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Factors Contributing to High Readmissions for Congestive Heart Failure Among African Americans

Shavonda Caprice Devereaux
Walden University

Walden University

College of Health Sciences

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Shavonda C. Devereaux

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Review Committee
Dr. Patrick Williams, Committee Chairperson, Public Health Faculty
Dr. Richard Palmer, Committee Member, Public Health Faculty
Dr. Loretta Cain, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

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MS, Trident University International, 2013

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

African Americans are disproportionately affected by heart failure, with prevention and treatment of heart failure being a public health concern in the United States. The purpose of this retrospective quantitative study was to examine the primary variable race, specifically African Americans, and how this variable relates to 30-day readmission post discharge when controlled with geographic location (urban vs. rural), gender, and insurance status. The expanded chronic care model was used as a framework to shape health promotion, prevention efforts, and social determinants of health and to enhance community involvement related to chronic disease issues. The research questions were focused on determining a relationship among African Americans being at a higher risk for 30-day readmission than others using selected control variables. Secondary data were collected for 565 patients diagnosed with congestive heart failure from the 2015 Hospital Inpatient Discharges data set and analyzed using simple and multivariate logistic regression methods to answer research questions and test hypotheses. Key results of the simple logistic regression revealed that African Americans were 1.7 times more likely to be readmitted than other races and 1.3 times more likely to be readmitted than Caucasians. The multiple logistic regression revealed race, gender and geographic location (urban) as significant predictors of readmission among African Americans. Insurance status revealed no significance for readmission among African Americans. Implications for social change from this study may include policy implementation at the family, organizational, and societal levels, such as policy related to education on establishing a surveillance system that identifies those in the population who are at risk and more vulnerable to social and health care disparities.

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Dedication

To Mildred B. Campbell, my maternal grandmother, and Mattie V. Green, my paternal grandmother, may you both continue to rest. You both have inspired me to be the best human I can be and to continue to reach for greater heights. To my maternal grandfather, Gaston H. Campbell, you were the pillar of strength for our family and have always believed that we can do and be whatever we desired. I know you are in a much better place.

Acknowledgments

First and foremost, I must thank GOD, my Lord and Savior Jesus Christ, for keeping me, saving me and giving me the strength to do all things through him which are possible. Without him I am truly nothing. To my husband Willie, thank you for patience, understanding, and being a shoulder to lean on while I pursued my goals and dreams. To my lovely children, Savion, London, and Cameron, I hope as you grow older, you gain the understanding of the importance of continuing education and setting yourself apart. We sacrificed an abundance of family time to ensure each of you are equipped with the tools necessary to be whatever your hearts desire. To my wonderful and awesome parents, William Gary Sr. and Kathy Gary, I pray I continue to make both of you proud and be the example you both taught me. I would like to personally thank my committee chair, Dr. Patrick Williams, methodologist, Dr. Richard Palmer, and URR, Dr. Loretta Cain, for always making themselves available and giving me the honest feedback that I often did not want to hear but needed. Your assistance has been invaluable to me. This has truly made me a better scholar. Lastly, to my battle buddy and friend, Catherine Mincey. You are the most dedicated, sweetest, down to earth, positive, and determined person I have met. I know by the time you read this dissertation, you will have been Dr. Mincey quite some time. We have both been on this educational journey since our times at Lansing, Michigan. I'm glad we crossed paths and are among the 1%.

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Chapter 1: Introduction to the Study

Introduction

Congestive heart failure (CHF) is a major public health problem that affects more than 5 million Americans annually and is one of the main reasons for hospital admissions and readmissions in people over 65 years of age (Roger, 2013). Medicare expenditures exceed $17 billion with over a million patients being hospitalized for heart failure (Boback et al., 2018). Admission rates following heart failure hospitalization remains at an all-time high with over half of patients being readmitted within 6 months of discharge (Fischer et al., 2014). The prevalence of readmissions for heart failure is higher among ethnic minority populations. Fischer et al. (2014) revealed that the readmission rates 3–6 months post discharge for African Americans diagnosed with CHF was 24.8% compared to 22.6% for Caucasians. Although CHF is a major cause of mortality and morbidity in the United States, existing literature has been limited to the contribution of single risk factors on readmission for CHF. There is ample information available on the social and racial disparities that African Americans face in health care, but there is no research on the correlation between race, gender, insurance type, geographic location, and the effect on readmission. Accordingly, CHF and social determinants of health are believed to be interrelated. In this context, individual socioeconomic status, level of education, health literacy, race, gender, culture, social support, access to health care, and residential location are all known to precipitate CHF in minority populations (Fischer et al., 2014). Heart failure generally continues to be distributed unequally across specific ethnic groups in the population. Specifically, African Americans have yet to see an improvement in

heart failure outcomes equal to that of other racial groups (Ziaeian, 2017). Several studies had been conducted with the goals of preventing and reducing CHF hospital readmissions. Identifying the population at an increased risk along with the variables that increase this risk is key to ensuring the success of these goals. With all the preexisting literature in which researchers have sought to identify the single risk factors for CHF readmission, none analyzes specific variables that may contribute to readmissions. Closing the gap by identifying effective approaches that address social and health care system shortcomings on disparities in readmissions would involve studying and analyzing such multiple and related patient variables as gender, race, insurance status, and geographic location (urban vs. rural) in proximity to a teaching hospital. All these variables could be used as predictors for assessing readmissions and form the basis of a model that could identify risk factors for CHF readmissions during diagnosis.

Background

According to the American Heart Association (2018), African Americans are more disproportionately affected by cardiovascular diseases than any other racial groups. Cardiovascular disease remains the number-one killer among all Americans (AHA, 2018). The strongest factors that increase the risk of cardiovascular disease in African Americans are diabetes, obesity, chronic kidney disease, low levels of high-density lipoproteins, and high blood pressure (hypertension). Cardiovascular diseases are conditions that affect the structures of the heart and include congenital heart disease, heart valve disease, arrhythmias, coronary artery disease, cardiomyopathy, and CHF (AHA, 2018). Although family history plays a significant role in the manifestation of

CHF among African Americans, this racial group faces substantial additional health disparities. There is a need for more research findings regarding the disparities in CHF management and care among African Americans and how these relate to hospital readmissions for this community. Differences in health and health care by racial category and race are of major public health issues and concerns. According to the literature, African Americans do not benefit from treatment to the same extent that other races do (Sharma et al., 2014). When hospitalized, African Americans are at a higher risk for mortality than Caucasians are. Additionally, when socioeconomic factors are the major cause of disease, African Americans have an increased rate of hospital readmission. Low income has been found to be an important predictor of hospital readmission in the African American population (Sharma et al., 2014). According to a U.S. study, patients with Medicaid or Medicare have a worse prognosis with heart failure than those with private health insurance (Bittoni, 2015). Researchers conducting a heart study in Ontario, Canada, found that older women with comorbidities were more likely to suffer from heart failure than men were (Sun et al., 2018). Hispanic men were found to have a significant decrease in hospitalizations after heart failure diagnosis (Dupre et al., 2017). Hospitalizations were found to be higher in African American women than Caucasian women (Dupre et al., 2017). After adjusting for psychosocial and behavioral factors, racial disparities remained significant (Dupre et al., 2017). Few researchers have used a theoretical model that assesses multiple risk factors, readmissions, and how the identification of disparities in the underserved population could improve treatment

outcomes. My research focused solely on gender, race, insurance status, geographic location, and how these factors contribute to readmissions among African Americans.

Problem Statement

Heart failure generally continues to be distributed unequally, affecting particular ethnic and racial groups more than others within the U.S. population. Specifically, African Americans have yet to see an improvement in heart failure outcomes equal to that of other racial groups, and the quality of care for racial minorities who suffer from heart failure varies (Ziaeian, 2017). African Americans and Hispanic patients have the highest preventable hospitalization rate and 30-day readmission rate (Ziaeian, 2017). Although continuous improvements have been made in the management of heart failure, there continues to be an influx of rehospitalization and patient mismanagement among African Americans diagnosed with CHF compared to Caucasians and other racial groups (Cuyjet & Akinboboye, 2014). Disparities in heart failure have largely been attributed to hypertension, diabetes, obesity, high salt intake, genetics, and socioeconomic status. The quality of care and disparities that exist toward African Americans diagnosed with heart failure are not uncommon. The variation in treatment approaches among certain racial groups have resulted in dissimilar pharmaceutical approaches. Various socioeconomic factors influence hospitalization/readmission rates, medication/treatment compliance, and disease progression (Cuyjet & Akinboboye, 2014). African Americans are typically underrepresented in clinical trials and thus race-related risk and treatment for them has not been well understood (Cuyjet & Akinboboye, 2014). Additional research could increase understanding of physiologic CHF variances among racial groups. There is a

need for training programs that promote the understanding of culture and how it may improve service and quality of care in CHF patients.

Purpose of the Study

The purpose of this study was to determine a relationship among variables that contribute to increased readmissions for CHF in African Americans 30 or more days after hospital discharge. In this study, I compared the primary variable, race, and the control variables–gender, geographic location (urban vs. rural), insurance status–and their relation to post 30-day readmission (dependent variable). The results of this study were used to answer the research questions associating CHF readmission in African Americans post 30-day discharge and the relationship of gender, insurance status, and geographic location.

Research Questions and Hypotheses

The following were the research questions for this study:

RQ1: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge?

RQ2: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural)?

RQ3: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender?

RQ4: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status?

RQ5: Are race, geographic location (urban vs. rural), insurance status, and gender independently related to being readmitted post 30-day discharge?

The following were the hypotheses for this study:

$H_0$1: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge.

H_A1: African Americans are at a higher risk than others for CHF readmission post 30-day discharge.

$H_0$2: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural).

H_A2: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural).

$H_0$3: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender.

H_A3: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender.

$H_0$4: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status.

H_A4: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status.

$H_0$5: Race, geographic location (urban vs. rural), insurance status, and gender are not independently related to being readmitted post 30-day discharge.

H_A5: Race, geographic location (urban vs. rural), insurance status, and gender are independently related to being readmitted post 30-day discharge.

Theoretical Framework

The chronic care model (CCM) has been used by organizations to facilitate care for people who suffer from chronic illnesses. Developed by Ed Wagner, the CCM is based on evidence from a review of interventions to improve care for chronically ill patients (NIH, 2017). Quality care for patients diagnosed with CHF are characterized by the effective interactions between providers and patients (NIH, 2017). These interactions are considered positive outcomes when patients are provided proper support for continued self-care management, optimal therapy, and follow up. Feltner et al. (2013) defined *transitional care* as a "broad range of limited services that are designed to ensure health care continuity, avoidance of preventable poor outcomes among at risk populations and the promotion of safely transferring patients from one level of care to another." Transitional care strategies aligned with the CCM can optimize clinical care and self-management, leading to the reduction of hospital readmissions. I used the expanded chronic care model (ECCM) to guide this study.

