualitative and quantitative research designs*. Retrieved from University of Phoenix database: RES/711 Course materials newsgroup.

Blair, A. S., Lloyd-Williams, F., & Mair, F. S. (2002). What do we know about socioeconomic status and congestive heart failure? A review of the literature. *The Journal of Family Practice, 51*(2), 169-169.

Bolton, M. M., & Wilson, B. A. (2005). The influence of race on heart failure in African-American women. *MEDSURG Nursing, 14*(1), 8-16.

Boudreaux, E. D., Emond, S. D., Clark, S., & Camargo, C. A., Jr. (2003). Acute asthma among adults presenting to the emergency department: the role of race/ethnicity and socioeconomic status. *CHEST, 124*(3), 803-812.

Braithwaite, D., Moore, D., Lustig, R., Epel, E., Ong, K., Rehkopf, D., et al. (2009). Socioeconomic status in relation to early menarche among black and white girls. *Cancer Causes & Control: CCC*, *20*(5), 713-720. Retrieved from MEDLINE with Full Text database

Brameld, K., & Holman, C. (2005). The use of end-quintile comparisons to identify under-servicing of the poor and over-servicing of the rich: a longitudinal study describing the effect of socioeconomic status on healthcare. *BMC Health Service Research, 5*, 61. doi: 1472-6963-5-61 [pii] 10.1186/1472-6963-5-61

Broda, H., & Baxter, R. (2002). Using GIS and GPS technology as an instructional tool. *Clearing House*, *76*(1), 49. Retrieved from Educational Administration Abstracts database.

Brower, A., & Carroll, L. (2007). Spatial and temporal aspects of alcohol-related crime in a college town. *Journal of American College Health*, *55*(5), 267-275. Retrieved from Educational Administration Abstracts database.

Brown, D. W., Haldeman, G. A., Croft, J. B., Giles, W. H., & Mensah, G. A. (2005). Racial or ethnic differences in hospitalization for heart failure among elderly adults: Medicare, 1990 to 2000. *American Heart Journal, 150*(3), 448-454. doi: S0002-8703(04)00862-2 [pii]10.1016/j.ahj.2004.11.010

Carroll, R. (Ed.). (2004). *Risk management handbook for healthcare organizations*. San Francisco, CA: Jossey-Bass.

Centers for Disease Control and Prevention. (2010c). *Classification of dieseases, functioning, and disability*. Retrieved from http://www.cdc.gov/nchs/icd/icd9cm.htm

Centers for Disease Control and Prevention. (2010b). *Heart disease and stroke prevention*. Retrieved from http://www.cdc.gov/chronicdisease/resources/publications/aag/dhdsp.htm

Centers for Disease Control and Prevention. (2010a). *Heart failure fact sheet*. Retrieved from http://www.cdc.gov/DHDSP/library/fs_heart_failure.htm

Centers for Disease Control and Prevention. (2010d). *Vision, mission, core values, and pledge* . Retrieved from http://www.cdc.gov/about/organization/mission.htm

Centers for Medicare and Medicaid Services. (2005). *Overview.* Retrieved on from http://www.cms.gov/MedicareGenInfo/

Centre for Reviews and, D. (2005). Complexity of program and clinical outcomes of heart failure disease management incorporating specialist nurse-led heart failure clinics: a meta-regression analysis (Structured abstract). *European Journal Of Heart Failure*, *7*(3), 333-341.

Centre for Reviews and, D. (2002). Randomized trial of an education and support intervention to prevent readmission of patients with heart failure (Structured abstract). *Journal Of The American College Of Cardiology*, *39*(1), 83-89.

Chang, W. C., Kaul, P., Westerhout, C. M., Graham, M. M., & Armstrong, P. W. (2007). Effects of socioeconomic status on mortality after acute myocardial infarction. *American Journal of Medicine, 120*(1), 33-39. doi: S0002-9343(06)00693-0 [pii] 10.1016/j.amjmed.2006.05.056

Chen, Y., Stewart, P., Dales, R., Johansen, H., Scott, G., & Taylor, G. (2004). Ecological measures of socioeconomic status and hospital readmissions for asthma among Canadian adults. *Respiratory Medicine, 98*(5), 446-453.

Clarke, S. P., Davis, B. L., & Nailon, R. E. (2007). Racial segregation and differential outcomes in hospital care. *West Journal of Nursing Research, 29*(6), 739-757. doi: 0193945907303167 [pii]10.1177/0193945907303167

Cleveland Clinic. (2005/2009). *Estrogen & heart disease.* Retrieved from http://my.clevelandclinic.org/heart/women/estrogen.aspx

Cohn, J. N. (2006). The use of race and ethnicity in medicine: lessons from the African-American Heart Failure Trial. *Journal of Law, Medicine & Ethics, 34*(3), 552.

Cooper, D. R., & Schindler, P. S. (2003). *Business research methods* (8th ed.). Boston, MA: Irwin.

Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Upper Saddle River, NJ: Pearson.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Currie, J., & Reagan, P. B. (2003). Distance to hospital and children's use of preventive care: Is being closer better, and for whom? *Economic Inquiry, 41*(3), 378-391.

Davis, S. K., Yong, L., & Gibbons, G. H. (2003). Disparities in trend of hospitalization for potentially preventable chronic conditions among African American during the 1990s: Implications and benchmarks. *American Journal of Public Health, 93*(3), 447-455.

DeWalt, D., Broucksou, K., Hawk, V., Baker, D., Schillinger, D., Ruo, B., …Pignone, A. (2009). Comparison of a one-time educational intervention to a teach-to-goal educational intervention for self-management of heart failure: design of a randomized controlled trial. *BMC Health Services Research*, *9*99. Retrieved from MEDLINE with Full Text database.

Esposito, D., Bagchi, A., Verdier, J., Bencio, D., & Kim, M. (2009). Medicaid beneficiaries with congestive heart failure: Association of medication adherence with healthcare use and costs. *American Journal of Managed Care*, *15*(7), 437-445. Retrieved from Academic Search Complete database.

Euser, A., Zoccali, C., Jager, K., & Dekker, F. (2009). Cohort studies: Prospective versus retrospective. *Nephron Clinical Practice*, *113*(3), c214-c217. doi:10.1159/000235241.

Fairclough, S., Boddy, L., Hackett, A., & Stratton, G. (2009). Associations between children's socioeconomic status, weight status, and sex, with screen-based sedentary behaviours and sport participation. *International Journal of Pediatric Obesity*, *4*(4), 299-305. doi:10.3109/17477160902811215.

Ferraris, V., Ferraris, S., Harmon, R., & Evans, B. (2001). Risk factors for early hospital readmission after cardiac operations. *Journal of Thoracic and Cardiovascular Surgery, 122*(2), 278-286.

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London, England, UK: Sage.

Fonarow, G., Abraham, W., Albert, N., Stough, W., Gheorghiade, M., Greenberg, B., . . . OPITIMZE-HF Investigators and Hospitals (2009). Age- and gender-related differences in quality of care and outcomes of patients hospitalized with heart failure (from OPTIMIZE-HF). *American Journal of Cardiology, 104*(1), 107-115. doi: S0002-9149(09)00678-X [pii]10.1016/j.amjcard.2009.02.057

Franciosa, J. A., Ferdinand, K. C., & Yancy, C. W. (2010). Treatment of heart failure in African Americans: Executive summary. *Congest Heart Fail, 16*(1), 1-2. doi: CHF120[pii]10.1111/j.1751-7133.2009.00120.x

Galvao, M. (2005). Reshaping our perception of the typical hospitalized heart failure patient: a gender analysis of data from the ADHERE Heart Failure Registry. *Journal of Cardiovascular Nursing, 20*(6), 442-450.

Gardetto, N., & Carroll, K. (2007). Management strategies to meet the core heart failure measure for acute decompensated heart failure: a nursing perspective. *Critical*

*Care Nursing Quarterly, 30*(4), 307-320. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed

Gaskin, D. J., Spencer, C. S., Richard, P., Anderson, G. F., Powe, N. R., & Laveist, T. A. (2008). Do hospitals provide lower-quality care to minorities than to whites? *Health Affiliate (Millwood), 27*(2), 518-527. doi: 27/2/518 [pii]10.1377/ hlthaff.27.2.518

Getzen, T. (2007). *Health economics and financing* (3rd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Gonzalez-Fernandez, M., Kuhlemeier, K. V., & Palmer, J. B. (2008). Racial disparities in the development of dysphasia after stroke: analysis of the California (MIRCal) and New York (SPARCS) inpatient databases. *Arch Physical Medical Rehabilitation, 89*(7), 1358-1365. doi: S0003-9993(08)00230-X [pii] 10.1016/j.apmr.2008.02.016

Graves, B. A. (2010). Access to cardiac interventional services in Alabama and Mississippi: a geographical information system analysis. *Perspectives in Health Information Management, 7*.

