

2022

Examining Health Care Utilization Among Adult Heart Disease Patients with Self-Reported Depressive Symptoms

Courtney R. Lockett
Walden University

Follow this and additional works at: <https://scholarworks.waldenu.edu/dissertations>



Part of the [Psychiatric and Mental Health Commons](#), and the [Public Health Education and Promotion Commons](#)

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact ScholarWorks@waldenu.edu.

Walden University

College of Management and Human Potential

This is to certify that the doctoral study by

Courtney Lockett

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. Brittany Smalls, Committee Chairperson, Health Sciences Faculty
Dr. Nicole McGuire, Committee Member, Health Sciences Faculty
Dr. Cheryl Cullen, University Reviewer, Health Sciences Faculty

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

Walden University
2022

Abstract

Examining Health Care Utilization Among Adult Heart Disease Patients with Self-
Reported Depressive Symptoms

by

Courtney Lockett

MS, Central Michigan University, 2017

BS, Grand Valley State University, 2009

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Health Care Administration

Walden University

November 2022

Abstract

Health care costs are most commonly concentrated among small groups of high-cost patients, or high utilizers. Many of these patients receive unnecessary and ineffective care and often critical health care needs can go unmet, even when substantial care from multiple sources is received. Thus, there is a need to look into high utilizing patients for not only quality improvement but also effective resource allocation. The operational problem for health care administrators is managing resources and improving quality of care by targeting specific medical conditions that may be high utilizers of medical resources. The purpose of this study was to identify a relationship, if any, of a disproportionate amount of health care resource utilization by patients with heart disease who have depressive symptoms using MEPS data from 2018. This correlational quantitative study was guided by the Andersen-Newman Behavioral Model for health service utilization to provide a framework for the study. A Spearman's rank-order correlation analysis and one-way multivariate analysis of variance (one-way MANOVA) was used for the analysis of the data. The results indicated that there was a significant relationship between health care utilization and heart disease patients with depressive symptoms. There was also a significant difference in the amount of health care utilization when comparing those diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms. The findings from this study may be used for positive social change through future research design and policy design.

Examining Health Care Utilization Among Adult Heart Disease Patients with Self-
Reported Depressive Symptoms

by

Courtney Lockett

MS, Central Michigan University, 2017

BS, Grand Valley State University, 2009

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Health care Administration

Walden University

November 2022

Table of Contents

Section 1: Foundation of the Study and Literature Review	1
Introduction.....	1
Problem Statement	3
Purpose of the Study	4
Research Questions and Hypotheses	4
Theoretical Foundation for the Study	5
Nature of the Study	7
Literature Review Search Strategy	7
Literature Review.....	8
Heart Disease	8
Hypertension	9
Coronary Artery Disease.....	10
Angina.....	10
Heart Disease and Gender.....	11
Heart Disease and Age.....	12
Heart Disease and Race/Ethnicity.....	12
Depression.....	13
Heart Disease and Depression	14
Health Care Utilization	15
Previous Research.....	16

Definitions.....	19
Assumptions.....	20
Scope and Delimitations	21
Significance.....	22
Summary	23
Conclusion	23
Section 2: Research Design and Data Collection	25
Introduction.....	25
Research Design and Rationale	25
Methodology	26
Population and Sampling	26
Instrumentation and Operationalization on Constructs.....	28
Threats to Validity	29
Summary	29
Section 3: Presentation of the Results and Findings.....	30
Introduction.....	30
Data Collection of Secondary Data Set	31
Results	38
Summary	47
Section 4: Application to professional Practice and Implications for Social	
Change	48
Introduction.....	48

Interpretation of the Findings.....	49
Limitations of the Study.....	50
Recommendations.....	50
Implications for Professional Practice and Social Change	51
Conclusion	51
References.....	53

List of Tables

Table 1. Demographics of Sample Population	33
Table 2. Descriptive Statistics.....	38
Table 3. Correlations Between Variables	38
Table 4. Multivariate Tests	39
Table 5. Tests of Between-Subjects Effects	40
Table 6. Multivariate Tests With Covariates	41
Table 7. Tests of Between-Subjects Effects	44

Section 1: Foundation of the Study and Literature Review

Introduction

Heart disease is often referred to as cardiovascular disease and includes various conditions such as angina, congenital heart disease, and arrhythmias (Mayo Clinic, 2018). Heart disease is the number one cause of resident deaths in the United States and leads to serious illness, disability, decreased quality life, and economic loss. More than one in three adults currently have one or more types of heart disease (Healthy People, 2020). Heart disease accounts for approximately \$320 billion in health care expenditures and related expenses annually (Mayo Clinic, 2018).

Among those diagnosed with heart disease, feelings of depression or depressive symptoms are not uncommon and is one of the most common comorbidities in heart disease patients. Depression is a mood disorder that causes persistent feelings of sadness and in many cases leads to a loss of interest in everyday activities. Those who suffer from this highly prevalent mental condition, often experience substantial personal and economic burden (Bahall, 2019). Evidence has also suggested that depression is an independent risk factor for the recurrence of cardiac events as well as cardiac mortality (Sever et al., 2018).

There is a growing concern and need for prevention for both heart disease and depression. Communication to the public will be the most effective in relaying the reality and seriousness of the two comorbidities. Communication is also important to policy makers and health care administrators to increase efforts in relieving the health care system of the burden heart disease and depression on available health care resources (Hofer, 2020). The purpose of this study was to identify the relationship, if any, of health care resource utilization by patients

with heart disease who also have depressive symptoms by using secondary data obtained by patient questionnaires. The dataset used to answer the research questions comes from the Medical Expenditure Panel Survey (MEPS) provided by The Agency for Health care Research and Quality and is a public use file.

The results of the study have the potential to have a great social impact on patient outcomes and effective health care strategy. Optimally, all health care facilities would have access to mental health professionals who could provide assessments for depressive symptoms among heart disease patients. However, this is not always a viable option, and, in those cases, a brief screening tool or referral list of local providers should be considered (Jackson et al., 2018). Use of established screening instruments is one option for medical professionals to assess depressive symptoms in heart disease patients and help them get the appropriate mental health treatment. Investing in early detection and treatment of depressive symptoms will help ensure better outcomes for heart disease patients (Jackson et al., 2018). Application of policies and depression assessment protocols can help health care providers identify high-risk groups of heart patients who are more likely to suffer from depressive symptoms, and ultimately decrease morbidity and mortality (AbuRuz, 2019).

The following information will provide insight on the problem being addressed by the study, the purpose, research questions, theoretical foundation, and nature of the study. As well as a brief overview of the research strategy and a review of current literature to provide a more in depth understanding of heart disease and depressive symptoms in order to better realize the problem addressed by the study and its significance.

Problem Statement

According to Wammes et al. (2018), health care costs are most commonly concentrated among small groups of high-cost patients, or high utilizers. Many of these patients receive unnecessary and ineffective care and often critical health care needs can go unmet, even when substantial care from multiple sources is received. This provides evidence that there is a need to look into high utilizing patients for not only quality improvement but also effective resource allocation. Care coordination and disease management programs are most effective when interventions are targeted to patients that are most likely to benefit from them (Wammes et al., 2018).

Depression has been associated with more office visits, increases in hospitalization days, and an increase in hospital readmissions (Robinson et al., 2016). Health care utilization is three times higher among depression sufferers compared to those who do not suffer from depression (Tusa et al., 2019). Utilization increases when depression is combined with a chronic disease such as heart disease (Tusa et al., 2019). There is still limited information on how depressive symptoms among patients with heart disease contribute to the burden placed on the health care system and its resources through high utilization (Hols et al., 2020; Mourad et al., 2018). Addressing this gap in the literature will be addressed by seeking to identify the relationship, if any, of health care resource utilization by patients with heart disease who also have depressive symptoms. Depressive symptoms will be measure through self-reported feelings of depression.

The operational problem for health care administrators is managing resources and improving quality of care by targeting specific medical conditions that are more likely to be high utilizers of medical resources. Understanding more on this population's characteristics and health care utilization patterns will provide health care administrators insight on their health

requirements and drivers of cost in order to design effective policy or program responses (Wammes et al., 2018).

Purpose of the Study

Identifying high utilizers of health care resources is essential to identifying the sources and ways of reducing any overutilization of resources (Robinson et al., 2016). Health care utilization refers to the use of health care services for the purpose of preventing or treating health problems, maintaining health, or obtaining information about one's health status (Carrasquillo, 2013). The purpose of this study was to identify a relationship, if any, of a disproportionate amount of health care resource utilization by patients with heart disease who have depressive symptoms. Addressing the purpose was done by comparing health care utilization of patients diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms. Identifying the relationship between health care utilization and heart disease patients with depressive symptoms may enable health care administrators to make informed decisions on how to reduce high resource utilization among a vulnerable population that may require more attention.

Research Questions and Hypotheses

RQ₁: What is the relationship, if any, between health care utilization (office visits, outpatient visits, emergency room visits, and hospitalization days) and heart disease patients with depressive symptoms?

H₀: There is no relationship between health care utilization and heart disease patients with depressive symptoms.

H_A: There is a significant relationship between health care utilization and heart disease patients with depressive symptoms.

RQ₂: What is the difference, if any, between the utilization of health care services, measured by office visits, outpatient visits, emergency room visits, and hospitalizations, of heart disease patients with depressive symptoms and heart disease patients without depressive symptoms?

H₀: There is no difference between the utilization of health care services, measured by office visits, outpatient visits, emergency room visits, and hospitalizations, of heart disease patients with depressive symptoms and heart disease patients without depressive symptoms.

H_A: There is a significant difference in the amount of health care utilization when comparing those diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms.