The ECCM is an enhanced version of the CCM and includes elements such as population health and health promotion (Barr et al., 2003). In the ECCM, positive and productive interactions between external organizations and community members were responsible for improving the health of the population (Barr et al., 2003). As previous studies suggest, chronic diseases now require a clinical and public health approach to include examination of population health. By introducing the ECCM, this model would

redirect efforts toward chronic disease management by including community support and addressing health determinants. Optimization of the environment and support systems is important to have optimal care for patients diagnosed with heart failure. The use of the ECCM framework will serve as a foundation to enhance heart failure management and care, facilitate the decline in readmissions, and maximize quality of life. Social determinants of health and support from the ECCM positively influence community, individual, and population health. Adopting the ECCM can lead to a better understanding of how patient care fits within population health concepts. Populations, communities and individuals can benefit from greater positive health outcomes using this action driven model. Furthermore, merging population health promotion and clinical healthcare could build interdisciplinary teams between community supporters, legislative officials and health care teams.

Nature of the Study

For this research, I selected a quantitative study using secondary data. The use of quantitative data was necessary because it provided generalization of preexisting statistical data. The secondary data were gathered from the Statewide Planning and Research Cooperative System (SPARCS) database. All facilities that are considered Article 28 hospitals are required to submit claim-level data on ambulatory surgery, emergency room visits, patient data and characteristics, diagnosis, treatment, services, and charges for discharges to the SPARCS database (New York State Department of Health, 2015). SPARCS data from Article 28 hospitals are then submitted to the Health Commerce System (HCS). The multiple virtual storage (MVS) mainframe system then

edits files as appropriate and pushes the edits to an encrypted file distribution server (New York State Department of Health, 2015).

The design of this study was used to measure the 30-day readmissions (dependent variable) and geographic location (urban vs. rural), race, gender, and insurance status (independent variables) of African Americans and other races. I analyzed the data using simple and multivariate logistic regression to learn how the independent variables has an effect on the dependent variable.

Definition of Terms

For this study, the following terms were defined as follows:

Congestive heart failure (*CHF)*: A serious medical condition in which the heart cannot pump enough blood to the body to meet the body's need (CDC, 2012).

Readmission: A patient admission to a hospital within 30 days after being discharged from an earlier hospital stay (Mayo Clinic, 2017)

Social determinants: Conditions in which people are born, grow, live, work, and age (WHO, 2017).

Socioeconomic factors: The social and economic experiences and realities that help mold a person's personality, attitudes, and lifestyle (Chase, 2018).

SPARCS: An all-payer database reporting system known as the Statewide Planning and Research Cooperative System located in the state of New York (New York State Department of Health, 2016).

Urbanized area: An urbanized area consists of densely developed territory that contains 50,000 or more people and possess a density of at least 1,000 people per square mile (U.S. Census Bureau, 2018).

Rural area: A population or housing and territory not included in an urbanized area or urban cluster (U.S. Census Bureau, 2018).

Assumptions

There is an assumption that secondary data used for this study were accurate and CHF data were truthfully reported. An additional assumption was that patients whose data were included in the study returned to the hospital where initial treatment was obtained.

Delimitations

The quality of care was not determined between the two teaching hospitals. Therefore, it could not be concluded if quality of care contributed to an increase in readmissions. The study was restricted to using secondary data from the SPARCS database and not data obtained directly from the teaching hospitals. In addition, only two teaching hospitals were included in the study, thereby limiting generalization to all teaching hospitals. This study determined if geographic location to either of the teaching hospitals had influence on certain racial populations.

Limitations

The study included two teaching hospitals and quality of care between the hospitals was not factored into the study. In addition, travel time between zip code to a teaching hospital were not estimated or measured. Patients who would be initially treated

at one of the teaching hospitals and subsequently sought treatment elsewhere were limited in the study.

Significance of the Study

CHF is a growing burden and considered one of the leading causes of hospitalizations and readmissions in the United States. Decreasing readmissions for CHF patients is a priority for researchers, clinicians, and stakeholders. The challenge lies in the identification of factors that influence readmission risk. According to Bradley et al.'s (2013) study, minority patients are continuously discharged without a clear understanding of CHF, symptom management, medication administration, and how to access follow-up care. Additional studies have shown an increase in hospital readmission rates in minority populations due to factors such as race and income. Bradley et al. found that the readmission risk for African American and other minorities was a result of limited clinical knowledge, poor access to care, poor patient follow-up, quality of care, and use of preventive services. Further clarification of the relationships among gender, insurance status, geographic locations, and race are necessary due to their significant relationship to an increase in hospital readmissions and the lack of studies in which researchers examine the combination of these factors. The findings of this study may enhance community and family involvement, which has the potential to increase understanding and awareness of CHF disparities.

The attitudinal change and inclusion of political infrastructure encourages a systemic change in institutional outcomes and health care delivery. Providing the results of this study to hospital administration and other hospital leadership may help improve

service to heart failure patients. Early identification of heart failure patients at risk for readmission within 30 days may reduce additional health care costs. In addition, this study could affect social change by influencing lawmakers to ensure that Medicare beneficiaries receive community support to reduce potentially preventable readmissions. Extending education to family members could potentially provide increased support.

Summary

CHF continues to be a major chronic condition for hospitalizations among the elderly population. Heart failure has been positively linked to high morbidity, mortality, and an increase in health care expenditures. Over 1 million Americans are hospitalized and 5 million Americans diagnosed with heart failure each year (Dupre et al., 2017). In the United States alone, $21 billion have been directed toward annual medical costs for heart failure rehospitalization among the older population (Dupre et al., 2017). Despite the myriad of clinical predictors that exist, it is still difficult to construct a risk model that will enable positive identification of those who are at a higher risk for readmission. The objective of this study was to identify risk factors that contribute to readmission post 30-day discharge of CHF patients, based on geographic location, to a rural and urban teaching hospital in New York. The influences of 30-day readmissions were analyzed with additional variables that could affect this status.

Chapter 2: Literature Review

Introduction

Heart failure is a major public health issue that affects over 5 million Americans annually (Jacobson, 2018). Additionally, African Americans are less likely to be treated or referred to a cardiologist than Caucasians are; African Americans' risk for heart failure and death is higher than any other race (Jacobson, 2018). My research aimed to identify the factors associated with high readmissions among African Americans compared to other races. My review of the existing literature revealed limited research identifying the relationship between geographic location, insurance status, race, and gender, and their effect on readmission in patients diagnosed with heart failure. Breathett et al. (2018) noted, after adjusting for rurality and age, that the Caucasian community is more likely than any other race to be admitted by a heart specialist ($p \leq .001$). The significant percentage of African Americans who lack access and insurance is high, and providers need to recognize the racial and ethnic disparities in care (Pina, 2018).

Several researchers have studied CHF and its effect on readmissions, mortality, and morbidity, and results of these studies were pertinent in answering the research questions presented. The studies reviewed covered factors that contributed to readmissions post 30-day discharge of patients diagnosed with CHF. My review of the studies helped me to identify the gap in research and justified the need for further research on the complexity of factors and how they correlate to increases in readmissions among minority populations.

The literature review in Chapter 2 comprised three sections: (a) theoretical foundation, (b) literature related to the method, (c) and how previous studies have been conducted with similar methodology. The remaining sections reviewed relevant literature relating to content, insurance status, race, gender, and proximity.

Literature Search Strategy

I conducted a systematic review of the literature using the ProQuest, PubMed, CINAHL, Ovid, and Medline databases. The articles I reviewed comprised of literature obtained between 2013 and 2018. I used the following keywords in the databases: *insurance status, heart failure, congestive heart failure, risk factors, readmission, gender, race, proximity, rural, urban*, and *socioeconomic status*.

Theoretical Foundation

The theoretical framework I used to analyze the relationship between social determinants and 30-day readmissions was the expanded chronic care model (ECCM). In this chapter, I will discuss the theoretical propositions for this theory and how it has been used in similar studies.

The ECCM used for this research was developed in 2003 as an extension of the chronic care model (CCM). The ECCM (see figure 1 below) integrates components of prevention and health promotion, which include social determinants of health, population health promotion, and improved community participation (Barr et al., 2003). The ECCM supports the role that individual and population health and social determinants influence the community. Including the ECCM in the treatment of chronic diseases bridges the gap

between health care and communities. This model can help expand the focus of better health outcomes for communities, individuals, and populations.

Gonzaga (2018) applied the ECCM to evaluate and implement a patient-centered educational program and to test its effectiveness. Gonzaga used a subacute setting to focus on self-care management, and the health determinants of self-care management were coordinated using the ECCM. In Gonzaga's study, a pretest and posttest was employed using an index tool called the *Self Care of Heart Failure*. Using descriptive statistics, Gonzaga analyzed pretest and posttest scores using the mean and difference. The results revealed a statistically significant increase in the pre- and post-survey mean scores directly relating to self-confidence, self-management, and self-care maintenance. Gonzaga found that the implementation of patient-centered education programs was directly responsible for enhancing self-care management, maintenance, and confidence among those diagnosed with heart failure.

Drouin, Walker, McNeil, Elliot, and Stolee (2015) aimed to use the ECCM to assess interventions in older populations. Out of 619 articles Drouin et al. reviewed, they found that only a quarter used the ECCM in public and population health strategies. Many published studies using ECCM interventions lacked detailed descriptions of interventions, which made it challenging to determine how the interventions corresponded with the ECCM framework (Drouin et al., 2015).

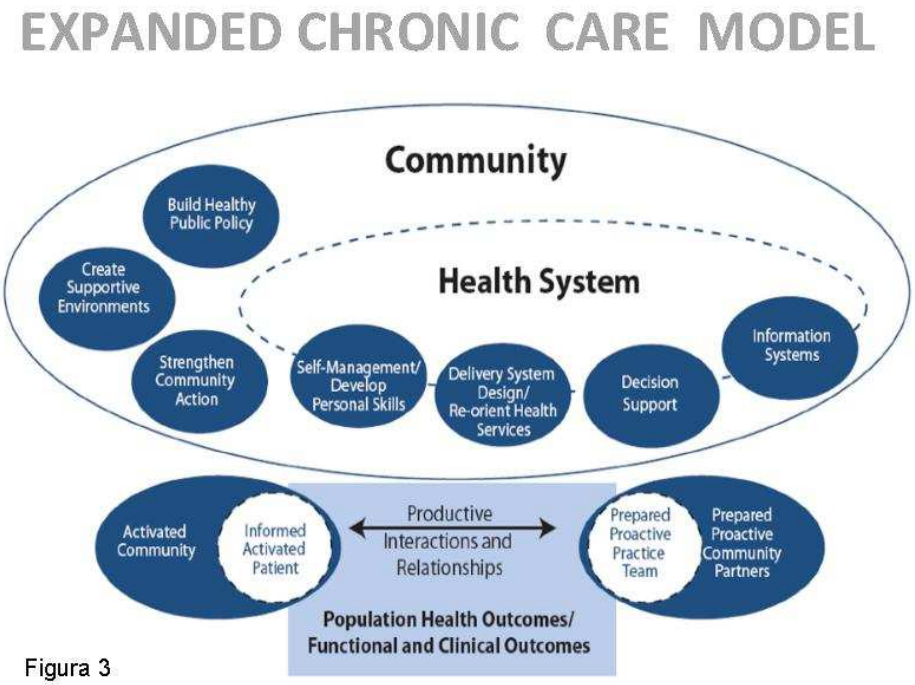

Figure 1. The expanded chronic care model. Adapted from "The Expanded Chronic Care Model: An Integration of Concepts and Strategies from Population Health Promotion and the Chronic Care Model" by V. J. Barr, S. Robinson, B. Marin-Link, L. Underhill, A. Dotts, D. Ravensdale, and S. Salivaras, 2003, *Hospital Quarterly*, *7*(1), 73–82.

