2020

Impact of Medicare Utilization on Mortality and Readmission Rates of Heart Failure Patients 65 Years and Over

Joanna Alexander
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Joanna Alexander

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Cynthia Newell, Committee Chairperson, Health Sciences Faculty
Dr. Kourtney Nieves, Committee Member, Health Sciences Faculty
Dr. Ronald Hudak, University Reviewer, Health Sciences Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Impact of Medicare Utilization on Mortality and Readmission Rates of Heart Failure Patients 65 Years and Over

by

Joanna Alexander

MBA, Keller Graduate School of Management, 2016

BS, University of South Alabama, 2012

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

Walden University

November 2020

Abstract

Roughly 25% of individuals 65 years and over hospitalized with heart failure are readmitted within 30 days after discharge. Elderly individuals identified with heart failure possess a 5-year mortality approaching 50%. The purpose of this study was to determine if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for beneficiaries 65 years and over with heart failure. To address this topic, the chosen approach was retrospective and quantitative. The theoretical foundation was the Chronic Care Model. The research questions sought to determine if there is a relationship between the Medicare-covered services for care and mortality rates of patients 65 years and over with heart failure, and whether there is a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure. The study involved Hospital Compare data from CMS for Medicare patients 65 years and over who were seen in hospitals within the United States and diagnosed with heart failure from 2015 to 2017. Quantitative analyses were conducted through correlational and multiple regression analysis. Findings indicated statistically significant relationships of utilization of Medicare and mortality for 2015, 2016, and 2017 and statistically significant relationships of utilization of Medicare and readmission rates of individuals 65 years and over with heart failure in 2015 and 2016. It can be concluded that covariates and a focus on the impact of socioeconomic variables on Medicare beneficiaries 65 years and over with heart failure should be included for future research. Findings may be used by hospital administrators to create social change by understanding Medicare use and the needs of older adults.

Impact of Medicare Utilization on Mortality and Readmission Rates of Heart Failure Patients 65 Years and Over

by

Joanna Alexander

MBA, Keller Graduate School of Management, 2016

BS, University of South Alabama, 2012

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

Walden University

November 2020

Acknowledgments

I would like to express my heartfelt appreciation to my family. My husband, parents, and brothers were there to encourage me all the way. They also went above and beyond to take care of our daughter so that I would be able to efficiently conduct research and analysis. The completion of my dissertation would not have been possible without their constant love and unwavering support.

I would also like to extend my sincere gratitude to my committee. Dr. Carmen McDonald, my previous chair, guided me and offered valuable advice throughout the dissertation journey. Dr. Cynthia Newell, Dr. Kourtney Nieves, and Dr. Ronald Hudak provided insightful feedback which pushed me to sharpen my thinking and brought my work to a higher level.

Table of Contents

List of Tables

Section 1: Foundation of the Study and Literature Review

Heart failure is a widespread and expensive disease, impacting approximately 6.5 million adults in the United States, and is expected to rise to more than 8 million adults by the year 2030 (Benjamin et al., 2017). Among individuals 65 years and older, the prevalence of heart failure is expected to rise from 62% in 2012 to 71% in 2030 (Heidenreich et al., 2013). In 2012, the medical costs associated with heart failure were assessed at around $21 billion (Fitch et al., 2018); these costs are expected to grow to $53 billion by the year 2030. Among individuals 65 and older, medical costs associated with heart failure are expected to rise approximately 81% to 88%, creating significant monetary liability for Medicare. The majority of expenses associated with heart failure (80%) are due to hospital admissions, while about 15% is associated with the care of deteriorating heart failure (Fitch et al., 2018).

Heart failure is a primary source of mortality in elderly individuals (Butrous & Hummel, 2016). The Centers for Medicare & Medicaid Services (CMS) reports hospital specific, 30-day risk standardized readmission and mortality rates publicly for patients of Medicare admitted with heart failure (Horwitz et al., 2012). These measures are meant to indicate performance of hospitals on quality of care delivered to patients for the duration of their hospital stay and after discharge (Horwitz et al., 2012). The Cardiovascular Health Study (CHS) reported 1-, 5-, and 10-year death rates of 19%, 56%, and 83% after the start of heart failure (Murad et al., 2015). CHS is a longitudinal cohort study of heart failure in individuals 65 years and older residing in the US (Murad et al., 2015). Administrative

records also confirm that once heart failure develops, mortality increases rapidly with age (Blais et al., 2014).

Heart failure is a leading cause of hospital readmissions for patients with Medicare in the United States. The Heart Disease and Stroke Statistics Report (2016) from the American Heart Association estimated that heart failure is responsible for about one million hospital stays (Mozaffarian et al., 2016). The Affordable Care Act (ACA) established the Hospital Readmissions Reduction Program (HRRP), which mandated that the Centers for Medicare and Medicaid Services (CMS) decrease reimbursements to hospitals that have high readmission rates. This system offered substantial incentives for both health care professionals and hospitals to minimize readmissions while also advancing outcomes for patients (McIlvennan et al., 2015). The Healthcare Cost and Utilization Project (HCUP) (2015) reported a drop in all-cause 30-day readmission rates for heart failure patients from 25.1% in 2009 to 23.5% in 2013, with cost savings of approximately $200 million (Bambhroliya, 2018). Additionally, in 2016, MedPAC reported a decrease in avoidable readmissions due to heart failure from 19.5% in 2010 to 17.0% in 2014 (Borzecki et al., 2016). Due to the increasing prevalence of heart failure in the United States and the financial consequences associated with high readmission rates, it is vital to recognize factors contributing to readmissions and create strategies to decrease readmissions among high-risk groups (Chamberlain et al., 2018).

The aim of this study was to determine if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for beneficiaries 65 years and over with heart failure. This study will allow hospitals to better comprehend the

utilization of Medicare among heart failure patients 65 years and over and to assess factors impacting mortality and readmission rates for heart failure Medicare beneficiaries.

Heart failure has an in-hospital mortality rate of 10%, a post-discharge mortality rate (within one year) of 20%-40%, and a readmission rate (within one month) of 20%-25% (Maggioni et al., 2013). Hospital admissions for heart failure are projected to increase considerably over the next ten years, resulting in a greater burden on the health care system as costs related to heart failure will also increase (Driscoll et al., 2016). To effectively treat heart failure, it is necessary to redesign the system of heart failure treatment in a way that advances evidence-based procedures and establishes unified organizations of treatment throughout the healthcare system encompassing hospital care, community care, and primary care (Driscoll et al., 2016).

Section one outlines the research problem, the study purpose, the research questions and related hypotheses, the theoretical foundation for the study, the nature of the study, the literature search strategies, the literature review connecting to key variables, the literature review summary, the definitions of terms utilized in the study, the assumptions for the study, the scope and delimitations for the study, and the significance of the study.

Problem Statement

Medicare is a health insurance program conducted by the federal government for individuals over the age of 65, individuals diagnosed with End-Stage Renal Disease, and younger individuals with disabilities. The study intends to address the research gap regarding if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for beneficiaries 65 years and over with heart failure.

One recent study analyzed the National Inpatient Sample from 2001-2009, and found that in-hospital mortality for Medicare patients 65 years and over dropped from 4.5% in 2001 to 3.3% in 2009. The results suggest that Medicare beneficiaries aged 65 years and over displayed low incidences of heart failure in-hospital mortality. Even though in-hospital mortality for Medicare beneficiaries has reduced over the past ten years, 30-day mortality has reduced at a more gradual rate as a result of an increased number of deaths that transpire after discharge from heart failure stay at the hospital (Chen et al., 2013). Another study examined claims data among Medicare recipients admitted to the hospital for heart failure from July 1, 2011, through June 30, 2014. The results indicated that higher hospital-level 30-day payment episodes were associated with decreased mortality for patients following heart failure hospitalization (Wadhera et al., 2018).

Even though overall rates for heart failure hospitalization among Medicare recipients decreased between 1998 and 2008, unexpected readmissions continue to be a common occurrence, with approximately one in four patients readmitted within 30 days of discharge. In a study analyzing Medicare heart failure claims from 2009-2012, only 1.4% of hospitals had attained a 20% decrease in 30-day readmission rates by December of 2012. This percentage was similar to those from reports based on data from the Hospital Compare database, in which only 2.6% of hospital sites attained a 20% relative decrease from the periods of July 2006 to June 2009 vs. July 2009 to June 2012. These outcomes for heart failure patients are reliable, with current information indicating that reductions in overall readmission rates for fee-for-service Medicare recipients have been minimal,

despite financial incentives and increased efforts among health systems (Bergethon et al., 2016).

Purpose of the Study

The purpose of this study was to determine if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for beneficiaries 65 years and over with heart failure. To address this gap, the approach was retrospective, quantitative, and correlational with the application of multiple regression analysis. Mortality rates and readmission rates are the dependent variables, and Medicare utilization is the independent variable. These variables were examined using secondary datasets (data.medicare.gov/data/hospital-compare and cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main) in conjunction with relevant literature to develop an understanding of how Medicare utilization impacts mortality and readmission rates among heart failure patients 65 years and over.

Research Questions and Hypotheses

RQ1: Is there a relationship between the Medicare-covered services for care and mortality rates of patients 65 years and over with heart failure?

*H*1: There is no relationship between Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

*H*1: There is a relationship between Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

RQ2: Is there a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure?

*H*2: There is no relationship between the Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

*H*2: There is a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

Theoretical Foundation for the Study

The theoretical foundation for this study was the Chronic Care Model (CCM). This model is an organizing structure aimed at enhancing the care of persistent illnesses and is also an exceptional instrument for refining care at both the population and individual level (Fiandt, 2006). CCM is comprised of six components, including: health systems, community resources, decision support, patient self-management support, clinical information systems, and delivery system design (Stellefson et al., 2013). Health systems work with organizations and mechanisms to encourage high-quality and safe care. Clinical information systems work to manage population and patient data. Patient self-management support aims to allow patients to supervise their health care and health. The community resources component of CCM is meant to mobilize patients' resources. Finally, the delivery system design works with self-management support and clinical care, which also includes team care (Stellefson et al., 2013).

Heart failure poses a substantial challenge for health care systems. The demands of heart failure-associated health care and costs are expected to increase (Lesyuk et al., 2018). The CCM provides an improved method of providing care for patients with heart failure. Chronic care management dramatically decreases mortality in heart failure patients (Lorenzini et al., 2016) and has a positive impact on shorter hospitalizations and better

quality of life (Drewes et al., 2012). The CCM method is potentially advantageous for the supervision of patients with heart failure; however, studies have found mixed (Ballo et al., 2018).

Nature of the Study

Quantitative research includes the use of mathematical, statistical, and computational tools to derive outcomes (McLeod, 2019). This study was correlational with a quantitative focus through the use of multiple regression analysis. Previous studies have focused on mortality and readmission rates of patients with pneumonia, heart failure, and acute myocardial infarction. One such study utilized correlation analysis to examine the relationship between hospital mortality rates and readmission rates (Krumholz et al., 2013). Another recent study analyzed readmission and mortality rates of heart failure patients using a multi-level logistic model that allowed the researchers to disentangle hospital- and patient-level covariates (Roshanghalb et al., 2019).

Literature Search Strategy and Keywords

A variety of resources were used in the literature search. These resources included: the databases ScienceDirect, PubMed, Medline, and Academic Search Complete; Walden University's library; and Google Scholar. The literature search was conducted by searching keywords in ScienceDirect, PubMed, Medline, and Academic Search Complete. Keywords included: *Medicare, mortality rates, geriatric, elderly, heart failure, readmission rates, the Chronic Care Model, 30-day readmission, and insurance.* This literature search was limited to journal articles published within the last five years; older articles were utilized only when more current data was not available.

Literature Review

The literature review focused on critical variables, including: Medicare utilization and heart failure outcomes, mortality rates of heart failure patients 65 years and over, readmission rates of heart failure patients 65 years and over, financial burden of heart failure on patients, impact of patient age on heart failure patients, and CCM alignment with heart failure. Heart failure mortality rates are important given that CMS (via the obligatory Hospital Value-based Purchasing, HVBP, system) monetarily penalizes or rewards institutions based on patient mortality rates (Wadhera et al., 2018). Similarly, heart failure readmission rates are important given that the Hospital Readmission Reduction Program (HRRP) requires CMS to financially penalize hospitals if heart failure readmission rates are higher than expected (McIlvennan et al., 2015).

Literature Review Related to Key Variables

The Link between Medicare Utilization and Heart Failure Outcomes

In contrast to younger patients, older heart failure patients are usually cared for by general physicians rather than cardiologists. Previous research demonstrates that general physicians recommend fewer follow-up procedures and fewer potentially effective medications compared to cardiologists (Berliner & Bauersachs, 2018).