Gronda, E., Aronica, A., Visconti, M., Di Malta, A., Pini, D., Mangiavacchi, M., . . . Morenghi, E. (2010). [Gender differences of at risk patients with overt heart failure in the real world of general practice. Data from the GIPSI (Gestione Integrata Progetto Scompenso in Italia) registry]. *Giornale Italiano Cardiologia (Rome), 11*(3), 233-238.

Gustafsson, F., & Arnold, J. (2004). Heart failure clinics and outpatient management: review of the evidence and call for quality assurance. *European Heart Journal*, *25*(18), 1596-1604.

Gustafsson, F., Torp-Pedersen, C., Burchardt, H., Buch, P., Seibaek, M., Kjoller, E., Gustafsson, I., & Kober, L. (2004). Female sex is associated with a better long-term survival in patients hospitalized with congestive heart failure. *European Heart Journal, 25*(2), 129-135.

Harris, D., Aboueissa, A., & Hartley, D. (2008). Myocardial infarction and heart failure hospitalization rates in Maine, USA - variability along the urban-rural continuum. *Rural & Remote Health*, *8*(2). Retrieved from CINAHL Plus with Full Text database.

Heart Failure Society of America. (2002). *The stages of heart failure- NYHA classification.* Retrieved from http://www.abouthf.org/questions_stages.htm

Heslop, C. L., Miller, G. E., & Hill, J. S. (2009). Neighborhood Socioeconomics Status Predicts Non- Cardiovascular Mortality in Cardiac Patients with Access to Universal Health Care. [Article]. *Public Library of Science ONE,* (1), 1-8. doi: 10.1371/journal.pone.0004120

Hesse-Biber, S. N. (2010). *Mixed methods research: Merging theory with practice.* New York, NY: The Guilford Press

Hibbard, J., Stockard, J., & Tusler, M. (2005). It isn't just about choice: The potential of a public performance report to affect the public image of hospitals. *Medical Care Research & Review*, *62*(3), 358-371. doi:10.1177/1077558705275415.

Hickman, B. (2007). quality the new healthcare imperative. *Healthcare Financial Management, 61*(8), 90-5. Retrieved from ABI/INFORM Global. (Document ID: 1321035991).

Hulley, S., Cummings, S., Browner, W., Grady, D, & Newman, T. (2006). *Designing clinical research* (3rd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Hussey, L. C., & Hardin, S. (2005). Comparison of characteristics of heart failure by race and gender. *Dimensions of Critical Care Nursing, 24*(1), 41-46.

Ilksoy, N., Moore, R. H., Easley, K., & Jacobson, T. A. (2006). Quality of care in African-American patients admitted for congestive heart failure at a university teaching hospital. *American Journal of Cardiology, 97*(5), 690-693. doi: S0002-9149(05)02017-5 [pii]10.1016/j.amjcard.2005.09.116

Institute of Medicine. (2004). *Quality through collaboration: The future of rural health.* Retrieved from http://iom.edu/Reports/2004/Quality-Through-Collaboration-The-Future-of-Rural-Health.aspx

Ishizawar, D., & Yancy, C. (2010). Racial differences in heart failure therapeutics. *Heart Failure Clinic, 6*(1), 65-74. doi: S1551-7136(09)00078-6 [pii] 10.1016/j.hfc.2009.08.006

Izquierdo, C., Oviedo, M., Ruiz, L., Sintes, X., Vera, I., Nebot, M., . . . Elderly, W. G. f. t. S. o. t. P. o. C. i. t. (2010). Influence of socioeconomic status on community-acquired pneumonia outcomes in elderly patients requiring hospitalization: a multicenter observational study. *BMC Public Health Research, 10*, 421. doi: 1471-2458-10-421 [pii]10.1186/1471-2458-10-421

James, P. A., Li, P., & Ward, M. M. (2007). Myocardial infarction mortality in rural and urban hospitals: rethinking measures of quality of care. *Annual Family Medicine, 5*(2), 105-111.

Jarrett, N. C., Bellamy, C. D., & Adeyemi, S. A. (2007). Men's health help-seeking and implications for practice. [Article]. *American Journal of Health Studies, 22*(2), 88-95.

Jencks, S., Williams, M., & Coleman, E. (2009). Rehospitalizations among patients in the Medicare fee-for-service program. *The New England Journal Of Medicine*, *360*(14), 1418-1428. Retrieved from MEDLINE with Full Text database.

Jimenez-Navarro, M. F., Ramirez-Marrero, M. A., Anguita-Sanchez, M., & Castillo, J. C. (2010). Influence of gender on long-term prognosis of patients with chronic heart failure seen in heart failure clinics. *Clinical Cardiology, 33*(3), E13-18. doi: 10.1002/clc.20476

The Joint Commission. (n.d.). *Advanced certification in heart failure.* Retrieved from http://www.jointcommission.org/certification/heart_failure.aspx

The Joint Commission. (2010). *Summary of quality information.* Retrieved from http://www.qualitycheck.org/qualityreport.aspx?hcoid=5705

Joint Commission on Accreditation of Hospitals. (2008). *Performance measurement initiatives.* Retrieved from http://www.jointcommission.org/Improving_Americas_Hospitals_The_Joint_Commissions_Annual_Report_on_Quality_and_Safety_-_2008/

Joint Commission on Accreditation of Hospitals. (2009). *A journey through the history of the joint commission.* Retrieved from http://www.jointcommission.org/AboutUs/joint_commission_history.htm

Jong, J. D., Westert, G. P., Lagoe, R., & Groenewegen, P. P. (2006). Variation in hospital length of stay: Do physicians adapt their length of stay decisions to what is usual in the hospital where they work? [Article]. *Health Services Research, 41*(2), 374-394. doi: 10.1111/j.1475-6773.2005.00486.x

Jugdutt, B. I. (2010). Aging and heart failure: Changing demographics and implications for therapy in the elderly. *Heart Failure Review, 15*(5), 401-405.

Kajino, K., Iwami, T., Daya, M., Nishiuchi, T., Hayashi, Y., Kitamura, T., et al. (2010). Impact of transport to critical care medical centers on outcomes after out-of-hospital cardiac arrest. *Resuscitation, 81*(5), 549-554.

Kamath, S. A., Drazner, M. H., Wynne, J., Fonarow, G. C., & Yancy, C. W. (2008). Characteristics and outcomes in African American patients with decompensated heart failure. *Arch Internal Medicine, 168*(11), 1152-1158. doi: 168/11/1152 [pii]10.1001/archinte.168.11.1152

Kazembe, L. N., Kleinschmidt, I., & Sharp, B. L. (2006). Patterns of malaria-related hospital admissions and mortality among Malawian children: an example of spatial modeling of hospital register data. *Malar Journal, 5*, 93.

Kennedy, B. M., Paeratakul, S., Ryan, D. H., & Bray, G. A. (2007). Socioeconomic Status and Health Disparity in the United States. [Article]. *Journal of Human Behavior in the Social Environment, 15*(2/3), 13-23. doi: 10.1300/J137v15n02_02

Khaliq, A. A., & Broyles, R. W. (2006). Hospital admissions: Who is admitted through the emergency department? *Health Service Management Research, 19*(1), 13-22. doi: 10.1258/095148406775322034

Khunti, K., Stone, M., Paul, S., & Squire, I. (2008). Heart failure. Community cardiology clinics for secondary prevention of coronary heart disease and heart failure in primary care. *Cardiology Review*, *25*(12), 64-67

Kind, A. J. H., Bartels, C., Mell, M. W., Mullahy, J., & Smith, M. (2010). For-Profit Hospital Status and Rehospitalizations at Different Hospitals: An Analysis of Medicare Data. [Article]. *Annals of Internal Medicine, 153*(11), 718-w.242.

Klabník, A., & Murín, J. (2009). Gender differences in pharmacotherapy of chronic heart failure. *Vnitr Lek, 55*(12), 1167-1172.

Klapholz, M. (2009). Beta-blocker use for the stages of heart failure. *Mayo Clinic Proceedings*, *84*(8), 718-729. Retrieved from CINAHL Plus with Full Text database.

Kleinpell, R., & Avitall, B. (2005). Telemanagement in chronic heart failure: a review. *Disease Management & Health Outcomes*, *13*(1), 43-52.

Konhilas, J. P. (2010). What we know and do not know about sex and cardiac disease. [Article]. *Journal of Biomedicine & Biotechnology*, 1-11. doi: 10.1155/2010/562051

Konstantino, Y., Chen, E., Hasdai, D., Boyko, V., Battler, A., Behar, S., & Haim, M. (2007). Gender differences in mortality after acute myocardial infarction with mild to moderate heart failure. [Article]. *Acute Cardiac Care, 9*(1), 43-47. doi: 10.1080/17482940601100819

Knox, D., & Mischke, L. (1999). Implementing a congestive heart failure disease management program to decrease length of stay and cost. *Journal Of Cardiovascular Nursing*, *14*(1), 55-74.