Literature Related to the Method

The following studies address previous research undertaken which parallel the method of analysis used in this body of research. Ayatollahi et al. (2018) evaluated risk factors in older heart failure patients using multivariate logistic regression. They used chi-square and one-way analysis of variance (ANOVA) for continuous and categorical variables. Their study was conducted on hospitalized patients age 65 years and older from November 2013 to October 2014. Inclusion criteria were those patients admitted to intensive care or discharged with a primary diagnosis of heart failure. Ayatollah et al.

found increased age, non-Caucasian race, and home health care to be linked to early readmission and heart failure readmission rates.

Kheirbek et al. (2016) conducted a retrospective data analysis to study racial disparity among heart failure veterans at 130 Veterans Affairs centers. Of the 46,524 Caucasians and 14,124 African Americans, both Caucasians and African Americans had similar 30-day readmissions (Kheirbek et al., 2016).

Evans, Smith, Kobayashi, and Chang (2013) used a retrospective study design to examine community health centers and their role in decreasing rehospitalization. They calculated community health center density using geocoding and Haversine distance formula. Evans et al. conducted a retrospective analysis using data from the 2010 California Office of Statewide Health Planning and Development (OSHPD). Inclusion criteria for the study were inpatient hospitalizations in which payment was through self-pay or Medicare (Evans et al., 2013). Street addresses were obtained using OSHPD24 and FQHC Look Alike delivery site addresses from the Health Resources and Services Administration data warehouse. The researchers calculated hospital and community center addresses using geocoding services from Texas A&M University geography department (Evans et al., 2013). Logistic regression was used for insurance type, age, gender, race, county of residence, and comorbidity. The mean distance from the nearest community center was 2.14 miles. Bivariate analysis showed that hospitals with the greatest density had more minorities (75.27% vs. 50.51%, $p <. 001$). The rate of preventable hospitalizations among the uninsured was 8.71%. Those patients receiving Medicaid had a preventable hospitalization of 7.93%. Among those uninsured,

multivariate analysis showed that as community health increased, patients were less likely to be admitted (Evans et al., 2013). Using logistic regression, Evans et al. found positive correlations between race and gender. African Americans were more likely to be hospitalized for preventable reasons than Caucasians (OR = 1.714, 1.582 in those uninsured and Medicaid patients, $p < .001$). Female patients who were on Medicaid, were 15% less likely than male patients to have a preventable admission (OR = 0.85, $p < .001$). Uninsured women were 9% more likely to be admitted for preventable conditions than men (OR = 1.094, $p < .003$). Results of the study indicated that as health center density increased, preventable hospitalizations in Medicaid and uninsured patients decreased.

Flanagan, Rizzo, James, Spegman, and Barnawi (2018) conducted a retrospective review of patients discharged from a 180-bed skilled nursing facility to examine the individual determinants of health behaviors and its relationship. The 221 sample included patients 65 years and older from January to December 2014. The results of the logistic regression revealed that age and gender were not predictors of 30-day readmissions. The results of the analysis showed that patients with prior diagnoses of CHF were 2.5 times more likely to be readmitted than those without the diagnosis (Flanagan et al., 2018).

Navathe et al. (2018) evaluated the social factors associated with readmission rates among heart failure patients. They conducted an observational study of 49,319 patients from 2011 to 2013 using multivariable logistic regression. Data were obtained from electronic health records and claims information. Navathe et al. found that high readmissions were significantly associated with housing instability (24.5%, $p < .001$), depression (20.6%, $p < .001$), and reduced social support (20.0%, $p < .001$).

Anderson (2014) conducted a descriptive quantitative retrospective study using logistical regression to explore the characteristics of hospitalized patients with heart failure. Medical records of 134 individuals were reviewed for clinical data, history, and sociodemographic characteristics. Anderson's results indicated that age ($p = .001$), gender ($p = .003$) and race ($p = .004$) were significant factors of 30-day readmissions.

Basu, Hanchate, and Bierman (2018) used a logistics regression model to examine the variances in 30-day readmission among patients based on race and insurance coverage. They tested the association between race and insurance status and the probability of being readmitted within 30 days in Tennessee, Florida, California, Missouri, and New York (Basu et al., 2018). They found that African Americans had a higher incident rate of being readmitted 30 days post discharge compared to Caucasians. Those patients using Medicaid were considered higher risk along with those uninsured (Basu et al., 2018).

Golas et al. (2018) conducted a research study to develop a risk identification model for those diagnosed with heart failure. Longitudinal electronic health record data was were used to predict 30-day readmission among those patients diagnosed with heart failure. Data extracted from health records included demographics, utilization, and clinical data, and the risk reduction model was validated using logistic regression. Golas et al.'s electronic medical record for 30-day readmission rate among heart failure patients resulted in 76.4% accuracy for classifying risk factors. They used this model to identify impending hospitalizations, which could enable health care teams to target interventions (Golas et al., 2018).

A length of stay, acuity of admission, comorbidity index, and emergency department use (LACE) index model was developed by Yazdan-Ashoori, Lee, Ibrahim, and Van Spall (2016) to assess predictive 30-day outcomes among heart failure patients. They found that LACE scores and 30-day readmissions odds both increased, with most patients (91%) having LACE scores greater than 10 (*OR* = 1.13, 95% CI = 1.02–1.24). LACE index scores greater than or equal to 13 were a positive predictor for 30-day readmission rates (*OR* = 1.91, 95% CI = 1.17–3.09). Yazdan-Ashoori et al. found that bedside LACE index scores positively predicted 30-day clinical outcomes.

Shah et al. (2017) sought to determine the impact of weekend versus weekday care in patients diagnosed with heart failure. They studied admission with ICD-9 codes for heart failure using data from the Nationwide Inpatient Sample. To determine outcomes, Shah et al. used logistic regression and concluded that decreased admission rates and discharge occurred on the weekend and resulted in an increase in mortality (*OR* = 1.07, 95% CI = 1.05–1.08, $p < .010$). In addition to modifiable risk factors among African Americans, they found that Friday admission was associated with an increase in 30-day readmission rates (*OR* = 1.12, 95% CI = 1.01–1.23, $p = .020$) (Shah et al., 2017).

Sepulveda-Pacsi (2019) conducted a prospective cross-sectional quantitative study to determine confidence in discharge of stabilized heart failure patients at an urban community hospital in New York City. They conducted a self-reported questionnaire between March 2013 and March 2014. When controlling for clinical and socioeconomic variables, Hispanics admitted to an urban hospital were found to most likely be admitted to an emergency department compared to Caucasians. Sepulveda-Pacsi determined that

the cause of high readmissions among this population was due to poor medication compliance and patient education.

Patterson, Marken, Zhong, Simon, and Ketcherside (2014) compared Medicare fees for service among discharged heart failure patients from hospitals with fully implemented electronic health records and hospitals without. Through a retrospective cohort study, Patterson et al. determined an association between electronic health record implementation and readmissions. Equal readmission rates were found in patients discharged with implemented electronic health records (*OR* = 0.97, 95% CI = 0.73–1.3) (Patterson et al., 2014).

African Americans were found to have an increased risk of readmission according to Rathore, Foody, Wang, Smith, and Herring (2014). They conducted a retrospective analysis to determine racial differences in quality of care between African Americans and Caucasians. Among Medicare beneficiaries hospitalized for heart failure, African Americans (68.2%) had significantly higher readmission rates within 1 year of discharge compared to Caucasians (63.0%). Differences in readmission rates were attributed to diet, pharmacotherapy regimens, delay in seeking care, and poor quality follow up ($p < .001$) (Rathore et al., 2014).

Readmission rates were higher among African Americans compared to Caucasians (*OR* = 1.04, 95% CI = 1.03–1.06) according to Joynt, Orav, and Jha's (2015) quantitative study. They evaluated readmission rates for Medicare beneficiaries after hospitalization for heart failure from 2006 to 2008. Reduced quality in outpatient care was found among the elderly African American population (Joynt et al., 2015).

Chaudhry, Herrin, Phillips, Butler, and Mukerjhee (2016) conducted a retrospective cohort study of 82 African Americans and 316 Caucasian patients 50 years of age and older. African Americans were found significantly less likely to receive care from a cardiologist than any other race; additional factors included were income, age, and education (*OR* = 0.53, 95% CI = 0.35–0.80) (Chaudhry et al., 2016).

Evangelista, Dracup, and Doering (2014) conducted a retrospective chart review of heart failure patients (*n* = 753) at a Veterans Affairs medical center. Results indicated a delay in treatment for African Americans compared to Caucasians, Asians, and Hispanics (mean 3.2 days, 2.8, 2.9, and 2.8 days, *p* = .019). Additionally, African American patients were found to have higher readmission rates and lower functional status (*p* = .001) (Evangelista et al., 2014).

Literature Related to Content

Risk Factors

A subset of hospitals that voluntarily participated in the Get with the Guidelines-Heart Failure (GWTG-HF) national quality improvement program were included in Bergethon et al.'s (2016) study. Data obtained from the GWTG-HF registry and other health care data sources described 30-day readmission trends among heart failure patients. Approximately 21,264 patients were included in the study between January 2009 and October 2012. Patients were excluded if they were ineligible for Medicare at the time of discharge, they died in the hospital, or their discharge status was missing. Hospitals were excluded from submitting data if they had fewer than 10 patients admitted (Bergethon et al., 2016). Using the GWTG-HF registry, patient demographic

characteristics, medical history, and medical testing results, the study population was evaluated for the number of annual unplanned heart failure readmissions that occurred within 30 days. The researchers used the Fisher exact test to compare categorical variables as frequencies, and the Kruskal-Wallis test was used to compare continuous variables as means. Risk adjusted readmission rates were also calculated for 60-day readmissions. A sensitivity analysis was used to ensure the studied population had similar rates of relative change in readmissions nationwide (Bergethon et al., 2016). Hospital level factors associated with 30-day readmission improvements between 2009 and 2012 were determined using multivariable linear regression. Bergethon et al. found that the unadjusted 30-day readmission rates ranged from 0.0 to 45.5% in 2009 and 5.6 to 38.5% in 2012, with no significant improvement. There were no statistically significant changes in 30-day mortality rates between 2009 (7.8%) and 2012 (7.6%; $p = 0.71$) (Bergethon et al., 2016). The limitations of the study included both measured and unmeasured confounding variables. Only those hospitals that participated in the GWTG-HF program were included and the results could not be generalized to all hospitals.