The management and diagnosis of heart failure are usually more challenging in older individuals due to comorbidity, frailty, cognitive impairment, and polypharmacy. Complete consideration of these geriatric issues is crucial for patient-centered management, prognosis determination, and enhancement of overall clinical results in

elderly heart failure adults (Butrous & Hummel, 2016). One recent study found that approximately 60% of older adults with heart failure possessed three or more comorbidities, while just 2.5% did not possess any related comorbidities (Murad et al., 2015). Hypertension was the most frequent comorbidity, at approximately 82% occurrence, trailed by coronary heart disease, at around 60% occurrence. Additional cardiac comorbidities include cardiac valvular disease, arrhythmias, and peripheral vascular disease. Common non-cardiac comorbidities include diabetes mellitus, malnutrition, sleep apnea, cognitive dysfunction, chronic kidney disease, anemia, depression, and arthritis. Not surprisingly, some comorbid illnesses are associated with higher mortality in elderly heart failure individuals, including: depression, diabetes mellitus, chronic kidney disease, and cerebrovascular disease, with comorbid cerebrovascular disease having the greatest mortality rate (Murad et al., 2015). In recent years, the prevalence of comorbid disorders among elderly heart failure patients has increased and, given that pharmacotherapy is a common treatment for many of these disorders, polypharmacy is a common issue (Murad et al., 2015).

Reduced functional capability is typical in elderly heart failure patients, particularly after admission to the hospital. An unbiased assessment of functional capability can offer prognostic importance in elderly heart failure patients. Symptom-limited cardiopulmonary exercise testing (CPET) is considered the gold-standard modality since it determines exercise intolerance and offers numerous independent forecasters of heart failure patients' survival odds (e.g., the ventilatory equivalent ratio for carbon dioxide and peak oxygen consumption) (Butrous & Hummel, 2016). Unfortunately, CPET

is costly, not available universally, time-consuming, and can be difficult for older patients to complete (Butrous & Hummel, 2016).

One study found that Medicare insured the majority (90.9%) of heart failure patients aged 65 years and older, and that individuals with Medicare had considerably shorter durations of stay for heart failure hospitalizations; this trend was not seen among individuals possessing other insurance coverages (Chen et al., 2013). In-hospital mortality for Medicare individuals with heart failure dropped from 4.5% in 2001 to 3.3% in 2009. Significant decreases in in-hospital mortality were also detected for adults aged 65 - 74 years and 75 years or older. Individuals possessing self-pay coverage, private insurance, Medicaid, and Medicare had substantial drops in in-hospital mortality. Utilizing a nationwide all-payer database of institution discharges within the US, the general nationwide hospitalization rate of heart failure fell by a comparative 26.9% from 2001-2009. This drop is comparable in scale to the 29.5% drop for hospitalization rates for heart failure detected in the population with Medicare from 1998 to 2008. Adults of standard Medicare age (greater than or equal to 65 years old) had statistically significant decreases over time in duration of stay during the period of the study. Elderly patients usually have several comorbidities, and thus possibly additional chances to lessen length of stay (LOS) through more rigorous utilization of expert nursing accommodations or more referrals to hospice care, both of which have grown in the population with Medicare over the past ten years. Even though in-hospital mortality has reduced throughout the past ten years amongst Medicare beneficiaries, 30-day mortality has gradually reduced as a result of an

increased amount of deaths that transpire the following discharge from heart failure hospitalization (Chen et al., 2013).

A previous examination of Medicare claims data discovered that, of the individuals admitted for heart failure, an outpatient visit did not occur for approximately 52% of individuals (Driscoll et al., 2016). Heart failure medical procedures require prompt check-up seven to ten days after discharge (Driscoll et al., 2016). Most analyses of information from The Longitudinal Health and Retirement Study have reported that insurance coverage in near-elderly individuals is associated with a slower rate of health deterioration and reduced mortality (Woolhandler & Himmelstein, 2017). Similarly, two US studies and one Canadian study compared mortality trends across matched locations without and with coverage expansions and reported that greater coverage was associated with lower mortality (Woolhandler & Himmelstein, 2017).

Advanced heart failure patients, or Stage D heart failure, have evident heart failure indicators at rest despite optimum medical supervision, as described by the American College of Cardiology/the American Heart Association (Yim et al., 2017). In addition, these patients have higher one-year mortality rates (approximately 50%). Consequently, the American College of Cardiology/the American Heart Association standards recommend that healthcare professionals propose hospice as an alternative for individuals with stage D heart failure while contemplating cutting-edge treatments. The Medicare Hospice Benefit provides emotional, physical, spiritual, medical, and social services to patients with a life expectancy of less than or equal to six months and who decide to

forego life-extending treatments. Previous studies have reported that, in advanced cancer patients, hospice increased chances of survival, decreased healthcare expenses, reduced patients' physical and psychological warning signs, and improved family satisfaction and caregiver well-being. Even though symptomatic heart failure has a poorer prognosis than the majority of cancers, advanced heart failure patients register in hospice at lesser rates than individuals with cancer. Substantial declines have been reported in ICU admissions and ER visits following hospice registration (Yim et al., 2017). Individuals with heart failure might not be given the complete advantage of hospice benefits when registration times are less than or equal to one week, and this has been previously linked to reduced quality for end-of-life care for patients and families (Yim et al, 2017). A study conducted by the US Department of Health and Human Services reported that the benefits of hospice treatment are not apparent until at least 30 days after admission (Yim et al., 2017). Scheduling an appointment for referral to hospice is difficult due to the erratic clinical progression of heart failure. Research indicates that the number of ICU admissions, hospital admissions, and ER visits are all reduced after enrollment into hospice, similar to other clinical populations (Yim et al., 2017).

Mortality Rates of Heart Failure Patients 65 Years and Over

Heart failure has a massive cost and a bleak diagnosis, with a typical 1-year mortality of 33%-35% (Azad & Lemay, 2014). Frailty is linked to mortality and hospitalizations and negatively impacts heart failure management in older adults by effecting their self-care and reducing their ability to register for clinical trials. Frailty is

associated with standard heart failure symptoms such as decreased exertional capacity and fatigue and all-cause hospitalizations and mortality, even in advanced heart failure patients who obtain ventricular-assist tools (Madan et al., 2016).

In an examination of 6.5 million heart failure patients in the United States, the in-hospital unadjusted mortality rate dropped from about 8.5% during 1993 to almost 4.3% during 2006 (Cowie et al., 2014). Moreover, the 30-day mortality rate dropped from 12.8 to 10.7% for the identical amount of time. Additional Medicare examinations have also reported a reduction in hospital mortality rates, from about 5.1% during 2001 to approximately 4.2% during 2005 (Cowie et al, 2014). However, one-year all-cause and 480-day mortality rates stayed unchanging at about 37% and 26%, respectively. An examination of statistics from 55 million Medicare beneficiaries also reported a decrease in the one-year mortality rate from 31.7% during 1999 to 29.6% during 2008 (Cowie et al., 2014). Despite continuing improvements in care for heart failure, the survival odds following an incident of acute heart failure continue to be low and five-year mortality rates are about 70%. In a community-based study within the United States, the five-year mortality rate for individuals recently diagnosed with heart failure increased from 57% in 1979 to 48% in 1984 (Cowie et al., 2014). In another community-wide study examining severe heart failure, two-year and five-year post-discharge mortality rates among hospitalized individuals improved from 1995 to 2004 (Cowie et al., 2014).

A national heart failure audit conducted in the UK from April 2010 to March 2011 revealed that inpatient mortality rates were higher among individuals hospitalized in

cardiology departments compared to those in internal medicine and other departments (Driscoll et al., 2016). Lower heart failure mortality rates have also been reported among individuals that obtained follow-up care at cardiology clinics compared to non-cardiology clinics (Driscoll et al., 2016). Similarly, lower mortality rates have also been observed among heart failure patients that obtained follow-up care with a nurse having heart failure expertise compared to follow-up care with a nurse lacking heart failure expertise (Driscoll et al., 2016). The utilization of specialist heart failure nurses within heart failure programs also enhanced patient results. Several meta-analyses of heart failure programs have revealed that systems that have nurses with heart failure expertise and training in critical care or cardiovascular care have better patient outcomes than systems that do not have nurses with this type of expertise (Driscoll et al., 2016).

Hospital Readmission Rates of Heart Failure Patients 65 Years and Over

In 2005, the 7-day hospital readmission rate for heart failure Medicare beneficiaries was 6.2%, 15-day readmission rates were 12.5%, and 30-day readmission rate was 17.6%. Many of these 7-day, 15-day, and 30-day readmissions were considered avoidable (Chamberlain et al., 2018). The ACA established the Hospital Readmissions Reduction Program (HRRP) in October 2012, which mandated that the Centers of Medicare and Medicaid Services (CMS) monetarily penalize institutions with high readmission rates by decreasing hospital reimbursements. The Healthcare Cost and Utilization Project (HCUP) reported a drop in all-cause 30-day rates of readmission among adults with heart failure from 25.1% in 2009 to 23.5% in 2013, saving about $200 million (Chamberlain et al.,

2018). The Medicare Payment Advisory Commission (MedPAC) projected that 12% of readmissions to the hospital are possibly preventable. Avoiding as little as 10% of these excess readmissions can allow Medicare to save $1 billion (McIlvennan et al., 2015).

Moreover, in 2016, MedPAC reported a drop in avoidable readmission rates from 19.5% in 2010 to 17.0% in 2014 among individuals with heart failure (Chamberlain et al., 2018). By the beginning of 2014, two thirds of hospitals were already penalized for excess readmission rates (Chamberlain et al., 2018). As a result, health centers and hospitals began to prioritize detecting heart failure patients with the highest risk of readmission and authorizing preventative intervention and early risk stratification. Medicare beneficiaries have higher readmission rates compared to individuals with private insurance and Medicaid (Chamberlain et al., 2018). Medicare recipients with heart failure have the highest readmission rates, with research indicating that 18% of six-month all-cause readmission rates were due to heart failure. In a study examining administrative discharge figures on 41,776 individuals admitted to 236 hospitals in New York State, there was a declining trend in heart failure readmission rates from the lowermost income quartile to the uppermost (Chamberlain et al., 2018). The authors also discovered that salary was a statistically significant predictor of readmission, with lower salaries associated with a greater likelihood of readmission (Chamberlain et al., 2018).

Readmission rates are highest in the elderly within three to six months after discharge and fluctuate between 27% - 47% (Azad & Lemay, 2014). Cognitive function is one factor that may contribute to readmission in elderly individuals in several ways. First,

the requirements of self-care for ideal heart failure management are extensive; general instructions for discharge consist of symptom monitoring, daily weighing, compliance with a low sodium diet, multidrug treatment, and fluid restriction. Cognitive impairment could affect any of these essential responsibilities. For example, dosages of diuretics could be misunderstood, or symptoms, such as weight gain, might be overlooked until they become critical. These factors could explain why heart failure patients have one of the highest early readmission rates following discharge (Azad & Lemay, 2014).

Even though overall rates for heart failure hospitalization among Medicare recipients decreased between 1998 and 2008, unexpected readmissions continue to be a common occurrence, with approximately one in four patients readmitted within 30 days of discharge. In a study analyzing Medicare heart failure claims from 2009-2012, only 1.4% of hospitals had attained a 20% decrease in 30-day readmission rates by December of 2012 (Bergethon et al., 2016). This percentage was similar to those from reports based on data from the Hospital Compare database, in which only 2.6% of hospital sites attained a 20% relative decrease from the periods of July 2006 to June 2009 vs. July 2009 to June 2012. These outcomes for heart failure patients are reliable, with current information indicating that reductions in overall readmission rates for fee-for-service Medicare recipients have been minimal, despite financial incentives and increased efforts among health systems (Bergethon et al., 2016).

A common reason for readmissions is cardiac disease, with the reappearance of heart failure making up approximately 30% of all cases (Cowie et al., 2014). In the United

States, 30-day readmission rates were around 20%-25% (Cowie et al., 2014). An examination of Veterans Affairs (VA) healthcare data from 2002 to 2006 indicated a rise in 30-day rehospitalization for heart failure and better survival over this interval (Cowie et al., 2014). This study reported that appropriate post-discharge appointments utilized through the VA and prompt readmittance to the hospital for heart failure were linked to better patient outcomes (Cowie et al., 2014).

Quite a few United States national quality improvement programs have been created in an attempt to decrease 30-day hospital readmissions. One such initiative is called Get with the Guidelines (GWTG). GWTG was created through the American Heart Association to promote the application of evidence-based clinical practice procedures to enhance patient results post-discharge. Mortality and readmission rates were substantially lowered in hospitals participating in the GWTG initiative (Driscoll et al., 2016).

Despite substantial therapeutic developments, individuals with heart failure need regular hospital admissions for heart conditions such as congestion, arrhythmia, uncontrolled hypertension, hypervolemia, and ischemia, as well as non-cardiovascular comorbidities. Results from observational studies suggest that the bulk of individuals identified with heart failure will be admitted to the hospital at least one time, and more than half will be admitted to the hospital three or more times within four to five years of diagnosis. Nearly 25% of individuals with heart failure are admitted to the hospital again within 30 days (Kilgore, Patel, Kielhorn, Maya, & Sharma, 2017).