Theoretical Foundation for the Study

The Andersen-Newman Behavioral Model for health service utilization provided a framework for this quantitative study. Andersen and Newman modeled systematic identification of factors that influence a person's decisions to use or not use available health services (Tesfaye et al., 2018). The framework emphasizes characteristics of the health services delivery system, changes in medical technology and social norms relating to the definition and treatment of illness and individual determinants of utilization (Andersen & Newman, 1973). Andersen and Newman explained that health care utilization is determined by predisposing, enabling, and need factors which allows for analyzing predictors of health care utilization (Kim & Lee, 2016). The proposed study will assess the general experiences of heart disease patients with depressive

symptoms by exploring health care utilization through application of the Andersen-Newman model.

Predisposing factors, at the individual level, include demographic characteristics (age, gender, race/ethnicity), socioeconomic characteristics, and health beliefs (attitudes, values, and knowledge of health services). Enabling factors refers to resources or means that enable individuals to obtain health services such as insurance or income and availability of resources. Need factors are either need perceived by the individual or need evaluated by the medical professional and are the most important factors impacting health services utilization (Zhang et al., 2019). The components from the above predisposing factors that will be assessed in this study are the demographics of age, gender, and race. Although socioeconomic characteristics and health beliefs may play a role in determining health care utilization, those factors were not assessed due to the lack of data, however this model was still the best fit for this study. The enabling factors were health insurance and distance/access to health facility. The need factors were heart disease, depressive symptoms, office visits, outpatient visits, emergency room visits, and hospital days. Determining the role that a particular variable plays in affecting an individual's health care utilization was assessed through applying the model. The application of the Andersen-Newman Model helped to understand the functionality of the country's health sector and health care system. As a result, the research will identify factors associated with health care utilization in the target population as well as identify any additional gaps in knowledge on health care utilization. The findings from this study will lead to future research design and policy design (Zhang et al., 2019).

Nature of the Study

The study is a correlational quantitative research design, using secondary data not previously collected for research. The dataset used to answer the research questions comes from the Medical Expenditure Panel Survey (MEPS) provided by The Agency for Health care Research and Quality. Correlational design explores the relationship between variables. Although cause and effect cannot be determined, the design allows for observation and statistical analysis. Keeping the focus on how depression in conjunction with heart disease may be causing a strenuous burden on the health care system by comparing health care utilization of patients diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms. The independent variables are patients diagnosed with heart disease with depressive symptoms and patients diagnosed with heart disease with no depressive symptoms. The dependent variable is health care utilization that will be measured by self-reported office visits, outpatient visits, emergency room visits, and hospitalization days. The covariates are age, gender, race/ethnicity, and health insurance. If a correlational relationship can be found, this quantitative analysis can be used to enable health care administrators to make informed decisions to reduce the impact of factors that contribute high resource utilization among a vulnerable population and alleviate and/or eliminate the burden on the health care system.

Literature Review Search Strategy

The literature review was prepared using multiple databases from the Walden University Library, specifically databases such as ProQuest, Sage Journals Online, and PsycInfo. Keywords and phrases searched to find relevant articles were: *health care utilization, depression,*

depressive symptoms, heart disease, cardiovascular disease, and comorbidity. Articles were limited by only using articles that were dated within the last 5 years. The articles reviewed contained similar study designs to the current study and helped to provide direction and insight on study design in addition to background. The previous research provides context and identifies relevant information on research methodology, results of prior and similar studies, which provide relevant background and historical perspective. The following sections will outline and summarize prior research.

Literature Review

The following information is a brief overview of certain variables that were examined in this study. The following provides relevant background information and general definitions. The variables will be defined in more detail for the purpose of this study in sections to follow. A brief look into prior research will also be examined in this literature review to understand what researchers have previously done and what has resulted from those studies.

Heart Disease

Heart disease, often interchanged with cardiovascular disease, is a broad term that describes various conditions that affect the heart (Mayo Clinic, 2018). Heart disease is one of the most common diseases due to contributing factors such as high blood pressure, diabetes, high cholesterol, sedentary lifestyles, tobacco use, obesity and many other factors. Many precautions have been made to diagnose the disease early as well as reduce the effects of the disease (Almustafa, 2020). Not only is heart disease the number one cause of death in the United States, it is also one of the leading causes of death globally. Heart disease contributes greatly to the escalating cost of health care (Wu et al., 2020). The escalating costs are due to cost of health

care services, medicines, and loss of productivity due to death (Centers for Disease Control and Prevention, 2020).

Hypertension

Hypertension is one form of heart disease, commonly referred to as high blood pressure. Hypertension is a chronic condition and the most common of the cardiovascular disorders (Satyal et al., 2020). The elderly population is the most commonly affected group. Medication is one key approach to effectively controlling hypertension (Thuy et al., 2020). Other methods of controlling or preventing hypertension include: reduce sodium intake, regular exercise, weight reduction, reducing stress, not smoking, and limiting alcohol intake (Satyal et al., 2020).

According to the Center for Disease Control and Prevention (2020), 45% of the population has hypertension in the United States. Hypertension costs the United States an estimated \$131 billion each year (Centers for Disease Control and Prevention, 2020). Hypertension can increase the risk of developing severe health conditions such as a heart attack, stroke, heart failure, and kidney disease. Approximately, 1,000 per day have been due to hypertension in the United States (Yu & Sheu, 2020).

Studer et al. (2018), conducted a study to assess treatment patterns, health care resource utilization and health care costs among patients with pulmonary arterial hypertension. The study was a retrospective administrative claims study conducted from July 2009 through March 2016. Health care resource utilization and health care costs were assessed during baseline and follow-up periods and stratified by whether patients were enrolled in commercial or Medicare Advantage Part D plans. Health resource utilization was calculated as the number and percentage of patients with at least one encounter for ambulatory visits, emergency room visits,

and inpatient admissions. Total health care costs were calculated as the combined health plan and patient paid amounts per patient per month to account for varying length of follow-up. The results of the study showed nearly 100% had an ambulatory visit, and emergency room visits and inpatient stays were common. Health care costs increased more than twofold from baseline to follow-up for both insurance types (Studer et al., 2018).

Coronary Artery Disease

Coronary artery disease is one of the leading contributors to economic burden and causes over 370,000 deaths per year in the United States (Liu et al., 2019). Coronary artery disease is often referred to as coronary heart disease or ischemic heart disease (American Heart Association, 2020). Coronary artery disease is a condition in which blood flow is prevented from reaching the heart due to a plaque (waxy material) build up in the arteries along the artery walls. The plaque builds up causing the artery walls to thicken, harden, and narrow which causes a blockage and blood can no longer flow to the heart muscles. As the arteries become completely clogged, the cells of the heart muscles begin to die off and this leads to heart failure and even death. People with coronary artery disease can also have hypertension, a heart attack, stroke, or sudden death due to cardiac arrest (Alhosani et al., 2017).

Angina

Angina, or angina pectoris, is a symptom of coronary artery disease and is a chest pain caused by a reduction in blood flow to the heart. Angina is different from other types of chest pain, such as discomfort from indigestion. Angina has been described as squeezing, pressure, heaviness, burning, or tightness in the chest (Mayo Clinic, 2020). Angina is categorized by

severity and cause into stable angina pectoris, unstable angina pectoris, microvascular angina, and variant angina (Jia et al., 2020).

Heart Disease and Gender

Historically, heart disease was thought to mainly affect men. However, heart disease is the leading cause of death for women in the United States. Both men and women share the same traditional risk factors from heart disease, but women also present non-traditional risk factors as well. Non-traditional risk factors that include premature menopause, pre-eclampsia, social and vocational disparity, and higher prevalence of autoimmune diseases. Additionally, because symptoms are usually atypical in women and present differently than in men, diagnosis can be delayed, or worse lead to misdiagnosis, resulting in greater risk. This typically results in more severe complications and outcomes in women compared to men (El Missiri et al., 2020).

Women are less likely to undergo interventional cardiac procedures (Calabro et al., 2019). Clinical evidence has demonstrated that women have a higher rate of mortality along with poorer prognosis even though men have higher incidences of heart disease. Prevention strategies have been tailored to be more gender specific since it has been reported that diagnostic procedures have been performed at lower rates in women compared to men. The evidence of gender disparities has also led to gender-specific treatments (Gao et al., 2019). Heart disease tends to develop on average seven to ten years later in women than in men. Under the age of sixty, men are three to four more time likely to develop heart disease. While women represent the majority of patients over the age of 75. The presence of estrogen has been found to be the protective factor for women. Estrogen deficiency increases a woman's risk by seven-fold (Calabro et al., 2019).

Heart Disease and Age

Increased age is one of the risk factors associated with heart disease. Individuals aged 65 and older are much more likely to develop heart disease than younger people. Aging causes changes to the heart and blood vessels (U.S. Department of Health & Human Services, 2020). People 65 years of age and older account for more than half of all heart disease related hospitalizations and procedures as well as roughly 80% of all heart disease related deaths in the United States. People aged 75 years and older account for more than 50% of heart disease related deaths for this age group (Rich et al., 2016).

Heart Disease and Race/Ethnicity

Heart disease has been shown to have higher rates of traditional risk factors, different rates of treatment, and excess morbidity and mortality rates for minority groups compared to the White population. Heart disease is the second leading cause of death for Hispanics (20.8%) in the United States. Heart disease is the leading cause of death (26.3%) among Hispanics sixty-five and older. Among African American men the rate of heart disease is lower than White men (7.2% vs 7.8%), but among African American women the rate is higher when compared to White women (7.0% vs 4.6%). Asian Americans heart disease rate is 3.7%, which is lower than the general population (Leigh, Alvarez, & Rodriguez, 2016).

African Americans have higher rates of obesity and hypertension compared to White American populations. Resulting in greater rates of heart disease, stroke, and cardiovascular outcomes (Woudberg et al., 2016). African Americans are at a higher risk of dying from heart disease regardless of the disease severity or symptomatic state (Guy-Walls & Long, 2017). Hispanics have been associated with having high presence of hypertension, diabetes, high

cholesterol, obesity, and smoking. Increasing the risk of developing heart disease (Lamar et al., 2019). Asian Americans have higher rates of risk factors for heart disease such as diabetes lower levels of physical activity, family history, and obesity compared to Whites (Palaniappan et al., 2018).