Krumholz, H. M., Merrill, A. R., Schone, E. M., Schreiner, G. C., Chen, J., Bradley, E. H., et al. (2009). Patterns of hospital performance in acute myocardial infarction and heart failure 30-day mortality and readmission. *Circulation Cardiovascular Quality and Outcomes, 2*(5), 407-413.

Lee, J. E., Sung, J. H., Ward, W. B., Fos, P. J., Lee, W. J., & Kim, J. C. (2007). Utilization of the emergency room: impact of geographic distance. *Geospat Health, 1*(2), 243-253.

Lee, W. C., Chavez, Y. E., Baker, T., & Luce, B. R. (2004). Economic burden of heart failure: a summary of recent literature. *Heart Lung, 33*(6), 362-371.

Lee, W. Y., Capra, A. M., Jensvold, N. G., Gurwitz, J. H., & Go, A. S. (2004). Gender and risk of adverse outcomes in heart failure. *American Journal of Cardiology, 94*(9), 1147-1152. doi: S0002-9149(04)01164-6 [pii]10.1016/ j.amjcard.2004.07.081

Leedy, P. D., & Ormrod, J. E. (2005). *Practical research*: *Planning and design* (8th ed.). Upper Saddle River, NJ: Pearson - Merrill Prentice Hall.

Lemstra, M., Mackenbach, J., Neudorf, C., & Nannapaneni, U. (2009). High health care utilization and costs associated with lower socio-economic status: results from a linked  dataset. *Canadian Journal of Public Health, 100*(3), 180-183.

Liao, L., Allen, L. A., & Whellan, D. J. (2008). Economic burden of heart failure in the elderly. *Pharmacoeconomics, 26*(6), 447-462.

Lipley, N. (2008). Mortality rates affected by distance travelled for admission. *Emergency Nurse, 16*(7), 3-3.

Liu, L. (2010). Changes in cardiovascular hospitalization and comorbidity of heart failure in the United States: Findings from the National Hospital Discharge Surveys 1980-2006. *International Journal of Cardiology*. doi: S0167-5273(09)01634-9 [pii] 10.1016/j.ijcard.2009.11.037

Listerman, J., Huang, R. L., Geisberg, C., & Butler, J. (2007). Risk factors for development of heart failure. [Article]. *Current Cardiology Reviews, 3*(1), 1-9. doi: 10.2174/157340307779939916

Lloyd-Jones, D., Adams, R. J., Brown, T. M., Carnethon, M., Dai, S., De Simone, G., et al. (2010). Heart disease and stroke statistics--2010 update: A report from the American Heart Association. *Circulation, 121*(7), e46-e215.

Marcin, J. P., Schembri, M. S., Jingsong, H., & Romano, P. S. (2003). A population-based analysis of socioeconomic status and insurance status and their relationship with pediatric trauma hospitalization and mortality rates. *American Journal of Public Health, 93*(3), 461.

Marshal, C., & Rossman, G. (2011). *Designing qualitative research* (5th ed.). Thousand Oaks, CA: Sage Publications.

Martínez-Sellés, M., Domínguez, M., Martínez, E., García Fernández, M., & García, E. (2007). Women with left ventricular ejection fraction < or = 20% have better prognosis than men. *International Journal of Cardiology, 120*(2), 276-278. doi: S0167-5273(06)01053-9 [pii]10.1016/j.ijcard.2006.07.195

McClellan, M., McNeil, B., & Newhouse, J. (1994). Does more intensive treatment of acute myocardial infarction in the elderly reduce mortality? *Journal of American Medical Association,* 272 (11), 859-866. Retrieved from http://ovidsp.tx.ovid.com.ezproxy.apollolibrary.com/sp-3.2.1/ovidweb.cgi?&S=DKEJFPOJIGDDLIDLNCDLMHDCGEAFAA00&Link+Set=jb.search.23%7c1%7csl_10

McCullough, P., Philbin, E., Spertus, J., Kaatz, S., Sandberg, K., Weaver, W., & Study, R. U. A. C. H. F. R. (2002). Confirmation of a heart failure epidemic: Findings from the Resource Utilization Among Congestive Heart Failure (REACH) study. *Journal of American College of Cardiology, 39*(1), 60-69. doi: S0735109701017004 [pii]

Medicare Hospital Compare Quality of Care. (2010a). *Death rate for heart failure patients.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/hospital-profile.aspx?pid=330013&lat=42.65258&lng=-73.75623&#OOC

Medicare Hospital Compare Quality of Care. (2010b). *Death rate for heart failure patients.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/Graphs/Hospital-OOCGraph.aspx?hid=330214&stype=GENERAL&mCode= MORT&MTorAM=MORT

Medicare Hospital Compare Quality of Care. (2010c). *General information.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/hospital-results.aspx?loc=

Albany,%20NY&lat=42.6525793&lng=-73.7562317&stype=MEDICAL&mcid=GRP_2#Payment

Medicare Hospital Compare Quality of Care. (2010d). *General information.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/hospital-results.aspx?loc=new%20york,%20ny&lat=40.7143528&lng=-74.0059731&stype=MEDICAL&mcid=GRP_2

Medicare Hospital Compare Quality of Care. (2010e). *Heart failure process of care measures.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/hospital-profile.aspx?pid=330013&lat=42.65258&lng=-73.75623&#POC

Medicare Hospital Compare Quality of Care. (2010f). *Heart failure process of care measures.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/hospital-profile.aspx?pid=330214&lat=40.71435&lng=-74.00597&#POC

Medicare Hospital Compare Quality of Care. (2010h). *Rate of readmission for heart failure patients.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/Graphs/Hospital-OOCGraph.aspx?hid=330013&stype=GENERAL&mCode=READM&MTorAM=READM

Medicare Hospital Compare Quality of Care. (2010i). *Rate of readmission for heart failure patients.* Retrieved from http://www.hospitalcompare.hhs.gov/(X(1)S(gfz0t0nf45eg3h2owthv4345))/Graphs/Hospital-OOCGraph.aspx?hid=330214&stype=GENERAL&mCode=READM&MTorAM=READM

Mehta, S. K., Toto, K. H., Nelson, L. L., & Drazner, M. H. (2004). Therapy of heart failure in African Americans: lessons from an urban public hospital. *Congest Heart Fail, 10*(1), 40-43.

Mejhert, M., Kahan, T., Edner, M., & Persson, H. E. (2008). Sex differences in systolic heart failure in the elderly: the prognostic importance of left ventricular mass in women. *Journal of Women's Health (15409996), 17*(3), 373-381.

Menec, V., Shooshtari, S., Nowicki, S., & Fournier, S. (2010). Does the relationship between neighborhood socioeconomic status and health outcomes persist into very old age? A population-based study. *Journal of Aging Health, 22*(1), 27-47. doi: 22/1/27 [pii]10.1177/0898264309349029

Mensah, G. A., Mokdad, A. H., Ford, E. S., Greenlund, K. J., & Croft, J. B. (2005). State of disparities in cardiovascular health in the United States. *Circulation, 111*(10), 1233-1241. doi: 111/10/1233 [pii]10.1161/01.CIR.0000158136.76824.04

Merriam, S. (2009). *Qualitative research: A guide to designs and implementation.* San Francisco, CA: John Wiley & Sons, Inc.

Meyers, S., Grant, R., Lugan, N., Holbert, B., & Kvedar, J. (2006). Impact of home-based monitoring on the care of patients with congestive heart failure. *Home Health Care Management Practice, 18*(6), 444-451.

Mullens, W., Abrahams, Z., Sokos, G., Francis, G., Starling, R., Young, J., . . . Wilson Tang, W. (2008). Gender differences in patients admitted with advanced decompensated heart failure. *American Journal of Cardiology, 102*(4), 454-458. doi: S0002-9149(08)00672-3 [pii] 10.1016/j.amjcard.2008.04.009

Mulvenon, S., Kening, W., Mckenzie, S., & Anderson, T. (2006). Spatially referenced educational achievement data exploration: A web-based interactive system integrative system integration of GIS, PHP, and MySQL technologies. *Journal of Educational Technology Systems*, *34*(3), 243-256.

National Heart Lung and Blood Institute. (n.d.). *Who is at risk for heart failure?* Retrieved from http://www.nhlbi.nih.gov/health/dci/Diseases/Hf/ HF_WhoIsAtRisk.html

National Heart Lung and Blood Institute. (2010a). *What is heart failure?* Retrieved from http://www.nhlbi.nih.gov/health/dci/Diseases/Hf/HF_WhatIs.html

National Heart Lung and Blood Institute. (2010b). *Who is at risk for heart failure.* Retrieved from http://www.nhlbi.nih.gov/health/dci/Diseases/Hf/HF_ WhoIsAtRisk.html

National Institute of Health. (2010). *NIH mission.* Retrieved from http://www.nih.gov/about/mission.htm

Naylor, M., Brooten, D., Campbell, R., Maislin, G., McCauley, K., & Schwartz, J. (2004). Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *Journal Of The American Geriatrics Society*, *52*(5), 675-684.