Chamberlain, Sond, Mahendraraj, and Lau (2017) used a predictive scale to study readmission risks among patients with CHF, with data from the State Inpatient Database. This database contained discharge data files from 47 participating states, including California and New York (derivation cohort) and Florida and Washington (validation cohort), and the researchers used International Classification of Disease (ICD-9) codes. The demographic and clinical data included discharge location, noncardiac comorbidities, insurance payer, length of stay, age, gender, income, race, and CHF admission, using

multivariate, univariate, and chi-square tests and binary logistical regression. Statistical significance was determined with a *p* value of < 0.01 (Chamberlain et al., 2017). The Readmission Association Heart Failure scale was used to validate patients located in Washington and Florida. Many patients in the cohort were Caucasian; 62.4% in the derivation cohort, and 72.3% for those in the validation cohort. Those between the ages of 65 and 84 in the derivation cohort were 48.7%, and 50.8% in the validation cohort. African Americans had the highest readmission rate at 12.57% (Chamberlain et al., 2017). The validation cohort had a readmission rate of 9.17%, with African Americans having the highest readmission rate at 12.4%. Using multivariate analysis, Chamberlain et al. determined the following factors were associated with readmission rates: under 65 years (*OR* = 1.14, 95% CI = 1.11–1.18), other races (*OR* = 1.10, 95% CI = 1.07–1.12), male (*OR* = 1.13, 95% CI = 1.11–1.15), self-pay (*OR* = 1.14, 95% CI = 1.07–1.22), African American (*OR* = 1.34, 95% CI = 1.30–1.37), Medicare (*OR* = 1.33, 95% CI = 1.29–1.38), Medicaid (*OR* = 1.72, 95% CI = 1.65–1.78). They found higher CHF readmission rates among patients with the following factors: multiple comorbidities, aged under 65 years, African American, Medicare beneficiary, and lower income (Chamberlain et al., 2017).

Numerous researchers investigated sociodemographic and clinical factors and their effect on heart failure readmissions. Sherer, Crane, Able, and Efird (2016) reported only five models were able to predict risk of readmission out of 117 studies. To date, no predictive clinical model has been developed for CHF readmission. Although these studies have yielded evidence for readmission, understanding the clinical picture for CHF

remains lacking. Patients admitted between October 2007 and October 2009 were studied; two groups were used: (a) 125 patients who were readmitted and (b) 125 who were not (Sherer et al., 2016). The sociodemographic variables used in the study included age, sex, race, insurance type, time of admission, and referrals. They used a univariable analysis and *t* test to examine heart failure, variables associated, and the difference between those readmitted for heart failure. The variables they deemed significant were included in the multivariable model. The sample age ranged from 21 to 98 (mean age 69.9) with most of the sample being Caucasian (59%); standard deviation was 15 (Sherer et al., 2016). Medications and comorbidities were significant predictors of readmission, with those prescribed fewer than 12 medications more likely to be readmitted ($p = .037$). The likelihood of readmission was found to be 3.6 times more likely in patients with 3 to 4 comorbidities ($p = .001$). The most significant comorbidity was renal insufficiency (RR, 1.7; $p = .003$), and an increase in medications was found to increase the risk for readmission (Sherer et al., 2016). The researchers did not find gender, age, or race to be significant predictors of heart failure readmission rates.

Bradford, Shah, Shane, Wachi and Sahota (2016) used a retrospective analysis to study clinical characteristics associated with patients readmitted within 30 days. Using descriptive statistics and logistic regression, they developed a predictive model to determine 30-day readmission risk factors. Approximately 2,420 patients were included in the study cohort, and the mean age of the study cohort was 72. Among the studied population, 55% were Caucasian men, 91% were unemployed, and 68% were Medicare recipients. Of the 2,420 hospitalizations, there were 394 (16.3%) 30-day readmissions.

The final multivariate predictive models showed employment status (retired/disabled), more than one ER visit, and length of stay (> 5 days) were associated with an increased risk for 30-day readmission (Bradford et al., 2016).

Mirkin, Enomoto, Caputo, and Hollenbeak (2017) sought to identify readmission risk factors in patients diagnosed with CHF. Statewide discharge data were studied for patients living in Pennsylvania. They found that factors associated with readmission rates included male, African American, and those covered by Medicare with a prolonged length of stay ($p < .001$) (Mirkin et al., 2017).

Social Determinants of Health

Researchers have frequently found that social factors were linked and related to readmission risk. To better understand the impact that social factors have on hospital readmission rates, Nagasako, Reidhead, Waterman, and Dunagan (2013) conducted an exploratory analysis comparing risk standardized readmission rates using two types of models. The models used were the Socioeconomic Factor Enriched model and a baseline model used by the CDC. They studied hospital admissions for patients with a principal diagnosis of heart failure who were discharged between June 1, 2009, and May 31, 2012. Inclusion criteria for the study were patients 65 years and older discharged from a Missouri hospital. All-cause hospital readmission rates were compared based on age, race, sex, census-tract poverty rate, income, education, and employment, and they arrived at a cohort of 22,433 predominantly Caucasian patients (Nagasako et al., 2013). The unadjusted readmission rate was 19.3% for heart failure. Results indicated that race, income, and education were positive contributors to readmission rates. The inclusion of

these factors had significant effects on hospital performance and hospital readmission rates (Nagasako et al., 2013).

Villanueva and Aggarwal (2013) studied neighborhood poverty and the relationship between hospitalization readmission in those diagnosed with CHF. A total of 2,198 residents were studied using zip code data to quantify socioeconomic poverty. Odds ratio was used along with logistic regression to determine an association between the lowest (Q1) and highest (Q5) quintile of poverty and hospitalization (Villanueva & Aggarwal, 2013). Those listed in the Q5 quintile were more likely to be younger females without health insurance. Among those hospitalized with CHF, neighborhood's with higher poverty were associated with higher re-hospitalization (Villanueva & Aggarwal, 2013).

Meddings et al. (2016) assessed heart failure readmissions and social determinants of health. A retrospective study was performed using Medicare claims data. Multilevel logistic regression was used to assess social determinants and its significance to 30-day readmission rates. Non-Caucasian (African American) patients were found to be significant (*OR* = 1.17, 95% CI = 1.056–1.292; other: *OR* = 1.14, 95% CI = 1.036–1.26) (Meddings et al., 2016).

O'Lawrence, Martinez, and Solis (2017) discovered a statistically significant association among race and insurance status. Prevalence of CHF diagnosis was examined by using cross-tabulation of the independent and dependent variables. Chi-square test were used to analyze the independent variable and its significant association to the dependent variable (O'Lawrence et al., 2017). Disparities were found to exist in those

diagnosed with CHF when race and insurance status were associated. In addition, differences were revealed between privately, publicly and the uninsured (O'Lawrence et al., 2017).

Insurance Status

Aseltine, Yan, Gruss, Wagner, and Katz (2015) conducted a study using statewide databases to assess patients hospitalized for chest pain and heart failure. The purpose of the study was to determine disparities in race and insurance status in Connecticut residents. A logistic model for clustered data using generalized estimating equations was used (Aseltine et al., 2015). A total of 39,985 records were analyzed for patients admitted for chest pain and heart failure. Adults 18 years and older were included in the study who had an ICD code for chest pain or heart failure during fiscal years 2008 and 2012 (Aseltine et al., 2015). Results from the study indicated that African Americans had a higher readmission rate for chest pain than Caucasian patients post 30-day discharge (*OR* = 1.19, 95% CI = 1.04–1.37) and Hispanics (*OR* = 1.30, 95% CI = 1.15–1.47). Racial disparities were positively found in those insured by Medicaid with rates of 30-day readmission being significantly higher (Aseltine et al., 2015). These findings increase the need for further investigation into disparities in health care.

Trends analysis of 30-day readmission rates post discharged was assessed by Devore et al. (2016). Medicare claims were analyzed for patients discharged between 2006 and 2012 using hospital level regression models. The study sample included Medicare enrolled patients discharged due to heart failure, COPD, acute myocardial infarction diabetes and pneumonia greater than 65 years of age. A policy was adopted by

the Centers for Medicare and Medicaid Services (CMS) to improve readmission and patient outcomes. The source of data were administrative claims from Medicare beneficiaries from 2005 to 2012 (Devore et al., 2016). The study sample included Medicare enrolled patients greater than 65 years discharged for diabetes, COPD, acute MI, heart failure and pneumonia. Out of the 100,189 analyzed hospitalizations for heart failure, improvements were found in adjusted readmission rates (heart failure–1.8%) compared to MI (–2.3%) and pneumonia (–2.0%) (Devore et al., 2016).

Basu (2018) studied differences in readmission rates in patients based on race and insurance coverage. Hospital discharge data were used from New York, Florida, California, Tennessee, and Missouri. Findings concluded African Americans were at a higher risk of readmissions than Caucasians. Odds ratio stratified by insurance type indicated uninsured African Americans had an increased chance of readmission compared to those with private insurance (*OR* = 0.86), Medicaid (*OR* = 0.95) and other payer (*OR* = 0.93). All insurance types had p values < .050 (Basu, 2018).

Race

A retrospective cohort study was conducted on over 8,532 adults who were admitted to New York City hospitals for heart failure. Data were obtained from the SPARCS database and the New York Vital Statistics. The primary variable included the patient's race (Durstenfeld, Ogedebe, Katz, Park and Blecker, 2016). Patients who were American Indian/Alaska Native or other were excluded based on sample size. Of the 8,532 adults hospitalized, 4,305 (51%) were African American, 1,494 (18%) were

Caucasian and 284 (3%) Asian. Overall, African Americans had a higher readmission rate than Caucasians (*OR* = 1.21, 95% CI = 1.01–1.47) (Durstenfeld et al., 2016).

Sharma, Colvin-Adams and Yancy (2014), reviewed challenges that African Americans faced with heart failure management. According to the American Heart Association (2018), the prevalence of heart failure in Caucasians is less than African Americans. Furthermore, when African Americans are hospitalized for heart failure, their risk of death is greater than 45% (Sharma et al., 2014). The high incident of heart failure has been attributed to modifiable risk factors such as smoking, hypertension, obesity and diabetes. High rates of heart failure readmission rates have been implicated in African Americans more than any other racial group. Lower income was identified as being a major predictor (Sharma et al., 2014).

Eapen et al. (2015) studied the linkage between clinical data and patients diagnosed with heart failure, socioeconomic status and 30-day readmission. After adjusting for hospital and patient characteristics results of the study indicated median household, income, and race was associated with 30-day readmission (Eapen et al., 2015).