Depression

Mental illness is no longer stigmatized as it once was in previous years and, as a result, people are seeking help from the health care system more than before. Mental health is crucial for learning, productivity, and lifestyle habits. Mental health conditions are on the rise globally, with depression and anxiety disorders increasing the most. Depression is the leading cause of nonfatal disease burden (Ljungberg et al., 2020). Depression is a mood disorder that causes persistent feelings of sadness and in many cases leads to a loss of interest in everyday activities (Bahall, 2019). Depression is one of the most common comorbidities experienced among heart disease patients (Sever et al., 2018).

Symptoms of depression include: persistent sadness or anxiousness, feelings of hopelessness, irritability, feelings of guilt, feelings of worthlessness or helplessness, loss of interest or pleasure in activities, decreased energy or fatigue, moving or talking more slowly, restless or trouble sitting still, difficulty concentrating or remembering or making decisions, difficulty sleeping or oversleeping, changes in weight and appetite, thoughts of death or suicide, suicide attempts, aches or pains, headaches, and cramps or digestive problems. Everyone who suffers from depression will experience all symptoms. Some people may experience many symptoms while others may experience many. Symptoms may also vary in intensity as well from person to person (National Institute of Mental Health, 2018). Treatment for depression may involve pharmacotherapy, psychological treatment, or a combination of these interventions. If

left untreated, chronic emotional distress can lead to severe consequences on the cardiovascular system (Jackson et al., 2018).

Heart Disease and Depression

According to Chang et al. (2020), heart disease and depression will be the top two leading causes of disability and premature death by the year 2030. Depression increases in patients with heart diseases two-fold when compared to the general population (Chang et al., 2020). The two diseases can become part of a vicious cycle. The opposite is also true that, patients with depression are at a higher risk of developing heart disease compared to the general population (Zhou et al., 2020). Studies have shown patients diagnosed with depression are at a 60% higher risk of developing heart disease compared to healthy controls. The prevalence of depression in heart disease patients is about two to three times (15-30%) more than the general population (Gorini et al., 2020). Clinical depression affects both a person's mood and behavior including appetite and sleeping patterns (Kerr, 2018). Clinical depression is both an independent risk factor and predictor of heart disease and poor prognosis of cardiovascular events (Zhou et al., 2020). Depression has repeatedly been found to be an independent risk factor of heart disease, more than the normal predictors such as obesity, hypertension, diabetes, high cholesterol and smoking (Hamieh et al., 2020).

Depression in heart disease patients is often associated with poor outcomes, poor quality of life, and mortality (Allabadi, et al., 2019). After an acute heart event, 20% of patients experience major depression (Server et al., 2019). Depression symptoms are common among heart disease patients at hospital discharge and as far as three months after hospitalization (Christensen et al., 2020). Treatment compliance and loss of productivity in heart disease patients is often associated to depression. This occurrence of these comorbidities is a major

concern for health care providers and administrators due to the association with increased health care utilization costs and hospital readmission rates (Server et al., 2019).

Health Care Utilization

Health care utilization is the use of health care services in order to diagnose, treat, or cure a disease or injury; improve or maintain function; or to obtain information about one's health status and prognosis. Health care utilization can be of both high and low cost to patients and health care providers. Health care utilization is determined by many factors such as the need for care, ability to obtain care, and the ability to access care (National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Committee on Health Care Utilization and Adults with Disabilities, 2018). This study will examine the use and number of office visits, outpatient visits, emergency room visits, and hospitalization days to determine the degree of health care utilization by patients with heart disease and depressive symptoms compared to patients with heart disease and no depressive symptoms. These variables will be utilized to determine the degree of burden placed on the health care system by this specific vulnerable population.

A study done by Hols et al. (2020), showed results indicating that patients with heart disease and depressive symptoms had more contact with outpatient health care providers. The authors found that patients will not necessarily seek medical care due to severe cardiac events but for reassurance. The authors stated patients who fear progression of their diseases/condition prefer more reassurance and seek out health care professionals and diagnostic tests. The study results also showed patients with more severe depressive symptoms were associated with increased health care utilization through use of mental health providers, specialists, and internal medicine physicians (Hols et al., 2020).

Health Care Utilization and Health Insurance

Health care costs across the world are rapidly increasing and as a result, supplementary private health insurance is in high demand (Zhang et al., 2020). Approximately 80% of Americans had to purchase a private health insurance plan in 2015 to help mitigate out-of-pocket expenses for health care services (Zhang et al., 2020). While some researchers believe the use of private health insurance should be encouraged to ease patient financial burden as well as the financial burden placed on social health care systems, others argue private health insurance will not only contribute to the current rapid increase in health expenditures, but also induce fragmentation of the health care system, and increase the gap in health care utilization between opposite ends of the socioeconomic spectrum. If individuals with private health insurance increase their health care utilization, inequity in health care utilization between those who purchase private health insurance and those who do not will result (Zhang et al., 2020).

Insured individuals are more likely to receive medical imaging tests and use prescription medication, while uninsured individuals are more likely to visit emergency departments for medical care and less likely to receive preventative care (Bailey et al., 2015). Uninsured individuals are less likely to receive treatment for hypertension and high cholesterol, both of which are risk factors for heart disease (Smith et al., 2017). Diagnostic screenings for blood pressure have protective effects for heart disease related deaths as well as building a relationship with a primary care physician. Having a continuous primary care provider is an important determinant to utilization of preventative services (Lee et al., 2015).

Previous Research

A study done in Trinidad and Tobago consisted of a sample population of patients admitted for cardiac diseases at the San Fernando General Hospital. The purpose of the study

was to assess the prevalence of and identify factors associated with depression among cardiac disease patients. There was a total of 388 participants in the study. The participants were surveyed via questionnaire which contained patient demographics and items related to a depression diagnostic tool. This study is similar to the current study in that medical and lifestyle history were self-reported by the patients (Bahall, 2019).

Bahall (2019) used SPSS to conduct a cross-sectional study analysis of the data, including 95% confidence intervals and chi-square tests. The results of the study showed that 40.2% (n=155) of the participants either had a depression prevalence or significant clinical depression. Higher levels of depression were found in patients with chronic conditions. Higher levels of depression were also found in women. Participants also had a 5.6-day average hospital length of stay. The results of the study provided background insight into the prevalence and characteristics of depressive symptoms among heart disease patients as well as average hospitalization days. The hospitalization days show health care utilization by heart disease patients with depression (Bahall, 2019).

A study was done to identify the frequency and trends of mental health disorders among adult congenital heart disease hospitalizations; demographics and comorbidities for adult congenital heart disease patients with and without mental health disorders; the rate and trends of in hospital mortality, disposition, mean length of stay, and hospitalization charges among the patients. The data was obtained from the National Inpatient Sample (NIS) database which included information from 44 states and included 85,029 participants. There were 11,709 adult congenital heart disease patients that also had a mental health disorder (anxiety, depression, mood disorder, or psychosis) (Desai et al., 2020).

The results showed that patients with congenital heart disease and a mental health disorder were more often White, followed by Blacks then Hispanics. Patients with congenital heart disease and a mental health disorder also had more hospital admissions compared to those without a mental health disorder. Hospitals in the South and Midwest regions recorded higher numbers of patients with congenital heart disease and a mental health disorder. This is insightful information given the current study will contain data from all across the country and is broken down into quadrants (Northeast, Midwest, South and West) (Desai et al., 2020).

Robinson et al. (2016) conducted a study to characterize health care costs, resource use, and treatment patterns of patients with a history of depression who are high utilizers of health care and to identify factors associated with high utilization. The study included 1,912 participants. Patient surveys were conducted for data on demographics, general health, and symptoms as well as comorbidities associated with depression. Patients claims (physician, facility, pharmacy) data was used for all participants. Data analysis for high utilization was identified using logistic regression models.

The researchers defined high utilizers as those who consumed a disproportionate amount of health care resources. The article provided information for the background of the current study and defining context information for the topic. The results of this study by the researchers showed 10% (n=193) of patients were classified as high utilizers. Patients with mental health related disorders had more inpatient encounters, emergency room department visits, physician office visits, other outpatient visits, and psychiatric service visits. These same patients were also hospitalized for twice as long (Robinson et al., 2016).

Server et al. (2019) conducted an observational study to investigate the factors associated with depression in patients with comorbid depression while attending cardiac rehabilitation. An independent t-test and chi-square test were used to compare the association between acute depression symptoms and baseline characteristics. The study included 2,715 patients with comorbid depression. The study showed results that cardiac rehabilitation patients with higher levels of depressive symptoms at the start should be treated with more caution. The researchers were able to define risk factors and characteristics for depressive symptoms. Depressive symptoms were found to be associated with a higher number of comorbidities, increased weight, higher BMI, anxiety symptoms, comorbid anxiety, physical inactivity, and smoking in patients with historic comorbid depression. Results showed patients with depression were found to be younger and single. However, the researchers found no significant association for gender or alcohol use (Server et al., 2019).

A study conducted in Finland to examine the health service utilization profiles among a non-depressive patients and patients with depressive symptoms with and without clinical depression. The researchers used random sampling to obtain a group of 705 participants in the study. Data was analyzed using ANOVA, Kruskal-Wallis test, and chi-square test. The results showed that 447 patients had clinical depression. The clinical depression patients also used more cardiovascular medication and used more physician visits and nurse calls (Tusa et al., 2019).

Definitions

Depressive symptoms: Any symptoms of or relating to depression, including persistent sadness or anxiousness, feelings of hopelessness, irritability, feelings of guilt, feelings of worthlessness or helplessness, loss of interest or pleasure in activities, decreased energy or fatigue, moving or talking more slowly, restless or trouble sitting still, difficulty concentrating or

remembering or making decisions, difficulty sleeping or oversleeping, changes in weight and appetite, thoughts of death or suicide, suicide attempts, aches or pains, headaches, and cramps or digestive problems (National Institute of Mental Health, 2018).