New York State Department of Health. (2007). *SPARCS overview.* Retrieved from http://www.health.state.ny.us/statistics/sparcs/operations/overview.htm

Ng, A., Wong, H., Yong, A., & Sindone, A. (2007). Impact of gender on outcomes in chronic systolic heart failure. *International Journal of Cardiology, 117*(2), 214-221. doi: S0167-5273(06)00550-X [pii]10.1016/j.ijcard.2006.04.079

Nieminen, M., Harjola, V., Hochadel, M., Drexler, H., Komajda, M., Brutsaert, D., . . . Lopez-Sendon, J. (2008). Gender related differences in patients presenting with acute heart failure. Results from EuroHeart Failure Survey II. *European Journal of Heart Failure, 10*(2), 140-148. doi: S1388-9842(07)00529-6 [pii]10.1016/ j.ejheart.2007.12.012

Norris, K., & Nissenson, A. (2008). Race, gender, and socioeconomic disparities in CKD in the United States. *Journal of American Society of Nephrology, 19*(7), 1261-1270. doi: ASN.2008030276 [pii]10.1681/ASN.2008030276

NYU Langone Medical Center. (n.d.). *About us.* Retrieved from http://www.med.nyu.edu/about-us/who-we-are

Parashar, S., Katz, R., Smith, N. L., Arnold, A. M., Vaccarino, V., Wenger, N. K., & Gottdiener, J. S. (2009). Race, gender, and mortality in adults > or =65 years of age with incident heart failure (from the Cardiovascular Health Study). *American Journal of Cardiology, 103*(8), 1120-1127. doi: S0002-9149(09)00056-3 [pii] 10.1016/j.amjcard.2008.12.043

Philbin, E., Dec, G., Jenkins, P., & DiSalvo, T. (2001). Socioeconomic status as an independent risk factor for hospital readmission for heart failure. *The American Journal Of Cardiology*, *87*(12), 1367-1371. Retrieved from MEDLINE with Full Text database.

Pines, J. M., Localio, R., & Hollander, J. E. (2009). Racial disparities in emergency department length of stay for admitted patients in the United States. *Academy of Emergency Medicine, 16*(5), 403-410. doi: ACEM381 [pii]10.1111/j.1553-2712.2009.00381.x

Popescu, I., Nallamothu, B. K., Vaughan-Sarrazin, M. S., & Cram, P. (2008). Do specialty cardiac hospitals have greater adherence to acute myocardial infarction and heart failure process measures? An empirical assessment using Medicare quality measures: Quality of care in cardiac specialty hospitals. *American Heart Journal, 156*(1), 155-160. doi: S0002-8703(08)00193-2 [pii]10.1016/ j.ahj.2008.02.018

Polisena, J., Tran, K., Cimon, K., Hutton, B., McGill, S., Palmer, K., & Scott, R. (2010). Home telemonitoring for congestive heart failure: a systematic review and meta-analysis. *Journal Of Telemedicine And Telecare*, *16*(2), 68-76.

Popescu, I., Nallamothu, B. K., Vaughan-Sarrazin, M. S., & Cram, P. (2010). Racial differences in admissions to high-quality hospitals for coronary heart disease. *Arch Intern Med, 170*(14), 1209-1215. doi: 170/14/1209[pii]10.1001/ archinternmed.2010.227

Quan, J. M. (1980). SPARCS: The New York State health care data system. *Journal of Clinical Monitoring and Computing, 8*(6), 255-263.

Ramani, G. V., Uber, P. A., & Mehra, M. R. (2010). Chronic heart failure: contemporary diagnosis and management. *Mayo Clinical Procedure, 85*(2), 180-195. doi: 85/2/180 [pii]10.4065/mcp.2009.0494

Ramos, R. G., Talbott, E. O., Youk, A., & Karol, M. H. (2006). Community urbanization and hospitalization of adults for asthma. *Journal of Environmental Health, 68*(8), 26.

Rask, K., O'Malley, E., & Druss, B. (2009). Impact of socioeconomic, behavioral and clinical risk factors on mortality. *Journal of Public Health (Oxford), 31*(2), 231-238. doi: fdp015[pii]10.1093/pubmed/fdp015

Regitz-Zagrosek, V., Brokat, S., & Tschope, C. (2007). Role of gender in heart failure with normal left ventricular ejection fraction. *Progress in Cardiovascular Disease, 49*(4), 241-251. doi: S0033-0620(06)00095-8[pii]10.1016/j.pcad.2006.08.011

Regitz-Zagrosek, V., & Lehmkuhl, E. (2005). Heart failure and its treatment in women. Role of hypertension, diabetes, and estrogen. *Herz, 30*(5), 356-367. doi: 10.1007/s00059-005-2718-1

Robbins, J., Valdmanis, V., & Webb, D. (2008). Do public health clinics reduce rehospitalizations?: the urban diabetes study. *Journal of Health Care Poor Underserved, 19*(2), 562-573. doi: S1548686908200215[pii]10.1353/hpu.0.0013

Rosengren, A., & Hauptman, P. (2008). Women, men and heart failure: a review. *Heart Failure Monitor, 6*(1), 34-40.

Ross, J. S., Normand, S. L., Wang, Y., Nallamothu, B. K., Lichtman, J. H., & Krumholz, H. M. (2008). Hospital remoteness and thirty-day mortality from three serious conditions. *Health Affairs (Millwood), 27*(6), 1707-1717.

Rudestam, K. E., & Newton, R. R. (2007). *Surviving your dissertation: A comprehensive guide to content and process* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Sabit, R., Griffiths, T., Watkins, A., Evans, W., Bolton, C., Shale, D., & Lewis, K. (2008). Predictors of poor attendance at an outpatient pulmonary rehabilitation programme. *Respiratory Medicine, 102*(6), 819-824.

Saydah, S., & Lochner, K. (2010). Socioeconomic status and risk of diabetes-related mortality in the U.S. *Public Health Reports, 125*(3), 377-388.

Scalvini, S., Zanelli, E., Volterrani, M., Martinelli, G., Baratti, D., Buscaya, O., & ... Giordano, A. (2004). A pilot study of nurse-led, home-based telecardiology for patients with chronic heart failure. *Journal Of Telemedicine & Telecare*, *10*(2), 113-117.

Schadewaldt, V., & Schultz, T. (2011). Nurse-led clinics as an effective service for cardiac patients: results from a systematic review. *International Journal Of Evidence-Based Healthcare*, *9*(3), 199-214

Scrutinize your readmissions and take steps to avoid them: CMS to begin penalizing hospitals when patients come back. (2010). *Hospital Case Management, 18*(2), 17-20.

Shen, J. J., Washington, E. L., Chung, K., & Bell, R. (2007). Factors underlying racial disparities in hospital care of congestive heart failure. *Ethnicity & Disease, 17*(2), 206-213.

Singh, T., Givertz, M., Semigran, M., Denofrio, D., Costantino, F., & Gauvreau, K. (2010). Socioeconomic position, ethnicity, and outcomes in heart transplant recipients. *American Journal of Cardiology, 105*(7), 1024-1029. doi: S0002-9149(09)02729-5[pii]10.1016/j.amjcard.2009.11.015

Small, K., Wagoner, L., Levin, A., Kardia, S., & Liggett, S. (2002). Synergistic polymorphisms of beta1- and alpha2C-adrenergic receptors and the risk of congestive heart failure. *New England Journal of Medicine, 347*(15), 1135-1142. doi: 347/15/1135[pii]10.1056/NEJMoa020803

Srbinoski, Z. (2009). State base map for GIS -- New digital topographic map of the Republic of Macedonia. *Cartography & Geoinformation*, *8*(12), 18-30.

SPARCS. (2006). *Identifying data overview and instructions.* Retrieved from http://www.health.state.ny.us/statistics/sparcs/dprb/overview.htm

SPARCS (2007a). *Obtaining SPARCS data overview.* Retrieved from http://www.health.state.ny.us/statistics/sparcs/datareq.htm

SPARCS. (2007b). *SPARCS overview.* Retrieved from http://www.health.state.ny.us/statistics/sparcs/operations/overview.htm

SPARCS. (2009). *Operations guide.* Retrieved from http://www.health.state.ny.us/statistics/sparcs/sysdoc/operguid.htm#part4_4

Steinberg, W. J. (2008). *Statistics alive!* Los Angelos: Sage Publications, Inc.