Ponce et al. (2015) compared readmission rates among different racial/ethnic groups. Data from the University of New Mexico Hospital were analyzed from 2010 to 2014 among those diagnosed with heart failure. The independent variables race, age, sex, level of poverty, education level, distance from hospital and the dependent variable, risk for 30-day readmission were analyzed using univariable and multivariable statistical analysis. The overall 30-day readmission rate was found to be 13.4% for Hispanics

(17.5%, $p > .000$) and non-Hispanics (9.6%, $p > .000$). The 30-day readmission rates for females regardless of race was 13.4% compared to males at 10.9% ($p = .001$). The use of multivariable analysis yielded 30-day readmission rates for Hispanic race being significantly associated with sex, poverty level and distance from hospital ($OR = 2.8$, 95% CI = 1.58–5.19; p > .001). Living furthest from the hospital was positively associated with lower readmission rates ($OR = 0.5$, 95% CI = 0.3–0.8, $p > .007$) (Ponce et al., 2015).

Gender

In their commentary by Dupre et al. (2017), a study was undertaken to examine racial/ethnic and gender differences in older adults diagnosed with heart failure. From 1998 to 2014, 3011 non-Hispanic Caucasian, Hispanic and non-Hispanic African American were followed. Results indicated no racial differences in men who were hospitalized. In women, there were significantly more hospitalizations in African American women than Caucasian women ($OR = 0.28$, 95% CI = 0.00–0.55, $p = .048$; Dupre et al., 2017).

Blecker, Paul, and Taskler (2013) noted the trends in hospitalization in heart failure patients. Using the Nationwide Inpatient Sample, trends were evaluated between 2001 and 2009. Results indicated most hospitalized patients were Caucasian women (55.9% in 2001 and 52.7% in 2007). Women were found to have higher hospitalizations due to higher age distributions (Blecker et al., 2013).

Several researchers (Islam, O'Connell, and Lakhan, 2018) investigated unplanned readmission rates and the factors associated with older adults diagnosed with CHF. A

multivariate logistic regression was used to identify readmission types and the risk factors associated. At the end of the study, males with comorbidities (95% CI = 1.03–1.46), low socioeconomic status and a length of stay 3 days or longer were at a significant risk for being readmitted 30 days of discharge (Islam et al., 2018).

Proximity

Heart failure beneficiaries living in a rural area were studied using a cross sectional design by Chen, Carlson, Popoola, and Suzuki (2016). The independent variables studied were metropolitan, remote rural and adjacent rural areas. The dependent variable studied were 30-day preventable readmission (Chen et al., 2016). Results of the study indicated a 33% probability of beneficiaries in rural areas having a high illness severity and a 27% lower preventable 30-day readmission rate (Chen et al., 2016).

In their study of 62,451 discharge records from 221 hospitals, Jia and Xierali (2015), examined demographics and socioeconomic factors associated with travel patterns of patients diagnosed with CHF. Discharge level data were used from the Agency for Healthcare Research and Quality's (AHRQ) state inpatient database. Confounding factors were adjusted to limit the effects on race, age, sex, patient location (small metropolitan < 1 million residents, large metropolitan > million residents and micropolitan), socioeconomic status and severity of illness. Multiple logistic and linear regression models were used to study travel patterns in relation to race, payer patient location and socioeconomic status (Jia & Xierali, 2015). Results of the study indicated that African Americans were more likely to seek hospitalization than Caucasians (*OR* = 1.24). Asians were more likely to be locally hospitalized than Caucasians. Variations in

travel patterns were found to be affected due to insurance coverage type and source of insurance payment. Patients living in large metropolitan areas sought hospitalization in their health coverage area and spent the shortest travel time. Rural patients spent 22.4% travel time than large metropolitan areas (Jia & Xierali, 2015).

A retrospective cohort study of heart failure patients was conducted from April 2004 to December 2013. McAlister, Youngson & Kaul (2017), compared patients readmitted within 30 days between two hospitals. The mean age of hospitalization was 76.8 years and 50.1% were male. Of the 217,039 admitted, (39,368, 18.1%) were readmitted to the original hospital within 30 days (32,771, 83.2%) and (6,597, 16.8) to a different hospital (young males living in a rural area) (McAlister et al., 2017).

Summary and Conclusions

Enclosed in Chapter 2 reviewed previous literature relating to the variables race, gender, geographic location, insurance status and its relation to 30-day readmissions. There is a lack of focused research to address multiple risk factors and its relation to 30-day readmissions in African Americans. The commonality among most studies are due to lack of access to care, poor health literacy and race, African Americans are at an increased risk to be readmitted within 30 days post discharge. Socioeconomic factors have been implicated as a contributing cause to high rates of hospital readmission in African American heart failure patients to include low income (Sharma, Colvin-Adams & Yancy, 2014). In addition, this chapter explored the ECCM which will serve as the framework for this research. This framework can be used to address health determinants and redirect efforts to better monitoring of chronic disease by including community

support. Chapter 3 will disclose the methodology used to explore the research questions. Additionally, the research method design, identified population, reliability, validity, archival data and method of analysis will be defined.

Chapter 3: Research Method

Introduction

Using this quantitative research, I sought to assess the differences in 30-day readmissions based on race, insurance status, and gender. Through further inquiry, I investigated if geographic location had an influence on heart failure readmissions among the population. For this study, the independent variables were race (African Americans, Caucasians, and others), insurance status (federal/state, private pay, and self-pay), gender (male or female), and geographic location (urban or rural). The dependent variable was 30-day readmission (yes or no). I used a quantitative research methodology for this study to describe the relationship between multiple variables using multivariate logistic regression. I selected two teaching hospitals for the study based on their urban and rural geographic location. Both are New York hospitals accredited by the Joint Commission. The collected data from (SPARCS) were used to assess the relationship of each variable and its significance to 30-day readmissions. The studied population were both men and women 30 years of age and older diagnosed with heart failure. I retrieved data from the SPARCS database and cleaned it before analyzing it with Statistical Package for Social Sciences (SPSS) software.

Research Design and Rationale

For this study, I used a quantitative method based on the secondary data I obtained using the SPARCS database. The independent variables were race, gender, geographic location (urban or rural), and insurance status, and the dependent variable was 30-day readmission rate. I used a quantitative design so that my research questions could

be answered by investigating the relationship the independent variables had with the outcome variable. The correlational design was useful because of the association between the variables studied.

Research Questions and Hypotheses

The following were the research questions for this study:

RQ1: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge?

RQ2: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural)?

RQ3: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender?

RQ4: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status?

RQ5: Are race, geographic location (urban vs. rural), insurance status, and gender independently related to being readmitted post 30-day discharge?

The following were the hypotheses for this study:

$H_0$1: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge.

H_A1: African Americans are at a higher risk than others for CHF readmission post 30-day discharge.

$H_0$2: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural).

H_A2: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural).

H_03: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender.

H_A3: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender.

H_04: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status.

H_A4: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status.

H_05: Race, geographic location (urban vs. rural), insurance status, and gender are not independently related to being readmitted post 30-day discharge.

H_A5: Race, geographic location (urban vs. rural), insurance status, and gender are independently related to being readmitted post 30-day discharge.

Methodology

Population and Sampling Procedures

I obtained the study population from the 2015 SPARCS data set, Hospital Inpatient Discharges (SPARCS De-Identified). The data set included secondary data on men and women 30 years of age and older with a principal diagnosis of CHF who were admitted to either a rural hospital in Manhattan, New York or an urban hospital in Albany, New York. The age groups were selected in the study due to CHF being present in 2% of those aged 40 to 59, and more than 5% of people aged 60 to 69 suffer from CHF

(Emory Health Care, 2018). Patients data in this study were stratified by gender, race, geographic location, and insurance status. I extracted the study's patient data from the SPARCS database, which had been deidentified. All data elements containing protected health information were redacted. G Power 3.1.9.2 was used to calculate the sample size; the minimal sample size needed to achieve a power of 0.80 with an odds ratio of 1.5 was 215; this sample size was needed to determine statistically significant differences. To increase power, precision, confidence and reduce bias, I included all 565 patients from the data set in the sample for this study.

Informed Consent and Confidentiality

The research data for this study did not require informed consent, and no inclusion of human subjects was involved in primary data collection. The SPARCS database contains files that have both identifiable and deidentified data. For this study, I obtained public deidentified data on patients previously admitted. Prior to data collection, I obtained IRB approval, and the IRB approval number for this study was 11-26-18-0482013.

According to Health and Human Services and FDA Regulations 45 CFR 46.111(a) (7) and 21 CFR 56.111(a) (7), the IRB shall determine the most appropriate means and establish provisions to protect the privacy of subjects. Respect for persons and beneficence are two principles that supports privacy and confidentiality. According to respect for persons, individuals should have the right to exercise autonomy and be treated as autonomous agents, including the right to private information remaining confidential. Beneficence dictates that participants' privacy and confidentiality should be maintained

to ensure no psychological effects occur (University of California Irvine.edu, 2018). To protect archival data, I housed patient data in a safe when not in use, and archival data were not transported outside of the primary research location.

Geographic Location

In this study, I analyzed deidentified data from patients admitted to a rural teaching hospital located in Manhattan, New York, and an urban teaching hospital located in Albany, New York. Manhattan was chosen for the study due to its high population density (1.66 million) and rural environment (United States Census Bureau, 2018). In comparison, the city of Albany was chosen because of its low population density (98,251) in an urban setting (United States Census Bureau, 2018).

The state of New York was the most appropriate geographic region to study due to the strict mandate under Section 400.18 of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of the state of New York. This regulation requires all Article 28 facilities to submit inpatient data (New York State Department of Health, 2016). A universal data set was released in April 1993, and streamlined electronic data were then processed and stored in the SPARCS database (New York State Department of Health, 2016).

Using data from the New York System Health Profile database, I was able to compare 30-day readmissions for both selected urban and rural teaching hospitals. According to the New York System Healthy Profile system, the rural hospital has an average of 21.50% 30-day readmissions compared to the urban hospital, which has a rate of 21.30% (New York State Department of Public Health, 2018).

Archival Data

Article 28 hospitals are required by Public Health Law, to submit data on outpatient services, ambulatory surgery, hospital inpatient stay, and emergency room visits. This data are then collected and stored in a database known as SPARCS. Researchers can gain access to these data sets by applying to the SPARCS Operations Branch if identifiable or limited access is required. I used the SPARCS database to obtain secondary data for this study. This database offers public (deidentified), identifiable, and limited data. Limited and identifiable data based on HIPAA standards require an application request (DOH-5132) that is reviewed by a data governance committee for approval or denial. The data collection instrument provided data on the independent variable's relationship to the dependent variable: 30-day readmission. I determined patients' geographic location in relation to a teaching hospital using zip codes provided by the SPARCS database. No historical or legal documents were required to use as sources of data.