Heart disease: Conditions that affect the heart (Mayo Clinic, 2018) and for the purpose of this study will be assessed through the variables related to heart conditions. These variables will include: high blood pressure, angina, heart murmur, heart arrhythmia/ irregular heartbeat, blocked or clogged artery, congestive heart failure, atrial fibrillation, mitral valve prolapse, enlarged heart, heart valve problems, and tachycardia/ rapid heart rate.

Health care Utilization: The use of health care services in order to diagnose, treat, or cure a disease or injury; improve or maintain function; or to obtain information about one's health status and prognosis (National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Committee on Health Care Utilization and Adults with Disabilities, 2018). For the purpose of this study will be defined as the number of days in the hospital and number of visits to a physician (office visits, outpatient visits, emergency room visits, and hospitalizations).

Assumptions

Since secondary data will be utilized in this study from the Medical Expenditure Panel Survey (MEPS) provided by The Agency for Health care Research and Quality, there are four assumptions made with this study. The first assumption is the instruments used by the researchers to assess the patients' health status were valid for the target population. The next assumption is that participants were honest about their eligibility for participation in the survey process by meeting any and all requirements set forth by the researchers, having sufficient

language skills to understand the survey questions, and lastly not having any learning or intellectual disabilities that may affect the accuracy of the survey answers. Third, patients were able to accurately recall events related to their health and medical treatment. Finally, the sample size of the targeted population of patients is large enough for generalizability of the results.

Scope and Delimitations

Examining health care utilization has shown to be an important issue in current health care climates as many health care professionals are looking to reduce cost as well as preserve resources. Focusing on this particular subset of the population examines the leader in death among United States residents and how it not only effects patients but the health care system as well. Heart disease has caused great economic loss to patients and health care professionals (Healthy People, 2020). Additionally, those who suffer from depression are often high utilizers of medical care. The two diseases, in combination, could account for disproportionate numbers of health care consumption, causing a strain on health care resources (Robinson et al., 2016). The purpose of this study is to identify a relationship, if any, of a disproportionate amount of health care resource utilization by patients with heart disease who have depressive symptoms through use of the Andersen-Newman Behavioral Model for health service utilization which provides the framework for the study.

Several limitations should be considered when interpreting study findings. The study will be a correlational design so there will only be an inferred association and no causation. Survey data was based on patient recollection of events such as number of office visits, outpatient visits, emergency room visits, and hospitalization days. The accuracy of data will be subject to self-report and recall biases. Depressive symptoms were self-reported and not based on a diagnosis

from a health care provider. Prior existing depressive symptoms were unknown prior to heart disease diagnosis.

Significance

Depression and other mental health disorders are on the rise among heart disease patients, due to an association with reduced quality of life once diagnosed with a heart condition (Desai et al., 2020). Those who suffer from depression and depressive symptoms are often high utilizers of medical care. Health care administrators can make informed decisions on how to reduce high resource utilization and ultimately reduce health care expenditures among a vulnerable population such as those with heart disease who also suffer from depression or depressive symptoms (Robinson et al., 2016). Heart disease treatments have primarily focused on treating the physical symptoms relating to the disease, however a greater emphasis should be placed on the psychological complications as well, such as depression. Depression can lead to a decrease in physical activity and an increase in substance abuse, all of which can have negative impacts on the heart (Bahall, 2019).

Identifying how this population utilizes health care resources is essential to reducing any overutilization of resources and identifying more effective resource allocation (Robinson et al., 2016). The purpose of this study is to identify a relationship, if any, of a disproportionate amount of health care resource utilization by patients with heart disease who also have depressive symptoms. In addition to this purpose, the aim of this study is to impact social change through shedding light on this topic. Small changes such as asking more questions on patient questionnaires during triage both in the hospital and physician's office to detect depressive symptoms earlier (Samsson & Larsson, 2015) or including more discharge instructions/knowledge relating to thoughts and feelings of depression to better educate patients

in to reduce readmissions (Meng et al., 2020) could have the potential to have a great social impact on patient outcomes and effective health care strategy.

Summary

The review of the literature reveals there is a breadth of knowledge on topics of heart disease, depression, and health care utilization independently. However, a gap in literature concerning the relationship between patients with heart disease who also exhibit depressive symptoms and their utilization of health care still exists. Depression has repeatedly been found to be a concerning risk factor of heart disease and the prevalence of depression in heart disease patients is higher than that of the general population. Health care utilization in excess can cause high financial burden on patients as well as health care providers in addition to disproportionate resource allocation.

Conclusion

Current literature posits that there is a vulnerable population of patients who suffer from both heart disease and depression and how these two diseases impact both each other and health care resources. The purpose of this study is to analyze the impact this has on resource availability through high utilization. Expanding on this topic will bring more information to be utilized by health care professionals and leaders to provide better insight for decision making. Decisions that will better help to use resources wisely, staffing, better patient care, better patient outcomes, and possibly cost reduction.

This study will attempt to address the gap in literature concerning the relationship between patients with heart disease who also exhibit depressive symptoms and their utilization of health care resources. This will be done by analyzing secondary data to determine a relationship,

if any, through a correlational design. The following sections will provide information on research design and rationale, methodology, and data collection.

Section 2: Research Design and Data Collection

Introduction

The problem addressed in this research study is the gap in literature concerning the relationship between patients with heart disease and depressive symptoms and their utilization of health care. The operational problem for health care administrators is improving quality of care by targeting a specific medical condition that is more likely to cause high utilizers of medical resources. The study focused on patients with heart disease and depressive symptoms to inform health care administrators on factors that may drive increased utilization of health care resources. Previous research has stressed the importance of understanding patients with heart disease and patients who suffer from depression separately and their impact on health care utilization and expenditure. However, there is a gap in literature concerning the relationship between patients with heart disease and depressive symptoms and their use of health care. This study attempted to fill this gap by analyzing utilization patterns of patients with heart disease who also have depressive symptoms.

Research Design and Rationale

The study is a correlational quantitative research design with secondary data not previously used for research. A correlational design will measure a correlation, if any, and determine the possible existence and the strength of a relationship between the variables. The independent variables are patients diagnosed with heart disease with depressive symptoms and patients diagnosed with heart disease with no depressive symptoms. The dependent variable is health care utilization, which was measured by self-reported office visits, outpatient visits,

emergency room visits, and hospitalization days. The covariates are age, gender, race/ethnicity, and health insurance.

SPSS software was used for the analysis. A one-way multivariate analysis of variance (one-way MANOVA) was performed to test and examine the differences between the two groups (heart disease patients with and without depressive symptoms). This tested for variation among the groups to be determined if a correlation, if any existed. Spearman's rank-order correlation analysis was also be used to answer the various research questions.

Methodology

Population and Sampling

The dataset used to answer the research questions came from the Medical Expenditure Panel Survey (MEPS) provided by The Agency for Health care Research and Quality and is a public use file. The data was from a survey conducted in 2018 containing a total of 30,461 participants. MEPS provides large-scale surveys of families, individuals, their medical providers, and employers. The data collected is a national representative sample of the civilian non-institutionalized population of the United States containing variables pertaining to administration, demographics, person-level conditions, health status, disability days, quality of care, employment, health insurance, and person-level medical care use counts (Agency for Healthcare Research and Quality, 2018). The questionnaire contains specific questions related to heart disease. Questions such as, the age of diagnosis with heart disease and the type of heart disease (high blood pressure, angina, heart murmur, heart arrhythmia/ irregular heartbeat, blocked or clogged artery, congestive heart failure, atrial fibrillation, mitral valve prolapse, enlarged heart, heart valve problems, and tachycardia/ rapid heart rate). Also, included are

questions related to patients' mood and thoughts, that were used to determine depressive symptoms experienced by patients. These questions helped to determine who has been diagnosed with heart disease and experienced depressive symptoms in order to be included in the sample.

This dataset contains a very comprehensive view of patient accounts of health services used. The survey is from patients across the United States. This allowed for better generalization of results for use on understanding this specific subset of the population. However, due to the survey data being based on patient recollection of events such as number of office visits, outpatient visits, emergency room visits, and hospitalization days, the accuracy of data is subject to self-report and recall biases.

The survey provided information on various conditions so narrowing down the sample to include only those with heart disease was needed. The sample was divided into two groups, (those who have depressive symptoms and those who do not have depressive symptoms). G*Power Analysis was used to determine a sample size that will be significant. The analysis determined for a small effect size, which is more desirable, for t-Test with the effect size $d=.02$, α error probability of 0.05, power ($1-\beta$ err prob) of 0.95, and an allocation ratio of 1, the desired sample size to give the analysis significance should be a total of 1,302 participants (651 participants per group). The sample population was dichotomized into two groups, patients with heart disease who have depressive symptoms and patients with heart disease without depressive symptoms. The effect size used will give a greater difference between the two groups. The alpha (α) level will give a 5% probability of rejecting the null hypothesis when it is true, therefore creating a small area for a Type I error to be made. The power level gives a 95% probability that a Type II error (failing to reject a false null hypothesis) will not be committed.

Instrumentation and Operationalization on Constructs

The secondary data provided within the MEPS Survey includes various smaller surveys. Among those surveys were the SAQ, RAND-12, K6, and PHQ-2. The Adult Self-Administered Questionnaire (SAQ). The SAQ collects a variety of health status and health care quality measures of adults age 18 and older. The SAQ contains three measures of health status: The Veteran's RAND 12-item Health Survey (VR-12), the Kessler Index (K6) of non-specific psychological distress, and the Patient Health Questionnaire (PHQ-2). The VR-12 is a patient reported instrument that measures physical and mental health by assessing physical functioning, role limitations due to physical or mental health problems, pain, energy, mental health, social functioning, and general health (Schalet et al., 2015). The K6 measures non-specific psychological distress in the general adult population to screen for mental health issues. The K6 scale asks respondents how frequently they experience symptoms of psychological distress to define behavioral, emotional, cognitive, and psychophysiological manifestations of psychological distress (Kessler et al., 2003).