Stromberg, A. (2005). The crucial role of patient education in heart failure. *The European Journal of Heart Failure, 7*(2005), 363-369. Retrieved from http://eurjhf.oxfordjournals.org/content/7/3/363.full.pdf+html

Taylor, A. L., Ziesche, S., Yancy, C., Carson, P., D'Agostino, R., Jr., Ferdinand, K., . . . Cohn, J. N. (2004). Combination of isosorbide dinitrate and hydralazine in blacks with heart failure. *New England Journal of Medicine, 351*(20), 2049-2057. doi: NEJMoa042934 [pii]10.1056/NEJMoa042934

Telehealth helps hospital cut readmissions by 75%: new approach to heart failure saves money. (2007). *Healthcare Benchmarks & Quality Improvement*, *14*(8), 92-94.

Thomas, R., Huntley, A., Mann, M., Huws, D., Paranjothy, S., Elwyn, G., & Purdy, S. (2013). Specialist clinics for reducing emergency admissions in patients with heart failure: a systematic review and meta-analysis of randomised controlled trials. *Heart*, *99*(4), 233-239.

Titler, M., Jensen, G., Dochterman, J., Xian-Jin, X., Kanak, M., Reed, D., et al. (2008). Cost of hospital care for older adults with heart failure: Medical, pharmaceutical, and nursing costs. *Health Services Research*, *43*(2), 635-655. doi:10.1111/j.1475-6773.2007.00789.x

Tonelli, M., Manns, B., Culleton, B., Klarenbach, S., Hemmelgarn, B., Wiebe, N., et al. (2007). Association between proximity to the attending nephrologist and mortality among patients receiving hemodialysis. *Canadian Medical Association Journal, 177*(9), 1039.

Trevisan, D., Dorioz, J. M., Poulenard, J., Quetin, P., Prigent Combaret, C., & Merot, P. (2010). Mapping of critical source areas for diffuse fecal bacterial pollution in extensively grazed watersheds. *Water Research, 44*(13), 3847-3860. doi: S0043-1354(10)00293-9[pii]10.1016/j.watres.2010.04.039

Trivedi, A. N., Sequist, T. D., & Ayanian, J. Z. (2006). Impact of hospital volume on racial disparities in cardiovascular procedure mortality. *Journal of the American College of Cardiology, 47*(2), 417-424. doi: S0735-1097(05)02570-2[pii]10.1016/j.jacc.2005.08.068

Tseng, K., Hemenway, D., Kawachi, I., Subramanian, S., & Chen, W. (2008). Travel distance and the use of inpatient care among patients with schizophrenia. *Administration and Policy in Mental Health, 35*(5), 346-356.

U.S. Census Bureau. (2010). *State & County Quickfacts.* Retrieved from http://quickfacts.census.gov/qfd/states/36/3651000.html

U.S. Department of Health and Human Services. (2008). *Guidance on research involving coded private information or biological specimens.* Retrieved from http://www.hhs.gov/ohrp/humansubjects/guidance/cdebiol.htm

U.S. Department of Health and Human Services. (2010). *Basic HHS policy for protection of human research subjects.* Retrieved from http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm

U.S. Department of Health and Human Services, N. I. O. H., National Heart, Lung, and Blood Institute. (2004). *The Seventh Report on the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*. Retrieved from http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.pdf

U.S. House of Representatives. (2010). *Patient protection and affordable care act health-related portions of the health care and education reconciliation act of 2010.* Retrieved from http://docs.house.gov/energycommerce/ppacacon.pdf

Vaccarino, V., Gahbauer, E., Kasl, S., Charpentier, P., Acampora, D., & Krumholz, H. (2002). Differences between African Americans and whites in the outcome of heart failure: Evidence for a greater functional decline in African Americans. *Congestive Heart Failure, 143*(6), 1058-1067.

Wei, L., Lang, C., Sullivan, F., et al. (2008). Impact on mortality following first acute myocardial infarction of distance between home and hospital: cohort study. *Heart, 94*, 1141-1146.

Weller, W., Kabra, G., Cozzens, K., & Hannan, E. (2010). Appending limited clinical data to an administrative database for assessing institutional quality outliers for AMI care: does it matter? *International Journal of Cardiology, 140*(1), 95-101. doi: S0167-5273(08)01158-3[pii]10.1016/j.ijcard.2008.11.003

Whellan, D. J., Greiner, M. A., Schulman, K. A., & Curtis, L. H. (2010). Costs of inpatient care among Medicare beneficiaries with heart failure, 2001 to 2004. *Circulation Cardiovascular Quality and Outcomes, 3*(1), 33-40.

Woodson, W., & Jenkins, S. (2010). Payment reform: How should your organization prepare? *Healthcare Leadership Review, 29*(3), 3-4. Retrieved from ProQuest Health Management. (Document ID: 1965345471).

Yamashita, T., & Kunkel, S. (2010). The association between heart disease mortality and geographic access to hospitals: county level comparisons in Ohio, USA. *Social Science & Medicine,* (70), 1211-1218.

Yancy, C. W. (2005). Heart failure in African Americans. *American Journal of Cardiology, 96*(7B), 3i-12i. doi: S0002-9149(05)01211-7[pii]10.1016/ j.amjcard.2005.07.028

Yancy, C. W., Abraham, W. T., Albert, N. M., Clare, R., Stough, W. G., Gheorghiade, M., . . . Fonarow, G. C. (2008). Quality of care of and outcomes for African Americans hospitalized with heart failure: Findings from the OPTIMIZE-HF (Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients

With Heart Failure) registry. *Journal of American College of Cardiology, 51*(17), 1675-1684. doi: S0735-1097(08)00565-2[pii]10.1016/j.jacc.2008.01.028

Yang, X., & Jin, W. (2010). GIS-based spatial regression and prediction of water quality in river networks: a case study in Iowa. *Journal of Environmental Management, 91*(10), 1943-1951. doi: S0301-4797(10)00112-X[pii]10.1016/j.jenvman. 2010.04.011

Yantzi, N., Rosenberg, M. W., Burke, S. O., & Harrison, M. B. (2001). The impacts of distance to hospital on families with a child with a chronic condition. *Social Science Medicine, 52*(12), 1777-1791. doi: S0277953600002975[pii]

Young, L. E., Cunningham, S. L., & Buist, D. S. M. (2005). Lone mothers are at higher risk for cardiovascular disease compared with partnered mothers. Data from the National Health and Nutrition Examination Survey III (NHANES III). *Health Care for Women International, 26*(7), 604-621.

Zajacova, A., Dowd, J., & Aiello, A. (2009). Socioeconomic and race/ethnic patterns in persistent infection burden among U.S. adults. *Journal of Gerontology Biological Science, 64*(2), 272-279. doi: gln012 [pii] 10.1093/gerona/gln012

Zeichner, B. C., & Adams, S. D. (2010). Using geographic information systems to maximize environmental surveillance efforts and impact. *US Army Medical Department Journal*, 29-35.

*Appendix A: Diagnosis Codes*

| Diagnosis Code | ICD-9-CM Description |
|---|---|
| 428 | Heart failure |
| 428.0 | Congestive heart failure unspecified |
| 428.1 | Left heart failure |
| 428.2 | Systolic heart failure |
| 428.20 | Unspecified systolic heart failure |
| 428.21 | Acute heart failure |
| 428.22 | Chronic systolic heart failure |
| 428.23 | Acute on chronic systolic heart failure |
| 428.3 | Diastolic heart failure |
| 428.30 | Unspecified diastolic heart failure |
| 428.31 | Acute diastolic heart failure |
| 428.32 | Chronic diastolic heart failure |
| 428.33 | Acute on chronic diastolic heart failure |
| 428.4 | Combined systolic and diastolic heart failure |
| 428.40 | Unspecified combined systolic and diastolic heart failure |
| 428.41 | Acute combined systolic and diastolic heart failure |
| 428.42 | Chronic combined systolic and diastolic heart failure |
| 428.43 | Acute on chronic combined systolic and diastolic heart failure |
| 428.9 | Heart failure unspecified |

*Appendix B: University of Phoenix Internal Review Board*

**UNIVERSITY OF PHOENIX**

**INSTITUTIONAL REVIEW BOARD**

This is to verify that your doctoral research proposal has been initially reviewed and deemed "exempt" for purposes of human subject research as mandated by federal regulations.

This decision applies to the dissertation title and learner identified below:

**A COMPARISON OF THE INPATIENT MORTALITY AND 30-DAY READMISSION RATES OF HEART FAILURE PATIENTS**
**By**

**Freling Smith**

This decision is applicable for one year from the date noted below. A progress report or final dissertation is due one year from the date identified below.