Operationalization of Variables

For this study, the primary independent variable was race; controlling variables were gender, insurance status, and geographic location (urban vs. rural); and the dependent variable was 30-day readmission. I used the following operational definitions for each variable: gender (male = 1 or female = 2), race (African American = 1, Caucasian = 2, and other = 3), insurance status (public = 1, private = 2, and self-pay = 3), geographic location based on zip code (urban = 1 or rural = 2), and 30-day readmission (yes = 1 or no = 2).

Table 1

Independent and Dependent Variables Level of Measurement

Variable	Level of measurement
Independent	
Race (primary)	Nominal
Gender (covariate)	Nominal/dichotomous
Insurance status (covariate)	Nominal
Geographic location (covariate)	Nominal
Dependent	
30-day readmission	Nominal/dichotomous

Data Analysis Plan

The software I used for this research was SPSS version 24. I used simple and multivariate logistic regression to analyze the relationship between variables. When there was one dichotomous variable and several independent variables, I used multivariate logistic regression. The 2015 Hospital Inpatient Discharges (SPARCS De-Identified) data set I used came from the SPARCS database. For data cleansing, I exported data to Microsoft Excel and removed variables not relevant to the study. Then, I subsequently imported cleansed data into SPSS. The independent variables were labeled and measured on a nominal scale and the dependent variable on a binary scale. The independent variables identified as covariates were insurance type (federal/state, private, self-pay); gender (male or female); and geographic location based on zip code (urban or rural). The primary independent variable was race (African American, Caucasian, and other). I conducted descriptive statistics on each variable. For RQ1, I used a simple logistic

regression to test the relationship between the primary independent variable, race, and the dependent variable, 30-day readmission. For RQ2, I used a multivariate logistic regression to test the relationship between the independent variable race and the dependent variable 30-day readmission, while controlling for geographic location. For RQ3, I used a multivariate logistic regression to test the relationship between race and the dependent variable 30-day readmission, while controlling for gender. For RQ4, I used a multivariate logistic regression to test the relationship between race and 30-day readmission, while controlling for insurance status. For RQ5, I used a multivariate logistic regression that included all variables in the model. The hypotheses were determined based on the outcome of the analysis.

Validity

Validity refers to the credibility or the believability of research. Internal validity refers to the instrument or questionnaire procedures measuring what they are supposed to measure in research. External validity refers to the application of conclusions beyond the immediate study. A sample was used from patients who dwell near an urban and rural hospital. External validity from the study allowed researchers to make inferences with a larger portion of the population.

Reliability

The SPARCS database has been in existence since 1935 and established in statute since 1979. Inpatient and outpatient data are required to be submitted under Article 28 (Public Health Law). Health care facilities are required to submit data to an electronic database known as the Health Commerce System. Documentation must support data in the patients' medical and billing records. The enabling regulation that makes SPARCS data a reliable instrument is governed by "Section 2816 of the Public Health Law, Section 400.18 of Title 10 (Health of the Official Compilation of Codes, Rules, Regulations of the state of New York") (Quality and SPARCS Data, 2015). On September 30, 2014, new regulations were published to codify SPARCS data. New provisions of the regulation required health care facilities to submit monthly data on inpatient visits and outpatient discharges. Approximately 95% of all outpatient discharges and inpatient visits are required to be submitted within 60 days of a patients discharge or visit whereas 100% of patient discharges and inpatient visits are required to be submitted within 6 months of discharge. Data submitted to the SPARCS database are subject to auditing. Audits conducted that contain inaccuracies, are immediately reported to the reporting hospital. These agencies then have 90 days to correct deficiencies with reported data (Quality and SPARCS Data, 2015).

Summary

Chapter 3 contains the justification for the chosen research methodology. Preexisting data were used in this quantitative retrospective study using the data instrument SPARCS. The research questions and hypothesis were answered by data

obtained from the SPARCS database. Chapter 4 provided analysis and interpretation of the data analyzed. Data analysis was conducted on the variables race, gender, insurance status, geographic location (urban vs. rural) and how it related to an increase in readmissions. The results of the study outlined in Chapter 4 was collected, analyzed and interpreted in greater detail in Chapter 5.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to assess factors that contributed to increased readmissions for CHF among the African American population 30 or more days after hospital discharge; I sought to answer five research questions and to test associated hypotheses. The study compared the independent variables gender, race, and geographic location (urban vs. rural) and their relation to post 30-day readmission (dependent variable) in two teaching hospitals. I performed a simple and multivariate logistic regression to analyze the relationship between the independent and dependent variables based on the research questions presented. In Chapter 4, I present results of descriptive and inferential statistics and answer proposed research questions and hypotheses.

Research Questions and Hypotheses

The research questions and hypotheses directing this study were:

RQ1: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge?

$H_0$1: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge.

H_A1: African Americans are at a higher risk than others for CHF readmission post 30-day discharge.

RQ2: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural)?

$H_0$2: African Americans are not a higher risk that others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural).

H_A2: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural).

RQ3: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender?

$H_0$3: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender.

H_A3: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for gender.

RQ4: Are African Americans at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status?

$H_0$4: African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status.

H_A4: African Americans are at a higher risk than others for CHF readmission post 30-day discharge when controlling for insurance status.

RQ5: Are race, geographic location (urban vs. rural), insurance status, and gender independently related to being readmitted post 30-day discharge?

$H_0$5: Race, geographic location (urban vs. rural), insurance status, and gender are not independently related to being readmitted post 30-day discharge.

H_A5: Race, geographic location (urban vs. rural), insurance status, and gender are independently related to being readmitted post 30-day discharge.

Data Collection

I conducted a secondary data analysis using SPARCS data. The study population included heart failure patients admitted to two teaching hospitals between 2005 and 2009. The data set used in this quantitative study was 2015 Hospital Inpatient Discharges (SPARCS De-Identified). Of the 565 CHF patients admitted to either teaching hospitals, 215 patients were the minimum sample size given from G Power; in order to reduce bias and increase power, 565 patients were used from the data set. This data set contained 14 variables, five of which were used. In variable view, I defined and labeled the variable types and values. The variable values entered in data view included race (African American = 1, Caucasian = 2, and other = 3), insurance (federal/state = 1, private = 2, and self-pay = 3), gender (male = 1 or female = 2), geographic location (urban = 1 or rural = 2), and readmission (yes = 1 or no = 2). After all data were verified for accuracy in data view, I performed descriptive statistics using frequencies. The subsequent analyses used were simple and multivariate logistic regression analysis.

Results

Descriptive Statistics

Using SPSS version 24, I performed descriptive statistics on the variables age, race, gender, insurance type, geographic location, and readmission. Of the 565 participants, 57 were between the ages 30 and 49, 279 were 50–69, and 229 were 70 and older (see Table 2). Prior to analysis, I determined that age was not a significant factor in the study and therefore did not include it in the analysis results. For African Americans there were 157 participants, 27.8%, Caucasians had 207 participants, 36.6% and for other

races there were 201 participants, 35.6% (see Table 3). The frequency distribution for gender in Table 4 also indicated that more men (n = 368, 65.1%) participated in the study than women (n = 197, 34.9%). There were 522 (92.4%) participants who used federal/state insurance, 29 (5.1%) who used private insurance, and 14 (2.5%) who used self-pay (see Table 5). Based on frequency distribution for geographic location, in Table 6, 323 (57.2%) participants were admitted to an urban hospital and 242 (42.8%) were admitted to a rural hospital. According to the frequency distribution for readmission in Table 7, 235 participants were readmitted within 30 days of discharge and 330 participants were found to not have been readmitted.

Table 2

Frequency Distribution of Age

	f	%	Valid %	Cumulative %
30–49	57	10.1	10.1	10.1
50–60	279	49.4	49.4	58.1
70 and older	229	40.5	40.5	100.0
Total	565	100.00	100.00	

Table 3

Frequency Distribution of Race

	f	%	Valid %	Cumulative %
African American	157	27.8	27.8	27.8
Caucasian	207	36.6	36.6	64.4
Other	201	35.6	35.6	100.0
Total	565	100.0	100.0	

Table 4

Frequency Distribution of Gender

	f	%	Valid %	Cumulative %
Male	368	65.1	65.1	65.1
Female	197	34.9	34.9	100.0
Total	565	100.0	100.0	

Table 5

Frequency Distribution of Insurance Type

	f	%	Valid %	Cumulative %
Federal/state	522	92.4	92.4	92.4
Private	29	5.1	5.1	97.5
Self-pay	14	2.5	2.5	100.0
Total	565	100.00	100.00	

Table 6

Frequency Distribution of Geographic Location

	f	%	Valid %	Cumulative %
Urban	323	57.2	57.2	57.2
Rural	242	42.8	42.8	100.00
Total	565	100.0	100.0	

Table 7

Frequency Distribution of Readmission

	f	%	Valid %	Cumulative %
Yes	235	41.6	41.6	41.6
No	330	58.4	58.4	100.00
Total	565	100.0	100.0	

Inferential Statistics and Results

RQ1. Are African Americans at a higher risk than others for heart failure readmission post 30-day discharge?

The crosstabulation performed in Table 8 revealed that 58.6% (n = 92) of African Americans, 36.2% (n = 75) of Caucasians, and 35.8% (n = 68) of other races were readmitted within 30 days of admission. A simple logistic regression (Table 9) was performed and revealed significance for African American and 30-day readmission (B = –1.018, SE = .220, Wald = 21.387, df = 1, OR = 1.69, 95% CI = 1.45–1.82, p = .000). Regarding the odds ratio for the significant predictors, African Americans were 1.7 times likely to be readmitted than other races. In Table 10, I performed a simple logistic regression to adjust for other racial groups, and the odds ratio for the significant predictors showed that African Americans were 1.3 times likely to be readmitted than Caucasians (B = 1.820, SE = .273, Wald = 10.583, df = 1, OR = 1.25, 95% CI = 1.19–1.67, p = .000). Based on the results, the null hypothesis that African Americans are not at a higher risk than others for heart failure readmission post 30-day discharge is rejected.

Table 8

Race and Readmission Crosstabulation

	Readmission yes	Readmission no	Total
African American	92	65	157
	58.6%	41.4%	100%
Caucasian	75	132	207
	36.2%	63.8%	100%
Other	68	133	201
	33.8%	66.2%	100%
Total	235	330	565
	41.6%	58.4%	100.0%

Table 9

Simple Logistic Regression for Race and Readmission, Step 1

	b	*SE*	Wald	*df*	Sig.	*OR*	CI
Other			25.349	2	.000		
African American	–1.018	.220	21.387	1	.000	1.69	1.45-1.82
Caucasian	–.106	.208	.258	1	.611	.900	.863-1.24
Constant	.671	.149	20.249	1	.000	1.956	

Note: Variable(s) entered on Step 1 were race (African American, Caucasian, and other).