The PHQ-2 consists of a subset of questions from the PHQ-9 that specifically target symptoms of depression. Both surveys derive from the PHQ-A, which is a more comprehensive survey that contains 67 questions. The PHQ-2 detects depression, grades its severity, and monitors outcomes (Lowe et al., 2005). The health care quality measures in the SAQ were taken from the health plan version of CAHPS®, an AHRQ-sponsored family of survey instruments designed to measure quality of care from the consumer's perspective (U.S. Department of Health & Human Services, 2019).

Threats to Validity

There were no threats to validity with this study. The dataset that was utilized contains a national sample making results more generalizable. The survey was conducted by MEPS and not multiple entities and the data is standardized.

Summary

The study is a correlational quantitative research design with secondary data. Spearman's rank-order correlation analysis and one-way MANOVA was used for the analysis of the data. The independent variables were patients diagnosed with heart disease with depressive symptoms and patients diagnosed with heart disease with no depressive symptoms. The dependent variable is health care utilization measured by self-reported office visits, outpatient visits, emergency room visits, and hospitalization days. The covariates are age, gender, race/ethnicity, and health insurance. The desired sample size to give the analysis significance was determined to be a total of 210 participants.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this study was to identify a relationship, if any, of a disproportionate amount of health care resource utilization by patients with heart disease who have depressive symptoms. Executing the purpose statement was done by comparing health care utilization of patients diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms.

The analysis followed a correlational quantitative research design, using secondary data not previously collected for research. The dataset used to answer the research questions came from the MEPS provided by The Agency for Health care Research and Quality. The independent variables will be patients diagnosed with heart disease with depressive symptoms and patients diagnosed with heart disease with no depressive symptoms. The dependent variable is health care utilization that will be measured by self-reported office visits, emergency room visits, and hospitalization days. The covariates are age, gender, race/ethnicity, and health insurance.

This study will attempt to address the gap in literature concerning the relationship between patients with heart disease who also exhibit depressive symptoms and their utilization of health care resources by addressing the following questions:

RQ₁: What is the relationship, if any, between health care utilization (office visits, outpatient visits, emergency room visits, and hospitalization days) and heart disease patients with depressive symptoms?

H₀: There is no relationship between health care utilization and heart disease patients with depressive symptoms.

H_A: There is a significant relationship between health care utilization and heart disease patients with depressive symptoms.

RQ₂: What is the difference, if any, between the utilization of health care services, measured by office visits, outpatient visits, emergency room visits, and hospitalizations, of heart disease patients with depressive symptoms and heart disease patients without depressive symptoms?

H₀: There is no difference between the utilization of health care services, measured by office visits, outpatient visits, emergency room visits, and hospitalizations, of heart disease patients with depressive symptoms and heart disease patients without depressive symptoms.

H_A: There is a significant difference in the amount of health care utilization when comparing those diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms.

The following section will describe the data collection of secondary data and results of the study. The following will present information on the secondary data, demographics of population and sample, and the analysis of the results. The analysis will provide answers to the research questions and report statistical findings.

Data Collection of Secondary Data Set

For this study, MEPS data from 2018 was analyzed. The Household Component was collected via computer assisted personal interviewing. The interview examined person level changes in selected variables such as health insurance coverage and health status. The Medical Provider Component of the survey includes medical information from the survey participants' medical providers where participants were not able to accurately provide the information. This

information includes dates of visits as well as diagnosis and procedure codes; this information was collected via telephone (Agency for Healthcare Research and Quality, 2018).

The MEPS 2018 dataset contained a total of 30,461 survey participants and is a national representative sample of the civilian non-institutionalized population across the United States. This will allow for better generalization of results for use on understanding this specific subset of the population of heart disease patients with and without depressive symptoms. The secondary dataset contains information on various health conditions, therefore the data had to be filtered to include only heart disease patients. To determine depressive symptoms the question (“Felt down/depressed/hopeless”) which was answered on a 4-point Likert scale was used in order to maintain simplicity.

The dataset was filtered to only include those 18 years of age or older and having at least one type of heart disease, so only the adult heart disease population could be studied. This caused the total number of participants to drop to a total of 7,683 patients. Some patients had more than one form of heart disease and the number of types of heart disease ranged from one to four different types of heart disease. The types were categorized into: High blood pressure, Coronary heart disease, Angina, and Other. Other was a collection of various types of heart disease that includes: heart murmur, heart arrhythmia/ irregular heartbeat, blocked or clogged artery, congestive heart failure, atrial fibrillation, mitral valve prolapse, enlarged heart, heart valve problems, and tachycardia/ rapid heart rate.

Descriptive statistics of the participants included age, sex, race/ethnicity, marital status, highest level of education, employment status, employment group, health insurance coverage, and census region (see Table 1). The ages of the participants ranged from 18-85 years of age.

There was a total of 3,688 male and 3,995 female participants. The census region was divided into four regions: Northeast, Midwest, South, and West. The Northeast included states: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. The Midwest included states: Indiana, Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. The South included states: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Lastly the West included states: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Table 1 gives descriptive statistics of the sample population.

Table 1

Demographics of Sample Population

Baseline characteristics	Depressive symptoms (n=676)		No depressive symptoms (n=7007)		Full sample (n=7683)	
	n	%	n	%	n	%
Sex						
Male	263	38.9	3425	48.9	3688	48.0
Female	413	61.1	3582	51.1	3995	52.0
Race/ethnicity						
Hispanic	121	17.9	1002	14.3	1123	14.6
White	370	54.7	4316	61.6	4686	61.0
Black	134	19.8	1226	17.5	1360	17.7

Baseline characteristics	Depressive symptoms (n=676)		No depressive symptoms (n=7007)		Full sample (n=7683)	
	n	%	n	%	n	%
Asian	19	2.8	243	3.5	262	3.4
Other/multiple	32	4.7	220	3.1	252	3.3
Marital status						
Married	233	34.5	3762	53.7	3995	52.0
Widowed	99	14.6	900	12.8	999	13.0
Divorced	156	23.1	1152	16.4	1308	17.0
Separated	35	5.2	198	2.8	233	3.0
Never married	153	22.6	995	14.2	1148	14.9
Highest degree earned						
No Degree	166	24.6	964	13.8	1130	14.7
GED	61	9.0	334	4.8	395	5.1
High school diploma	283	41.9	3107	44.3	3390	44.1
Bachelor's degree	59	8.7	1124	16.0	1183	15.4
Master's degree	27	4.0	577	8.2	604	7.9
Doctorate degree	9	1.3	158	2.3	167	2.2
Other degree	62	9.2	699	10.0	761	9.9

Baseline characteristics	Depressive symptoms (n=676)		No depressive symptoms (n=7007)		Full sample (n=7683)	
	n	%	n	%	n	%
Employment status						
Currently employed	128	18.9	3212	45.8	3340	43.5
Laid off	1	.1	14	.2	15	.2
Not employed	526	77.8	3580	51.1	4106	53.4
Retired	120	17.8	2083	29.7		
Occupation Group						
Management, Business, and Financial Operations	15	2.2	554	7.9	569	7.4
Professional and Related Occupations	14	2.1	705	10.1	719	9.4
Service Occupations	36	5.3	570	8.1	606	7.9
Sales and Related Occupations	18	2.7	291	4.2	309	4.0
Office and Administrative Support	19	2.8	373	5.3	392	5.1

Baseline characteristics	Depressive symptoms (n=676)		No depressive symptoms (n=7007)		Full sample (n=7683)	
	n	%	n	%	n	%
Farming, Fishing, and Forestry	0	0	29	.4	29	.4
Construction, Extraction, and Maintenance	8	1.2	263	3.8	271	3.5
Production, Transportation, Material Moving	16	2.4	461	6.6	477	6.2
Military Specific Occupations	0	0	4	.1	4	.1
Unclassifiable Occupation	2	.3	22	.3	24	.3
Health insurance coverage						
Any private	201	29.7	4175	59.6	4376	57.0
Public only	447	66.1	2516	35.9	2963	38.6
Uninsured	28	4.1	316	4.5	344	4.5
Census region						
Northeast	90	13.3	1135	16.2	1225	15.9
Midwest	164	24.3	1453	20.7	1617	21.0
South	276	40.8	2888	41.2	3164	41.2

Baseline characteristics	Depressive symptoms (n=676)		No depressive symptoms (n=7007)		Full sample (n=7683)	
	n	%	n	%	n	%
West	146	21.6	1531	21.8	1677	21.8

A spearman's rank-order correlation analysis and one-way MANOVA was performed for the analysis of the data. The independent variables were patients diagnosed with heart disease with depressive symptoms and patients diagnosed with heart disease with no depressive symptoms. The dependent variable is health care utilization that was measured by self-reported office visits, outpatient visits, emergency room visits, and hospitalization days. The total number of participants in the study were 7,683 adults with at least one form of heart disease.

The participants were dichotomized into two groups, based on their response to the SAQ question, "Felt down/depressed/hopeless," as those with depressive symptoms and those without. Those with depressive symptoms consisted of those who answered yes and resulted in 676 participants, whereas 7,007 participants answered no. Spearman's rank-order correlation analysis was performed to determine the strength of association between the variables (depression and health care utilization) and the direction of the relationship. One-way MANOVA analysis was used to determine whether there were any differences between participants with heart disease who indicated they did have depressive symptoms and those who did not. An alpha level of .05 was used for all statistical tests.

Results

The Spearman's rank-order correlation analysis results (see Tables 2 and 3) indicate a positive correlation between depressive symptoms and health care utilization (office visits $r_s(7681) = .111$, $p < .001$, outpatient visits $r_s(7681) = .075$, $p < .001$, emergency room visits $r_s(7681) = .075$, $p < .001$, and hospitalization days $r_s(7681) = .124$, $p < .001$). Therefore, the null hypothesis can be rejected, concluding that there is a significant relationship between health care utilization and heart disease patients with depressive symptoms.