Considerable attention has been paid to the association between mortality and readmission rates. A study examining CMS Hospital Compare data regarding heart failure statistics found a statistically significant inverse correlation between 30-day mortality rates and 30-day readmission rates (McIlvennan et al., 2015). A subsequent evaluation of hospital-level risk-standardized mortality and readmission rates reported a small inverse relationship between readmission coupled with mortality rates for heart failure (McIlvennan et al., 2015). There are numerous reasons as to why heart failure mortality and readmission rates are inversely related. One possibility is that some institutions have a low level of admittance along with readmission; such institutions might admit patients with less severe cases of heart failure, therefore resulting in higher rates of readmission and lower rates of mortality. An alternate justification is that hospitals with high mortality rates have fewer individuals for readmitting; a patient known to be high-risk who perishes within the institution is not able to be readmitted. Similarly, a patient who perishes at his or her residence abruptly following initial release from the hospital cannot be admitted again (McIlvennan et al., 2015).

Financial Burden of Heart Failure on Patients

Heart failure is the principal reason for hospitalization for individuals over 65 years and represents a substantial economic and clinical burden. Outpatient and inpatient expenses associated with heart failure management make it one of the most expensive health care issues (Azad & Lemay, 2014). Heart failure is also one of the most frequent and costly medical illnesses within Medicare. Following heart failure diagnosis, 83% of

individuals are admitted to the hospital at least one time, and 43% a minimum of 4 times (Kumbhani et al., 2018). Heart failure is a considerable burden to the United States health care system, costing citizens about $30.7 billion yearly (Bergethon et al., 2016). The syndrome impacts approximately 6.5 million adults and is expected to rise to more than 8 million incidents by the year 2030. It is estimated that the percentage of the population 65 years and older with heart failure will rise from 6% in 2012 to approximately 71% by 2030. Overall direct medical expenses for heart failure were assessed to be about $21 billion in 2012 and expected to rise to roughly $53 billion in the year 2030 along with the percentage of the populace 65 years and older climbing from 81% to 88%, creating significant monetary liability for Medicare. Most of the expenses among the populace (80%) with heart failure are linked with hospital admissions, and approximately 15% of the hospital admission expenses are for the care of deteriorating heart failure (Fitch et al., 2018). In an examination of 1.1 million Medicare beneficiaries during 2010, expenses for heart failure hospitalization resulted in approximately $91.9 million, making up for 3.1% of the overall Medicare expenditure (Cowie et al., 2014).

Hospital admissions are especially resource-intensive; costs for inpatient care are approximately $83,980 throughout the lifespan of each person with heart failure. One research study reported that nearly 80% of the overall lifetime expenses associated with heart failure are accrued for the duration of hospital stays (Kilgore et al., 2017). The overall mean per-patient amount of one heart failure-associated hospitalization was estimated at $14,631, with CMS covering $13,073, and $1,558 taken care of by other payers. Individuals with heart failure are likely to accumulate at least $34,000 in

hospitalization expenditures each year. This outcome is considerably greater than that observed in a 2012 analysis in which the overall medical expenses among Medicare recipients during the one-year period following initial hospital admission for heart failure were $22,124 (Kilgore et al., 2017).

The yearly fee-for-service treatment cost for deteriorating heart failure is $12.8 billion, which is 3.3% of the yearly overall Medicare fee-for-service populace spending (Fitch et al., 2018). Patients with heart failure have three times the average per-member-per-month costs compared to the total Medicare fee-for-service populace ($3,482 per-member-per-month for patients with heart failure compared to $1,072 per-member-per-month for Medicare fee-for-service populace), and four times the average per member per month costs when compared to the non-heart failure Medicare fee-for-service populace ($3,482 per-member-per-month for patients with heart failure compared to $791 per-member-per-month for patients without heart failure) (Fitch et al., 2016).

Heart failure represents a massive economic load for healthcare systems within developed countries. For example, the United States and Europe paid one to two percent of their yearly healthcare budget on heart failure (Lesyuk et al., 2018). The global economic problem of heart failure is estimated at $108 billion each year, with $43 billion assigned to indirect costs and $65 billion assigned to direct costs. The United States is the main contributor to international heart failure expenses and is accountable for 20.4% of overall global heart failure spending (Lesyuk et al., 2018). Hospitalization expenses are the greatest contributor to healthcare fees, while costs for prescription drugs are the second

greatest contributor. Among hospitalization expenses, room and board were the most costly, after procedures, laboratory testing, and imaging. Dialysis had the highest procedural costs, but this procedure was only required for a small number of patients. Newly diagnosed heart failure patients had considerable healthcare costs (Lesyuk et al., 2018). Compared to the control group without heart failure, individuals with heart failure had four times greater overall healthcare expenses. The most frequent causes of rising expenses for patients with heart failure were diabetes mellitus, kidney dysfunction, a higher NYHA (New York Heart Association) stage, and comorbidity. Heart failure comorbidities contribute to three-fourths of all readmissions in patients with heart failure. Dunlay et al. (2011) found that diabetes mellitus increased lifetime expenses of heart failure patients by 25%. Bogner et al. (2010) further reported that diabetes mellitus causes prolonged stays in the hospital and worsens the prognosis. Studies indicate that the financial burden of heart failure relies on the NYHA stage, and that costs increase with more advanced stages. Two studies examined healthcare expenses among heart failure patients during the initial year of heart failure diagnosis compared to the year prior to diagnosis and found that there was a 318% increase in healthcare expenses during the initial year following heart failure diagnosis compared to the prior year (Lesyuk et al., 2018). The research further revealed that expenses were high during the first year following heart failure diagnosis, then dropped and attained a steady, relatively low level, and then increased again at the end of the patient's life (Lesyuk et al., 2018).

Heart failure-associated medical expenditure rose 4.8-fold (a rise of $5,917) from the sixth month to the first month prior to death, with a 5.3-fold surge (an increase of

$5,690) reported for inpatient expenses. Within this analysis, average all-cause inpatient and medical expenses throughout the six months prior to death were $25,600 and $37,186, respectively, for Medicare Advantage with Part D (MAPD) enrollees (Obi et al., 2016). These results are similar to hospitalization ($20,309) and medical costs ($36,216) through the utilization of 2007 Medicare statistics. The study also reported that expenses related to inpatient hospitalizations were the primary expenses throughout the last six months prior to death (Obi et al., 2016). This finding is similar to a recent report of higher inpatient hospitalization resource utilization during the final two months of life (Obi et al., 2016). Additional studies have reported that throughout the last six months, just over one-quarter of all-cause inpatient expenses for commercial and MAPD beneficiaries (28.7% and 27.8%, respectively) were not attributable to heart failure-associated inpatient expenses (Obi et al., 2016). This indicates that a considerable percentage of these hospitalizations may be linked to comorbid diseases. Earlier findings have reported a connection between higher hospitalization risk and comorbidity in patients with heart failure. Even though heart failure-related care makes up a considerable share of all-cause expenses, comorbid illnesses might also be a significant factor (Obi et al., 2016).

Impact of Patient Age on Heart Failure Patients

The incidence and prevalence of heart failure increase with patient age. Heart failure is a significant cardiac condition that increases 10-fold from age 60 to age 80 (Azad & Lemay, 2014). Due to the aging population in the US and improved life expectancy, the frequency of heart failure is likely to grow to roughly 46% by 2030, resulting in over eight

million heart failure adults (Zhao et al., 2019). Consequently, for individuals aged 45-55 years, the occurrence of heart failure is less than 1%, but frequency rises to about 10% in patients over the age of 80. Mortality in older heart failure patients has increased significantly; statistics indicate that the average life expectancy in elderly heart failure patients is about 2.5 years, with approximately 25% perishing within the initial year (Berliner & Bauersachs, 2018). The lifetime risk of developing heart failure is 1 in 5, and its occurrence grows with age; there is an increase from 1.4% - 1.9% among patients who are middle aged to 12.8% - 14.7% among patients who are octogenarians. Elderly individuals with heart failure are frequently female, have decreased cardiac illnesses and related risk issues, but possess increased rates of non-cardiac co-morbidities (Azad & Lemay, 2014). Over 50% of patients with heart failure who are greater than or equal to 60 years old describe some amount of mobility restriction and countless struggles with day-to-day living, such as dressing, bathing, and eating. Functional disability and mobility are linked with cognitive weakening and comorbidity burden. This link is most likely bidirectional. A noteworthy extra contributor is frailty - a multi-systemic, aging-related condition that incorporates weakness, fatigue, and reduced tolerance to physiological stressors (Butrous & Hummel, 2016).

Early discovery of heart failure by doctors is hindered by a lack of specific warning signs, the existence of comorbidities, and limited admissions to echocardiography (Riet et al., 2014). Attempting to detect heart failure without echocardiography can lead to a significant number of false positives and false negatives. One of the main non-specific symptoms of heart failure is shortness of breath from exertion (dyspnea). Even though

dyspnea is frequent in older individuals, assessment of this warning sign is difficult because it has subjective qualities, and several circumstances are proven to trigger it, as well as pulmonary illnesses. Since unrecognized heart failure is widespread in the elderly arriving at primary care facilities with dyspnea, careful assessment is important in these patients (Riet et al., 2014). Even though elderly patients are not often included in clinical experiments, all heart failure treatments, from devices to drugs, are, nevertheless, used among the elderly. The best method of treatment must be decided based on each patient's unique condition and must consider factors such as such as frailty, economic background, comorbidities, social, and quality of life (Guerra et al., 2017).

Chronic Care Model Alignment with Heart Failure

The Chronic Care Model (CCM) is a well-established model meant to change health care by concentrating on improving patient care using strategies at the organization, patient, practice, and community levels. Though broad implementation of this model has occurred globally for managing chronic illness, few studies have examined its success in enhancing outcomes in patients with heart failure (Ballo et al., 2018). A metanalysis established that CCM is beneficial for heart failure patient care, but has considerable variations in success (Drewes et al., 2012).

CCM was independently linked to a 35% decreased likelihood of hospitalization for heart failure (Ballo et al., 2018). After an initial admission for heart failure, no variations were detected between the two categories (the control group and CCM group) in danger of additional hospitalizations for heart failure. There was no substantial difference

between the control and CCM group in regard to 30-day heart failure readmission rates after an initial hospitalization. When urgent and planned hospitalizations for heart failure were considered separately, CCM was linked to a pointedly greater rate of hospitalizations. Through multivariate analysis, it was established that CCM was linked to an 18% lower risk of mortality. Remarkably, even after being admitted, heart failure patients in the CCM group indicated a 16% lower risk of death compared to controls. Results indicated that CCM patients had a lower risk of death, but an increased risk of being admitted to the hospital for heart failure than a matched control populace. Previous studies, typically conducted in hospitals, have reported that implementation of CCM for heart failure patients with continuing cardiac issues could be beneficial, but there is variability in its success (Ballo et al., 2018).

A multidisciplinary approach, founded upon standards of CCM, is the best method for guaranteeing the best social and clinical results for heart failure patients (Lorenzini et al., 2016). The best environment to build coordination of heart failure care with staff is through CCM, to convert information among actual care practices and evidence-based chronic disease care. CCM proposes that six interconnected foundations are crucial for top-quality care of chronic disease, including: clinical data technology, restructuring delivery structures, self-management support, system-wide decision support, connections to resources within the community, and hospital organization. Primary care is a vital part of the initial detection of heart failure, management of end-of-life care along with co-morbidities, and self-care awareness. However, a thorough systematic review of twenty-two studies reported obstacles to executing CCM within primary care settings (Lorenzini

et al., 2016). Evaluating organizational capability and requirements and obtaining a clearer understanding of organizational perspective and healthcare providers is critical during the application of the CCM. In chronic disease, patient-centered care has a positive impact between providers and patients concerning strategies for treatment, patient satisfaction, patient health outcomes, and respecting patients' preferred amount of participation in healthcare choices. Education for patients is focused on helping patients understand their illness and make appropriate choices concerning their treatment and wellbeing rather than simply providing assessments related to the illness. Counseling remains the best method for steering, aiding, and improving empowerment and self-management among individuals and their caregivers by providing education and self-care skills and allowing patients to make their own treatment decisions. Patients' ability to manage persistent illnesses is vital to enhancing health results, and a patient-centered methodology regarding heart failure supervision is generally advised. Counseling for heart failure should be centered on straightforward activities that caregivers and patients can implement. Incorporated patient-centered care systems have conclusively shown a substantial decrease in hospital admissions, mortality, and readmissions, including emergency department admissions (Lorenzini et al., 2016).

Doctors and nurses must supervise patients with chronic illnesses through periodic checkups that evaluate patients' active participation and early discovery of deterioration of the illness along with its sources. After each meeting, healthcare specialists must assess patients' comprehension of what has been discussed. For advanced heart failure patients, healthcare professionals should remain adaptable, and the consultation must offer clear-cut

suggestions to family members and patients regarding when to consult a doctor and indications of destabilization, which necessitate professional guidance (Lorenzini et al., 2016).

Definitions

Centers for Medicare and Medicaid (CMS): A segment of the Department of Health and Human Services ("About CMS," 2018).

Excess Readmissions: Calculating an institution's rates of readmission, adjusting for sex, co-existing illnesses, and age, which are contrasted to nationwide rate norms and resulting in above average rates (McIlvennan et al., 2015).