Dr. Jeremy Moreland, Chair
Institutional Review Board
University of Phoenix
**4/18/11**

NEW YORK STATE DEPARTMENT OF HEALTH
Information Systems & Health Statistics Group

## SPARCS/PRI Identifying Data Request Form

Send completed application to:

Executive Secretary
Data Protection Review Board (DPRB)
New York State Department of Health
800 North Pearl Street, Room 231
Albany, New York 12204
Phone: (518) 473-8144
sparcs@health.state.ny.us

**FOR DOH USE:**
Request Number________________
DOH Request: ☐ yes ☐ no

Date____________________

### 1. ORGANIZATION AND INDIVIDUAL REQUESTING USE OF DATA

**a. Project Director and Title:**
Freling Smith, University of Phoenix Doctoral Student

*(Person who is primarily responsible for conducting the study/project)*

**b. Organizational Affiliation:**
University of Phoenix

*(If Organization is NYSDOH, complete NYSDOH Application)*

**c. Contact Person:**
Freling Smith

*(Person who can be contacted for application questions)*

**d. Street Address or P.O. Box:**
5372 South Stephentown Road

**e. City/State/Zip Code:**
Stephentown, NY 12168

**f. Telephone of Contact Person:**
518-423-9737

*(Include area code)*

**g. E-mail of Contact Person:**
freling2@hotmail.com

DOH-4385 (12/05) Page 1 of 17

## 2. NATURE OF REQUEST

**a. Title of Study/Project:**
A Retrospective Comparison of the Inpatient Mortality and 30-day Readmission Rates of Heart Failure Patients

**b. Name and Affiliation of Project Participants:** Specify name of Study Partners, Contractors, Organizations and Consultants (i.e., outside programmers) involved with this study/project other than the Project Director and his/her staff.

Nora Galambos, PhD of Statistical Power, Inc.

**c. Sources of Funding:** Specify all sources of funding/sponsors for this study/project.

Personal

**d. Type of Request:** Check all that apply (under regulations NYCRR Title 10 §400.18).

☐ Financial Study

☐ Rate Setting

☐ Surveillance

☐ Health Planning and Resource Allocation Study

☐ Epidemiological Study

x☐ Research Study

☐ Utilization Review of Resources

☐ Quality of Care Assessment

☐ Other (List) ____________________

**e. Protection of Human Subjects:** This section must be filled out for research application. If not, skip to "f".

Has this project been reviewed by an Institutional Review Board (IRB) for the protection of human subjects? IRB review may be necessary even without patient contact.

☐ Yes. *If yes, attach a copy of the IRB review to this application.*

**f. Data Requested:** SPARCS is required to redact SPARCS records containing HIV/AIDS and abortion information*. Each year approximately 50,000 HIV/AIDS and 16,000 abortion records are affected. The DPRB is extremely conservative in providing access to SPARCS data that have not been redacted. You must provide strong evidence that access to these records is needed and that the study has particular merit warranting the release of this data.
*Note: See instruction for detail on HIV/AIDS edit

*1. Type and Time Period of Requested Data:* List specific calendar year(s) requested for each type of SPARCS data file.

| | Year(s) Requested |
|---|---|
| (a) PRI Data | ______________ |
| (b) SPARCS Inpatient | 1999-2009__________ |
| (c) SPARCS Outpatient (AS & ED) | ______________ |
| 1. Ambulatory Surgery only | ______________ |
| 2. Emergency Department only | _1999-2009 if patient |

admissions through the emergency department are not captured in Inpatient data

*2. HIV/AIDS Records:* Patient-identifying information is removed from HIV/AIDS records. Are you requesting non-redacted HIV/AIDS records?

x ☐ No.

☐ Yes. *Attach a detailed justification for the additional information.*

*3. Abortion Records:* The Physician Identifier is removed on abortion records. Are you requesting non-redacted abortion records?

x ☐ No.

☐ Yes. *Attach a detailed justification for the additional information.*

**g. Data Selection/Extraction Criteria:**

☐ None (You will receive all facilities, statewide data).

x☐ Specific Facility (list specific PFI codes):
Albany Medical Center and New York Universtity Medical Center.
*Please note: Before data can be released, a notification letter, with a copy to SPARCS, must be sent to each facility targeted.*

x ☐ Specific patient population (identify population; i.e. >65, specific ICD-9 codes):

The following DRG heart failure codes are requested; 428, 428.0, 428.1, 428.2, 428.20, 428.21, 428.22, 428.23, 428.3, 428.30, 428.31, 428.32, 428.33, 428.4, 428.40, 428.41, 428.42, 428.43, and 428.9.

## 3. SUMMARY OF STUDY PROPOSAL AND PROJECT ACTIVITIES

**Note:** The summary provided below should be a succinct and accurate description of the study/project. All of the items below must be addressed in this summary. You may append a copy of your proposed study/project, protocol or any other supporting documentation in addition to the summary provided below.

**a. Primary Purpose:** Include specific health or medical conditions to be examined.

Heart failure is the disease state with the highest rate of hospitalization in the Medicare population. According to the American Heart Association (n.d.), heart failure patients with Medicare benefits consumed 37% of the annual Medicare reimbursement and exhausted 37-50% of the total annual Medicare inpatient dollars (American Heart Association; Esposito et al., 2009.).

**b. Objectives:** Include a description of the main issues to be addressed and the analyses to be conducted.
To identify differences between the inpatient mortality and 30-day readmission rates of heart failure patients based on the proximity to two teaching hospitals: one in a densely populated area and one is a less densely populated area

**c. Benefits:** What are the benefits of this study/project?

The findings of the proposed study may:

1. Help to identify if a patient's race, socioeconomic status, or gender places the patient at greater risk for heart failure impatient mortality and 30-day readmission.

2. Offer empirical evidence to suggest that hospitals should consider investing in outreach programs or building satellite heart failure clinics in the surrounding communities to improve patient care.
3. Offer empirical evidence to suggest that the Centers for Medicare and Medicaid and others payers should reimburse heath care providers for tele-health designed to follow heart failure patients not living in close proximity to health care services.

---

**d. Contractors:** Identify any contractors involved and their role.

Nora Galambos, PhD of Statistical Power, Inc. will analyze the data

---

**e. Linkage:** The SPARCS/PRI data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient element not collected by SPARCS but present in other data sets, such as name or social security number. For example, if you have not been approved for patient's date of birth you cannot link SPARCS data with a file that contains this date of birth information.

Will you link the SPARCS/PRI data to another data source?

x ☐ No. *If no, skip to #4.*

☐ Yes. *If yes, answer the following questions.*

1. What SPARCS/PRI identifying data elements will be used to perform the linkage?

N/A

---

2. Once the linkage is made, what data elements will be the new file contain from the non-SPARCS/PRI file? Identify the data elements in the non-SPARCS/PRI file that will be linked/matched.

N/A

---

3. Have all necessary approvals been obtained to receive and link with the other data files?

N/A

---

## 4. QUALIFICATIONS OF THE APPLICANT TO UNDERTAKE THE STUDY

Non-Health Department requestors must provide information regarding the organization and project director and team.

**a. Describe how the mission of the organization/agency relates to the study/project.**

The mission of the University of Phoenix is to enable students to develop knowledge and skills necessary to achieve their professional goals, improve the productivity of their organizations and provide leadership to their communities. I plan to use the requested information to complete doctoral dissertation and to potentially provide valuable information about heart failure inpatient mortality and 30-day re-hospitalization rates. The proposed study may also provide empirical information which might suggest; 1.) that the Centers for Medicare and Medicaid should consider reimbursing for tele-health to improve heart failure patient care and 2.) hospitals should consider investing in outreach programs or building satellite heart failure clinics in the surrounding communities to improve patient care.

**b. Describe the qualifications/credentials of the project director.**

I am a doctoral student who will use the requested information to complete my dissertation for my degree as a Doctor in Health Administration. I have completed a masters in business administration at Sage Graduate and a bachelor degree at Skidmore College

**c. Describe the qualifications/credentials of the project team/organization.**

Nora Galambos has a PhD in statistics

## 5. PAST REQUESTS

Has the Project Director/Organization requested deniable (identifying) information in the past?

x☐ No.