Table 10

Simple Logistic Regression for Adjusted Race and Readmission, Step 1

	b	*SE*	Wald	*df*	Sig.	*OR*	CI
Caucasian			12.801	2	.000		
African American	1.820	.273	10.583	1	.000	1.25	1.19–1.67
Other	1.025	.369	.414	1	.765	.768	.687–1.48
Constant	.587	.189	25.628	1	.000	3.587	

Note: Variable(s) entered on Step 1 were race (African American, Caucasian, and other).

RQ2: Are African Americans at a higher risk than others for readmission post 30-day discharge when controlling for geographic location (urban vs. rural)?

African American participants accounted for 53.3% (n = 49) of those readmitted after 30 days post discharge at an urban hospital, Caucasian patients accounted for 21.3% (n = 16), and other races accounted for 92.6% (n = 63; Table 11). At a rural hospital, African American patients accounted for 46.7% (n = 43), Caucasian patients accounted for 78.7% (n = 59), and other 7.4% (n = 5) readmitted within 30 days post discharge. Caucasian patients were found to have the highest readmission percentage at 78.7% of the admitted population to a rural hospital. Overall, other races (92.6%) at an urban hospital had the highest number of readmissions versus Caucasians. At an urban hospital, African American patients were more likely to be readmitted than Caucasian patients, and other racial categories of patients were more likely to be readmitted than any other races.

To address RQ2 and answer the applicable hypotheses, I performed a multivariate logistic regression analysis. The results of the multivariate logistic regression revealed a

significant relationship with African American and 30-day readmission when geographic location was entered in the model (B = –.902, SE = .228, Wald = 15.618, *df* = 1, *OR* = 1.59, 95% CI = 1.38–2.03, *p* = .002) (See Table 12). The odds of African Americans being readmitted was 1.6 times higher than other races. Being Caucasian was found not to be significant with readmission when the geographic location was entered in the model. Additionally, being readmitted to an urban hospital was 1.6 times more likely than a rural hospital. Based on the results, the null hypothesis that African Americans are not at a higher risk than others for CHF readmission post 30-day discharge when controlling for geographic location (urban vs. rural) is rejected.

Table 11

Race, Geographic Location, and Readmission Crosstabulation

Readmission = Yes	Urban	Rural	Total
African American	49	43	92
	53.3%	46.7%	100%
Caucasian	16	59	75
	21.3%	78.7%	100%
Other	63	5	68
	92.6%	7.4%	100%
Total	128	107	235
	54.5%	45.5%	100%

Table 12

Multivariate Logistic Regression for Race, Geographic Location, and Readmission, Step 1

	b	*SE*	Wald	*df*	Sig.	*OR*	CI
Other			.27.468	2	.000		
African American	–.902	.228	15.618	1	.002	1.59	1.38–2.03
Caucasian	.236	.285	.854	1	.356	1.30	1.28–1.62
Urban	.469	.245	3.659	1	.046	1.59	1.33–1.66
Constant	.236	.271	.758	1	.384	1.26	

Note: Variable(s) entered on Step 1 were race (African American, Caucasian, and other) and geographic location (urban vs. rural).

RQ3: Are African Americans at a higher risk than others for heart failure readmission post 30-day discharge when controlling for gender?

I conducted a cross-tabulation revealing that 69.6% (n = 64) of African American men, 30.4% (n = 28) of African American women, 61.3% (n = 46) of Caucasian men, 38.7% (n = 29) of Caucasian women, 69.1% (n = 47) of men from other races, and 30.9% (n = 21) of women from other races were readmitted (Table 13). More Caucasian women were readmitted than African Americans and other races. On the other hand, more African American men were readmitted than Caucasian men or men from other races.

To address RQ3 and answer the applicable hypotheses, I performed a multivariate logistic regression and included gender in the model. Based on the multivariate logistic regression results, listed in Table 14, African American was significant for being readmitted post 30-day discharge when gender was entered in the model (B = –1.021,

SE = .220, Wald = 21.464, *df* = 1, *OR* = 2.36, 95% CI = 1.61–6.52, *p* = .000). The odds of an African American being readmitted was 2.4 times higher compared to other races. Gender alone was not significant to being readmitted post 30-day discharge, however, when gender was added to the model, both African Americans (*p* = .000) and other races (*p* = .000) were significantly associated with being readmitted post 30-day discharge. Based on the results, the null hypotheses is rejected that African Americans are not at a higher risk than others for HF readmission post 30-day discharge when controlling for gender.

Table 13

Race, Gender and Readmission Crosstabulation

Readmission = Yes	Male	Female	Total
African American	64	28	92
	69.6%	30.4%	100%
Caucasian	46	29	75
	61.3%	38.7%	100%
Other	47	21	68
	69.1%	30.9%	100%
Total	157	78	235
	68.8%	33.2%	100%

Table 14

Multivariate Logistic Regression for Race, Gender, and Readmission, Step 1

Variable	b	*SE*	Wald	*df*	Sig.	*OR*	CI
Male	.100	.185	.292	1	.589	1.10	0.98–1.25
Female	.235	.126	.364	1	.457	.598	.488–.962
Other			25.149	2	.000		
African American	–1.021	.220	21.464	1	.000	2.36	1.61–6.52
Caucasian	–.119	.209	.324	1	.569	.888	.356–1.54
Constant	.542	.281	3.707	1	.054	1.71	

Note: Variable(s) entered on Step 1 were gender (male or female) and race (African American, Caucasian, and other).

RQ4: Are African Americans at a higher risk than others for HF readmission post 30-day discharge when controlling for insurance status?

A crosstabulation was conducted and revealed in Table 15 that of 92 African American patients readmitted post 30-day discharge, 85.9% (n = 79) used federal and or state insurance as coverage, 8.7% (n = 8) used private insurance and 5.4% (n = 5) self-paid. Of 75 Caucasian patients readmitted, 93.3% (n = 70) used federal and or state insurance, 5.3% (n = 4) used private insurance and 1.3% (n = 1) self-paid. Out of 68 other races readmitted, 97.1% (n = 66) used federal and or state insurance, 1.5% (n = 1) used private insurance and 1.5% (n = 1) self-paid.

For RQ4, a multivariate logistic regression analysis was performed to answer the associated hypotheses. Results of the analysis (Table 16) indicated there was no significance found with 30-day readmission and being African American when insurance status was included in the model (B = –.284, SE = .374, Wald = .578, df = 1, OR = .752,

95% CI = .686–1.59, p = .447). The findings did indicate an association with being Caucasian, 30-day readmission when insurance status was entered in the model (B = –.788, SE = .352, Wald = 5.001, df = 1, OR = .455, 95% CI = .449–2.85, p = .025). The odds ratio revealed that Caucasians were .455 times likely to be readmitted compared to other races. Based on results of the analysis, the null hypotheses can be retained that African Americans are not at a higher risk than others for HF readmission post 30-day discharge when controlling for insurance status.

Table 15

Race, Insurance and Readmission Crosstabulation

Readmission = yes	State/federal insurance	Private insurance	Self-pay	Total
African American	79	8	5	92
	85.9%	8.7%	5.4%	100%
Caucasian	70	4	1	75
	93.3%	5.3%	1.3%	100%
Other	66	1	1	68
	97.1%	1.5%	1.5%	100%
Total	215	13	7	235
	91.5%	5.5%	3.0%	100%

Table 16

Multivariate Logistic Regression for Race, Insurance, and Readmission, Step 1

	b	*SE*	Wald	*df*	Sig.	*OR*	CI
Federal/state insurance	–2.72	.486	.314	1	.575	.762	.526–.850
Other	~Z8		5.179	2	.075		
African American	–.284	.374	.578	1	.447	.752	.686–1.59
Caucasian	–.788	.352	5.001	1	.025	.455	.449–2.85
Constant	–.037	.574	.004	1	.949	.964	

Note: Variable(s) entered on Step 1 were insurance type (federal/state), race (African American, Caucasian, and other).

RQ5**:** Are race, geographic location (urban vs. rural), insurance status and gender independently related to being readmitted post 30-day discharge?

To answer RQ5, a multivariate logistic regression was performed and revealed that being geographically located in an urban environment and being African American was statistically significant ($p = .043$, $p = .000$; Table 17). After all variables were placed in the model, results revealed the following variables were found not to be significant: race (Caucasian, $p = .353$), insurance type (federal and or state insurance, $p = .648$), (private insurance, $p = .745$) and gender (male, $p = .468$). The odds ratio indicated that African Americans were 2.4 times likely to be readmitted than other races and being in an urban area was .605 times likely to result in readmittance than being in a rural area. Based on results of the multivariable logistic regression model, I rejected the null hypotheses that race, geographic location (urban vs. rural), insurance status and gender are not independently related to being readmitted post 30-day discharge. This was based on two out of four independent variables being significant which were race and

geographic location (urban). The other independent variables were found to be insignificant when placed into the model.

Table 17

Multivariable Logistic Regression for Predictor/Covariate Variables

Readmission = yes	*b*	*SE*	Wald	*df*	Sig.	*OR*	CI
Intercept	.053	.650	.007	1	.935		
African American	.892	.230	15.112	1	.000	2.44	1.55–3.82
Caucasian	.266	.286	.863	1	.353	.767	.438–1.34
Other	0[b]			0			
Urban	.502	.249	4.084	1	.043	.605	.372–.985
Rural	0[b]						
Male	.137	.188	.526	1	.468	1.14	.793–1.65
Female	0[b]						
Federal/state	.258	.566	.209	1	.648	.772	.255–2.34
Private	.220	.679	.105	1	.745	.802	.212–9.03
Self-pay	0[b]						

Note: b=this parameter is set to zero because it is redundant.

Summary

In Chapter 4, a quantitative analysis was used to determine whether it predicted the value of independent variables and their relationship to the dependent variable 30-day readmission. There is no known research study that has analyzed multiple demographic/socioeconomic variables to include but not limited to insurance status, geographic location, gender and race in a single body of research. The chapter included a description of the data set, identified demographics and a discussion of the secondary data source. $H_0 1$ was rejected because being African American was found to be

associated with a 30-day readmission post discharge. $H_0$2 was rejected due to a significant association with being African American and 30-day readmission when geographic location (urban vs. rural) was included in the model. $H_0$3 was rejected because findings revealed that African Americans are at an increased risk of being readmitted post 30-day discharge when gender was added to the model. $H_0$4 was retained due to no association found with being an African American, 30-day readmission and the inclusion of insurance type. When combining all four independent variables into one model, geographic location (urban) and race (African Americans) were found to be independent predictors of readmission post 30-day discharge. For this reason, $H_0$5 was rejected. The chapter reported the results and applied them to the applicable hypotheses and research questions. Chapter 5 provides an in-depth analysis of the research study findings from Chapter 4, in addition to limitations, recommendations, implications and conclusions.