Geriatric Heart Failure Patient: An elderly person receiving special care for heart failure at the hospital. They constitute about 80% of individuals who suffer from heart failure (Díez-Villanueva & Alfonso, 2016).

Length of Stay (LOS): Number of days admitted in the hospital for a single episode. LOS is a significant marker of the utilization of medical services to evaluate the competence of hospital management, functional evaluation, and quality of care for patients. Reduced LOS has been linked to a lower risk of infection and side effects of medicine, and with enhancements in treatment results and reduced rates of mortality (Baek et al., 2018).

Medicare Part C Program: The program offers all of Part A (hospital insurance), Part B (medical insurance) coverage, and most programs include Part D (prescription drug coverage) ("What is Medicare Part C?", 2014).

Medicare Utilization: Medicare is a health insurance program conducted by the federal government for individuals who are over the age of 65, those diagnosed with End-Stage Renal Disease, and younger people with disabilities ("What is Medicare?", 2018).

Mortality Rates for Heart Failure Patients: Measure of the frequency of occurrence of death in the heart failure population during a specified interval *(*Bytyçi & Bajraktari, 2015).

Patients Diagnosed with Heart Failure: Patients presenting to the hospital with International Classification for Disease (ICD)-9 codes of 428.0 through 428.9 (Chamberlain et al., 2018).

Readmission Rates for Heart Failure Patients: Admittance to an institution in the span of 30 days from discharge for heart failure ("Readmissions-Reduction-Program," 2019).

Assumptions

One assumption in this study is that the Medicare utilization information, mortality rates, and readmission rates for heart failure patients (provided through data.medicare.gov/data/hospital-compare and cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main) is accurate and

provides nationally representative data. This assumption is necessary in order to examine how utilization of Medicare impacts mortality and readmission rates of heart failure patients 65 years and over.

Scope and Delimitations

Factors examined in this study include the link between Medicare and heart failure outcomes, mortality rates of heart failure patients 65 years and over, readmission rates of heart failure patients 65 years and over, the financial burden of heart failure on patients, and the impact of patient age on heart failure patients improve the understanding of how utilization of Medicare impacts mortality and readmission rates of heart failure patients 65 years and over. The study population is Medicare patients 65 years and over seen in hospitals within the United States and diagnosed with heart failure from 2015 to 2017.

The generalizability of the study is limited to patients admitted to the hospital for heart failure, diagnosed with heart failure, possessed Medicare, aged 65 and over, and other factors that may influence mortality and readmission rates for heart failure Medicare beneficiaries. Studies have previously found that hospitals vary in readmission or mortality rates according to culture, patient volume, organizational structure, academic status, financial structure, and information technology (Horwitz et al., 2012).

Significance, Summary, and Conclusions

By examining if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for beneficiaries 65 years and over with heart failure, this study contributes to the field of health care administration by improving our

understanding of the relationship between these factors in heart failure patients 65 years and over. Readmission rates are elevated in the elderly within three to six months after discharge, fluctuating between 27% - 47% (Azad & Lemay, 2014). Understanding these factors and the impact they have upon heart failure patients 65 years and over is significant to health care administrators, as the CMS is imposing fines against hospitals for excess readmissions (Chamberlain et al., 2018). These fines are significant to health care administrators, as the penalties can rise to 3% of the hospital's overall Medicare payments and applied for one year, possibly affecting the financial strength of the institution (McIlvennan et al., 2015). Preserving the viability and financial stability of institutions supports admittance to care for patients by preventing hospital closings resulting from reduced profit margins due to enforced fines by the CMS (Fitch et al., 2018).

Specific themes in the literature concern Medicare, mortality, and heart failure hospitalizations. Even though in-hospital mortality has reduced throughout the past ten years among Medicare beneficiaries, 30-day mortality has reduced at a more gradual rate as a result of an increased amount of deaths that transpire the following discharge from heart failure hospitalization (Chen et al., 2013). Policymakers and researchers recognize the 30-day hospital readmission rate for heart failure as an unnecessary and avoidable expense (Wadhera et al., 2018).

There is minimal literature regarding patients 65 years and over and heart failure clinical experiments. Elderly patients are not often represented in clinical experiments (Guerra et al., 2017). Previous heart failure clinical trials, upon which present therapy

standards are based, mainly involve younger patients. Consequently, a gap remains regarding patients registered in clinical trials and those handled in everyday clinical practice. There is also minimal literature examining the Chronic Care Model's success in enhancing results in heart failure patients, even though this model has been broadly implemented globally for managing patients with chronic illnesses (Ballo et al., 2018). This study, therefore, fills the gaps existing in the current literature, offering an expansion of understanding and practical application in the field of health care administration.

Section 2: Research Design and Data Collection

In the preceding section, current literature was reviewed based on critical variables, including: the link between Medicare and heart failure outcomes, mortality rates of heart failure patients 65 years and over, readmission rates of heart failure patients 65 years and over, financial burden of heart failure on patients, impact of patient age on heart failure patients, and Chronic Care Model alignment with heart failure. This study involves Hospital Compare data from CMS for Medicare patients 65 years and over who were seen in hospitals within the United States and diagnosed with heart failure from 2015 to 2017. The purpose of the study is to quantitatively investigate the factors influencing mortality and readmission rates among heart failure Medicare patients 65 years and over. In this section, specifics will be provided regarding the research design, methodology, and analytical tools used in this study.

Research Design and Rationale

The dependent variables in this study are mortality and readmission rates among heart failure Medicare patients 65 years and over. The independent variable is the utilization of Medicare. This study will use a quantitative, nonexperimental design utilizing retrospective archival Hospital Compare data from the CMS website from 2015 to 2017 to conduct a correlational analysis followed by multiple regression. This research design is consistent with previous studies examining mortality and hospital readmission rates for elderly heart failure patients. Pacho et al. (2018) examined mortality rates and 30-day readmission rates in frail, elderly heart failure patients. The authors utilized correlational analysis and multiple regression analysis for evaluating outcomes. Chamberlain et al. (2018) also studied 30- day readmission rates for heart failure patients using multiple regression analysis. Dharmarajan et al. (2017) analyzed changing hospital readmission rates and mortality rates for heart failure patients while also applying correlational analysis and logistic regression analysis.

Methodology

Study Population

The target population for this study was Medicare heart failure patients 65 years and over. The CMS Hospital Compare data for 2015 to 2017 regarding mortality and readmission rates for Medicare heart failure patients 65 years and over, will be utilized for evaluation.

Sampling and Sampling Procedures

Hospital Compare is an element of the Centers for Medicare & Medicaid Services Hospital Quality Initiative. It was formed via the efforts of the Hospital Quality Alliance (HQA) and Medicare. This initiative utilizes different tools to aid hospitals in improving the quality of care they provide. The goal is to support the improvement of hospitals' quality of care via easily comprehendible data on quality statistics and hospital performance from the perspective of patients ("About Hospital Compare Data," 2020).

The sampling strategy is relevant. Every Medicare recipient's status and age are concluded based on a value at the end of the year ("Data Sources and Methodology," 2020). A Medicare recipient is deemed to possess a chronic illness if the administrative data within CMS has a claim showing that the recipient accepted treatment or service for a specific condition ("Chronic Conditions Data Warehouse," 2020).

Hospital-specific death rates and readmissions were assessed using Medicare claims information and eligibility records from 2015 to 2017. The mortality and readmission measures incorporate hospitalizations for Medicare recipients 65 years and over who were registered in Original Medicare one year prior to their hospital admittance. When concerning readmission rates, measures involved Medicare recipients 65 and over registered in Original Medicare for 30 days following their initial admittance ("Readmission and Death Measures," 2020). The information is accessible from the CMS Chronic Condition Data Warehouse (CCW), www.ccwdata.org. For all the chronic condition reports, the Medicare recipient populace is limited for recipients of fee-for-

service. Medicare recipients with any Medicare Advantage registration throughout the year were excluded since claims data are not available for these recipients. Also, recipients who registered at any point within the year in just Part A or only Part B were excluded, due to the fact that their spending and utilization was not directly comparable to recipients registered in both Part A and Part B. Recipients who perish within the year were included up to their death date if they met the other inclusion factors ("Chronic Conditions," 2020).

The CCW has restricted, optional data available to allow users to create estimated cohort sizes using chronic condition, diagnosis/procedure parameters, demographic, and enrollment factors. The information includes only Dual Eligible and Medicare recipients ("Chronic Conditions Data Warehouse," 2020). However, accessibility for the secondary data for this study uses the CCW publicly accessible information. Since the information is accessible publicly, there are no required permissions to obtain access to the records.

Power Analysis

Sample size and power analysis assumed an overall medium effect size association between predictor and outcome variables. Based on previous literature, a medium-sized association is a reasonable assumption (Amarasingham et al., 2010). The alpha (0.05) and power (0.80) thresholds are set by convention (Brydges, 2019). Based on the results of the power analysis, the required sample size for the linear multiple regression analysis is 55 (Cohen's $f_2 = 0.15$, alpha = 0.05, power = 0.80, and a single predictor), as shown in Table 1. Sample size and power estimation was conducted through utilization of G*Power 3.1.9.2.

Table 1

*Linear Multiple Regression Power Analysis Utilizing G*Power*		
Input:	Tail(s)	Two
	Effect size f_2	0.1494253
	α err prob	0.05
	Power (1-β err prob)	0.80
	Number of predictors	1
Output:	Total sample size	55
	Actual power	0.8035892

Operationalization of Variables

One independent and two dependent variables will be investigated in this study. Medicare utilization is the independent variable, while mortality rates among patients 65 years and over is one dependent variable, and readmission rates is another dependent variable.

The independent variable, Medicare utilization, is measured when a Medicare beneficiary 65 years or over was admitted to the hospital for heart failure. The dependent variable, mortality rates, focused on whether Medicare heart failure patients 65 years and over died within a span of 30 days following their admittance to the hospital. The other dependent variable, readmission rates, focused on whether Medicare heart failure patients 65 years and above were readmitted to the hospital within 30 days. Mortality and readmission rates will be computed using claims records and Medicare enrollment. Mortality and readmission rates are risk-adjusted. The 30-day time frame is utilized since

this is the amount of time when deaths are most likely to be linked to the treatment patients obtained within the hospital ("Death Rates," 2020).

Data Analysis Plan

I utilized the Statistical Package for the Social Sciences (SPSS), Version 25 for analysis of the data from 2015 to 2017 offered through CMS. Readmission rates and mortality are risk-adjusted. The computations considered how ill patients were when they were admitted for initial hospitalization. Risk-adjusted rates allow for comparisons across hospitals to be fair and significant by adjusting for differences in the patient mix and allowing individuals to assess actual fluctuations in performance ("Hospital Mortality and Readmission Data," 2018). Data included within the years 2015 to 2017 that did not apply to the research and related variables, were not incorporated in the statistical assessment.

Research Questions and Hypotheses

RQ1: Is there a relationship between the Medicare-covered services for care and mortality rates of patients 65 years and over with heart failure?

*H*1: There is no relationship between Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

*H*1: There is a relationship between Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

RQ2: Is there a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure?

*H*2: There is no relationship between the Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

*H*2: There is a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

Detailed Analysis Plan

Correlational analysis followed by multiple regression analysis was used to test the hypotheses, as the goal of assessment is to analyze the links between mortality and readmission with the utilization of Medicare. Additionally, multiple regression analysis offers the ability to observe the impact of independent variables with dependent variables while adjusting for the effect of one variable while assessing the impact of the other (Schaik et al., 2019). Study outcomes will be centered on the standard threshold for multiple regression testing using an alpha cutoff of 0.05.

Validity

External Validity

The study's data consists of secondary data collected to produce accurate nationwide results. Approximately 30% of Medicare recipients are registered in a Medicare Part C program via a private insurer, and this proportion has risen gradually since 1999. Information on recipients protected by Medicare Part C programs are not incorporated in the Standard Analytic Files (SAFs) supplied to scholars utilizing CMS. Medicare Part C claims are accessible in some US commercial claims databanks, but

merging these claims with CMS Fee-For-Service files might not be viable (Mues et al., 2017). Thus, it is consequently challenging to perform studies on the whole population of Medicare.

Internal Validity

Data on patient characteristics such as exercise, diet, laboratory test outcomes, outcomes of diagnostic exams, and additional disease severity markers were not available. As with most other claims databanks, illnesses are usually specified in Medicare records via the existence of a diagnostic code. This method might be susceptible to misclassification depending on the type of ailment under examination, and the capability to differentiate severe from mild illness might be limited unless other claims for services such as treatment or procedure are incorporated into the description. Since several of these factors are prognostic signs that could impact decisions for treatment, comparative effectiveness utilizing these data might be exposed to residual inaccuracy (Mues et al., 2017).

Construct Validity

Within Medicare, problems can arise by the extension of the amount of ICD-9/10 diagnosis and procedure code fields on a claim from 9 and 6 to 25 and 25, respectively. This development occurred in 2010, but did not visibly impact the resultant information in the SAFs until January 2011. This development in the number of accessible fields could end in a synthetic rise in estimations of illness burden, primarily if more sensitive classifications of illnesses are used (Mues et al., 2017).