Table 2

Descriptive Statistics

	Mean	Standard deviation
Depressive symptoms	1.91	.283
Office visits	17.15	25.573
Outpatient visits	2.02	7.485
Emergency room	.37	.883
Nights in the hospital	.93	5.380

Table 3

Correlations Between Variables

		Office visits	Outpatient visits	Emergency room	Nights in the hospital
Depressive symptoms	Correlation coefficient	.111	.075	.144	.124
	Sig. (2-tailed)	<.001	<.001	<.001	<.001

Note. Correlation is significant at the 0.01 level (2-tailed)

The one-way MANOVA determined there was a difference between those who did and did not experience depressive symptoms with health care utilization (see Table 4), $F(12, 23039.079) = 23.632$, $p < .001$; Wilks' $\Lambda = .964$. We can see that depressive symptoms have a statistically significant effect on health care utilization (see Table 5) (office visits $F(3, 7679) = 36.770$; $p < .001$, outpatient visits $F(3, 7679) = 17.547$; $p < .001$, emergency room visits $F(3, 7679) = 64.654$; $p < .001$, and hospitalization days $F(3, 7679) = 10.868$; $p < .001$). Therefore, the null hypothesis can be rejected, concluding that there is a significant difference between the utilization of health care services, measured by office visits, outpatient visits, emergency room visits, and hospitalizations, of heart disease patients with depressive symptoms and heart disease patients without depressive symptoms.

Table 4

Multivariate Tests

Effect	Value	F	Hypothesis df	Error df	Sig.
Intercept					
Pillai's trace	.228	567.990 ^b	4.000	7676.000	.000
Wilks' lambda	.772	567.990 ^b	4.000	7676.000	.000
Hotelling's trace	.296	567.990 ^b	4.000	7676.000	.000
Roy's largest root	.296	567.990 ^b	4.000	7676.000	.000

Effect		Value	F	Hypothesis df	Error df	Sig.
Depression						
	Pillai's trace	.036	23.356 ^b	12.000	23034.000	<.001
	Wilks' lambda	.964	23.632 ^b	12.000	23039.079	<.001
	Hotelling's trace	.037	23.872 ^b	12.000	23024.000	<.001
	Roy's largest root	.036	69.384 ^b	12.000	7678.000	<.001

Note. Design: Intercept + Depression; ^b Exact statistic

Table 5

Tests of Between-Subjects Effects

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.
Depression						
	Office visits	71146.854	3	23715.618	36.770	<.001
	Outpatient visits	2930.291	3	976.764	17.547	<.001

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.
	Emergency room	147.474	3	49.158	64.654	<.001
	Nights in the hospital	940.079	3	313.360	10.868	<.001

The one-way MANOVA was then adjusted to include the covariates (age, sex, race/ethnicity, and health insurance coverage) (see Tables 6 and 7). The results still showed a significant difference between the two groups $F(12, 20298.496) = 22.406$, $p < .001$; Wilks' $\Lambda = .966$, office visits $F(3, 25225.736) = 40.182$; $p < .001$, outpatient visits $F(3, 1058.846) = 19.088$; $p < .001$, emergency room visits $F(3, 40.510) = 53.694$; $p < .001$, and hospitalization days $F(3, 344.086) = 11.995$; $p < .001$. The covariates that had a statistically significant effect were age ($F(4, 7672) = 51.900$, $p < .001$; Wilks' $\Lambda = .974$), sex ($F(4, 7672) = 14.604$, $p < .001$; Wilks' $\Lambda = .992$), and health insurance coverage ($F(4, 7672) = 8.900$, $p < .001$; Wilks' $\Lambda = .995$). Race/Ethnicity had no statistically significant effect ($F(4, 7672) = 1.170$, $p = .322$; Wilks' $\Lambda = .999$).

Table 6

Multivariate Tests with Covariates

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept						
	Pillai's trace	.001	2.713 ^b	4.000	7672.000	.028
	Wilks' lambda	.999	2.713 ^b	4.000	7672.000	.028
	Hotelling's trace	.001	2.713 ^b	4.000	7672.000	.028
	Roy's largest root	.001	2.713 ^b	4.000	7672.000	.028
Age						
	Pillai's trace	.026	51.900 ^b	4.000	7672.000	<.001
	Wilks' lambda	.975	51.900 ^b	4.000	7672.000	<.001
	Hotelling's trace	.026	51.900 ^b	4.000	7672.000	<.001
	Roy's largest root	.026	51.900 ^b	4.000	7672.000	<.001
Sex						
	Pillai's trace	.008	14.604 ^b	4.000	7672.000	<.001

Effect		Value	F	Hypothesis df	Error df	Sig.
	Wilks' lambda	.992	14.604 ^b	4.000	7672.000	<.001
	Hotelling's trace	.008	14.604 ^b	4.000	7672.000	<.001
	Roy's largest root	.008	14.604 ^b	4.000	7672.000	<.001
Race/Ethnicity						
	Pillai's trace	.001	1.170 ^b	4.000	7672.000	.332
	Wilks' lambda	.999	1.170 ^b	4.000	7672.000	.332
	Hotelling's trace	.001	1.170 ^b	4.000	7672.000	.332
	Roy's largest root	.001	1.170 ^b	4.000	7672.000	.332
Insurance						
	Pillai's trace	.005	8.900 ^b	4.000	7672.000	<.001
	Wilks' lambda	.995	8.900 ^b	4.000	7672.000	<.001
	Hotelling's trace	.005	8.900 ^b	4.000	7672.000	<.001

Effect		Value	F	Hypothesis df	Error df	Sig.
	Roy's largest root	.005	8.900 ^b	4.000	7672.000	<.001
Depression						
	Pillai's trace	.034	22.160 ^b	12.000	23022.000	<.001
	Wilks' lambda	.966	22.406 ^b	12.000	20298.496	<.001
	Hotelling's trace	.035	22.620 ^b	12.000	23012.000	<.001
	Roy's largest root	.034	65.570 ^b	4.000	7674.000	<.001

Note. Design: Intercept + Age + Sex + Race + Insurance + Depression; ^b Exact statistic

Table 7

Tests of Between-Subjects Effect

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.
Age						
	Office visits	111498.269	1	111498.269	177.607	<.001

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.
	Outpatient visits	1586.870	1	1586.870	28.607	<.001
	Emergency room	5.867	1	5.867	7.777	.005
	Nights in the hospital	1131.975	1	1131.975	39.461	<.001
Sex						
	Office visits	17172.508	1	17172.508	27.354	<.001
	Outpatient visits	104.092	1	104.092	1.877	.171
	Emergency room	14.356	1	14.356	19.029	<.001
	Nights in the hospital	101.774	1	101.774	3.548	.060
Race						
	Office visits	287.794	1	287.794	.618	.432
	Outpatient visits	82.796	1	82.796	1.493	.222

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.
	Emergency room	1.471	1	1.471	1.949	.163
	Nights in the hospital	6.116	1	6.116	.213	.644
Insurance						
	Office visits	1508.539	1	1508.539	2.403	.644
	Outpatient visits	3.670	1	3.670	.066	.121
	Emergency room	22.104	1	22.104	29.298	.797
	Nights in the hospital	25.917	1	25.917	.903	<.001
Depression						
	Office visits	75677.209	3	25225.736	40.182	<.001
	Outpatient visits	3176.539	3	1058.846	19.088	<.001
	Emergency room	121.530	3	40.510	53.694	<.001

Source	Dependent variable	Type III sum of squares	Df	Mean square	F	Sig.
	Nights in the hospital	1032.257	3	344.086	11.995	<.001

Summary

A spearman's rank-order correlation analysis and one-way MANOVA was performed for the analysis of the data. The independent variables were patients diagnosed with heart disease with depressive symptoms and patients diagnosed with heart disease with no depressive symptoms. The dependent variable is health care utilization that was measured by self-reported office visits, outpatient visits, emergency room visits, and hospitalization days. The results of the analysis conclude both null hypotheses can be rejected. Indicating there is a significant relationship between health care utilization and heart disease patients with depressive symptoms. Also, there is a significant difference in the amount of health care utilization when comparing those diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms. The next section will discuss the implications of these findings with the literature.

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

Introduction

The purpose of this study was to identify a relationship, if any, of a disproportionate amount of health care resource utilization by patients with heart disease who have depressive symptoms. Identifying the relationship between health care utilization and heart disease patients with depressive symptoms can enable health care administrators to make informed decisions on how to reduce high resource utilization among a vulnerable population that may require more attention. Many of these patients receive unnecessary and ineffective care and often critical health care needs can go unmet, even when substantial care from multiple sources is received. This provides evidence that there is a need to look into high utilizing patients for not only quality improvement but also effective resource allocation. Treatment programs are more effective when targeting specific patient needs (Wammes et al., 2018).

The questions this study sought to answer were 1.) what is the relationship, if any, between health care utilization (office visits, outpatient visits, emergency room visits, and hospitalization days) and heart disease patients with depressive symptoms? 2.) what is the difference, if any, between the utilization of health care services, measured by office visits, outpatient visits, emergency room visits, and hospitalizations, of heart disease patients with depressive symptoms and heart disease patients without depressive symptoms? The results concluded that there is a significant relationship between health care utilization and heart disease patients with depressive symptoms. There is also a significant difference in the amount of health care utilization when comparing those diagnosed with heart disease and having reported depressive symptoms and those diagnosed with heart disease and having reported no depressive symptoms.

Interpretation of the Findings

The results concluded that there is a significant positive relationship between health care utilization and heart disease patients with depressive symptoms, and the results showed a positive correlation. This indicates that both variables are moving in the same direction, meaning higher levels of depression were associated with higher levels of health care utilization. The results also showed that there is a significant difference in the amount of health care utilization between those with heart disease and depressive symptoms and those with heart disease and no depressive symptoms. The covariates when added to the analysis show patients' age, sex, and insurance coverage also effect health care utilization, though race had no effect on utilization in this study.