Chapter 5: Discussion, Conclusions and Recommendations

Introduction

Congestive heart failure (CHF) is a major public health issue and its prevalence has steadily increased over the past decade (CDC, 2019). Researchers have analyzed single factors that are widely known to precipitate CHF but never multiple factors. Race, marital status, and income are a few variables that have been identified as risk factors for CHF readmission (Damiani et al., 2015). The increase in those affected by chronic diseases has led to higher readmissions. Disparities in health place a tremendous burden on society and the health care community. Although the overall population's health has improved greatly in the United States, all segments of the population have not benefited at the same rate. The combination of improved access to health care, increased health literacy and awareness, better living standards, advancement in medicine, and increased knowledge of health risk have attributed to improvements in overall population health. Disparities among population subgroups have been well documented by several researchers independent of age, race, socioeconomic status, geographic location, and gender. There has been great effort at the national level to address, eliminate, and reduce health disparities among racial/ethnic minorities, particularly African Americans. Geographic disparities have been found to be a significant factor in death and illness among racial/ethnic groups according to recent studies. Contrary to individual measures of socioeconomic status, measures of socioeconomic conditions in local areas typically reflect the ability for local political and social economic structures to support a high quality of life. Identifying underlying factors and root causes that give rise to conditions

that impede medical, social, and behavioral interventions is important to improve health at the local level. How multiple measures interact could reveal the relationship between health outcomes and socioeconomic conditions.

The purpose of the study was to examine the primary variable race and how this variable relates to 30-day readmission post discharge when controlled with geographic location (urban vs. rural), gender, and insurance. In this study, I examined participants admitted to two teaching hospitals, due to their distinct locations (urban and rural, respectively) in New York. The study included 565 patients, and I performed a thorough analysis of demographic/socioeconomic variables and their possible contribution to 30-day readmission based on locality. I investigated five research questions and hypotheses, and I performed a simple logistic regression for one research question and multivariate logistic regression for four research questions. For RQ1, I found a significant relationship to exist between African American patients and 30-day readmission. For RQ2, I found significance between being African American, urban location, and 30-day readmission. I also found an association indicating other minorities admitted to an urban hospital had a higher percentage of readmissions than Caucasian patients did. The rural hospital had a higher percentage of Caucasian patient readmissions than either African American patients or patients of other races. For RQ3, I found significance with African American patients and 30-day readmission when gender was added to the model. For RQ4, I found no significance with African American patients and 30-day readmission when insurance status was included in the model. Based on RQ5, only two independent variables were significant. The outcome of the analysis revealed that geographic location (urban) and

race (African American) were significant variables that had an association with post 30-day readmission.

Findings and Interpretation of the Results

The first key finding I found was an association with African Americans and 30-day readmission. Additionally, being African American and living in an urban geographic location were significantly associated with 30-day readmission. African American patients had a higher risk of being readmitted than Caucasian patients did, but patients of other races had a higher risk of readmission overall. The finding is consistent with Sharma et al. (2014), who suggested that African American patients had higher 30-day readmission rates due to lower income and poor living conditions. In the study conducted by Nagasako et al. (2013), the variables race, education and income were contributing factors to readmission rates.

Readmissions were found to be higher among African Americans than Caucasians according to Durstenfield et al.'s (2016) retrospective study on 8,532 adults admitted to New York City hospitals for heart failure. They found that more African American patients (n = 4,305; 51%) were admitted than Caucasian patients (n = 284; 3%). In this study as well, more African American patients were readmitted to an urban hospital (n = 17; 43.6%) than Caucasian patients (n = 12; 17.1%), but patients of other races were found to have a higher readmission than any other racial category (n = 31; 86.1%). Nonetheless, at a rural hospital, Caucasian patients had higher readmissions than either African American patients (n = 22, 56.4%) and patients of other races (n = 5, 13.9%). These findings are consistent with African Americans (n = 49, 53.3%) and other races (n

= 63, 92.6%) being more prevalent in an urban environment than Caucasians (n = 16, 21.3%), and Caucasians (*n* = 59, 78.7 %) being more prevalent in a rural environment than African Americans (*n* = 43, 46.7%) and other races (*n* = 5, 7.4%).

The second key finding was that African Americans (*n* = 79, 85.9%), Caucasians (*n* = 70, 93.3%), and other races (*n* = 66, 97.1%) received federal/state insurance more than any other insurance type. I found no significance associated with race, insurance type, and 30-day readmissions, which does not support the study conducted by Aseltine, Yan, Gruss, Wagner, and Katz (2015). They conducted research to assess the disparities in race and insurance status among Connecticut residents and found racial disparities in those receiving Medicaid (federal/state insurance) and readmitted within 30 days. Additionally, Basu (2018) found that African Americans were at a higher risk of readmission compared to those with private insurance and any other payer.

For the third key finding, gender and being African American were found to be predictors for being readmitted within 30 days when entered in the multivariate logistic regression model. Independently, I did not find gender to be a significant predictor for 30-day readmission. Out of the 33 women admitted to an urban hospital and 46 women admitted to a rural hospital, other races (*n* = 20; 60.6%) had a higher percentage of being admitted to a rural hospital than African Americans (*n* = 8; 24.2%) and Caucasians (*n* = 34; 73.9%). At the urban hospital, Caucasians had a higher percentage of admission than African Americans (*n* = 9; 19.6%) or other races (*n* = 3; 6.5%). These findings parallel research by Dupre et al. (2017), who discovered that among women, there were significant hospitalizations for African Americans more so than Caucasian women.

Blecker, Paul, and Taskler (2013) noted that Caucasian women were found to have higher hospitalizations due to age.

I performed a multivariate logistic regression using one primary predictor variable—race (African American = 1, Caucasian = 2, and other = 3)—three confounding variables—gender (male = 1, female = 2), insurance status (state/federal = 1, private = 2, and self-pay = 3), geographic location (urban = 1, rural = 2)—and the outcome variable, 30-day readmission. Those patients admitted to an urban hospital were found to be a significant predictor of being readmitted within 30 days. This finding was inconsistent with the retrospective study conducted by McAlister, Youngson, and Kaul (2017). They found that young men living in a rural area were at a significant risk of being readmitted within 30 days. Additionally, Jia and Xierali (2015) examined demographics and socioeconomic factors associated with travel patterns relating to race, payer status, and socioeconomic status. African Americans were found to seek hospitalization more than Caucasians, and Asians were more likely to be locally hospitalized than Caucasians were. Those living in metropolitan areas were hospitalized more than those living in a rural area.

The theoretical framework I used for this study was the expanded chronic care model (ECCM). The expanded chronic care model has been used in previous research to develop comprehensive strategies to manage chronic diseases. Initiatives to improve CHF management among the population should include incorporating the ECCM into the health system. The model integrates the necessary elements for early detection and treatment of CHF. The second recommendation is to promote the integration of a

comprehensive care model, such as the ECCM, in the health system at the primary care level. Published evidence demonstrated that applying the ECCM in primary settings is effective in managing heart failure and it might result in positive health outcomes for patients (Ellefson, Dipnarine, & Stopka, 2013). Further investigations should focus on evaluating the implementation of the ECCM and its effect in comprehensive health care for diagnoses and prevention of heart failure. Additionally, once heart failure symptoms are detected, the ECCM supports the use of collaborative care to improve outcomes. Collaborative care should include the use of multidisciplinary professionals to reach expected health outcomes in patients with this comorbidity.

Limitations of the Study

There were several limitations of the study. Only two hospitals were included in the study, which only allowed exploration of data from a small geographic footprint. Future research should study a larger geographic area that encompasses a higher number of hospitals and people. Upon receipt of data, it immediately became apparent to me which demographic was more prevalent at each hospital locality. The rural teaching hospital had higher admissions by Caucasians than any other racial group. On the other hand, the urban teaching hospital had more other races admitted for CHF than any other race. Furthermore, in this study, I was not able to consider if patients were readmitted to any other institution besides the initial treatment facility.

Recommendations

In the study, I examined two geographically dispersed teaching hospitals in New York, with varying population densities. In the study results, I found significant

differences in 30-day readmissions between the two hospitals based on geographic location and race. Contrarily, I found evidence that independently, and when included in the overall model, gender and insurance status do not influence readmissions; most races use federal and/or state insurance and are male. As discussed in Chapter 2, I confirmed the need for further inquiry and found a gap in evidence-based research as to how patient demographics in relation to geographic location to health care services may affect 30-day readmissions. Additional research is needed to unravel the disparities in health care and unify treatment opportunities for those patients identified as being underserved.

Implications

The results of the current study support Chen, Carlson, Popoola, and Suzuki (2016). Although there was no statistically significant difference in insurance status, I did find differences in 30-day readmission status based on race and locality at both hospitals. The rural hospital had a higher percentage of heart failure readmissions in patients of other races, whereas the urban hospital had a higher percentage of heart failure readmissions for Caucasian patients. Based on the results of this study, geographic location may be significant to support that patients living in urban localities may be more vulnerable. The social change implications for this quantitative study include the individual, family, organizational, and societal level. According to my review of the literature, this was the first study using demographic and socioeconomic variables to test its association with being readmitted within 30 days. My findings could be useful to create and improve programs and policies that focus on the needs and demographics of those patients age 50 and older. With a steady decrease in the elderly living with family

members, there is a need for more social and health services in local communities (Kaplan & Berkman, 2018). Of the 565 patients included in the study, 522 patients used federal and or state insurance. Currently, Medicare is an entitlement program, and it is not comprehensive. Medicare is a federal health care program for people age 65 and older. Medigap is a comprehensive Medicare supplement that can fill the gap between what Medicare pays and what patients pay out of pocket. Comprehensive Medigap coverage pays the deductible and any coinsurance amount (Senior Corps, 2018). Hospitals that accept this supplemental insurance should file claims against this supplement in order to cover additional expenses associated with inpatient and outpatient care, medical supplies, medical preventive services, and prescription drugs.

Positive social changes in the implementation and improvement of public policy may be challenging. However, creating and improving programs and policies is essential to meet the needs of elderly citizens. Positive social change is necessary at all levels of society but most important at the individual, community, family, organizational, and political level, so that partnerships can be formed to find solutions to this growing health epidemic.

Conclusions

Future studies are needed that focus on demographics and socioeconomic factors associated with readmission for patients with CHF. Further research into the relationship between education, income, and social support is needed due to insufficient studies existing to address those issues. Understanding is needed regarding the elderly patient population and how risk for readmission may correlate with other socioeconomic factors.

Furthermore, a model is needed that will measure and identify specific indicators that give rise to socioeconomic disparities. Future studies will aid in identifying plans, policies, and procedures that will further develop interventions by creating multifaceted health care teams, disease management programs, and social support networks for people with CHF with specific socioeconomic conditions from specific population groups, in particular African Americans.

In Chapter 5, I synthesized results based on this study's research questions and hypotheses. I highlighted the need for further research, the implications for positive social change, and how important this change is at the individual, family, and societal level. I believe my study will open opportunities for additional research on disparities and how they relate to heart failure outcomes. The study of these disparities must be investigated scientifically and be hypotheses-driven. Better strategies are warranted to reveal factors that are hidden and unrecognized in the built environment for African Americans.

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