Ethical Procedures

Data from CMS from 2015 to 2017 is publicly available secondary data that de-identifies patients. Since the information de-identifies patients, no threats were possible for the discovery of classified health knowledge in the data that will be utilized for the study. The data will be downloaded, saved on a private laptop, and will be removed once the research is completed. In this way, the security of the data will be preserved. For ethical reasons, the Institutional Review Board supervised the data assessment and study decisions.

Summary

Section 2 described utilization of secondary data from CMS to perform quantitative analysis through correlational and multiple regression analysis. The study aimed to determine if there is a relationship between Medicare utilization and mortality and readmission rates. Additionally, Section 2 contains the proposed methodology for the study, and Section 3 will offer the statistical results linked to the research questions and related hypotheses.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative study was to determine if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for

beneficiaries 65 years and over with heart failure. The data from the CMS Chronic Conditions Data Warehouse for the years 2015, 2016, and 2017 contain the independent and dependent variables utilized to analyze mortality and readmission rates of Medicare heart failure beneficiaries 65 years and over. Mortality rates among patients 65 years and over is a dependent variable, readmission rates are another dependent variable, and utilization of Medicare is the independent variable. Utilizing these independent and dependent variables, the research questions and associated hypotheses are as follows.

RQ1: Is there a relationship between the Medicare-covered services for care and mortality of patients 65 years and over with heart failure?

*H*1: There is not a relationship between the Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

*H*1: There is a relationship between the Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

RQ2: Is there a relationship between the Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure?

*H*2: There is not a relationship between the Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

*H*2: There is a relationship between the Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

Section 3 includes results of the statistical analyses (correlation and multiple regression) of data utilized from the 2015, 2016, and 2017 found on the CMS website. Brief descriptions are provided of the survey time frame for data collection, descriptive characteristics of the sample, representativeness of the sample and conclusion with a summary of the results.

Data Collection of Secondary Data

Time Frame

For this study, archival data was downloaded from the CMS website for the years 2015, 2016, and 2017. The data selected for the study were for mortality and readmission rates for heart failure Medicare beneficiaries 65 years and over. The CMS Chronic Conditions Data Warehouse contains variables for sixty-six conditions. A Medicare recipient is deemed to possess a chronic illness if the administrative data within CMS have a claim showing that the recipient accepted treatment or service for a specific condition. These variables are created to aid scholars in the detection of cohorts of Medicare recipients who have specific illnesses. The condition variables are constructed from algorithms that comb the administrative claims data within CMS for specific MS-DRG codes, procedure codes, or diagnosis codes ("Chronic Conditions Data Warehouse," 2020). The data are compiled from all 50 U.S. states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

The G*Power analysis required a sample size of 55 (power = 0.80 and alpha = 0.05). The secondary datasets cover the entire population of interest--heart failure

Medicare beneficiaries 65 years and over from 50 US states. There were no discrepancies in the data noted. Nonapplicable data were excluded to segregate the subpopulation of heart failure Medicare beneficiaries' mortality and readmission rates.

Baseline Characteristics, Population Representativeness

Table 2 presents the descriptive statistics concerning the study population. The analysis looked at heart failure prevalence (independent variable) and the mortality and readmission rates (dependent variables) of Medicare patients 65 years of age and above. The N for each year is 53 (rather than 50 states) because some U.S. territories such as the Virgin Islands are included in the data.

Table 2

Means and Medians of Heart Failure Prevalence, Readmission Rates, and Mortality

Year	Heart Failure Prevalence (%)		Readmission Rates (%)		Mortality (Count)	
	Mean (SD)	Median	Mean (SD)	Median	Mean (SD)	Median
2015 (N = 53)	12.2 (1.8)	12.0	23.5 (2.1)	23.7	17,399 (15,911)	13,999

2016 (N=53)	12.2 (1.8)	12.2	23.5 (2.1)	24.1	25,813.2 (24,645)	20,894
2017 (N=53)	12.1 (1.9)	12.2	23.8 (2.2)	24.0	18,030.2 (17,874)	12,166

The information utilized in the CMS Chronic Conditions Data Warehouse reports over the three years (2015, 2016, 2017) is based upon claims data and administrative enrollment within CMS for Medicare recipients registered in the fee-for-service system ("Chronic Conditions," 2020). Every Medicare recipient's status and age are data item as recorded is the actual value as of the last day of the year concluded based on a value at the end of the year ("Data Sources and Methodology," 2020). Utilizing eligibility and claims data allows the researcher to analyze death and readmission rates without needing to examine medical charts or asking hospitals for additional data. The mortality and readmission measures incorporate hospitalizations for Medicare recipients over the age of 65 who were registered in Original Medicare 1 year prior to their hospital admittance. When concerning readmission rates, measures involved Medicare recipients 65 and over registered in Original Medicare for 30 days following their initial admittance ("Readmission and Death Measures," 2020).

Study Results

This subsection includes the statistical assumptions, research questions, results of the statistical analysis findings, hypotheses test results, answers to the research questions, and concludes with a summary of the study results.

Statistical Assumptions

The reason for using Pearson's correlation is to determine the degree of relationship that occurs between two variables. The assumptions for its use are that the two variables must be continuous, there is a linear relationship between them, no significant outliers are evident, and the variables must be approximately normally distributed (Laerd Statistics, n.d.a). Assumptions for using multiple regression analysis are that the dependent variable should be measured on a dichotomous scale, there is at least one continuous independent variable, independence of observations must exist, a linear relationship exists between the dependent and independent variables, there must be mutually exclusive dependent variables; and the data must display homoscedasticity (Laerd Statistics, n.d.b). For this study, the statistical assumptions were met and correlational and multiple regression analysis were conducted and analyzed.

Research Questions

RQ1: Is there a relationship between the Medicare-covered services for care and mortality rates of patients 65 years and over with heart failure?

*H*1: There is no relationship between Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

*H*1: There is a relationship between Medicare-covered services for care and mortality of patients 65 years and over with heart failure.

RQ2: Is there a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure?

*H*2: There is no relationship between the Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

*H*2: There is a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure.

Results of Correlational Analysis

Correlational analysis was conducted using SPSS version 25. Analysis in SPSS was run using the Analyze>Correlate>Bivariate graphical user interface menu and syntax. Publicly available CMS data for the years 2015, 2016 and 2017 were utilized in this analysis. Variables under study were Medicare heart failure prevalence, heart failure 30-day readmission, and heart failure mortality. Pearson correlation analysis was conducted between Medicare heart failure prevalence and 30-day readmission for each year and between Medicare heart failure prevalence and mortality.

As shown in Table 3, a statistically significant positive correlation was found between Medicare heart failure prevalence and heart failure 30-day readmission for 2015

and 2016 indicating that as Medicare heart failure prevalence increases, heart failure readmission rates also increase for both years 2015 and 2016. Though there is a positive association for the year 2017, the association is not statistically significant. Conventional thresholds for interpreting the size of a correlation coefficient are values below 0.3 indicate a weak correlation; values ranging from 0.3-0.7 indicate a moderate correlation; values >0.7 indicate a strong correlation (Ratner, 2009). A correlation cannot exceed 1 (Ratner, 2009).

Table 3

Pearson Correlational Analyses Between Variables by Year for the Association Between Heart Failure Prevalence and 30-Day Readmission

Year	Variable (X)	Variable (Y)	Correlation Coefficient	P-value
2015	Heart Failure Prevalence	Heart Failure 30-Day Readmission	0.42	0.0017
2016	Heart Failure Prevalence	Heart Failure 30-Day Readmission	0.48	0.0003
2017	Heart Failure Prevalence	Heart Failure 30-Day Readmission	0.25	0.0711

According to Table 4, a statistically significant positive correlation between Medicare heart failure prevalence and heart failure mortality for the years 2015, 2016 and 2017 indicating that as Medicare heart failure prevalence increases, heart failure mortality numbers also increase for years 2015, 2016 and 2017.

Table 4

Pearson Correlational Analyses Between Variables by Year for the Association Between Heart Failure Prevalence and Mortality

Year	Variable (X)	Variable (Y)	Correlation Coefficient	P-value
2015	Heart Failure Prevalence	Heart Failure Mortality	0.48	0.0003
2016	Heart Failure Prevalence	Heart Failure Mortality	0.46	0.0006
2017	Heart Failure Prevalence	Heart Failure Mortality	0.47	0.0004

1. The heart failure mortality presented in this study is not limited to a 30-day period. Mortality data for the 30-day period is sparsely reported in the dataset U.S. States and not reliable.

Results of Multiple Regression Analysis

Publicly available CMS data for the years 2015, 2016 and 2017 were utilized in this analysis. Regression analysis was conducted using the Analyze>Regression>Linear graphical user interface menu and syntax. Variables were Medicare heart failure prevalence, heart failure 30-day readmission, and heart failure mortality. The multiple regression analyses were conducted between Medicare heart failure prevalence and heart failure 30-day readmission for each year. The second set of multiple regression analyses examined the association between Medicare heart failure prevalence and mortality. The predictor variable was assumed to be Medicare heart failure prevalence and the outcome variable is heart failure mortality.

This regression analysis predicts 30-day readmission for Medicare heart failure (Y, denoting the outcome variable). The single predictor is heart failure prevalence (X, denoting the predictor variable). As shown in Table 5, in 2015, higher heart failure prevalence is associated with greater 30-day readmission rates (regression coefficient b=0.48, p=0.002). Since the regression coefficient is 0.48, this means that on average a 1-unit increase in the heart failure prevalence rate corresponds to an average 0.48 increase in 30-day readmission for heart failure, and this association is statistically significant (p=0.002). For 2016, higher heart failure prevalence is associated with greater 30-day readmission rates (regression coefficient b=0.57, p=0.001). Since the regression coefficient is 0.57, this means that on average a 1-unit increase in the heart failure prevalence rate corresponds to an average 0.57 increase in 30-day readmission for heart failure and this

association is statistically significant (p=0.001). The association between the two variables is not statistically significant for the year 2017 (p=0.071).

Table 5

Regression Analysis Between Variables by Year for the Association Between Heart Failure Prevalence and 30-Day Readmission

Year	Variable (X)	Variable (Y)	Regression Coefficient (95% CI)	P-value
2015	Heart Failure Prevalence	Heart Failure 30-Day Readmission	0.48 (0.18-0.77)	0.002
2016	Heart Failure Prevalence	Heart Failure 30-Day Readmission	0.57 (0.27-0.86)	0.001
2017	Heart Failure Prevalence	Heart Failure 30-Day Readmission	0.29 (-0.02-0.61)	0.071

The second set of multiple regression analysis predicts mortality due to heart failure (Y, denoting the outcome variable). The single predictor is Medicare heart failure prevalence (X, denoting the predictor variable). As shown in Table 6, in 2015, higher heart

failure prevalence is associated with greater mortality (regression coefficient b=4142.59, p=0.001). Since the regression coefficient is 4,142.59, this indicates that, on average, a 1-unit increase in the heart failure prevalence rate predicts an average 4,143 increase mortality numbers for heart failure; this association is statistically significant (p=0.001). In 2016, higher heart failure prevalence is associated with greater mortality (regression coefficient b=6248.10, p=0.001). Since the regression coefficient is 6,248.10, this indicates that on average, a 1-unit increase in the heart failure prevalence rate predicts an average 6,248 increase in mortality numbers for heart failure; this association is statistically significant (p=0.001). For 2017, higher heart failure prevalence is associated with greater mortality (regression coefficient b=4468.74, p=0.001). Since the regression coefficient is 4,468.74, this indicates that on average, a 1-unit increase in the heart failure prevalence rate corresponds to an average 4,469 increase in mortality numbers for heart failure; this association is statistically significant (p=0.001).

Table 6

Regression Analysis Between Variables by Year for the Association Between Heart Failure Prevalence and Mortality

Year	Variable (X)	Variable (Y)	Regression Coefficient (95% CI)	P-value
2015	Heart Failure Prevalence	Heart Failure Mortality	4,142.59 (1,991.94 - 6,293.25)	0.001

2016	Heart Failure Prevalence	Heart Failure Mortality	6,248.10 (2,802.64 - 9,693.55)	0.001
2017	Heart Failure Prevalence	Heart Failure Mortality	4,468.74 (2,117.70 - 6,819.78)	0.001

1. The Heart failure mortality presented in this study is not limited to a 30-day period. Mortality data for the 30-day period is sparsely reported in the dataset by the U.S. States and not reliable.