☐ Yes. *If yes, indicate the most recent SPARCS application number(s) and approximate date.*

6. **IDENTIFYING DATA ELEMENTS REQUIRED**

a. **SPARCS Identifying Data Elements Requested:** What specific data items do you require for use in your study/project? Please check all identifying data elements that apply to your study/project and provide justification for use of each. The dates listed under "Inpatient" and "Outpatient" are the implementation dates for that data element. A full description of each data elements can be found in the Output Data Dictionaries: Inpatient: http://www.health.state.ny.us/statistics/sparcs/inpat.htm
Outpatient: http://www.health.state.ny.us/statistics/sparcs/outpat.htm

| SPARCS Requested Item | Identifying Data Elements | Collection Start Date Inpatient | Collection Start Date Outpatient | Justification |
|---|---|---|---|---|
| | Accident Related Date | 1994 | 2003 | |
| x | Admission Date/Start of Care | 1982 | 1995 | This information is needed to track 30-day readmission rates |
| | Date Alternate Care Required | 1982-1999 | | |
| | Discharge Date/Ambulatory Surgery Service Date | 1982 | 1983 | |
| | Medical Record Number | 1982 | 1983 | |
| | Mother's Medical Record Number for Newborn Child | 1990 | | |
| | Non-Acute Care from Date | 1999 | | |
| | Non-Acute Care through Date | 1999 | | |
| x | Patient Birth Date | 1982 | 1983 | This information will be needed to help control for excessive mortality due to old age |
| | Patient Control Number | 1982 | 1983 | |
| | Patient Residence Address Line 1 | 1982 | 1997 | |

| SPARCS Requested Item | Identifying Data Elements | Collection Start Date Inpatient | Collection Start Date Outpatient | Justification |
|---|---|---|---|---|
| | Patient Residence Address Line 2 | 1994 | 2003 | |
| x | Patient Zip Code Extension | 1994 | 1994 | This information will be needed to identify the median household income for the zip code the patient resides. This information will help to calculate socioeconomic status |
| | Policy Number | 1992 | | |
| | PreHospital Care Report Number | 1994-1997 | | |
| | Principal Procedure Date | 1983 | 2003 | |
| | Statement Covers Period from Date | 1982 | | |
| | Statement Covers Period thru Date | 1982 | | |
| x | Unique Personal Identifier | 1995 | 1997 | This information will needed to help identify patients who were readmitted within 30-days |
| | Other Procedure Date 1-4 | 1982 | | |
| | Other Procedure Date 5 | 1992 | | |
| | Other Procedure Date 6-14 | 1994 | | |

**DATA ELEMENTS BELOW REQUIRE ADDITONAL CONSIDERATION:**

| | | | | |
|---|---|---|---|---|
| | Physician ID/State License Numbers w/Abortion Records | 2000 | 2000 | |
| | HIV/Aids Identifying Data Elements | 1999 | 1999 | |

b. **PRI Identifying Data Elements Requested:** What specific PRI data items do you require for use in your study/project? Please check all identifying data elements that apply to your study/project and provide justification for use of each.

| PRI Requested Item | Identifying Data Elements | Collection Start Date | Justification |
|---|---|---|---|
| | Admission Date | 1986 | |
| | Medical Record Number | 1986 | |
| | Medicaid Number of Patient | 1986 | |
| | Medicare Number of Patient | 1986 | |
| | Operating Certificate Number | 1986 | |
| | Patient Birth Date | 1986 | |
| | Patient Name | 1987 | |
| | Patient Room Number | 1986 | |
| | Patient Unit Number | 1986 | |
| | Social Security Number | 1986 | |

## 7. CONFIDENTIALITY OF DATA

**a. Narrative:** Describe how you will maintain the confidentiality of the requested data. Include an explanation of how and where such data will be stored, as well as how and when you plan to dispose of the data after your study/project is completed. Also describe the safeguards that currently exist or will be implemented.

The CD or DVD will be stored in a secured location at home until it can be delivered to the contracted statistician for data analysis. The CD or DVD will be retained in a secure location for a period of one year after which it will be destroyed in a shredder.

1. Processing and Storing of Data:

(a) Will the data be stored at a location other than the organization's physical site?

x☐ No.

☐ Yes. *If yes, a separate organization affidavit is required.*

______________________________

*(Name of Organization)*

(b) Will a Vendor/Contractor store/manipulate/process this data?

☐ No.

x☐ Yes. *If yes, separate organizational and individual affidavits are required.*

Statistical Power, Inc. (Nora Galambos, PhD)

______________________________

*(Name of Organization)*

(c) Please provide a description to any "yes" answers above.

**b. Affidavits:** The data provided as a result of an approved request may not be released to anyone unless specifically requested and approved by the Data Protection Review Board. In addition, this data can only be used by the specific purpose contained in this application.

In the spaces below, identify every individual who will have access to the provided information including the name of consultants, contractors, subcontractors, etc. For every individual listed, there must be a complete affidavit attached. ONLY THOSE INDIVIDUALS LISTED BELOW WHO HAVE AN ATTACHED, SIGNED AFFIDAVIT MAY HAVE ANY ACCESS TO THESE DATA. NO ONE ELSE IS APPROVED TO HAVE ACCESS TO ANY REQUESTED SPARCS DATA.

| NAME | TITLE/AFFILIATION |
|---|---|
| Freling Smith | ProgramDirector |
| Nora Galambos, PhD. | Statistician/ Statistical Power, Inc. |
| Joseph Breault, PhD, ScD | Dissertation Mentor |
| | |
| | |
| | |

**c. Release of Data:** Do you intend to disseminate information derived from the data received, including publication or presentation of findings, release to clients, consultants, contractors, etc.?

☐ No.

X☐ Yes. If yes, answer questions 1 and 2 below.

1. To whom will the information be released?
   The University of Phoenix

2. Describe what will be released and in what format. Attach examples as necessary to show the information is properly aggregated an/or de-identified.

The requested information will be used to fulfill my doctoral dissertation requirement and will be disseminated and published by the University of Phoenix

**8. DPRB REQUIREMENTS: ONLY USE FOR THE PURPOSE OF THIS STUDY**

**a. Data Retention:** The applicant organization is required to destroy or return all information and derivatives containing identifying data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval.

Do you expect to request an extension for access beyond two years?

x☐ No.

☐ Yes. If yes, explain why the extension is needed.

______________________________________

______________________________________

**b. Required Signatures:**

1. *Project Director:*
I understand that SPARCS maintains the right, while the information is in my possession, to request my submission quarterly statements describing how the requested data information has been used, descriptions of any and all releases of the information including identification of who received the information, data elements released and purpose of the release.

By signing below, I am also attesting that this data will be used for the ***sole purpose*** of this research study/project. The identifying data will not be shared with any person or entity not covered by this application.

______________________________________
Signature of Project Director

2. *Organization:*
I have read and approve this application for the identifying data requested and purpose specified and understand the confidentiality requirements regarding this data.

______________________________________
Signature of Organization Representative

# SPARCS/PRI Identifying Data Request Form

## Organizational Affidavit

STATE OF:

COUNTY OF:

**FOR DOH USE:**
Request Number__________________
DOH Request: ☐ yes ☐ no

______________________________, being duly sworn, deposes and says:

1. I am __________________________ of ____, and am authorized to sign on behalf of this organization. My signature indicates organizational support for this application and responsibility for maintaining the confidentiality of the data provided.

2. The data that this organization may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by my organization or anyone employed by or under contract to my organization to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18;

d. The data will be kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

## Organizational Affidavit

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

________________________
Date

________________________________________
Signature

________________________________________
Name (Printed)

________________________________________
Title

________________________________________
Organization

Subscribed and sworn to before me on

This _________ day of ___________, __________

______________________________
Notarization

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*

# SPARCS/PRI Identifying Data Request Form

## Individual Affidavit

**FOR DOH USE:**
Request Number__________________
DOH Request: ☐ yes ☐ no

STATE OF:

COUNTY OF:

__________________________________, being duly sworn, deposes and says:

1. I am identified in the attached Application for SPARCS/PRI Request Involving Identifying Data as an individual who will use or have access to the provided information.

2. The data I may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by me to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18, nor secondary release under similar terms;

d. The data is kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the attached application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

## Individual Affidavit

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

Date ____________________ Signature ____________________

Name (Printed) ____________________

Title ____________________

Organization ____________________

Subscribed and sworn to before me on

This ________ day of ___________, _________

____________________
Notarization

As project director for this application, I have approved the access and usage of the data for this research initiative for the requesting individual above.

____________________
Project Director Signature

____________________
Name (Printed)

____________________
DPRB Application Number (For DOH Post-Approval)

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*

## NYSDOH Application

1. Requests by the State Health Department for SPARCS files.

   a. Is this request to fulfill a statutory/legislative and/or regulatory mandate?

      x☐ No. ☐ Yes.

   b. If "Yes" specify program name and section of appropriate mandate (Public Health Law and/or Department of Health Regulations) that establishes the need for identifying SPARCS/PRI data.

      1. Program Name
      N/A

      2. Please specify the appropriate authority:

         a. Public Health Law
         N/A

         b. NYCRR Title 10
         N/A

         c. NYCRR Title 18
         N/A

         d. Other Regulations
         N/A

   c. Check what kind of SPARCS access is needed?

      ☐ Direct access to inpatient/outpatient master file.

      X☐ SPARCS data file (subset of full SPARCS file prepared by BBHS).