These results are consistent with the previous literature. For example, Hols et al. (2020), showed results indicating that patients with heart disease and depressive symptoms had more contact with outpatient health care providers more for reassurance than cardiac events out of fear for progression of their diseases/condition. The study results also showed patients with more severe depressive symptoms were associated with increased health care utilization through use of mental health providers, specialists, and internal medicine physicans (Hols et al., 2020). The current results of this study are consistent with the findings of Hols et al. and their study.

Assesing the theoretical context of the results, there is also consistency. Andersen and Newman modeled systematic identification of factors that influence a person's decisions to use or not use available health services (Tesfaye et al., 2018). According to the Andersen-Newman model, predisposing factors (age, gender, race/ethnicity), enabling factors (insurance), and need factors (need perceived by the individual or need evaluated by the medical professional) are the most important factors impacting health services utilization (Zhang et al., 2019). These

components were assessed in this study through the independent variable (patients with heart disease and depressive symptoms and patients with heart disease and no depressive symptoms), dependent variables (office visits, outpatient visits, emergency room visits, and hospital days), and covariates (age, race/ethnicity, sex, insurance). The framework emphasizes individual determinants of utilization (Andersen & Newman, 1973). When the one-way MANOVA was adjusted to include the covariates (age, sex, race/ethnicity, and health insurance coverage), the covariates that had a statistically significant effect were age, sex, and health insurance coverage. However, Race/Ethnicity had no statistically significant effect which did not confirm the theoretical framework of the study.

Limitations of the Study

Several limitations should be considered when interpreting study findings. The study is a correlational design so there is only an inferred association and no causation. Survey data was based on patient recollection of events such as number of office visits, outpatient visits, emergency room visits, and hospitalization days; Thus, the accuracy of data was subject to self-report and recall biases. Depressive symptoms were also self-reported and not based on a diagnosis from a health care provider. Prior existing depressive symptoms were unknown prior to heart disease diagnosis.

Recommendations

Recommendations for further research would be to perform a cohort study where only heart disease patients are studied. This study utilizing secondary data from a survey that included multiple questions on various conditions had to be filtered to only a subset of its original population. Using the original population, if subjects only had heart disease, would have allowed

for even greater generalizability of the results due to the larger sample size. A primary study would also allow for more control of the initial set up of the data for analysis.

Implications for Professional Practice and Social Change

The study results align with previous research on the subject. This information provides statistical evidence that when a patient suffers from both heart disease and depression, that patient is more likely to be a high utilizer of health care services. Understanding more on this population's characteristics and health care utilization patterns will provide health care administrators insight on their health requirements and drivers of cost in order to design effective policy or program responses (Wammes et al., 2018). Developing tools to help providers screen and detect early signs or risks for depression among patients would not only aid in better treatment and care programs for patients but help keep health utilization down. Research shows that mental health screening gives a significant advantage to improving outcomes through early intervention. A pilot program developed to screen for depression in adolescents helped to identify adolescents at risk for depression and linked those with signs of depression to early mental health evaluation and treatment. The project results showed a significant increase in knowledge to both providers and families (Arrojo & Hooshmand, 2021).

Conclusion

The purpose of this study was to identify the relationship, if any, of health care resource utilization by patients with heart disease who also have depressive symptoms because identifying the relationship between health care utilization and heart disease patients with depressive symptoms will enable health care administrators to make informed decisions on how to reduce high resource utilization among a vulnerable population that may require more attention. The results of the study concluded that there is a significant relationship between health care

utilization and heart disease patients with depressive symptoms. This study provides evidence that higher levels of depression were associated with higher levels of health care utilization, indicating this gap in current literature needs to be further explored. Depression in conjunction with heart disease may be causing a strenuous burden on the health care system and further research into this matter could provide some relief if researchers and administrators can find a way to reduce or eliminate high utilization among this population.

References

- AbuRuz, M. E. (2019). Pre-operative depression predicted longer hospital length of stay among patients undergoing coronary artery bypass graft surgery. *Risk Management and Health care Policy, 12*, 75-83.
- Agency for Health care Research and Quality. (2018). *Meps hc-204 2018 full year population characteristics*. https://meps.ahrq.gov/data_stats/download_data/pufs/h204/h204doc.pdf
- Alhosani, A., Alshizawi, S., Alali, S., Saleh, H., Assaf, T., & Stouraitis, T. (2017). Automatic detection of coronary artery disease (cad) in an ecg signal. *2017 24th IEEE International Conference on Electronics, Circuits and Systems (ICECS)*.
doi:10.1109/ICECS.2017.8292036
- Allabadi, H., Probst-Hensch, N., Alkaiyat, A., Haj-Yahia, S., Schindler, C., Kwiatkowski, M., & Zemp, E. (2019). Mediators of gender effects on depression among cardiovascular disease patients in palestine. *BMC Pschiatry, 19*(1), Article 284.
- Almustafa, K. M. (2020). Prediction of heart disease and classifiers' sensitivity analysis. *BMC Bioinformatics, 21*(1), Article 278.
- American Heart Association. (2020). *Coronary artery disease - coronary heart disease*.
<https://www.heart.org/en/health-topics/consumer-health-care/what-is-cardiovascular-disease/coronary-artery-disease>

- Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the united states. *The Milbank Memorial Fund Quarterly Health and Society*, 51(1), 95-124.
- Arrojo, M., & Hooshmand, M. (2021). Health care improvement depression screening in the pediatric emergency department and linking patient to early diagnosis and early intervention. *Pediatric Nursing*, 47(4), 175-180.
- Bahall, M. (2019). Prevalance and associations of depression among patients with cardiac diseases in a public health institute in trinidad and tobago. *BMC Psychiatry*, 19(1), Article 4.
- Bailey, S., O'Malley, J., Gold, R., Heintzman, J., Marino, M., & DeVoe, J. (2015). Receipts of diabetes preventative differs by insurance status at visit. *American Journal of Preventative Medicine*, 48(2), 229-233.
- Calabro, P., Niccoli, G., Gragnano, F., Grove, E. L., Vergallo, R., Mikhailidis, D. P., Patti, G., Spaccarotella, C., Katsiki, N., Masiero, G., Ueshima, D., Pinar, E., Chieffo, A., Paolo Ussia, G., Eitel, I., Tarantini, G., & Workong Group of Interventional Cardiology of the Italian Society of Cardiology Tarantini, G. (2019). Are we ready for a gender-specific approach in interventional cardiology? *International Journal of Cardiology*, 286, 226-233. <https://doi.org/10.1016/j.ijcard.2018.11.022>
- Carrasquillo, O. (2013). Health care utilization. In M. D. Gellman, & J. R. Turner (Eds.), *Encyclopedia of Behavioral Medicine*. <https://doi.org/10.1007/978-1-4419-1005-9>

Centers for Disease Control and Prevention. (2020). *Heart Disease Facts*.

<https://www.cdc.gov/heartdisease/facts.htm>

Centers for Disease Control and Prevention. (2020). *High blood pressure*. Retrieved from

[cdc.gov: https://www.cdc.gov/bloodpressure/facts.htm](https://www.cdc.gov/bloodpressure/facts.htm)

Chang, J. P.-C., Shih-Sheng, C., Yang Hui-Ting, C. H.-T., Chien, Y.-C., Yang, B., Su, H., & Su, K.-P. (2020). Omega-3 polyunsaturated fatty acids in cardiovascular diseases comorbid major depressive disorder – results from a randomized controlled trial. *Brian, Behavior, and Immunity*, 85, 14-20.

Christensen, A. V., Dixon, J. K., Juel, K., Ekholm, O., Rasmussen, T. B., Borregaard, B., Mols, R. E., Thrysoe, L., Thorup, C. B., & Berg, S. K. (2020). Psychometric properties of the danish hospital anxiety and depression scale in patients with cardiac disease: Results from the denhart survey. *Health and Quality of Life Outcomes*, 18(1).

<https://doi.org/10.1186/s12955-019-1264-0>

Desai, R., Patel, K., Dave, H., DeWitt, N., Fong, H. K., Varma, K., Mansuri, Z., Sachdeva, R., Khanna, A., & Kumar, G. (2020). Nationwide frequency, sequential trends, and impact of co-morbid mental health disorders on hospitalizations, outcomes, and health care resource utilization in adult congenital heart disease. *The American Journal of Cardiology*, 125(8), 1256-1262. <https://doi.org/10.1016/j.amjcard.2020.01.024>

El Missiri, A. M., Awadalla, H. M., & Almoudi, M. M. (2020). Gender differences among ischemic heart disease patients enrolled in a cardiac rehabilitation program. *The Egyptian Heart Journal*, 72(1), 1-8. <https://doi.org/10.1186/s43044-020-00052-6>

Gao, Z., Chen, Z., Sun, A., & Deng, X. (2019). Gender differences in cardiovascular disease.

Medicine in Novel Technology and Devices, 4.

<https://doi.org/10.1016/j.medntd.2019.100025>

Gorini, A., Giuliani, M., Raggio, L., Barbieri, S., & Tremoli, E. (2020). Depressive and anxiety

symptoms screening in cardiac inpatients: A virtuous italian approach to

psychocardiology. *International Journal of Environmental Research and Public Health,*

17(4).

Guy-Walls, P., & Long, J. G. (2017). African americans and heart disease. *Health & Social*

Work, 42(4), 247-249.

Hamieh, N., Meneton, P., Zins, M., Goldberg, M., Wiernik, E., Empana, J.-P., . . . Lemogne, C.

(2020). Hostility, depression and incident cardiac events in the gazel cohort. *Journal of*

Affective Disorders, 266, 381-386. doi:10.1016/j.jad.2020.01.164

Healthy People. (2020, May 5). *Heart disease and stroke.*

<https://www.healthypeople.gov/2020/topics-objectives/topic/heart-disease-and-stroke>

Hofer, S. (2020). Health-related quality of life in heart disease. *Portuguese Society of*

Cardiology, 39(7), 375-376. <https://doi.org/10.1016/j.repc.2020.06.007>

Hols, J. K., Beer, K., Arolt, V., Haverkamp, W., Kuhlmann, S. L., Martus, P., . . . Strohle, A.