Hypotheses Test Results

Research Question 1. The first research question asked if there is a relationship between the Medicare-covered services for care and mortality rates of patients 65 years and over with heart failure. Both correlational and multiple regression analyses determined with a 95% confidence interval that the independent variable, heart failure utilization of Medicare, was significant in predicting the outcome variable, mortality of heart failure Medicare patients 65 years and over. The predictive relationship was statistically significant per correlational analysis for 2015, 2016, and 2017 (p value = 0.0003, 0.0006, 0.0004) per Table 4 and statistically significant per multiple regression analysis for 2015, 2016, and 2017 (p value = 0.001, 0.001, 0.001) as shown in Table 6 for mortality due to heart failure for Medicare beneficiaries 65 years and over, as the p-values are below the conventional threshold of .05. Therefore, there is a relationship between Medicare-covered services for care and mortality for patients 65 and over with heart failure and the null

hypothesis is rejected: *H_o1: There is no relationship between Medicare-covered services and mortality of patients 65 and over with heart failure.*

Research Question 2. The second research question sought to determine if there is a relationship between Medicare-covered services for care and readmission rates of patients 65 years and over with heart failure. Both correlational and multiple regression analyses determined with a 95% confidence interval that the independent variable, heart failure Medicare utilization, was significant in predicting the outcome variable, readmission rates of heart failure Medicare patients 65 years and over for 2015 and 2016. The predictive relationship was statistically significant per correlational analysis for 2015 and 2016 (p value = 0.0017, 0.0003) as shown in Table 3 and statistically significant per multiple regression analysis for 2015 and 2016 (p value = 0.002, 0.001) as shown in Table 5 for readmission rates due to heart failure for Medicare beneficiaries 65 years and over, as the p-values are below the conventional threshold of .05. However, the relationship was not predictive and not statistically significant for 2017 per correlational analysis (p value = 0.0711) per Table 3 and not statistically significant per multiple regression analysis for 2017 (p value = 0.071) per Table 5 for readmission rates due to heart failure for Medicare beneficiaries 65 years and over, as the p-values are above the conventional threshold of .05. Therefore, there is a relationship between Medicare-covered services for care and readmission rates for patients 65 and over with heart failure for 2015 and 2016 and the null hypothesis is rejected: *H_o2: There is no relationship between Medicare-covered services and readmission rates of patients 65 and over with heart failure.*

Answers to Research Questions

Research question one was answered in that utilization of Medicare does predict mortality of patients 65 years and over with heart failure for 2015, 2016, and 2017. Research question two was answered in that utilization of Medicare does predict readmission rates of patients 65 years and over with heart failure for 2015 and 2016.

Summary

Section 3 contains the analytic results and findings of this doctoral study and includes the data compilation plan; results of the descriptive, correlational analyses, and multiple regression analyses of the hypotheses and research questions; and the important findings. The study examined Chronic Conditions Datawarehouse data from 2015 to 2017 collected by CMS to determine if heart failure Medicare utilization was predictive of mortality and readmission rates of heart failure patients 65 years and over.

Section 4 provides a comprehensive analysis and interpretation of the results and findings of the study. This section includes comparison of findings to the peer-reviewed literature, assessment and explanation of the findings within the context of CMM's framework limitations, recommendations, and conclusions relevant to the study.

Section 4: Application to Professional Practice and Implications for Social Change

The purpose of this quantitative study was to determine if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for

beneficiaries 65 years and over with heart failure. Findings from both correlational and multiple regression analyses revealed significant, predictive relationships of utilization of Medicare and mortality for 2015, 2016, and 2017. The results also revealed significant, predictive relationships of utilization of Medicare and readmission rates of patients 65 years and over with heart failure in 2015 and 2016. Conversely, findings from the correlational and multiple regression analyses indicated no significant predictive relationships between utilization of Medicare and readmission rates for 2017. Section 4 includes an interpretation of the findings, limitations of the study, recommendations for further research, and implications for professional practice and social change.

Interpretation of the Findings

Heart failure Medicare utilization was a significant predictor of mortality for 2015, 2016, and 2017 for heart failure patients 65 years and over. Heart failure Medicare utilization was also a significant predictor of readmission rates for 2015 and 2016. However, utilization of Medicare was not a significant predictor of readmission rates in 2017 for heart failure patients 65 years and over. In the following subsections, the findings of this study are compared with those in the literature and to CCM's framework, which was used to assess the quality of care.

Utilization of Medicare and Heart Failure Outcomes

One study found that Medicare insured the majority (90.9%) of heart failure patients aged 65 years and older, and that individuals with Medicare had considerably shorter durations of stay for heart failure hospitalizations when compared with individuals

possessing other insurance coverages (Chen et al., 2013). In-hospital mortality for Medicare individuals with heart failure dropped from 4.5% in 2001 to 3.3% in 2009. Significant decreases in in-hospital mortality were also detected for Medicare adults aged 65 - 74 years and 75 years or older. Individuals possessing self-pay coverage, private insurance, Medicaid, and Medicare had substantial drops in in-hospital mortality. Utilizing a nationwide all-payer database of institution discharges within the US, the general nationwide hospitalization rate of heart failure fell by a comparative 26.9% from 2001-2009. This drop is comparable in scale to the 29.5% drop for hospitalization rates for heart failure detected in the population with Medicare from 1998 to 2008. Adults of standard Medicare age (greater than or equal to 65 years old) had statistically significant decreases over time in duration of stay during the period of the study. Elderly patients usually have several comorbidities, and thus possibly additional chances to lessen length of stay (LOS) through more rigorous utilization of expert nursing accommodations or more referrals to hospice care, both of which have increased with Medicare over the past ten years. Even though in-hospital mortality has reduced throughout the past ten years amongst Medicare beneficiaries, 30-day mortality has gradually reduced as a result of an increased amount of deaths that transpire the following discharge from heart failure hospitalization (Chen et al., 2013).

Driscoll et al., 2016, examined Medicare claims data and found that of the individuals admitted for heart failure, an outpatient visit did not occur for approximately 52% of individuals. Heart failure medical procedures require prompt check-up seven to ten days after discharge (Driscoll et al., 2016). Most analyses of information from The

Longitudinal Health and Retirement Study have reported that insurance coverage in near-elderly individuals is associated with a slower rate of health deterioration and reduced mortality (Woolhandler & Himmelstein, 2017). Similarly, two US studies and one Canadian study compared mortality trends across matched locations without and with coverage expansions and reported that greater coverage was associated with lower mortality (Woolhandler & Himmelstein, 2017).

Readmission Rates Among Heart Failure Patients 65 Years and Over

By the beginning of 2014, two thirds of hospitals were already penalized for excess readmission rates (Chamberlain et al., 2018). As a result, health centers and hospitals began to prioritize detecting heart failure patients with the highest risk of readmission and authorizing preventative intervention and early risk stratification. Medicare beneficiaries have higher readmission rates compared to individuals with private insurance and Medicaid (Chamberlain et al., 2018). Medicare recipients with heart failure have the highest readmission rates, with research indicating that 18% of six-month all-cause readmission rates were due to heart failure. In a study examining administrative discharge figures on 41,776 individuals admitted to 236 hospitals in New York State, there was a declining trend in heart failure readmission rates from the lowermost income quartile to the uppermost (Chamberlain et al., 2018). The authors also discovered that salary was a statistically significant predictor of readmission, with lower salaries associated with a greater likelihood of readmission (Chamberlain et al., 2018).

Even though overall rates for heart failure hospitalization among Medicare recipients decreased between 1998 and 2008, unexpected readmissions continue to be a common occurrence, with approximately one in four patients readmitted within 30 days of discharge. In a study analyzing Medicare heart failure claims from 2009-2012, only 1.4% of hospitals had attained a 20% decrease in 30-day readmission rates by December of 2012. This percentage was similar to those from reports based on data from the Hospital Compare database, in which only 2.6% of hospital sites attained a 20% relative decrease from the periods of July 2006 to June 2009 vs. July 2009 to June 2012. These outcomes for heart failure patients are reliable, with current information indicating that reductions in overall readmission rates for fee-for-service Medicare recipients have been minimal, despite financial incentives and increased efforts among health systems (Bergethon et al., 2016).

Mortality Among Heart Failure Patients 65 Years and Over

A retrospective cohort study, conducted from 2002 – 2005, comprised of about 8 million Medicare beneficiary fee-for-service hospitalizations for heart failure, acute myocardial infarctions, and pneumonia of patients 65 years and above. The retrospective study reported a considerable surge in trends in 30-day post discharge mortality among Medicare recipients admitted for heart failure. The declaration and execution of the Hospital Readmission Reductions Program (HRRP) was linked with a substantial increase in death rates within 30 days of release from the hospital among Medicare recipients who were admitted for pneumonia and heart failure, but not for acute myocardial infarction.

Even though 30-day post discharge death rates for heart failure was growing before the HRRP implementation, this surge quickened following the declaration and execution of the program. Additionally, post discharge death rates for pneumonia was steady before the HRRP implementation but escalated after declaration and execution of the program. The surge in mortality for pneumonia and heart failure were propelled primarily by patients who were not admitted again within 30 days of release from the hospital. The authors state that further research is required in order to find out if increased mortality for heart failure patients are a result of the HRRP (Wadhera et al., 2018).

Chronic Care Model for Heart Failure

Though broad implementation of the Chronic Care Model has occurred globally for managing chronic illness, few studies have examined its success in enhancing outcomes in patients with heart failure (Ballo et al., 2018). A metanalysis established that CCM is beneficial for heart failure patient care, but has considerable variations in success (Drewes et al., 2012).

The CCM was independently linked to a 35% likely decrease in hospitalization for heart failure (Ballo et al., 2018). After an initial admission for heart failure, no variations were detected between the two categories (the control group and CCM group) in danger of additional hospitalizations for heart failure. There was no substantial difference between the control and the CCM group in regard to 30-day heart failure readmission rates after an initial hospitalization. When urgent and planned hospitalizations for heart failure were considered separately, CCM was linked to a pointedly greater rate of hospitalizations.

Through multivariate analysis, it was established that CCM was linked to an 18% lower risk of mortality. Remarkably, even after being admitted, heart failure patients in the CCM group indicated a 16% lower risk of death compared to controls. Results indicated that CCM patients had a lower risk of death, but an increased risk of being admitted to the hospital for heart failure than a matched control populace. Previous studies, typically conducted in hospitals, have reported that implementation of CCM for heart failure patients with continuing cardiac issues could be beneficial, but there is variability in its success (Ballo et al., 2018).

Limitations of the Study

Though this study contributes to the literature by identifying important associations, it is important to note its limitations. First, as with most secondary datasets, the data were not prospectively collected or designed and thus some important variables are missing from the dataset. Specifically, it would have been useful to adjust for the potential role of comorbidities such as history of hypertension and diabetes (Murad et al., 2015). Regarding readmissions, prior admissions tend to influence 30-day readmission in care for patients with heart failure (Hummel et al., 2014). These limitations should be considered when interpreting the findings of this study.

The strength and generalizability of this study are that it utilizes CMS data which covers beneficiaries' encounters with health care providers including procedures and services received. CMS data is a reliable and valid source of data for research and medical decision-making (Mahmoudi et al., 2015).

Recommendations

The limitations of the study reveal possible areas for improvement for future academic researchers. To extend the research, covariates such as diabetes and hypertension could be included (Murad et al., 2015). Common non-cardiac comorbidities for older adults with heart failure include diabetes mellitus, malnutrition, sleep apnea, cognitive dysfunction, chronic kidney disease, anemia, depression, and arthritis. Not surprisingly, some comorbid illnesses are associated with higher mortality in heart failure individuals 65 years and over, including depression, diabetes mellitus, chronic kidney disease, and cerebrovascular disease, with comorbid cerebrovascular disease having the greatest mortality rate (Murad et al., 2015). Furthermore, the research could be extended to focus on the impact of socioeconomic variables, such as race/ethnicity and marital status, on Medicare heart failure patients 65 years and over. Marital status and race are key reasons that contribute to the probability of readmission in heart failure patients 65 years and over (Damiani et al., 2015).

Implications for Professional Practice and Social Change

This section presents implications for professional practice and positive social change pertinent to readmissions and mortality for Medicare heart failure patients 65 years and over. Financial penalties are being placed upon hospitals for excess readmissions for heart failure patients (up to 3% of Medicare payments) for a year. Many hospitals are not able to continue business when dealing with financial trials (supply costs and labor) because profit status of the hospital is dependent upon hospital closures (Countouris et al.,

2014). While financial penalties persist, this study can aid health care administrators in recognizing some elements of hospital readmissions and mortality for heart failure patients 65 years and over.

Professional Practice

The results of this study indicate high mortality for heart failure patients 65 years and over. Data indicates that transitional care interventions (nurse visits to patients' homes) can decrease mortality rates and rates of readmission by over 30% for heart failure patients 65 years and over. Numerous health organizations have not implemented such plans. Experts in health policy state that non-implementation of the programs for transitional care could be due to concerns regarding costs (Blum et al., 2020). Hospital administrators can utilize the study to decide which transitional services are most cost-effective for its hospital system, rural population, and overall patient base. High readmission rates were also found in this study for Medicare heart failure patients 65 years and over. Avoidable readmissions to the hospital cost Medicare over $15 billion yearly (McHugh & Ma, 2013). Readmissions threaten the wellbeing of the frail, elderly who are especially susceptible to functional loss, infections acquired within the hospital, and other poor results once admitted to the hospital (McHugh & Ma, 2013). Pinpointing approaches to decreasing avoidable hospitalization can be beneficial to healthcare administrators and hospitals. A survey of preventative practices within hospitals and their impact on decreasing 30-day heart failure readmission rates include partnering with health systems and community physicians (Ziaeian, B. & Fonarow, 2016).