NEW YORK STATE DEPARTMENT OF HEALTH
Information Systems & Health Statistics Group

**SPARCS/PRI Identifying Data Request Form**

**Individual Affidavit**

FOR DOH USE:
Request Number_______________
DOH Request: ☐ yes ☐ no

**STATE OF:** NEW YORK

**COUNTY OF:** ALBANY

Freling S. Smith II, being duly sworn, deposes and says:

1. I am identified in the attached Application for SPARCS/PRI Request Involving Identifying Data as an individual who will use or have access to the provided information.

2. The data I may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by me to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18, nor secondary release under similar terms;

d. The data is kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the attached application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

DOH-4385 (12/05) Page 18 of 20

**Individual Affidavit**

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

Date: 1/14/11

Signature: [signature]

Name (Printed): Freling S. Smith III

Title: Project Director

Organization: University of Phoenix

Subscribed and sworn to before me on

This 14 day of JAN, 2011

Notarization: [signature] Sally A Mormile

MORMILE SALLY A
Notary Public - State of New York
No. 01MO5008658
Qualified in Saratoga County
My Commission Expires May 16, 2011

As project director for this application, I have approved the access and usage of the data for this research initiative for the requesting individual above.

Project Director Signature: [signature]

Name (Printed): Freling S. Smith III

DPRB Application Number (For DOH Post-Approval)

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*

NEW YORK STATE DEPARTMENT OF HEALTH
Information Systems & Health Statistics Group

# SPARCS/PRI Identifying Data Request Form

## Individual Affidavit

**FOR DOH USE:**
Request Number____________
DOH Request: ☐ yes ☐ no

STATE OF: LOUISIANA
~~COUNTY~~ PARISH OF: JEFFERSON

JOSEPH L. BREAM, being duly sworn, deposes and says:

1. I am identified in the attached Application for SPARCS/PRI Request Involving Identifying Data as an individual who will use or have access to the provided information.

2. The data I may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by me to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18, nor secondary release under similar terms;

d. The data is kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the attached application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

NEW YORK STATE DEPARTMENT OF HEALTH
Information Systems & Health Statistics Group

**SPARCS/PRI Identifying Data Request Form**

### Individual Affidavit

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

3/23/2011
Date

[signature]
Signature

JOSEPH BREAULT
Name (Printed)

ADJUNCT FACULTY
Title

UNIVERSITY OF PHOENIX
Organization

Subscribed and sworn to before me on
This 23rd day of March 2011

Cyril H. Reisgen II
Notarization

CYRIL H. REISGEN II
Notary Public
Bar # 8231
Lifetime Commission

As project director for this application, I have approved the access and usage of the data for this research initiative for the requesting individual above.

[signature]
Project Director Signature

Fielding J. Smith II
Name (Printed)

DPRB Application Number (For DOH Post-Approval)

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*

DOH-4385 (12/05) Page 19 of 20

# SPARCS/PRI Identifying Data Request Form

## Organizational Affidavit

STATE OF: Louisiana

~~COUNTY~~ OF: Jefferson
Parish

| FOR DOH USE: |
|---|
| Request Number ________ |
| DOH Request: ☐ yes ☐ no |

Joseph Breault ______, being duly sworn, deposes and says:

1. I am UOPX SAS Faculty of UPOX and am authorized to sign on behalf of this organization. My signature indicates organizational support for this application and responsibility for maintaining the confidentiality of the data provided.

2. The data that this organization may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by my organization or anyone employed by or under contract to my organization to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18;

d. The data will be kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

NEW YORK STATE DEPARTMENT OF HEALTH
Information Systems & Health Statistics Group

# SPARCS/PRI Identifying Data Request Form

## Organizational Affidavit

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

Date: 3/8/12

Signature: [signature]

Name (Printed): JOSEPH L. BREAULT

Title: SAS Faculty

Organization: UPOX (University of Phoenix)

Subscribed and sworn to before me on

This 8th day of March, 2012

Notarization: [signature]

Elizabeth F. Pretus
Notary Public
LA Bar No. 28726
My Commission Expires At Death

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*

NEW YORK STATE DEPARTMENT OF HEALTH
Information Systems & Health Statistics Group

# SPARCS/PRI Identifying Data Request Form

## Individual Affidavit

FOR DOH USE:
Request Number ____________
DOH Request: ☐ yes ☐ no

STATE OF: New York

COUNTY OF: Suffolk

Nora Galambos, being duly sworn, deposes and says:

1. I am identified in the attached Application for SPARCS/PRI Request Involving Identifying Data as an individual who will use or have access to the provided information.

2. The data I may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by me to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18, nor secondary release under similar terms;

d. The data is kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the attached application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

DOH-4385 (12/05) Page 18 of 20

# SPARCS/PRI Identifying Data Request Form

## Individual Affidavit

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

1/13/2011
Date

[signature]
Signature

Nora L. Galambos
Name (Printed)

President - Statistician
Title

Statistical Power, Inc.
Organization

Subscribed and sworn to before me on

This 13 day of January, 2011

[signature]
Notarization

JASON KIDD
Notary Public - State of New York
NO. 01KI6191870
Qualified in Suffolk County
My Commission Expires 8/25/2012

As project director for this application, I have approved the access and usage of the data for this research initiative for the requesting individual above.

[signature]
Project Director Signature

Freeling S. Smith II
Name (Printed)

DPRB Application Number (For DOH Post-Approval)

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*

# SPARCS/PRI Identifying Data Request Form

## Organizational Affidavit

| FOR DOH USE: |
|---|
| Request Number________ |
| DOH Request: ☐ yes ☐ no |

STATE OF: New York

COUNTY OF: Suffolk

Nora Galambos, being duly sworn, deposes and says:

1. I am Nora Galambos of Statistical Power, Inc., and am authorized to sign on behalf of this organization. My signature indicates organizational support for this application and responsibility for maintaining the confidentiality of the data provided.

2. The data that this organization may receive is confidential and is subject to strict limitations on disclosure delineated in Title 10 of the Official Compilation of Codes, Rules, and Regulations (NYCRR Title 10 §400.18). I have been informed by the New York State Department of Health and am aware that no attempt may be made by my organization or anyone employed by or under contract to my organization to identify specific individuals whose data has been received, except in those cases where the data supplied is to be used for legally-authorized surveillance of providers or utilization review, or where specific authorization has been given by the Data Protection Review Board pursuant to NYCRR Title 10 §400.18.

3. I also acknowledge that I have been informed by the New York State Department of Health and am aware of the following restrictions on use of any data/information to which the Data Protection Review Board grants access:

a. Access to any data deemed deniable (identifying) will be granted only to the individual(s) who have signed affidavits on file with the New York State Department of Health;

b. Data will be used only for the purposes stated in the Summary of the Study Proposal and Project Activities;

c. No data will be released or disclosed to any person or entity, or published in any manner whatsoever without prior written approval pursuant to NYCRR Title 10 §400.18;

d. The data will be kept in a secure environment and only authorized users will have access;

e. The data may not be matched and/or linked to any other data set containing elements deemed deniable (identifying) under NYCRR Title 10 §400.18 and/or SPARCS for which the user has not received explicit approval from the Data Protection Review Board to access, including patient elements not collected by SPARCS but present in other data sets, such as name or social security number;

f. The applicant organization is required to destroy or return all information and derivatives containing deniable (identifying) data within two years. The limit is defined as two years from when the final requested year's data file is considered "complete" by SPARCS. A written request to extend this time period may be submitted to SPARCS for approval;

g. The data will be processed and disposed of as is indicated in Sections 7 and 8 of the application;

h. SPARCS may perform an on-site audit of the use and security of SPARCS information received and I will cooperate if requested in the event of such an audit;

i. Any publication or report produced by this organization and/or using this data will acknowledge the source of the data.

## Organizational Affidavit

4. I am aware that any unauthorized disclosure of individually identifying or confidential information is prohibited by the Privacy Act of 1974 and by Title 18 §1905 of the U.S. Code. Additionally, I am aware that unauthorized disclosure of SPARCS information is prohibited under NYCRR Title 10 §400.18 (e) (9) (vi) and New York Public Health Law §12.

5. Furthermore, I understand that violations of these and any other disclosure guidelines are punishable by monetary fines, and that the Department of Health will prosecute to the fullest extent of applicable laws.

1/13/2011
Date

[signature]
Signature

Nora L. Galambos
Name (Printed)

President
Title

Statistical Power, Inc.
Organization

Subscribed and sworn to before me on

This 13 day of January, 2011

[signature]
Notarization

JASON KIDD
Notary Public - State of New York
NO. 01KI6191870
Qualified in Suffolk County
My Commission Expires 8/25/2012

*All requestors are asked to send the SPARCS Unit of the New York State Department of Health, for the information of the Data Protection Review Board, copies of any non-proprietary reports or publications based on requested data. The Board, as part of its conditions for the release of data, may specifically require the requestor to send the New York State Department of Health copies of reports or publications based on data from this request.*