(2020). Association between heart-focused anxiety, depressive symptoms, health

behaviors and health care utilization in patients with coronary heart disease. *Journal of*

Psychosomatic Research, 131. <https://doi.org/10.1016/j.jpsychores.2020.109958>

- Jackson, J. L., Leslie, C. E., & Hondorp, S. N. (2018). Depressive and anxiety symptoms in adult congenital heart disease: Prevalence, health impact and treatment. *Progress in Cardiovascular Diseases, 61*(3-4), 294-299.
- Jia, R.-f., Li, L., Li, H., Cao, X.-j., Ruan, Y., Meng, S., . . . Jin, Z.-N. (2020). Meta-analysis of c-reactive protein and risk of angina pectoris. *The American Journal of Cardiology, 125*(7), 1039-1045.
- Kerr, M. (2018, October). *Major depressive disorder (clinical depression)*.
<https://www.healthline.com/health/clinical-depression>
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstien, J. F., Gfroerer, J. C., Kiripi, E., . . . Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Arch Gen Psychiatry, 60*(2), 184-189.
- Kim, H.-K., & Lee, M. (2016). Factors associated with health services utilization between the years 2010 and 2012 in Korea: Using Andersen's behavioral model. *Osong Public Health Res Perspect, 7*(1), 18-25.
- Lamar, M., Durazo-Arvizu, R. A., Sachdeva, S., Pirazada, A., Perreira, K. M., Rundek, T., . . . Daviglus, M. L. (2019). Cardiovascular disease risk factor burden and cognition: Implications of ethnic diversity within the Hispanic Community Health Study/ Study of Latinos. *PLoS One, 14*(4).
- Lee, H., Cho, J., Shin, D. W., Lee, S.-P., Hwang, S.-S., Oh, J., . . . Guallar, E. (2015). Association of cardiovascular health screening with mortality, clinical outcomes, and health care cost: A nationwide cohort study. *Preventative Medicine, 70*, 19-25.

- Leigh, J. A., Alvarez, M., & Rodriguez, C. J. (2016). Ethnic minorities and coronary heart disease: An update and future directions. *Current Atherosclerosis Reports*, 18(9).
- Liu, H., Tian, Y., Liu, Y., Nigatu, Y. T., & Wang, J. (2019). Relationship between major depressive disorder, generalized anxiety disorder and coronary artery disease in the us general population. *Journal of Psychosomatic Research*, 119, 8-13.
- Ljungberg, T., Bondza, E., & Lethin, C. (2020). Evidence of the importance of dietary habits regarding depressive symptoms and depression. *International Journal of Environmental Research and Public Health*, 17(5).
- Lowe, B., Kroenke, K., & Grafe, K. (2005). Detecting and monitoring depression with a two-item questionnaire (phq-2). *Journal of Psychosomatic Research*, 58(2), 163-171.
- Mayo Clinic. (2018). *Heart disease*. <https://www.mayoclinic.org/diseases-conditions/heart-disease/symptoms-causes/syc-20353118>
- Mayo Clinic. (2020). *Angina*. <https://www.mayoclinic.org/diseases-conditions/angina/symptoms-causes/syc-20369373>
- Meng, N., Liu, R., Wong, M., Liao, J., Feng, C., & Li, X. (2020). The association between patient-reported readiness for hospital discharge and outcomes in patients diagnosed with anxiety disorders: A prospective and observational study. *Journal of Psychiatric and Mental Health Nursing*, 27(4).
- Mourad, G., Jaarsma, T., Stromberg, A., Svensson, E., & Johansson, P. (2018). The associations between psychological distress and health care use in patients with non-cardiac chest pain: Does a history of cardiac disease matter? *BMC Psychiatry*, 18.

- National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Committee on Health Care Utilization and Adults with Disabilities. (2018). *Health-care utilization as a proxy in disability determination*. Washington DC: National Academies Press (US). <https://doi.org/10.17226/24969>
- National Institute of Mental Health. (2018). *Depression*. Retrieved from nih.gov: <https://www.nimh.nih.gov/health/topics/depression/index.shtml>
- Palaniappan, L., Garg, A., Enas, E., Lewis, H., Bari, S., Gulati, M., . . . Gany, F. (2018). South asian cardiovascular disease & cancer risk: Genetics & pathophysiology. *Journal of Community Health, 43*(6), 1100-1114.
- Rich, M. W., Chyun, D. A., Skolnick, A. H., Alexander, K. P., Forman, D. E., Kitzman, D. W., . . . Tirschwell, D. L. (2016). Knowledge gaps in cardiovascular care of the older adult population: A scientific statement from the american heart association, american college of cardiology, and american geriatrics society. *Journal of the American College of Cardiology, 67*(20), 2419-2440.
- Robinson, R. L., Grabner, M., Palli, S. R., Faries, D., & Stephenson, J. J. (2016). Covariates of depression and high utilizers of health care: Impact on resource use and costs. *Journal of Psychosomatic Research, 85*, 35-43.
- Samsson, K. S., & Larsson, M. E. (2015). Physiotherapy triage assessment of patients referred for orthopaedic consultation – long-term follow-up of health-related quality of life, pain-related disability and sick leave. *Manual Therapy, 20*(1), 38-45.

- Satyal, G. K., Rai, L., Gautam, R., Dangol, B. K., & Shakya, R. (2020). Knowledge and self-care practice on hypertension among hypertensive patients in a tertiary level hospital of kathmandu. *Journal of Institute of Medicine*, 42(2), 10-15.
- Schalet, B. D., Rothrock, N. E., Hays, R. D., Kazis, L. E., Cook, K. F., Rutsohn, J. P., & Cella, D. (2015). Linking physical and mental health summary scores from the veterans rand 12-item health survey (vr-12) to the promis global health scale. *Journal of General Internal Medicine*, 30(10), 1524-1530.
- Server, S., Doherty, P., Harrison, A. S., & Golder, S. (2019). To what extent is multi-morbidity associated with new onset depression in patients attending cardiac rehabilitation. *BMC Cardiovascular Disorders*, 19(1), 256.
- Sever, S., Golder, S., & Doherty, P. (2018). Factors associated with acute depressive symptoms in patients with comorbid depression attending cardiac rehabilitation. *BMC Cardiovascular Disorders*, 18(1), 230.
- Smith, D. A., Akira, A., Hudson, K., Hudson, A., Hudson, M., Mitchell, M., & Crook, E. (2017). The effect of health insurance coverage and the doctor-patient relationship on health care utilization in high poverty neighborhoods. *Preventive Medicine Reports*, 7, 158-161.
- Studer, S., Hull, M., Pruett, J., Koep, E., Tsang, Y., & Drake III, W. (2018). Treatment patterns, health care resource utilization, and health care costs among patients with pulmonary arterial hypertension in a real-world us database. *Pulmonary Circulation*, 9(1).

- Tesfaye, G., Chojenta, C., Smith, R., & Loxton, D. (2018). Application of the andersen-newman model of health care utilization to understand antenatal care use in kersa district, eastern ethiopia. *PLOS One*, *13*(12), 20.
- Thuy, L. T., Monkong, S., Pookboonmee, R., Leelacharas, S., & Viwatwongkasem, C. (2020). Factors explaining medication adherence of older adults with hypertension: A cross-sectional study. *Pacific Rim International Journal of Nursing Research*, *24*(3), 306-320.
- Tusa, N., Koponen, H., Kautiainen, H., Korniloff, K., Raatikainen, I., Elfving, P., . . . Mantyselka, P. (2019). The profiles of health care utilization among a non-depressed population and patients with depressive symptoms with and without clinical depression. *Scandinavian Journal of Primary Health Care*, *37*(3), 312-318.
- U.S. Department of Health & Human Services. (2019). *Medical expenditure panel survey*. https://meps.ahrq.gov/mepsweb/survey_comp/survey.jsp
- U.S. Department of Health & Human Services. (2020). *Heart health and aging*. <https://www.nia.nih.gov/health/heart-health-and-aging>
- Wammes, J. J., van der Wees, P. J., Tanke, M. A., Westert, G. P., & Jeurissen, P. P. (2018). Systematic review of high-cost patients' characteristics and health care utilisation. *BMJ Open*. <https://doi.org/10.1136/bmjopen-2018-023113>
- Woudberg, N. J., Goedecke, J. H., & Lecour, S. (2016). Protection from cardiovascular disease due to increased high-density lipoprotein cholesterol in african black populations: Myth or reality? *Ethnicity and Disease*, *26*(4), 553-560.

- Wu, Y. M., Liu, C. C., Yeh, C. C., Sung, L. C., Lin, C. S., Cherng, Y. G., . . . Liao, C. C. (2020). Hospitalization outcome of heart diseases between patients who recieved medical care by cardiologists and non-cardiologist physicians: A propensity-score matched study. *PLoS One*, *15*(7).
- Yu, H., & Sheu, J.-J. (2020). Risk/protective factors of non-adherence to prescribed anti-hypertensive medication among adult hypertension patients in the united states, brfss, 2017. *Health Educator*, *52*(1), 25-36.
- Zhang, C., Fu, C., Song, Y., Feng, R., Wu, X., & Li, Y. (2020). Utilization of public health care by people with private health insurance: a systematic review and meta-analysis. *BMC Public Health*, *20*(1), 1-12.
- Zhang, S., Chen, Q., & Zhang, B. (2019). Understanding health care utilization in china through the andersen behavioral model: Review of evidence from the china health and nutrition survey. *Risk Management and Health care Policy*, *12*, 209-224.
- Zhou, L., Ma, X., & Wang, W. (2020). Inflammation and coronary heart disease risk in patients with depression in china mainland: A cross-sectional study. *Neuropsychiatric Disease and Treatment*, *16*, 81-86.