Positive Social Change

As individuals age, incidence of heart failure increases, and prevalence of heart failure is estimated to increase by 46% between 2012 to 2030 in the aging US population (Jackson et al., 2018). Elderly heart failure adults have a 5-year mortality close to 50% (Jackson et al., 2018). Mortality following a heart failure diagnosis has shown only small improvement in the 21st century falling behind preventative practices employed with other severe illnesses, such as cancer. Innovative approaches to attain well-timed identification and treatment initiation for all socioeconomic populations must become a main concern for upcoming research, healthcare administrators, and policymakers (Taylor et al., 2019).

Heart failure is the primary reason for hospitalizations among elderly adults and heart failure Medicare recipients possess the highest rate of readmission of any illness (Jackson et al., 2018). Through the Hospital Readmissions Reduction Program, specific kinds of hospitals are more prone than others to receive penalties. These consist of hospitals with comparatively greater amounts of low-income Medicare recipients and large academic hospitals (Boccuti & Casillas, 2018). Congress passed legislation to include a socioeconomic modification in the way hospital execution is assessed, centered on every hospital's number of inpatients who are dually eligible for full Medicaid and Medicare (Boccuti & Casillas, 2018). The enactment of this approach must take into consideration various important policy matters. A crucial question remains: How can care be improved for patients with the highest health care needs, especially for patients admitted to the hospital once or more in a year? An ongoing reduction in avoidable rates of readmission

could aid in decreasing the rise in Medicare expenditure and could also indicate better care for patients for the duration of their hospital stay (Boccuti & Casillas, 2018). Through these methods, the implication for positive social change is maintaining and improving access to care for all patients.

This study has provided clarity about utilization of Medicare, mortality rates, and readmission rates of heart failure Medicare beneficiaries 65 years and over. The relationship between these variables indicates a need for improved quality of care. Therefore, as healthcare administrators develop understanding of the mortality and readmission rates of Medicare heart failure beneficiaries, the strategies to be adapted for decreasing mortality and readmissions of patients will ultimately result in improved quality of care for patients.

Conclusion

This study identified if there is a relationship between Medicare-covered services for care, mortality rates, and readmission rates for beneficiaries 65 years and over with heart failure. Based on the findings of this study, it can be concluded that covariates and a focus on the impact of socioeconomic variables on Medicare beneficiaries 65 years and over with heart failure should be included for future research.

Overall, this study addressed the gap regarding the impact of the utilization of Medicare on mortality rates and readmission rates of beneficiaries over the age of 65 with heart failure. The study concluded significant, predictive relationships of utilization of Medicare and mortality for 2015, 2016, and 2017. The results also revealed significant,

predictive relationships of utilization of Medicare and readmission rates of patients 65 years and over with heart failure in 2015 and 2016. Healthcare administrators can utilize the results of this study to concentrate on developing approaches that decrease avoidable hospitalization and finding innovative approaches to attain well-timed identification and treatment initiation for all socioeconomic groups. Finally, the Chronic Care Model's conceptual framework was utilized as the theoretical foundation and used to comprehend the quality of care provided to heart failure patients.

References

About CMS. (2019). Retrieved from https://www.cms.gov/About-CMS/About-CMS.html

About hospital compare data. (2020). Retrieved from https://www.medicare.gov/hospitalcompare/Data/About.html

Amarasingham, R., Moore, B. J., Tabak, Y. P., Drazner, M. H., Clark, C. A., Zhang, S., Halm, E. A. (2010). An automated model to identify heart failure patients at risk for 30-day readmission or death using electronic medical record data. *Medical Care, 48(11),* 981–988. http://dx.doi: 10.1097/mlr.0b013e3181ef60d9

Azad, N., & Lemay, G. (2014). Management of chronic heart failure in the older population. *Journal of geriatric cardiology: JGC, 11(4),* 329–337. http://dx.doi.org/10.11909/j.issn.1671-5411.2014.04.008

Baek, H., Cho, M., Kim, S., Hwang, H., Song, M., & Yoo, S. (2018). Analysis of length of hospital stay using electronic health records: A statistical and data mining approach. *PloS one, 13(4).* http://dx.doi.org/10.1371/journal.pone.0195901

Ballo, P., Profili, F., Policardo, L., Roti, L., Francesconi, P., & Zuppiroli, A. (2018). Opposite trends in hospitalization and mortality after implementation of a chronic care model-based regional program for the management of patients with heart failure in primary care. *BMC Health Services Research, 18(1).* http://dx.doi.org/10.1186/s12913-018-3164-0

Bambhroliva, A. B., Donnelly, J. P., Thomas, E. J., Tyson, J. E., Miller, C. C., McCullough, L. D., & Vahidy, F. S. (2018). Estimates and temporal trend for US nationwide 30-day hospital readmission among patients with ischemic and

hemorrhagic stroke. *JAMA Network Open, 1(4).* http://dx.doi.org/10.1001/jamanetworkopen.2018.1190

Benjamin, E. J., Blaha, M. J., Chiuve, S. E., Cushman, M., Das, R. S., & Deo, R. (2017). Heart disease and stroke statistics-2017 update: A report from the American Heart Association. *Circulation, 135(10),* 146–603. http://dx.doi.org/10.1161/CIR.0000000000000485

Bergethon, K. E., Ju, C., DeVore, A. D., Hardy, N. C., Fonarow, G. C., Yancy, C. W., Heidenreich, P. A., Bhatt, D. L., Peterson, E. D., & Hernandez, A. F. (2016). Trends in 30-day readmission rates for patients hospitalized with heart failure: Findings from the Get With The Guidelines-Heart Failure registry. *Circulation. Heart failure, 9(6),* http://dx.doi.org/10.1161/CIRCHEARTFAILURE.115.002594

Berliner, D., & Bauersachs, J. (2018). Drug treatment of heart failure in the elderly. *Pharmakologische Therapie der Herzinsuffizienz beim alten Patienten*, *43(3),* 207–213. http://dx.doi.org/10.1007/s00059-017-4668-9

Blais, C., Dai, S., Waters, C., Robitaille, C., Smith, M., Svenson, L. W., Tu, K. (2014). Assessing the burden of hospitalized and community-care heart failure in Canada. *Canadian Journal of Cardiology, 30(3),* 352–358. http://dx.doi.org/10.1016/j.cjca.2013.12.013

Bleckler, S., Herrin, J., Li, L., Yu, H., Grady, J. N., & Horwitz, L. I. (2019). Trends in hospital readmission of Medicare-covered patients with heart failure. *Journal of the American College of Cardiology, 73(9),* 1004-1012. http://dx.doi.org/10.1016/j.jacc.2018.12.040

Blum, M. R., Øien, H., Carmichael, H. L., Heidenreich, P., Owens, D. K., & Goldhaber-Fiebert, J. D. (2020). Cost-Effectiveness of transitional care services after hospitalization with heart failure. *Annals of Internal Medicine*, *172(4)*, 248. http://dx.doi.org/10.7326/m19-1980

Boccuti, C., & Casillas, G. (2018, February 16). Aiming for fewer hospital u-turns: The Medicare Hospital Readmission Reduction Program. Retrieved from https://www.kff.org/medicare/issue-brief/aiming-for-fewer-hospital-u-turns-the-medicare-hospital-readmission-reduction-program/

Bogner, R., Miller, D., Vries, F., Chatre, S., Jayadevappa, R. (2010). Assessment of cost and health resource utilization for elderly patients with heart failure and diabetes mellitus. *J Cardiac Fail, 16(6),* 454-60

Borzecki, A. M., Chen, Q., Mull, H. J., Schwartz, M., Bhatt, D. L., Hanchate, A., & Rosen, A. K. (2016). Do acute myocardial infarction and heart failure readmissions flagged as potentially preventable by the 3mM potentially preventable readmissions software have more process-of-care problems. *Circulation: Cardiovascular Quality and Outcomes*, *9(5)*, 532–541. http://dx.doi.org/10.1161/circoutcomes.115.002509

Brydges, C. (2019). Effect size interpretation, sample size calculation, and statistical power in gerontology. http://dx.doi.org/10.31234/osf.io/u2jbm

Butrous, H., & Hummel, S. L. (2016). Heart failure in older adults. *The Canadian Journal of Cardiology*, *32(9)*, 1140–1147. http://dx.doi.org/10.1016/j.cjca.2016.05.005

Bytyci, I., & Bairaktari, G. (2015). Mortality in heart failure patients. *The Canadian*

Journal of Cardiology, *32(9)*, 1140–1147. http://dx.doi.org/10.5152/akd.2014.5731

Chamberlain, R. S., Sond, J., Mahendraraj, K., Lau, C. S., & Siracuse, B. L. (2018). Determining 30-day readmission risk for heart failure patients: The readmission after heart failure scale. *International journal of general medicine*, *11*, 127-141. http://dx.doi.org/10.2147/IJGM.S150676

Chen, J., Dharmarajan, K., Wang, Y., & Krumholz, H. M. (2013). National trends in heart failure hospital stay rates, 2001 to 2009. *Journal of the American College of Cardiology*, *61(10)*, 1078-1088. http://dx.doi.org/10.1016/j.jacc.2012.11.057

Chen, L., Levine, D., Hayward, R., Cox, M., Schulte, P., Devore, A., & Fonarow, G. (2018). Relationship between hospital 30-day mortality rates for heart failure and patterns of early inpatient comfort care. *Journal of Hospital Medicine*, *13(3)*, 170-176. http://dx.doi.org/10.12788/jhm.2862

Chronic Conditions. (2020). Retrieved from www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main

Chronic Conditions Data Warehouse. (2020). Retrieved from www2.ccwdata.org/web/guest/condition-categories

Countouris, M., Gilmore, S., & Yonas, M. (2014). Exploring the impact of a community hospital closure on older adults: A focus group study. *Health & place*, *26*, 143-148. https://dx.doi.org/10.1016/j.healthplace.2013.11.008

Cowie, M. R., Anker, S. D., Cleland, J. G., Felker, G. M., Filippatos, G., Jaarsma, T., & Lopez-Sendon, J. (2014). Improving care for patients with acute heart failure: Before, during and after hospitalization. *ESC Heart Failure*, *1(2)*, 110–145.

http://dx.doi.org/10.1002/eheart failure2.12021

Damiani, G., Salvatori, E., Silvestrini, G., Ivanova, I., Bojovic, L., Iodice, L., & Ricciardi, W. (2015). Influence of socioeconomic factors on hospital readmissions for heart failure and acute myocardial infarction in patients 65 years and older: evidence from a systematic review. *Clinical interventions in aging, 10,* 237–245. https://dx.doi.org/10.2147/CIA.S71165

Danielsen, R., Thorgeirsson, G., Einarsson, H., Ólafsson, Ö., Aspelund, T., Harris, T. B., Launer, L., & Gudnason, V. (2017). Prevalence of heart failure in the elderly and future projections: the AGES-Reykjavík study. *Scandinavian cardiovascular journal: SCJ, 51(4),* 183–189. http://dx.doi.org/10.1080/14017431.2017.1311023

Data sources and methodology. (2020). Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMSProgramStatistics/DataSourcesMethodology

Death rates. (2020). Retrieved from www.medicare.gov/hospitalcompare/Data/Death-rates.html

Dharmararajan, K., Wang, Y., Lin, Z., Normand, S. T., Ross, J. S., Horwitz, L. I., & Krumholz, H. M. (2017). Association of changing hospital readmission rates with mortality rates after hospital discharge. *Jama, 318(3),* 270. http://dx.doi.org/10.1001/jama.2017.8444

Díez-Villanueva, P., & Alfonso, F. (2016). Heart failure in elderly. *Journal of Geriatric Cardiology: JGC, 13(2),* 115-117. http://dx.doi.org/10.11909/j.issn.1671-5411.2016.02.009

Drewes, H. W., Steuten, L. M., Lemmens, L. C., Baan, C. A., Boshuizen, H. C., Elissen, A. M., & Vrijhoef, H. J. (2012). The Effectiveness of Chronic Care Management for heart failure: Meta-Regression Analyses to Explain the Heterogeneity in Outcomes. *Health Services Research, 47(5), 1926-1959*. http://dx.doi.org/10.1111/j.1475-6773.2012.01396.x

Driscoll, A., Meagher, S., Kennedy, R., Hay, M., Banerji, J., Campbell, D., & Patsamanis, H. (2016). What is the impact of systems of care for heart failure on patients diagnosed with heart failure: A systematic review. *BMC cardiovascular disorders, 16(1),* 195. http://dx.doi.org/10.1186/s12872-016-0371-7

Dunlay, S., Shah, N., Shi, Q., Morlan, B., Vanhouten, H., Long, K., & Roger, V. (2011). Lifetime costs of medical care after heart failure diagnosis. *Circulation: Cardiovascular Quality and Outcomes, 4(1),* 68-75. http://dx.doi.org/10.1161/circoutcomes.110.957225

Fiandt, K. (2006). The Chronic Care Model: Description and application of practice. Retrieved from www.medscape.com/viewarticle/549040

Fitch, K., Lau, J., Engel, T., Medicis, J. J., Mohr, J. F., & Weintraub, W. F. (2018). The cost impact to Medicare of shifting treatment of worsening heart failure from inpatient to outpatient management settings. *ClinicoEconomics and outcomes research: CEOR, 10,* 855-863. http://dx.doi.org/10.2147/CEOR.S184048

Fitch, K., Pelizzari, P. M., & Pyenson, B. (2016). Inpatient utilization and costs for Medicare fee-for-service beneficiaries with heart failure. *American health and drug benefits, 9(2),* 96–104. Retrieved from

https://www.researchgate.net/publication/303402801_Inpatient_Utilization_and_Costs_for_Medicare_Fee-for-Service_Beneficiaries_with_Heart_Failure

Guerra, F., Brambatti, M., Mattassini, M. V., & Capucci, A. (2017). Current therapeutic options for heart failure in elderly patients. *BioMed Research International, 2017*, 1-11. http://dx.doi.org/10.1155/2017/1483873

Heidenreich, P. A., Albert, N. M., Allen, L. A., Bluemke, D. A., Butler, J., & Fonarow, G. C. (2013). Forecasting the impact of heart failure in the United States: A policy statement from the American Heart Association. *Circulation. Heart Failure*, *6(3)*, 606-619. http://dx.doi.org/10.1161/Heartfailure.0b013e318291329a

Horwitz, L. I., Wang, Y., Desai, M. M., Curry, L. A., Bradley, E. H., Drye, E. E., & Krumholz, H. M. (2012). Correlations among risk-standardized mortality rates and among risk-standardized readmission rates within hospitals. *Journal of hospital medicine, 7(9)*, 690-696. http://dx.doi.org/10.1002/jhm.1965

Hospital mortality and readmission data. (2018). Retrieved from healthjournalism.org/resources-data-details.php?id=7#.Xk8BIWhKjIV

Hummel, S. L., Katrapati, P., Gillespie, B. W., Defranco, A. C., & Koelling, T. M. (2014). Impact of prior admissions on 30-day readmissions in Medicare heart failure inpatients. *Mayo Clinic proceedings*, *89(5)*, 623–630. https://dx.doi.org/10.1016/j.mayocp.2013.12.018

Jackson, S. L., Tong, X., King, R. J., Loustalot, F., Hong, Y., & Ritchey, M. D. (2018). National burden of heart failure events in the United States, 2006 to 2014. *Circulation: Heart Failure*, *11(12).*

https://dx.doi.org/10.1161/circheartfailure.117.004873

Kilgore, M., Patel, H. K., Kielhorn, A., Maya, J. F., & Sharma, P. (2017). Economic burden of hospitalizations of Medicare beneficiaries with heart failure. *Risk management and healthcare policy*, *10*, 63-70. http://dx.doi.org/10.2147/RMHP.S130341

Krumholz, H., Lin, Z., Keenan, P., Chen, J., Ross, J., Drye, E., & Normand, S. (2013). Relationship between hospital readmission and mortality rates for patients hospitalized with Acute Myocardial Infarction, Heart Failure, or Pneumonia. *Jama*, *309(6)*, 587. http://dx.doi.org/10.1001/jama.2013.333

Krumholz, H., Nuti, S., Downing, N., Normand, S., & Wang, Y. (2015). Mortality, hospitalizations, and expenditures for the Medicare population aged 65 years or older, 1999-2013. *Jama*, *314(4)*, 355. http://dx.doi.org/10.1001/jama.2015.8035

Kumbhani, D. J., Fonarow, G. C., Heidenreich, P. A., Schulte, P. J., Lu, D., Hernandez, A., & Bhatt, D. L. (2018). Association between hospital volume, processes of care, and outcomes in patients admitted with heart failure. *Circulation*, *137(16)*, 1661-1670. http://dx.doi.org/10.1161/circulationaha.117.028077

Laerd Statistics. (n.d.a.). Pearson's Product-Moment Correlation using SPSS Statistics. Retrieved April 18, 2020 from https://statistics.laerd.com/spss-tutorials/pearsons-product-moment-correlation-using-spss-statistics.php

Laerd Statistics. (n.d.b.). Multiple Regression Analysis Using SPSS Statistics. Retrieved April 18, 2020 from https://statistics.laerd.com/spss-tutorials/multiple-regression-using-spss-statistics.php

Leonard, C. E., Brensinger, C. M., Nam, Y. H., Bilker, W. B., Barosso, G. M., Mangaali, M. J., & Hennessey, S. (2017). The quality of Medicaid and Medicare data obtained from CMS and its contractors: Implications for pharmacoepidemiology. *BMC Health Services Research, 17(1)*. http://dx.doi.org/10.1186/s12913-017-2247-7

Lesyuk, W., Kriza, C., & Kolominsky-Rabas, P. (2018). Cost-of-illness studies in heart failure: A systematic review 2004–2016. *BMC Cardiovascular Disorders, 18(1)*. http://dx.doi.org/10.1186/s12872-018-0815-3

Lorenzini, M., Ricci, C., Riccomi, S., Abate, F., Casalgrandi, B., Quattrini, B., & Capelli, O. (2016). Integrated care for heart failure in primary care. *Primary Care in Practice - Integration Is Needed*. http://dx.doi.org/10.5772/63946

Madan, S. A., Fida, N., Barman, P., Sims, D., Shin, J., Verghese, J., & Patel, S. R. (2016). Frailty assessment in advanced heart failure. *Journal of Cardiac Failure, 22(10)*, 840–844. http://dx.doi.org/10.1016/j.cardfail.2016.02.003

Mahmoudi, E., Kotsis, S. V., & Chung, K. C. (2015). A Review of the Use of Medicare Claims Data in Plastic Surgery Outcomes Research. *Plastic and reconstructive surgery. Global open*, *3*(10), e530. https://doi.org/10.1097/GOX.0000000000000497

Maggioni, A. P., Dahlstrom, U., Filippatos, G., Chioncel, O., Leiro, M., Drozdz, J., & Tavazzi, L. (2013). EURObservationalResearch Programme: Regional differences and 1-year follow-up results of the heart failure pilot survey (ESC-Heart Failure Pilot). *European Journal of Heart Failure, 15(7)*, 808-817.

http://dx.doi.org/10.1093/eurjheart failure/heart failuret050

McHugh, M. D., & Ma, C. (2013). Hospital nursing and 30-day readmissions among Medicare patients with heart failure, acute myocardial infarction, and pneumonia. *Medical care*, *51(1)*, 52–59. https://dx.doi.org/10.1097/MLR.0b013e3182763284

McIlvennan, C. K., Eapen, Z. J., & Allen, L. A. (2015). Hospital readmissions reduction program. *Circulation*, *131(120)*, 1796–1803. http://dx.doi.org/10.1161/CIRCULATIONAHA.114.010270

McLeod, S. (2019). What's the difference between qualitative and quantitative research? Retrieved from www.simplypsychology.org/qualitative-quantitative.html#Quantitative-Research

Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., & Cushman, M. (2016). Heart disease and stroke statistics-2016 update a report from the American Heart Association. *Circulation*, *133(4)*, 38-48. http://dx.doi.org/10.1161/CIR.0000000000000350

Mues, K. E., Liede, A., Liu, J., Wetmore, J. B., Zaha, R., Bradbury, B. D., ... Gilbertson, D. T. (2017). Use of the Medicare database in epidemiologic and health services research: A valuable source of real-world evidence on the older and disabled populations in the US. *Clinical epidemiology*, *9*, 267–277. http://dx.doi.org/10.2147/CLEP.S105613

Murad, K., Goff, D. C., Morgan, T. M., Burke, G. L., Bartz, T. M., Kizer, J. R., & Kitzman, D. W. (2015). Burden of Comorbidities and Functional and cognitive

impairments in elderly patients at the initial diagnosis of heart failure and their impact on total mortality: The cardiovascular health study. *JACC. Heart Failure, 3(7),* 542–550. http://dx.doi.org/10.1016/j.jcheart failure.2015.03.004

Obi, E. N., Swindle, J. P., Turner, S. J., Russo, P. A., & Altan, A. (2016). Health care costs for patients with heart failure escalate nearly 3-fold in final months of life. *Journal of Managed Care & Specialty Pharmacy*, *22(12),* 1446-1456. http://dx.doi.org/10.18553/jmcp.2016.22.12.1446

Ody, C., Msall, L., Dafny, L. S., Grabowski, D. C., & Cutler, D. M. (2019). Decreases in readmissions credited to Medicare's program to reduce hospital readmissions have been overstated. *Health Affairs*, *38(1),* 36–43. http://dx.doi.org/ 10.1377/hlthaff.2018.05178

Pacho, C., Domingo, M., Nunez, R., Lupon, J., Nunez, J., Barallat, J., & Bayes-Genis, A. (2018). Predictive biomarkers for death and rehospitalization in comorbid frail elderly heart failure patients. *BMC Geriatrics*, *18(1).* http://dx.doi.org/10.1186/s12877-018-0807-2

Ratner, B. (2009). The correlation coefficient: Its values range between 1/−1, or do they? *Journal of Targeting, Measurement and Analysis for Marketing*, *17(2),* 139–142. http://dx.doi.org/10.1057/jt.2009.5

Readmission and death measures. (2020). Retrieved from www.medicare.gov/hospitalcompare/Data/30-day-measures.html.

Readmissions-Reductions program. (2019). Retrieved from www.cms.gov/Medicare/Medicare-Fee-for-Service-

Payment/AcuteInpatientPPS/Readmissions-Reduction-Program.html.

Riet, E., Hoes, A., Limburg, A., Landman, M., Hoeven, H., & Rutten, F. (2014). Prevalence of unrecognized heart failure in older persons with shortness of breath on exertion. *European Journal of Heart Failure, 16(7)*, 772-777. http://dx.doi.org/10.1002/ejheart failure.110

Rodriguez-Pascual, C., Paredes-Galan, E., Vilches-Moraga, A., Ferrero-Martinez, A. I., Torrente-Carballido, M., & Rodriguez-Artalejo, F. (2014). Comprehensive geriatric assessment and 2-year mortality in elderly patients hospitalized for Heart Failure. *Circulation: Cardiovascular Quality and Outcomes, 7(2),* 251–258. http://dx.doi.org/ 10.1161/circoutcomes.113.000551

Roshanghalb, A., Mazzali, C., & Lettieri, E. (2019). Multi-level models for heart failure patients' 30-day mortality and readmission rates: The relation between patient and hospital factors in administrative data. *BMC Health Services Research, 19(1).* http://dx.doi.org/10.1186/s12913-019-4818-2

Schaik, P. V., Peng, Y., Ojelabi, A., & Ling, J. (2019). Explainable statistical learning in public health for policy development: The case of real-world suicide data. *BMC Medical Research Methodology, 19(1).* http://dx.doi.org/10.1186/s12874-019-0796-7

Stellefson, M., Dipnarine, K., & Stopka, C. (2013). The Chronic Care Model and diabetes management in US primary care settings: A systematic review. *Preventing Chronic Disease, 10.* http://dx.doi.org/10.5888/pcd10.120180

Taylor, C. J., Ordóñez-Mena, J. M., Roalfe, A. K., Lay-Flurrie, S., Jones, N. R., Marshall,

T., & Hobbs, F. D. R. (2019). Trends in survival after a diagnosis of heart failure in the United Kingdom 2000-2017: Population based cohort study. *BMJ*, l223. http://dx.doi.org/10.1136/bmj.l223

Wadhera, R. K., Maddox, K. E., Wang, Y., Shen, C., & Yeh, R. W. (2018). 30-day episode payments and heart failure outcomes among Medicare beneficiaries. *JACC: Heart Failure, 6(5),* 6(5), 379-387. http://dx.doi.org/10.1016/j.jcheart failure.2017.11.010

What is Medicare? (2018). Retrieved from www.medicare.gov/what-medicare-covers/your-medicare-coverage-choices/whats-medicare

What is Medicare Part C? (2014). Retrieved from https://www.hhs.gov/answers/medicare-and-medicaid/what-is-medicare-part-c/index.html

Woolhandler, S., & Himmelstein, D. (2017). The relationship of health insurance and mortality: Is lack of insurance deadly? *Annals of Internal Medicine, 167(6),* 424. http://dx.doi.org/10.7326/m17-1403

Yim, C. K., Barron, Y., Moore, S., Murtaugh, C., Lala, A., Aldridge, M., & Gelfman, L. P. (2017). Hospice enrollment in patients with advanced heart failure decreases acute medical service utilization. *Circulation, 10(3).* http://dx.doi.org/10.1161/CIRCHEARTFAILURE.116.003335

Zhao, Q., Wang, L., Kurlansky, P. A., Schein, J., Baser, O., & Berger, J. S. (2019). Cardiovascular outcomes among elderly patients with heart failure and coronary artery disease and without atrial fibrillation: A retrospective cohort study. *BMC cardiovascular disorders, 19(1),* 19. http://dx.doi.org/10.1186/s12872-018-0991-1

Ziaeian, B., & Fonarow, G. C. (2016). The prevention of hospital readmissions in heart

failure. *Progress in cardiovascular diseases, 58(4)*, 379–385.

http://dx.doi.org/10.1016/j.pcad.2015.09.004